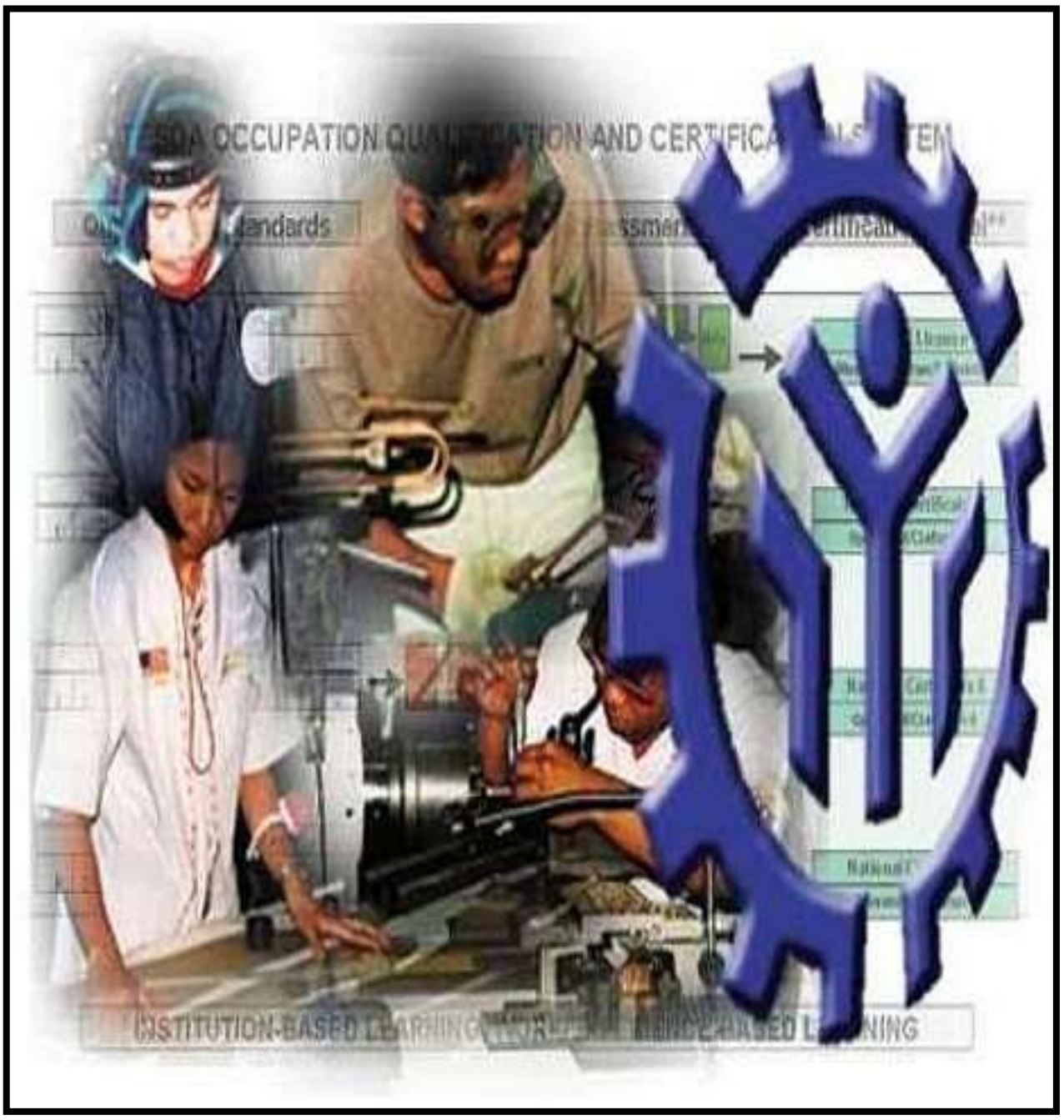
TRAINING REGULATIONS

BIOGAS PLANT INSTALLATION NC III



AGRICULTURE, FORESTRY AND FISHERY SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY

East Service Road, South Luzon Expressway (SLEX), Taguig City, Metro Manila

Technical Education and Skills Development Act of 1994

(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) serves as basis for:

1. Development of curriculum and assessment tools
2. Registration and delivery of training programs; and
3. Establishment of competency assessment and certification arrangements.

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 the 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.

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

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TRAINING REGULATIONS FOR

BIOGAS PLANT INSTALLATION NC III

SECTION 1 BIOGAS PLANT INSTALLATION NC III QUALIFICATION

The **BIOGAS PLANT INSTALLATION NC III** Qualification consists of competencies that a person must achieve to lead in the installation of biogas system. It consists of performing preparatory activities, overseeing and participating in the construction activities of biogas digester, leading in the installation of gas conveyance, conducting biogas quality assessment tasks and managing construction of secondary storage. This covered small (below 150 cubic meter), medium scale (150-499 cubic meter) up to large scale (500 cubic meters and above) production of biogas. In large scale, the individual is required to report to a site/project engineer.

This Qualification is packaged from the competency map of the Agriculture, Forestry and Fishery Sector as shown in Annex A.

The Units of Competency comprising this Qualification include the following:

UNIT CODE	BASIC COMPETENCIES
400311319	Lead workplace communication
400311320	Lead small teams
400311321	Apply critical thinking and problem solving techniques in the workplace
400311322	Work in a diverse environment
400311323	Propose methods of applying learning and innovation in the organization
400311324	Use information systematically
400311325	Evaluate occupational safety and health work practices
400311326	Evaluate environmental work practices
400311327	Facilitate entrepreneurial skills for micro-small-medium enterprises (MSMES)

UNIT CODE	COMMON COMPETENCIES
CON931201	Prepare construction materials and tools
CON311201	Observe procedures, specifications and manuals of instruction
CON311202	Interpret technical drawings and plans
CON311203	Perform mensuration and calculations
CON311204	Maintain tools and equipment

UNIT CODE	CORE COMPETENCIES
AFF312301	Lead biogas plant site preparation
AFF312302	Supervise biogas plant construction
AFF312303	Lead installation of biogas conveyance system

A person who has achieved this Qualification is competent to be:

- Biogas Project Supervisor/ Foreman
- Biogas Plant Construction Lead Man/ Foreman
- Biogas Piping Specialist

SECTION 2 COMPETENCY STANDARDS

These guidelines are set to provide the Technical Vocational Education and Training (TVET) providers with information and other important requirements to consider when designing training programs for **BIOGAS PLANT INSTALLATION NC III.**

BASIC COMPETENCIES

UNIT OF COMPETENCY: LEAD WORKPLACE COMMUNICATION

UNIT CODE : 400311319

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the effective dissemination and discussion of ideas, information, and issues in the workplace. This includes preparation of written communication materials.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Communicate information about workplace processes	1.1 Relevant communication ***method*** is selected based on workplace procedures 1.2 Multiple operations involving several topics/areas are communicated following enterprise requirements 1.3 Questioning is applied to gain extra information 1.4 Relevant sources of information are identified in accordance with workplace/ client requirements 1.5 Information is selected and organized following enterprise procedures 1.6 Verbal and written reporting is undertaken when required	1.1. Organization requirements for written and electronic communication methods 1.2. Effective verbal communication methods 1.3. Business writing 1.4. Workplace etiquette	1.1 Organizing information 1.2 Conveying intended meaning 1.3 Participating in a variety of workplace discussions 1.4 Complying with organization requirements for the use of written and electronic communication methods 1.5 Effective business writing 1.6 Effective clarifying and probing skills 1.7 Effective questioning techniques (clarifying and probing)

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	1.7 Communication and negotiation skills are applied and maintained in all relevant situations		
2. Lead workplace discussions	2.1 Response to workplace issues are sought following enterprise procedures 2.2 Response to workplace issues are provided immediately 2.3 Constructive contributions are made to ***workplace discussions*** on such issues as production, quality and safety 2.4 Goals/ objectives and action plans undertaken in the workplace are communicated promptly	2.1 Organization requirements for written and electronic communication methods 2.2 Effective verbal communication methods 2.3 Workplace etiquette	2.1 Organizing information 2.2 Conveying intended meaning 2.3 Participating in variety of workplace discussions 2.4 Complying with organization requirements for the use of written and electronic communication methods 2.5 Effective clarifying and probing skills
3. Identify and communicate issues arising in the workplace	3.1 Issues and problems are identified as they arise 3.2 Information regarding problems and issues are organized coherently to ensure clear and effective communication 3.3 Dialogue is initiated with appropriate personnel 3.4 Communication problems and issues are raised as they arise	3.1 Organization requirements for written and electronic communication methods 3.2 Effective verbal communication methods 3.3 Workplace etiquette 3.4 Communication problems and issues 3.5 Barriers in communication	3.1 Organizing information 3.2 Conveying intended meaning 3.3 Participating in a variety of workplace discussions 3.4 Complying with organization requirements for the use of written and electronic communication methods 3.5 Effective clarifying and probing skills 3.6 Identifying issues 3.7 Negotiation and

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.5 Identify barriers in communication to be addressed appropriately		communication skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Methods of communication	May include: 1.1. Non-verbal gestures 1.2. Verbal 1.3. Face-to-face 1.4. Two-way radio 1.5. Speaking to groups 1.6. Using telephone 1.7. Written 1.8. Internet
2. Workplace discussions	May include: 2.1. Coordination meetings 2.2. Toolbox discussion 2.3. Peer-to-peer discussion

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Dealt with a range of communication/information at one time 1.2 Demonstrated leadership skills in workplace communication 1.3 Made constructive contributions in workplace issues 1.4 Sought workplace issues effectively 1.5 Responded to workplace issues promptly 1.6 Presented information clearly and effectively written form 1.7 Used appropriate sources of information 1.8 Asked appropriate questions 1.9 Provided accurate information
2. Resource Implications	The following resources should be provided: 2.1 Variety of Information 2.2 Communication tools 2.3 Simulated workplace
3. Methods of Assessment	Competency in this unit may be assessed through: - Case problem 3.1. Third-party report 3.2. Portfolio 3.3. Interview 3.4. Demonstration/Role-playing
4. Context for Assessment	4.1. Competency may be assessed in the workplace or in a simulated workplace environment

UNIT OF COMPETENCY : LEAD SMALL TEAMS

UNIT CODE : 400311320

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to lead small teams including setting, maintaining and monitoring team and individual performance standards.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Provide team leadership	1.1 ***Work requirements*** are identified and presented to team members based on company policies and procedures 1.2 Reasons for instructions and requirements are communicated to team members based on company policies and procedures 1.3 ***Team members' and leaders' concerns*** are recognized, discussed and dealt with based on company practices	1.1 Facilitation of Team work 1.2 Company policies and procedures relating to work performance 1.3 Performance standards and expectations 1.4 Monitoring individual's and team's performance vis a vis client's and group's expectations	1.1 Communication skills required for leading teams 1.2 Group facilitation skills 1.3 Negotiating skills 1.4 Setting performance expectation
2. Assign responsibilities	2.1. Responsibilities are allocated having regard to the skills, knowledge and aptitude required to undertake the assigned task based on company policies. 2.2. Duties are	2.1 Work plan and procedures 2.2 Work requirements and targets 2.2 Individual and group expectations and assignments	2.1 Communication skills 2.2 Management skills 2.3 Negotiating skills 2.4 Evaluation skills 2.5 Identifying team member's

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	allocated having regard to individual preference, domestic and personal considerations, whenever possible	2.3 Ways to improve group leadership and membership	strengths and rooms for improvement
3. Set performance expectations for team members	3.1 Performance expectations are established based on client needs 3.2 Performance expectations are based on individual team members knowledge, skills and aptitude 3.3 Performance expectations are discussed and disseminated to individual team members	3.1 One's roles and responsibilities in the team 3.2 Feedback giving and receiving 3.3 Performance expectation	3.1Communication skills 3.2 Accurate empathy 3.3 Congruence 3.4 Unconditional positive regard 3.5 Handling of Feedback
4. Supervise team performance	4.1 **Performance is monitored** based on defined performance criteria and/or assignment instruction 4.2 Team members are provided with ***feedback*****,** positive support and advice on strategies to overcome any deficiencies based on company practices 4.3 ***Performance issues*** which cannot be rectified	4.1 Performance Coaching 4.2 Performance management 4.3 Performance Issues	4.1 Communication skills required for leading teams 4.2 Coaching skill

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	or addressed within the team are referred to appropriate personnel according to employer policy 4.4 Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on client/customer needs and satisfaction 4.5 Team operations are monitored to ensure that employer/client needs and requirements are met 4.6 Follow-up communication is provided on all issues affecting the team 4.7 All relevant documentation is completed in accordance with company procedures		

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work requirements	May include: 1.1. Client Profile 1.2. Assignment instructions
2. Team member's concerns	May include: 2.1 Roster/shift details
3. Monitor performance	May include: 3.1 Formal process 3.2 Informal process
4. Feedback	May include: 4.1 Formal process 4.2 Informal process
5. Performance issues	May include: 5.1 Work output 5.2 Work quality 5.3 Team participation 5.4 Compliance with workplace protocols 5.5 Safety 5.6 Customer service

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Maintained or improved individuals and/or team performance given a variety of possible scenario 1.2 Assessed and monitored team and individual performance against set criteria 1.3 Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4 Allocated duties and responsibilities, having regard to individual's knowledge, skills and aptitude and the needs of the tasks to be performed 1.5 Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members
2. Resource	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Materials relevant to the proposed activity or task
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Written Examination 3.2 Oral Questioning 3.3 Portfolio
4. Context for Assessment	4.1 Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : APPLY CRITICAL THINKING AND PROBLE – SOLVING TECHNIQUES IN THE WORKPACE

UNIT CODE : 400311321

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

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Examine specific workplace challenges	1.1 Variances are examined from normal operating **parameters;** and product quality. 1.2 Extent, cause and nature of the specific problem are defined through observation, investigation and ***analytical techniques***. 1.3 ***Problems*** are clearly stated and specified.	1.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations. 1.2 Competence to include the ability to apply and explain, enough for the identification of fundamental causes of specific workplace challenges. 1.3 Relevant equipment and operational processes. 1.4 Enterprise goals, targets and measures. 1.5 Enterprise quality OHS and environmental requirement. 1.6 Enterprise information systems and data collation	1.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 1.2 Identifying extent and causes of specific challenges in the workplace.

		1.7 Industry codes and standards.	
2. Analyze the causes of specific workplace challenges	2.1 Possible causes of specific problems are identified based on experience and the use of problem solving tools **/** analytical techniques. 2.2 Possible cause statements are developed based on findings. 2.3 Fundamental causes are identified per results of investigation conducted.	2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations. 2.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations. 2.3 Relevant equipment and operational processes. 2.4 Enterprise goals, targets and measures. 2.5 Enterprise quality OSH and environmental requirement. 2.6 Enterprise information systems and data collation. 2.7 Industry codes and standards.	2.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 2.2 Identifying extent and causes of specific challenges in the workplace. 2.3 Providing clear-cut findings on the nature of each identified workplace challenges.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Formulate resolutions to specific workplace challenges	3.1 All possible options are considered for resolution of the problem. 3.2 Strengths and weaknesses of possible options are considered. 3.3 Corrective actions are determined to resolve the problem and possible future causes. 3.4 **Action *plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures	3.1 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 3.2Relevant equipment and operational processes 3.3 Enterprise goals, targets and measures 3.4 Enterprise quality OSH and environmental requirement 3.5 Principles of decision making strategies and techniques 3.6 Enterprise information systems and data collation 3.7 Industry codes and standards	3.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 3.2 Identifying extent and causes of specific challenges in the workplace. 3.3 Providing clear-cut findings on the nature of each identified workplace challenges. 3.4 Devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Implement action plans and communicate results	4.1 Action plans are implemented and evaluated. 4.2 Results of plan implementation and recommendations are prepared. 4.2 Recommendations are presented to appropriate personnel. 4.3 Recommendations are followed-up, if required.	4.1 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 4.2. Relevant equipment and operational processes 4.3 Enterprise goals, targets and measures 4.4 Enterprise quality, OSH and environmental requirement 4.5 Principles of decision making strategies and techniques 4.6 Enterprise information systems and data collation 4.7 Industry codes and standards	4.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 4.2 Identifying extent and causes of specific challenges in the workplace. 4.3 Providing clear-cut findings on the nature of each identified workplace challenges. 4.4 Devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges.

RANGE OF VARIABLES

VARIABLES	RANGE
1. Parameters	May include: 1.1 Processes 1.2 Procedures 1.3 Systems
2. Analytical techniques	May include: 2.1. Brainstorming 2.2. Intuitions/Logic 2.3. Cause and effect diagrams 2.4. Pareto analysis 2.5. SWOT analysis 2.6. Gant chart, Pert CPM and graphs 2.7. Scattergrams
3. Problem	May include: 3.1. Routine, non – routine and complex workplace and quality problems 3.2. Equipment selection, availability and failure 3.3. Teamwork and work allocation problem 3.4. Safety and emergency situations and incidents 3.5. Risk assessment and management
4. Action plans	May include: 4.1. Priority requirements 4.2. Measurable objectives 4.3. Resource requirements 4.4. Timelines 4.5. Co-ordination and feedback requirements 4.6. Safety requirements 4.7. Risk assessment 4.8. Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Examined specific workplace challenges. 1.2. Analyzed the causes of specific workplace challenges. 1.3. Formulated resolutions to specific workplace challenges. 1.4. Implemented action plans and communicated results on specific workplace challenges.
2. Resource Implications	2.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as well as bank of questions which will be used to probe the reason behind the observable action.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Observation 3.2. Case Formulation 3.3. Life Narrative Inquiry 3.4. Standardized test The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
4. Context for Assessment	In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY : WORK IN A DIVERSE ENVIRONMENT

UNIT CODE : 400311322

UNIT DESCRIPTOR : This unit covers the outcomes required to work effectively in a workplace characterized by diversity in terms of religions, beliefs, races, ethnicities and other differences.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop an individual's cultural awareness and sensitivity	1.1 Individual differences with clients, customers and fellow workers are recognized and respected in accordance with enterprise policies and core values. 1.2 Differences are responded to in a sensitive and considerate manner 1.3 **Diversity** is accommodated using appropriate verbal and non-verbal communication.	1.1 Understanding cultural diversity in the workplace 1.2Norms of behavior for interacting and dialogue with specific groups (e. g., Muslims and other non-Christians, non-Catholics, tribes/ethnic groups, foreigners) 1.3Different methods of verbal and non-verbal communication in a multicultural setting	1.1 Applying cross-cultural communication skills (i.e. different business customs, beliefs, communication strategies) 1.2 Showing affective skills – establishing rapport and empathy, understanding, etc. 1.3 Demonstrating openness and flexibility in communication 1.4 Recognizing diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Work effectively in an environment that acknowledges and values cultural diversity	2.1 Knowledge, skills and experiences of others are recognized and documented in relation to team objectives. 2.2 Fellow workers are encouraged to utilize and share their specific qualities, skills or backgrounds with other team members and clients to enhance work outcomes. 2.3 Relations with customers and clients are maintained to show that diversity is valued by the business.	2.1 Value of diversity in the economy and society in terms of Workforce development 2.2 Importance of inclusiveness in a diverse environment 2.3 Shared vision and understanding of and commitment to team, departmental, and organizational goals and objectives 2.4 Strategies for customer service excellence	2.1 Demonstrating cross-cultural communication skills and active listening 2.2 Recognizing diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices 2.3 Demonstrating collaboration skills 2.4 Exhibiting customer service excellence

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Identify common issues in a multicultural and diverse environment	3.1 **Diversity-related conflicts** within the workplace are effectively addressed and resolved. 3.2 Discriminatory behaviors towards customers/stakeholders are minimized and addressed accordingly. 3.3 Change management policies are in place within the organization.	3.1 Value, and leverage of cultural diversity 3.2 Inclusivity and conflict resolution 3.3 Workplace harassment 3.4 Change management and ways to overcome resistance to change 3.5 Advanced strategies for customer service excellence	3.1 Addressing diversity-related conflicts in the workplace 3.2 Eliminating discriminatory behavior towards customers and co-workers 3.3 Utilizing change management policies in the workplace

RANGE OF VARIABLES

VARIABLE	RANGE
1. Diversity	This refers to diversity in both the workplace and the community and may include divergence in: 1.1 Religion 1.2 Ethnicity, race or nationality 1.3 Culture 1.4 Gender, age or personality 1.5 Educational background
2. Diversity-related conflicts	May include conflicts that result from: 2.1 Discriminatory behaviors 2.2 Differences of cultural practices 2.3 Differences of belief and value systems 2.4 Gender-based violence 2.5 Workplace bullying 2.6 Corporate jealousy 2.7 Language barriers 2.8 Individuals being differently-abled persons 2.9 Ageism (negative attitude and behavior towards old people)

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate**: 1.1 Adjusted language and behavior as required by interactions with diversity 1.2 Identified and respected individual differences in colleagues, clients and customers 1.3 Applied relevant regulations, standards and codes of practice
2. Resource Implications	**The following resources should be provided:** 2.1 Access to workplace and resources 2.2 Manuals and policies on Workplace Diversity
3. Methods of Assessment	**Competency in this unit may be assessed through**: 3.1 Demonstration or simulation with oral questioning 3.2 Group discussions and interactive activities 3.3 Case studies/problems involving workplace diversity issues 3.4 Third-party report 3.5 Written examination 3.6 Role Plays
4. Context for Assessment	Competency assessment may occur in workplace or any appropriately simulated environment

UNIT OF COMPETENCY : PROPOSE METHODS OF APPLYING LEARNING AND INNOVATION IN THE ORGANIZATION

UNIT CODE : 400311323

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to assess general obstacles in the application of learning and innovation in the organization and to propose practical methods of such in addressing organizational challenges.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Assess work procedures, processes and systems in terms of innovative practices	1.1. R***easons*** for innovation are incorporated to work procedures. 1.2. ***Models of innovation*** are researched. 1.3. G***aps or barriers*** to innovation in one's work area are analyzed. 1.4. Staff who can support and foster innovation in the work procedure are identified.	1.1 Seven habits of highly effective people. 1.2 Character strengths that foster innovation and learning (Christopher Peterson and Martin Seligman, 2004) 1.3 Five minds of the future concepts (Gardner, 2007). 1.4 Adaptation concepts in neuroscience (Merzenich, 2013). 1.5 Transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992).	1.1 Demonstrating collaboration and networking skills. 1.2 Applying basic research and evaluation skills 1.3 Generating insights on how to improve organizational procedures, processes and systems through innovation.

ELEMENTS	**PERFORMANCE CRITERIA** ***Italicized terms*** are elaborated in the Range of Variables	**REQUIRED KNOWLEDGE**	**REQUIRED SKILLS**
2. Generate practical action plans for improving work procedures, processes	2.1 Ideas for innovative work procedure to foster innovation using individual and group techniques are conceptualized 2.2 Range of ideas with other team members and colleagues are evaluated and discussed 2.3 Work procedures and processes subject to change are selected based on ***workplace requirements*** (feasible and innovative). 2.4 Practical action plans are proposed to facilitate simple changes in the work procedures, processes and systems. 2.5 ***Critical inquiry*** is applied and used to facilitate discourse on adjustments in the simple work procedures, processes and systems.	2.1 Seven habits of highly effective people. 2.2 Character strengths that foster innovation and learning (Christopher Peterson and Martin Seligman, 2004) 2.3 Five minds of the future concepts (Gardner, 2007). 2.4 Adaptation concepts in neuroscience (Merzenich, 2013). 2.5 Transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992).	2.1 Assessing readiness for change on simple work procedures, processes and systems. 2.2 Generating insights on how to improve organizational procedures, processes and systems through innovation. 2.3 Facilitating action plans on how to apply innovative procedures in the organization.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Evaluate the effectiveness of the proposed action plans	3.1 Work structure is analyzed to identify the impact of the new work procedures 3.2 Co-workers/key personnel is consulted to know who will be involved with or affected by the work procedure 3.3 Work instruction operational plan of the new work procedure is developed and evaluated. 3.4 Feedback and suggestion are recorded. 3.5 Operational plan is updated. 3.6 Results and impact on the developed work instructions are reviewed 3.7 Results of the new work procedure are evaluated 3.8 Adjustments are recommended based on results gathered	3.1 Five minds of the future concepts (Gardner, 2007). 3.2 Adaptation concepts in neuroscience (Merzenich, 2013). 3.3 Transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992).	3.1 Generating insights on how to improve organizational procedures, processes and systems through innovation. 3.2 Facilitating action plans on how to apply innovative procedures in the organization. 3.3 Communicating results of the evaluation of the proposed and implemented changes in the workplace procedures and systems. 3.4 Developing action plans for continuous improvement on the basic systems, processes and procedures in the organization.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Reasons	May include: 1.1 Strengths and weaknesses of the current systems, processes and procedures. 1.2 Opportunities and threats of the current systems, processes and procedures.
2. Models of innovation	May include: 2.1 Seven habits of highly effective people. 2.2 Five minds of the future concepts (Gardner, 2007). 2.3 Neuroplasticity and adaptation strategies.
3. Gaps or barriers	May include: 3.1 Machine 3.2 Manpower 3.3 Methods 3.4 Money
4. Critical Inquiry	May include: 4.1 Preparation. 4.2 Discussion. 4.3 Clarification of goals. 4.4 Negotiate towards a Win-Win outcome. 4.5 Agreement. 4.6 Implementation of a course of action. 4.7 Effective verbal communication. See our pages: Verbal Communication and Effective Speaking. 4.8 Listening. 4.9 Reducing misunderstandings is a key part of effective negotiation. 4.10 Rapport Building. 4.11 Problem Solving. 4.12 Decision Making. 4.13 Assertiveness. 4.14 Dealing with Difficult Situations.

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Established the reasons why innovative systems are required 1.2 Established the goals of a new innovative system 1.3 Analyzed current organizational systems to identify gaps and barriers to innovation. 1.4 Assessed work procedures, processes and systems in terms of innovative practices. 1.5 Generate practical action plans for improving work procedures, and processes. 1.6 Reviewed the trial innovative work system and adjusted reflect evaluation feedback, knowledge management systems and future planning. 1.7 Evaluated the effectiveness of the proposed action plans.
2. Resource Implications	The following resources should be provided: 2.1 Pens, papers and writing implements. 2.2 Cartolina. 2.3 Manila papers.
3.Methods of Assessment	Competency in this unit may be assessed through: 3.1 Psychological and behavioral Interviews. 3.2 Performance Evaluation. 3.3 Life Narrative Inquiry. 3.4 Review of portfolios of evidence and third-party workplace reports of on-the-job performance. 3.5 Sensitivity analysis. 3.6 Organizational analysis. 3.7 Standardized assessment of character strengths and virtues applied.
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 : **USE INFORMATION SYSTEMATICALLY**

UNIT CODE : **400311324**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to use technical information systems, apply information technology (IT) systems and edit, format & check information.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Use technical information	1.1. ***Information*** are collated and organized into a suitable form for reference and use 1.2. Stored information are classified so that it can be quickly identified and retrieved when needed 1.3. Guidance are advised and offered to people who need to find and use information	1.1. Application in collating information 1.2. Procedures for inputting, maintaining and archiving information 1.3. Guidance to people who need to find and use information 1.4. Organize information 1.5. classify stored information for identification and retrieval 1.6. Operate the technical information system by using agreed procedures	1.1. Collating information 1.2. Operating appropriate and valid procedures for inputting, maintaining and archiving information 1.3. Advising and offering guidance to people who need to find and use information 1.4. Organizing information into a suitable form for reference and use 1.5. Classifying stored information for identification and retrieval 1.6. Operating the technical information system by using agreed procedures

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Apply information technology (IT)	2.1. ***Technical information*** system is operated using agreed procedures 2.2. Appropriate and valid procedures are operated for inputting, maintaining and archiving information 2.3. ***Software*** required are utilized to execute the project activities 2.4. Information and data obtained are handled, edited, formatted and checked from a range of internal and external ***sources*** 2.5. Information are extracted, entered, and processed to produce the outputs required by ***customers*** 2.6. Own skills and understanding are shared to help others 2.7. Specified ***security measures*** are implemented to protect the confidentiality and integrity of project data held in IT systems	2.1. Attributes and limitations of available software tools 2.2. Procedures and work instructions for the use of IT 2.3. Operational requirements for IT systems 2.4. Sources and flow paths of data 2.5. Security systems and measures that can be used 2.6. Extract data and format reports 2.7. Methods of entering and processing information 2.8. WWW enabled applications	2.1. Identifying attributes and limitations of available software tools 2.2. Using procedures and work instructions for the use of IT 2.3. Describing operational requirements for IT systems 2.4. Identifying sources and flow paths of data 2.5. Determining security systems and measures that can be used 2.6. Extracting data and format reports 2.7. Describing methods of entering and processing information 2.8. Using WWW applications

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Edit, format and check information	3.1 Basic editing techniques are used 3.2 Accuracy of documents are checked 3.3 Editing and formatting tools and techniques are used for more complex documents 3.4 Proof reading techniques is used to check that documents look professional	3.1 Basic file-handling techniques 3.2 Techniques in checking documents 3.3 Techniques in editing and formatting 3.4 Proof reading techniques	3.1 Using basic file-handling techniques is used for the software 3.2 Using different techniques in checking documents 3.3 Applying editing and formatting techniques 3.4 Applying proof reading techniques

RANGE OF VARIABLES

VARIABLE	RANGE
1. Information	May include: 1.1. Property 1.2. Organizational 1.3. Technical reference
2. Technical information	May include: 2.1. paper based 2.2. electronic
3. Software	May include: 3.1. spreadsheets 3.2. databases 3.3. word processing 3.4. presentation
4. Sources	May include: 4.1. other IT systems 4.2. manually created 4.3. within own organization 4.4. outside own organization 4.5. geographically remote
5. Customers	May include: 5.1. colleagues 5.2. company and project management 5.3. clients
6. Security measures	May include: 6.1. access rights to input; 6.2. passwords; 6.3. access rights to outputs; 6.4. data consistency and back-up; 6.5. recovery plans

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Used technical information systems and information technology 1.2. Applied information technology (IT) systems 1.3. Edited, formatted and checked information
2. Resource Implications	**The following resources should be provided:** 2.1. Computers 2.2. Software and IT system
3. Methods of Assessment	**Competency in this unit should be assessed through:** 3.1. Direct Observation 3.2. Oral interview and written test
4. Context for Assessment	4.1. Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY : **EVALUATE OCCUPATIONAL SAFETY AND HEALTH WORK PRACTICES**

UNIT CODE : **400311325**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to interpret—Occupational Safety and Health practices, set OSH work targets, and evaluate effectiveness of Occupational Safety and Health work instructions

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 Work Practices Issues	May include: 1.1 Workers' experience/observance on presence of work hazards 1.2 Unsafe/unhealthy administrative arrangements (prolonged work hours, no break-time, constant overtime, scheduling of tasks) 1.3 Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/ guidelines
2. OSH Indicators	May include: 2.1 Increased of incidents of accidents, injuries 2.2 Increased occurrence of sickness or health complaints/symptoms 2.3 Common complaints of workers' related to OSH 2.4 High absenteeism for work-related reasons
3. OSH Work Instructions	May include: 3.1 Preventive and control measures**,** and targets 3.2 Eliminate the hazard (i.e., get rid of the dangerous machine 3.3 Isolate the hazard (i.e. keep the machine in a closed room and operate it remotely; barricade an unsafe area off) 3.4 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one) 3.5 Use administrative controls to reduce the risk (i.e. give trainings on how to use equipment safely; OSH-related topics, issue warning signages, rotation/shifting work schedule) 3.6 Use engineering controls to reduce the risk (i.e. use safety guards to machine) 3.7 Use personal protective equipment 3.8 Safety, Health and Work Environment Evaluation 3.9 Periodic and/or special medical examinations of workers
4. OSH metrics	May include: 4.1 Statistics on incidence of accidence and injuries 4.2 Morbidity (Type and Number of Sickness) 4.3 Mortality (Cause and Number of Deaths) 4.4 Accident Rate

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Identify OSH work practices issues relevant to work requirements 1.2. Identify gaps in work practices related to relevant OSH work standards 1.3. Agree upon OSH Indicators based on gathered information to measure effectiveness of workplace OSH policies and procedures 1.4. Receive OSH work instructions in accordance with workplace policies and procedures 1.5. Compare Observed OSH practices with against approved OSH work instructions 1.6. Assess findings regarding effectiveness based on OSH work standards
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 3.3 Written exam
4. Context for Assessment	4.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY : EVALUATE ENVIRONMENTAL WORK PRACTICES

UNIT CODE : 400311326

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude to interpret environmental Issues, establish targets to evaluate environmental practices and evaluate effectiveness of environmental practices

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Interpret environmental practices, policies and procedures	1.1 ***Environmental work practices*** issues are identified relevant to work requirements 1.2 Environmental Standards and Procedures nature of work are determined based on Applicability to nature of work 1.3 Gaps in work practices related to Environmental Standards and Procedures are identified	1.1 Environmental Issues- 1.2 Environmental Work Procedures 1.3 Environmental Laws 1.4 Environmental Hazardous and Non-Hazardous Materials 1.5 Environmental required license, registration or certification	1.1. Analyzing Environmental Issues and Concerns 1.2. Critical thinking 1.3. Problem Solving 1.4. Observation Skills
2. Establish targets to evaluate environmental practices	2.1. Relevant information are gathered necessary to determine environmental work targets 2.2. ***Environmental Indicators*** based on gathered information are set to measure environmental work targets 2.3. Indicators are verified with appropriate personnel	2.1. Environmental indicators 2.2. Relevant Environment Personnel or expert 2.3. Relevant Environmental Trainings and Seminars	2.1. Investigative Skills 2.2. Critical thinking 2.3. Problem Solving 2.4. Observation Skills

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Evaluate effectiveness of environmental practices	3.1. Work environmental practices are recorded based on workplace standards 3.2. Recorded work environmental practices are compared against planned indicators 3.3. Findings regarding effectiveness are assessed and gaps identified are implemented based on environment work standards and procedures 3.4. Results of environmental assessment are conveyed to appropriate personnel	3.1 Environmental Practices 3.2 Environmental Standards and Procedures	3.1 Documentation and Record Keeping Skills 3.2 Critical thinking 3.3 Problem Solving 3.4 Observation Skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Environmental Practices Issues	May include: 1.1 Water Quality 1.2 National and Local Government Issues 1.3 Safety 1.4 Endangered Species 1.5 Noise 1.6 Air Quality 1.7 Historic 1.8 Waste 1.9 Cultural
2. Environmental Indicators	May include: 2.1 Noise level 2.2 Lighting (Lumens) 2.3 Air Quality - Toxicity 2.4 Thermal Comfort 2.5 Vibration 2.6 Radiation 2.7 Quantity of the Resources 2.8 Volume

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Identified environmental issues relevant to work requirements 1.2. Identified gaps in work practices related to Environmental Standards and Procedures 1.3. Gathered relevant information necessary to determine environmental work targets 1.4. Set environmental indicators based on gathered information to measure environmental work targets 1.5. Recorded work environmental practices are recorded based on workplace standards 1.6. Conveyed results of environmental assessment to appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace/Assessment location 2.2 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.3 Case studies/scenarios relating to environmental protection
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Written/ Oral Examination 3.2 Interview/Third Party Reports 3.3 Portfolio (citations/awards from GOs and NGOs, certificate of training – local and abroad) 3.4 Simulations and role-plays
4. Context for Assessment	4.1 Competency may be assessed in actual workplace or at the designated TESDA center.

UNIT OF COMPETENCY : **FACILITATE ENTREPRENEURIAL SKILLS FOR MICRO-SMALL-MEDIUM ENTERPRISES (MSMEs)**

UNIT CODE : **400311327**

UNIT DESCRIPTOR : This unit covers the outcomes required to build, operate and grow a micro/small-scale enterprise.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop and maintain micro-small-medium enterprise (MSMEs) skills in the organization	1.1 Appropriate ***business strategies*** are determined and set for the enterprise based on current and emerging business environment. 1.2 ***Business operations*** are monitored and controlled following established procedures. 1.3 Quality assurance measures are implemented consistently. 1.4 Good relations are maintained with staff/workers. 1.5 Policies and procedures on occupational safety and health and environmental concerns are constantly observed.	1.1 Business models and strategies 1.2 Types and categories of businesses 1.3 Business operation 1.4 Basic Bookkeeping 1.5 Business internal controls 1.6 Basic quality control and assurance concepts 1.7 Government and regulatory processes	1.1 Basic bookkeeping/ accounting skills 1.2 Communication skills 1.3 Building relations with customer and employees 1.4 Building competitive advantage of the enterprise
2. Establish and maintain client-base/ market	2.1 Good customer relations are maintained 2.2 New customers and markets are identified, explored	2.1 Public relations concepts 2.2 Basic product promotion strategies 2.3 Basic market and	2.1 Building customer relations 2.2 Individual marketing skills 2.3 Using basic advertising (posters/

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	and reached out to. 2.3 Promotions/Incentives are offered to loyal customers 2.4 Additional products and services are evaluated and tried where feasible. 2.5 ***Promotional/advertising initiatives*** are carried out where necessary and feasible.	feasibility studies 2.4 Basic business ethics	tarpaulins, flyers, social media, etc.)
3. Apply budgeting and financial management skills	3.1 Enterprise is built up and sustained through judicious control of cash flows. 3.2 Profitability of enterprise is ensured though appropriate ***internal controls***. 3.3 Unnecessary or lower-priority expenses and purchases are avoided.	3.1 Cash flow management 3.1 Basic financial management 3.2 Basic financial accounting 3.3 Business internal controls	3.1 Setting business priorities and strategies 3.2 Interpreting basic financial statements 3.3 Preparing business plans

RANGE OF VARIABLES

VARIABLE	RANGE
1. Business strategies	May include: 1.1. Developing/Maintaining niche market 1.2. Use of organic/healthy ingredients 1.3. Environment-friendly and sustainable practices 1.4. Offering both affordable and high-quality products and services 1.5. Promotion and marketing strategies (e. g., on-line marketing)
2. Business operations	May include: 2.1 Purchasing 2.2 Accounting/Administrative work 2.3 Production/Operations/Sales
3. Internal controls	May include: 3.1 Accounting systems 3.2 Financial statements/reports 3.3 Cash management
4. Promotional/ Advertising initiatives	May include: 4.1 Use of tarpaulins, brochures, and/or flyers 4.2 Sales, discounts and easy payment terms 4.3 Use of social media/Internet 4.4 “Service with a smile” 4.5 Extra attention to regular customers

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires evidence that the candidate :** 1.1 Demonstrated basic entrepreneurial skills 1.2 Demonstrated ability to conceptualize and plan a micro/small enterprise 1.3 Demonstrated ability to manage/operate a micro/small-scale business
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
3. Methods of Assessment	**Competency in this unit may be assessed through :** 3.1 Written examination 3.2 Demonstration/observation with oral questioning 3.3 Portfolio assessment with interview 3.4 Case problems
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: PREPARE CONSTRUCTION MATERIALS AND TOOLS

UNIT CODE : CON931201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on identifying, requesting and receiving construction (plumbing) materials and tools in various workplace settings.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify materials	1.1 ***Materials*** are identified as per job requirements 1.2 Quantity and ***description of materials*** conform with the job requirements 1.3 Tools and accessories are identified according to job requirements	1.1 Different work specifications 1.2 Types and uses of plumbing materials and accessories 1.3 Types and uses of plumbing tools	1.1 Identifying tools according to the job requirements 1.2 Identifying materials and accessories according to the job requirements
2 Prepare requisition of materials	2.1 Materials and tools needed are requested according to the identified requirements 2.2 Request is done as per company standard operating procedures (SOP) 2.3 Substitute materials and tools are provided without sacrificing cost and quality of work	2.1 Work requirements 2.2 Types and uses of plumbing materials and tools 2.3 Material take-off 2.4 Requisition procedures	2.1 Preparing material take-off 2.2 Requesting materials and tools

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3 Receive and inspect materials	3.1 Materials and tools issued are inspected as per quantity and specification 3.2 Tools, accessories and materials are checked 3.3 Materials and tools are set aside to appropriate location	3.1 Policy on receiving material deliveries 3.2 Material and tools quality and defects 3.3 Material handling	3.1 Checking and inspecting materials and tools 3.2 Storing/ stacking of tool and materials

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials and Tools	May include: 1.1 Electrical supplies 1.2 Structural 1.3 Plumbing 1.4 Welding/pipefitting 1.5 Carpentry 1.6 Masonry
2. Description of Materials and Tools	May include: 2.1 Brand name 2.2 Size 2.3 Capacity 2.4 Kind of application
3. Company standard procedures	May include: 3.1 Job order 3.2 Requisition slip 3.3 Borrower slip

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires evidence that the candidate:** 1.1 Listed materials and tools according to quantity and job requirements 1.2 Requested materials and tools according to the list prepared and as per company SOP 1.3 Inspected issued materials and tools as per quantity and job specifications 1.4 Tools provided with appropriate safety devices
2. Resource implications	The following resources should be provided: 2.1 Workplace location 2.2 Materials relevant to the unit of competency 2.3 Technical plans, drawings and specifications relevant to the activities
3. Methods of assessment	**Competency in this unit must be assessed through:** 4.1 Direct observation and oral questioning
4. Context of assessment	4.1 Competency may be assessed in the workplace or in a simulated workplace 4.2 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY: OBSERVE PROCEDURES, SPECIFICATIONS AND MANUALS OF INSTRUCTIONS

UNIT CODE : CON311201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on identifying, interpreting, applying services to specifications and manuals and storing manuals.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify and access specification/manuals	1.1 Appropriate manuals are identified and accessed as per job requirements 1.2 Version and date of manual are checked to ensure that correct specification and procedures are identified	1.1 Types of manuals used in plumbing 1.2 Identification of symbols used in the manuals	1.1 Identifying manuals and specifications 1.2 Accessing information and data
2. Interpret manuals	2.1 Relevant sections, chapters of specifications/ manuals are located in relation to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance with industry practices	2.1 Types of manuals used in plumbing 2.2 Types of symbols used in manuals 2.3 System of measurements 2.4 Unit conversion	2.1 Interpreting symbols and specifications 2.2 Accessing information and data 2.3 Applying conversion of units of measurements

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Apply information in manual	3.1 ***Manual*** is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer's specification 3.3 Manual data are applied according to the given task 3.4 All correct sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications	3.1 Types of manuals used in plumbing 3.2 Types and application of symbols in manuals 3.3 Unit conversion	3.1 Applying information from manuals
4. Store manuals	4.1 Manual or specification is stored appropriately to prevent damage, ready access and updating of information when required in accordance with company requirements	4.1 Types of manuals used in plumbing 4.2 Manual storing and maintaining procedures	4.1 Storing and maintaining manuals

RANGE OF VARIABLES

VARIABLE	RANGE
1. Procedures, Specifications and Manuals of Instructions	May include: 1.1 Manufacturer's Specification Manual 1.2 Repair Manual 1.3 Maintenance Procedure Manual 1.4 Periodic Maintenance Manual

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires that the candidate:** 1.1 Identified and accessed specification/manuals as per job requirements 1.2 Interpreted manuals in accordance with industry practices 1.3 Applied information in manuals according to the given task 1.4 Stored manuals in accordance with company requirements
2. Resource implications	**The following resources should be provided:** 2.1 All manuals/catalogues relative to construction sector
3. Methods of assessment	**Competency should be assessed through:** 3.1 Direct observation 3.2 Questions/interview Assessment of underpinning knowledge and practical skills may be combined
4. Context of assessment	4.1 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 4.2 Assessment may be conducted in the workplace or a simulated environment

UNIT OF COMPETENCY: INTERPRET TECHNICAL DRAWINGS AND PLANS

UNIT CODE : CON311202

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in analyzing and interpreting symbols, data and work plan based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Analyze signs, symbols and data	1.1 ***Technical plans*** are obtained according to job requirements 1.2 ***Signs***, symbols and data are identified according to job specifications 1.3 Signs symbols and data are determined according to ***classification*** or as appropriate in ***drawing***	1.1 Blueprint Reading and Plan Specification 1.1.1 Plumbing symbols and abbreviations 1.2 Trade Theory 1.2.1 Types of plumbing plans 1.2.2 Notes and specifications	1.1 Interpreting technical plumbing plans
2 Interpret technical drawings and plans	2.1 Necessary ***tools, materials*** and equipment are identified according to the ***plan*** 2.2 Supplies and materials are listed according to specifications 2.3 Components, assemblies or objects are recognized as required 2.4 Dimensions are identified as appropriate to the plan	2.1 Systems of measurement 2.1.1 Linear measurement 2.1.2 Dimension 2.1.3 Unit-conversion 2.2 Types of plumbing plans 2.3 Plumbing symbols and abbreviations 2.4 Notes and specifications	2.1 Interpreting technical plumbing plans 2.2 Matching specification details with existing resources

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.5 Specification details are matched with existing/available resources and in line with job requirements 2.6 Work plan is drawn following the specifications		
3 Apply freehand sketching	3.1 Where applicable, correct freehand sketching is produced in accordance with the job requirements	3.1 Freehand sketching techniques 3.2 Pictorial drawing	3.1 Sketching skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technical Plans	May include: 1.1 Electrical plans 1.2 Structural plans 1.3 Architectural plans 1.4 Plumbing plans 1.5 Mechanical plans 1.6 Welding Procedures Specifications (WPS)
2. Work plan	May include: 2.1 Job requirements 2.2 Installation instructions 2.3 Components instruction
3. Classification	May include: 3.1 Electrical 3.2 Mechanical 3.3 Plumbing
4. Drawing	May include: 4.1 Drawing symbols 4.2 Alphabet of lines 4.3 Orthographic views 4.4 Front view 4.5 Right side view/left side view 4.6 Top view 4.7 Pictorial 4.8 Schematic diagram 4.9 Electrical drawings 4.10 Structural drawings 4.11 Plumbing drawings 4.12 Water 4.13 Sewerage/Drainage 4.14 Ventilation 4.15 Welding symbols
5. Tools and materials	May include: 5.1 Compass 5.2 Divider 5.3 Rulers 5.4 Triangles 5.5 Drawing tables 5.6 Computer

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires that the candidate:** 1.1 Identified and determined signs, symbols and data according to work plan, job requirements and classifications 1.2 Identified tools and equipment in accordance with job requirements 1.3 Listed supplies and materials according to blueprint specifications 1.4 Drawn work plan following specifications 1.5 Demonstrated ability to determine job specifications based on working / technical drawing
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace 2.2 Drawings and specification relevant to task 2.3 Materials and instrument relevant to proposed activity
3. Methods of Assessment	**Competency should be assessed through:** 3.1 Direct Observation 3.2 Questions/Interview 3.3 Written test related to underpinning knowledge
4. Context of Assessment	4.1 Competency assessment may occur in the workplace or in any appropriate simulated environment 4.2 Assessment shall be observed while task is being undertaken whether individually or in group 4.3 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY: PERFORM MENSURATIONS AND CALCULATIONS

UNIT CODE : CON311203

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on identifying and measuring objects based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** *terms* are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select measuring instruments	1.1 Object or component to be measured is identified, classified and interpreted according to the appropriate regular ***geometric shape*** 1.2 Measuring tools are selected/identified as per object to be measured or job requirements 1.3 Correct specifications are obtained from relevant sources 1.4 Appropriate ***measuring instruments*** are selected according to job requirements 1.5 Alternative measuring tools are used without sacrificing cost and quality of work	1.1 Types of measuring tools and its uses	1.1 Selecting measuring instruments

ELEMENT	PERFORMANCE CRITERIA ***Italicized** terms* are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Carry out measurements and calculations	2.1 Accurate ***measurements*** are obtained according to job requirements 2.2 Alternative measuring tools are used without sacrificing cost and quality of work 2.3 Calculation needed to complete work tasks are performed using the four basic process of addition (+), subtraction (-), multiplication (x) and division (/) 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks 2.5 Numerical computation is self-checked and corrected for accuracy 2.6 Instruments are read to the limit of accuracy of the tool 2.7 Systems of measurement identified and converted according to job requirements/ISO 2.8 Workpieces are measured according to job requirements	2.1 Measurements • Linear measurement • Geometrical measurement 2.2 Trade Mathematics • Unit conversion • Ratio and proportion • Area	2.1 Interpreting formulas for volume, areas, perimeters of plane and geometric figures 2.2 Handling of measuring instruments

RANGE OF VARIABLES

VARIABLE	RANGE
1. Geometric shape	May include: 1.1 Round 1.2 Square 1.3 Rectangular 1.4 Triangle 1.5 Sphere 1.6 Conical
2. Measuring instruments	May include: 2.1 Micrometer (In-out, depth) 2.2 Vernier caliper (out, inside) 2.3 Dial gauge with mag, std. 2.4 Straight edge 2.5 Thickness gauge 2.6 Torque gauge 2.7 Small hole gauge 2.8 Telescopic gauge 2.9 Try-square 2.10 Protractor 2.11 Combination gauge 2.12 Steel rule 2.13 Voltmeter 2.14 Ammeter 2.15 Mega ohmeter 2.16 Kilowatt hour meter 2.17 Gauges 2.18 Thermometers
3. Measurements and calculations	May include: 3.1 Linear 3.2 Volume 3.3 Area 3.4 Wattage 3.5 Voltage 3.6 Resistance 3.7 Amperage 3.8 Frequency 3.9 Impedance 3.10 Conductance 3.11 Capacitance 3.12 Displacement 3.13 Inside diameter 3.14 Circumference 3.15 Length 3.16 Thickness 3.17 Outside diameter 3.18 Taper 3.19 Out of roundness 3.20 Oil clearance 3.21 End play/Thrust clearance

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires that the candidate:** 1.1 Selected and prepared appropriate measuring instruments in accordance with job requirements 1.2 Performed measurements and calculations according to job requirements/ ISO
2. Resource implications	**The following resources should be provided:** 2.1 Workplace location 2.2 Problems to solve 2.3 Measuring instrument appropriate to carry out tasks 2.4 Instructional materials relevant to the propose activity Assessment of underpinning knowledge and practical skills may be combined
3. Methods of assessment	**Competency should be assessed through:** 3.1 Actual demonstration 3.2 Direct observation 3.3 Written test/questioning related to underpinning knowledge
4. Context of assessment	4.1 Competency assessment may occur in workplace or any appropriate simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in group 4.3 Competency assessment must be undertaken in accordance with the TESDA assessment guidelines

UNIT OF COMPETENCY: MAINTAIN TOOLS AND EQUIPMENT

UNIT CODE : CON311204

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on checking condition, performing preventive maintenance and storing of plumbing tools and equipment.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check condition of tools and equipment	1.1 ***Materials, tools and equipmen***t are identified according to classification and job requirements 1.2 Non-functional tools and equipment are segregated and labeled according to classification 1.3 Safety of tools and equipment are observed in accordance with manufacturer's instructions 1.4 Condition of ***PPE*** are checked in accordance with manufacturer's instructions	1.1 Safety Practices 1.1.1 Use of PPE 1.1.2 Handling of tools and equipment 1.1.3 Good housekeeping 1.2 Materials, Tools and Equipment 1.2.1 Types and uses of lubricants 1.2.2 Types and uses of cleaning materials 1.2.3 Types and uses of plumbing tools 1.2.4 Types and uses of plumbing equipment 1.3 Operational conditions of plumbing tools and equipment 1.4 Plumbing tools and equipment defects	1.1 Maintaining tools and equipment 1.2 Handling of tools and equipment 1.3 Identifying tools and equipment defects

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Perform basic preventive maintenance	2.1 Appropriate lubricants are identified according to types of equipment 2.2 Tools and equipment are lubricated according to preventive maintenance schedule or manufacturer's specifications 2.3 Measuring instruments are checked and calibrated in accordance with manufacturer's instructions 2.4 Tools are cleaned and lubricated according to standard procedures 2.5 Defective instruments, equipment and accessories are inspected and replaced according to manufacturer's specifications 2.6 Tools are inspected, repaired and replaced after use 2.7 Work place is cleaned and kept in safe state in line with Occupational Safety and Health Standards (OSHS)	2.1 Safety Practices 2.1.1 Use of PPE 2.1.2 Handling of tools and equipment 2.1.3 Good housekeeping 2.2 Materials, Tools and Equipment 2.2.1 Types and uses of lubricants 2.2.2 Types and uses of cleaning materials 2.3 Preventive Maintenance 2.3.1 Methods and techniques 2.3.2 Procedures	2.1 Handling of tools and equipment 2.2 Performing preventive maintenance

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Store tools and equipment	3.1 Inventory of tools, instruments and equipment are conducted and recorded as per company practices 3.2 Tools and equipment are stored safely in appropriate locations in accordance with manufacturer's specifications or company procedures	3.1 Safety Practices 3.1.1 Use of PPE 3.1.2 Handling of tools and equipment 3.1.3 Storing procedures and techniques 3.1.4 Storage conditions/ locations	3.1 Storing tools and equipment 3.2 Handling of tools and equipment

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials	May include: 1.1 Lubricants 1.2 Cleaning materials 1.3 Rust remover 1.4 Rugs 1.5 Spare parts
2. Tools and equipment	May include: 2.1 Tools Cutting tools - hacksaw, crosscut saw, rip saw Boring tools - auger, brace, grinlet, hand drill Holding tools - vise grip, C-clamp, bench vise Threading tools - die and stock, taps 2.2 Measuring instruments/equipment
3. PPE	May include: 3.1 Goggles 3.2 Gloves 3.3 Safety shoes 3.4 Aprons/Coveralls
4. Forms	May include: 4.1 Maintenance schedule forms 4.2 Requisition slip 4.3 Inventory Form 4.4 Inspection Form 4.5 Procedures

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires that the candidate:** 1.1 Selected and used appropriate processes, tools and equipment to carry out task 1.2 Identified functional and non-functional tools and equipment 1.3 Checked, lubricated and calibrated tools, equipment and instrument according to manufacturer's specifications 1.4 Replaced defective tools, equipment and their accessories 1.5 Observed and applied safe handling of tools and equipment and safety work practices 1.6 Prepared and submitted inventory report, where applicable 1.7 Maintained workplace in accordance with OSHS 1.8 Stored tools and equipment safely in appropriate locations and in accordance with company practices
2. Resource implications	**The following resources should be provided:** 2.1 Workplace 2.2 Maintenance schedule 2.3 Maintenance materials, tools and equipment relevant to the proposed activity/task
3. Methods of assessment	**Competency should be assessed through:** 3.1 Direct observation 3.2 Written test/questioning relevant to Underpinning knowledge
4. Context of assessment	4.1 Competency assessment may occur in workplace or any appropriate simulated environment 4.2 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

CORE COMPETENCIES

UNIT OF COMPETENCY : LEAD BIOGAS PLANT SITE PREPARATION

UNIT CODE : AFF312301

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the preparation and acquisition of tools, materials and equipment, source out labor and machineries, perform ocular survey, set-up boundaries and elevation, comply with legal requirements on clearing activities, oversee removal of obstructions, and monitor clearing activities. This may be performed with one or more assistants working with the lead technical personnel.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
1. Perform preparatory activities	1.1 Approved project plan and ***required permits*** are secured and confirmed with agricultural engineer. 1.2 Program of activities is prepared based on approved project plan 1.3 1.3 Preparation and acquisition of tools, materials and equipment is led following program of activities 1.4 1.4 Manpower and equipment requirement are sourced out following program of activities 1.5 1.5 Safety practices are applied following OSHS Rule 1080 and Rule 1150 1.6 1.6 Required output is completed as specified by the immediate supervisor based on work schedule	1.1 Approved Project Plans 1.2 Preparation and acquisition of tools materials and equipment 1.3 Schedule of works - PERT CPM - Gantt Chart 1.4 Sourcing of labor and machineries 1.5 Communication skills 1.6 OSHS 1.6.1 Rule 1410 and DO 13: Construction Safety ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety	1.1 Securing and confirming project plans 1.2 Leading preparation and acquisition of tools, materials and equipment 1.3 Sourcing out manpower and equipment 1.4 Applied safety practices 1.5 Using PERT CPM/Gantt Chart 1.6 Interpreting project plans 1.7 Practicing occupational health, safety and hazards elimination 1.8 Completed required output

		Shoes 1.6.2 Rule 1150: Materials Handling and Storage ▪ Use of Mechanical Equipment ▪ Secure Storage ▪ Clearance Limit 1.7 Environmental Laws: 1.8 PD 1586 – Environmental Impact Assessment System 1.9 RA 8749 - Clean Air Act of 1999 1.10 RA 9275 – Clean Water Act of 2004 1.11 RA 6969-Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 1.12 RA 9003-Ecological Solid Waste Management Act of 2000 1.13 Factors affecting productivity 1.14 Productivity work measurement 1.15 Ways of improving productivity 1.16 Attitude: • Focus to details • Polite • Diligent • Time conscious • Resourceful	
2. Confirm site location	2.1 Ocular survey is performed based on approved ***project plan specifications*** 2.2 Inspection checklist is accomplished based on project plan specification. 2.3 Problems encountered	2.1 Ocular survey 2.2 Inspection checklist 2.3 Project plan specification 2.4 OSHS 2.4.1 Rule 1410 and DO 13: Construction Safety	2.1 Performing ocular survey 2.2 Accomplishing inspection checklist 2.3 Consulting problems 2.4 Setting up boundaries and

	are consulted with the appropriate person 2.4 Setting up boundaries and elevation on selected site are conducted based on industry practices 2.5 Safety practices are applied following OSHS Rule 1410 and DO 13 – Construction Safety, Rule 1080 2.6 Required output is completed as specified by the immediate supervisor based on work schedule	▪ 1412- General Provision ▪ 1413- Excavation 2.4.2 Rule 1080 – Personal Protective Equipment and Devices ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes 2.5 Problems encountered 2.6 Consultation with immediate head 2.7 Communication skills 2.8 Setting up boundaries and elevation 2.9 Site selection 2.10 Factors affecting productivity 2.11 Productivity work measurement 2.12 Ways of improving productivity 2.13 Attitude: • Focus to details • Polite • Diligent • Resourceful	elevation 2.5 Practicing occupational health, safety and hazards elimination 2.7 Completed required output
3. Supervise land clearing activities	3.1 Removal of obstructions are overseen following work requirements and ***environmental laws***. 3.2 Clearing activities are monitored following program of activities and environmental laws. 3.3 Accomplishment	3.1 Related permits in clearing activities 3.2 Removal of obstructions 3.3 Clearing activities procedures 3.4 Accomplishment reports 3.5 OSHS 3.5.1 Rule 1410 and DO 13: Construction	3.1 Securing related permits 3.2 Overseeing removal of obstructions 3.3 Monitoring clearing activities 3.4 Accomplishing reports 3.5 Monitoring practice of safety measures

	reports are prepared based on clearing activities. 3.4 Practice of safety measures is monitored according to OSHS Rule 1410 and DO 13 – Construction Safety, Rule 1080 3.5 Required output is completed as specified by the immediate supervisor based on work schedule	Safety ▪ 1412- General Provision ▪ 1413- Excavation 3.5.2 Rule 1080: Personal Protective Services ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes 3.6 PD 1586 – Environmental Impact Assessment System 3.7 RA 9003- Ecological Solid Waste Management Act of 2000 3.8 Factors affecting productivity 3.9 Productivity work measurement 3.10Ways of improving productivity	3.6 Practicing occupational health, safety and hazards elimination 3.7 Completed required output

RANGE OF VARIABLES

VARIABLE	RANGE
1. Required permits	Related permits may include: 1.2 Environmental Impact Assessment Survey 1.1 Environmental Compliance Certificate 1.3 Permit to operate air pollution source installation 1.4Waste water discharge permit 1.5 Hazardous waste generator ID 1.6 Municipal Land use zoning certificate 1.7 Building permit 1.5 Excavation permit
2. Tools	Tools may include but not limited to: 2.1 Rake 2.2 Machete (Bolo) 2.3 Pick Mattock (Piko) 2.4 Spade 2.5 Wheel barrow/construction cart 2.6 Pail 2.7 Digging bars 2.8 Prunning cutter 2.9 Measuring tape 2.10 Weststone
3. Equipment	Equipment may include: 3.1 Compactor 3.2 Demolition hammer 3.3 Chipping gun 3.4 Grass cutter 3.5 Pump Equipment rental: 3.6 Backhoe 3.7 Dump truck 3.8 Bulldozer 3.9 Boom truck
4. Materials	Materials may include: 4.1 Sack 4.2 Staking and lay outing materials (lumber, common nail and tying materials-nylon) 4.3 Reinforce concrete pipe (RCP) 4.4 Fuel 4.5 PPEs (hard hat, safety vest, gloves, masks, safety shoes)
5.Program of activities	May include: 5.1 PERT CPM 5.2 Gantt chart 5.3 Schedule of works
6.Project plan specifications	May include: 6.1 Lot title 6.2 Lot plan 6.3 Site development plan 6.4 Land area 6.5 Size of digester 6.6 Type of digester 6.7 Topography

	6.8 Module/design 6.9 Resources
7.Problems	Problems may include: 7.1 Inundated area 7.2 Topography 7.3 Resources 7.4 Ownership of sites 7.5 Soil type 7.6 Water saturation
8.Appropriate person	May include: 8.1 Immediate head 8.2 Owner/client
9. Environmental laws	May include: 9.1 PD 1586 – Environmental Impact Assessment System 9.2 RA 9003-Ecological Solid Waste Management Act of 2000

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Performed preparatory activities 1.2 Confirmed site location 1.3 Supervised land clearing activities 1.4 Applied safety practices 1.5 Observed and complied with the productivity requirements
2. Resource implications	The following resources should be provided: 2.1 Simulated or actual site 2.2 Tools, materials and equipment required to demonstrate the task on site preparation 2.3 PPEs 2.4 References and manual 2.5 Approved project plan
3. Methods of assessment	Competency in this unit may be assessed through: 3.1 Written exam 3.2 Demonstration/Direct observation with oral questioning 3.3 Oral questioning 3.4 Third party report (should be supported with other assessment method) 3.5 Portfolio 3.6 Case study
4. Context for assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment. 4.2 Assessment may be performed on multiple occasions involving a combination of direct, indirect and supplementary forms of evidence.

UNIT OF COMPETENCY : SUPERVISE BIOGAS PLANT CONSTRUCTION

UNIT CODE : AFF312302

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the construction of biogas plant, including sourcing out of construction materials, supplies, equipment services and manpower requirements, layouting biogas digester and components, monitoring construction activities, and manage post construction activities.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
1. Perform pre-construction activities	1.1 Construction materials are reviewed following Safety Data Sheet (SDS) and Globally Harmonized Standard (GHS) 1.2 Construction materials and supplies, tools, equipment are received and checked based on approved bill of materials and technical specification 1.3 Tools availability is ensured following established practices 1.4 Material and supplies receiving report is prepared based on delivery 1.5 Equipment services are sourced out based on program of activities. 1.6 Manpower requirement is secured based on program of activities. 1.7 Approved technical drawing is interpreted based on construction	1.1 Use of Safety Data Sheet and Globally Harmonized Standard 1.2 Construction materials and supplies 1.3 Condition of tools 1.4 Record keeping 1.5 Communication skills 1.6 PERT-CPM 1.7 Source out equipment services 1.8 OSHS 1.8.1 Rule 1410 and DO 13 – Construction Safety ▪ 1412- General Provision ▪ 1413- Excavation 1.8.2 Rule 1080 – Personal Protective Equipment and Devices ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection	1.1 Reviewing of construction materials following SDS and GHS 1.2 Receiving and checking construction materials and supplies 1.3 Ensuring availability of tools 1.4 Preparing receiving report 1.5 Sourcing equipment services 1.6 Scheduling manpower requirement 1.7 Interpreting technical drawing 1.8 Employing safety practices 1.9 Practicing occupational health, safety and hazards elimination 1.10 Completed required output

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
	standards 1.8 Safety practices are employed following OSHS, Rule 1410 and DO 13, Rule 1080 1.9 Temporary facilities are secured according to project requirements. 1.10 Required output is completed as specified by the immediate supervisor based on work schedule	▪ Use of Safety Shoes 1.9 Construction Occupational, Safety and Health 1.10 Factors affecting productivity 1.11 Productivity work measurement 1.12 Ways of improving productivity	
2. Lead biogas plant construction activities*	2.1 Field lay-out is conducted based on the approved project plan 2.2 Construction activities are directed according to approved plan and standards 2.3 Construction quality control is performed following technical specification and environmental laws. 2.4 Toolbox meeting is conducted based on the program of activities 2.5 Construction activities are monitored according to program of activities 2.6 Safety measures are employed at every job following OSHS Rule 1410 and DO 13, Rule 1080 2.7 Required output is completed as specified by the immediate	2.1 Approved plan 2.2 Field lay-out 2.3 Construction activities 2.4 Toolbox meeting 2.5 PERT-CPM 2.6 Monitoring of construction activities 2.7 OSHS 2.7.1 Rule 1410 and DO 13 – Construction Safety ▪ 1412- General Provision ▪ 1413- Excavation 2.7.2 Rule 1080 – Personal Protective Equipment and Devices ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes 2.8 Communication skills	2.1 Field lay-out skills 2.2 Directing construction activities 2.3 Orienting construction team 2.4 Monitoring construction activities 2.5 Employing safety measures 2.6 Practicing occupational health, safety and hazards elimination 2.7 Completed required output

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
	supervisor based on work schedule	2.9 Environmental laws: ▪ PD 1586 – Environmental Impact Assessment System 2.10 RA 9003- Ecological Solid Waste Management Act of 2000 2.11 Construction Occupational, Safety and Health 2.12 Factors affecting productivity 2.13 Productivity work measurement 2.14 Ways of improving productivity	
3. Manage post construction activities*	3.1 Inspection activities are conducted following established workplace procedures 3.2 Punch list is accomplished and carried out based on project plan specifications 3.3 Removal of formwork and scaffolding is supervised following industry procedures and Ecological Solid Waste Management Act of 2000 3.4 Clearing and cleaning operation in the area is directed following workplace practices and environmental laws 3.5 Storage of materials hazardous and tools are managed according to	3.1 Inspection activities 3.2 Removal of formwork and scaffolding 3.3 Cleaning and clearing operations 3.4 Storage of materials and tools 3.5 Hazardous materials and chemicals 3.6 Waste management 3.7 3Rs 3.8 Reporting procedures 3.9 Inspection of waste materials 3.10 Photo documentations 3.11 Communication skills 3.12 RA 9003- Ecological Solid Waste Management Act	3.1 Conducting inspection activities 3.2 Supervising removal of formwork and scaffolding 3.3 Directing clearing and cleaning operation 3.4 Managing storage of materials and tools 3.5 Implementing waste management 3.6 Verbal reporting skills 3.7 Preparing and submitting report and photo documentation 3.8 Practicing occupational health, safety and hazards elimination

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
	workplace procedures 3.6 Housekeeping is performed following 5S of good housekeeping. 3.7 Verbal reporting during inspection to appropriate person was done based on industry standards 3.8 Report and photo documentation are prepared and submitted to appropriate person based on industry practice 3.9 Safety practices are applied following OSHS Rule 1410 and DO 13, Rule 1080, Rule 1090 3.10 Required output is completed as specified by the immediate supervisor based on work schedule	of 2000 3.13 OSHS 3.13.1Rule 1410 and DO 13 – Construction Safety ▪ 1412- General Provision ▪ 1413- Excavation 3.13.2Rule 1080 – Personal Protective Equipment and Devices ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes 3.13.3Rule 1090: Hazardous Materials ▪ 1093 – General Rules ▪ 1094-Hot and Corrosive Substances ▪ 1095 – Storage 3.14 Construction Occupational, Safety and Health 3.15 Factors affecting productivity 3.16 Productivity work measurement 3.17 Ways of improving productivity	3.9 Completed required output

RANGE OF VARIABLES

VARIABLE	RANGE
1. Tools	Tools may include: 1.1 Level hose 1.2 Auto level
2. Program of activities	Program of activities may include: 2.1 PERT CPM 2.2 Gantt chart
3. Construction activities	Construction activities includes: 3.1 Soil works 3.2 Excavation 3.3 Compaction 3.4 Soil disposal 3.5 Back fill 3.6 Water proofing 3.7 Civil works 3.7.1 Masonry works 3.7.2 Structural works 3.7.3 Water proofing 3.8 Mechanical works 3.9 Plumbing and sanitary works 3.10 Electrical works 3.11 Metal works
4. Construction quality control	Construction quality control may include: 4.1 Concrete compression test 4.2 Soil compaction test 4.3 Steel tensile strength test 4.4 As-Built Dimension check
5. Environmental laws	May include: 5.1 PD 1586 – Environmental Impact Assessment System 5.2 RA 9003-Ecological Solid Waste Management Act of 2000

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Performed pre-construction activities 1.2 Led biogas plant construction activities 1.3 Managed post construction activities 1.4 Applied safety practices 1.5 Observed and complied with the productivity requirements
2. Resource implications	The following resources should be provided: 2.1 Simulated or actual biogas construction workplace 2.2 Tools, materials, supplies and equipment required to demonstrate required tasks on biogas system construction 2.3 Biogas System Operation Manual 2.4 Approved plan 2.5 PPEs
3. Methods of assessment	Competency in this unit may be assessed through: 3.1 Written exam 3.2 Demonstration/Direct observation Oral questioning 3.3 Third party report (should be supported with other assessment method) 3.4 Portfolio 3.5 Case study
4. Context for assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment. 4.2 Assessment may be performed on multiple occasions involving a combination of direct, indirect and supplementary forms of evidence.

UNIT OF COMPETENCY : LEAD INSTALLATION OF BIOGAS CONVEYANCE SYSTEM

UNIT CODE : AFF312303

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to the preparation of tools, materials, supplies, and manpower requirements, direct installation of PVC pipes, gas conduits and fittings in reference to approved plans, supervise clearing and cleaning operation, conduct quality control activities, and report to immediate head.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
1. Manage preparation activities	1.1 Construction materials are reviewed following Safety Data Sheet (SDS) and Globally Harmonized Standard (GHS) 1.2 ***Tools, materials and supplies, and equipment*** are received and checked based on bill of materials and technical specification 1.3 Material and supplies receiving report is prepared based on delivery 1.4 Manpower requirement is scheduled based on program of activities 1.5 Technical drawing is interpreted following approved project plan 1.6 Safety practices are employed following OSHS, Rule 1410 and DO 13, Rule 1080 1.7 Required output is completed as specified by the	1.1 Use of Safety Data Sheet and Globally Harmonized Standard 1.2 Types of tools, materials and supplies 1.3 Functionality of tools and equipment 1.4 Checking and receiving procedures 1.5 PERT-CPM 1.6 Interpretation of technical drawing 1.7 OSHS 1.7.1Rule 1410 and DO 13 ▪ 1412- General Provision ▪ 1413- Excavation 1.7.2Rule 1080 ▪ 1081 – General Provision ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes	1.1 Reviewing of construction materials following SDS and GHS 1.2 Receiving and checking tools, materials and supplies 1.3 Preparing material and supplies receiving report 1.4 Scheduling manpower requirement 1.5 Interpreting technical drawing 1.6 Practicing occupational health, safety and hazards elimination 1.7 Completed required output

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
	immediate supervisor based on work schedule	1.8 Construction Occupational, Safety and Health 1.9 Factors affecting productivity 1.10 Productivity work measurement 1.11 Ways of improving productivity 1.12 Attitude: • Workmanship • Patient • Obedient	
2. Install PVC pipes, gas conduits and fittings	2.1 Networks of pipes are determined based on approved project plan and actual site condition * 2.2 Diameter, length and specifications of pipes and flexible hose are checked based on the approved project plan and actual site condition 2.3 Type and size of fittings to be used are checked based on specifications 2.4 Installation activities are directed based on work plan and precautionary measures and Ecological Solid Waste Management Act of 2000 2.5 Safety measures are practiced during installation based on OSHS Rule 1410 and DO 13, Rule 1080 and PNS PAES 413 – Biogas Plant 2.6 Required output is completed as specified by the	2.1 Interpretation of technical drawing 2.2 Cutting of pipes 2.3 Diameter and length 2.4 Installation activities 2.5 Precautionary measures 2.6 Pipes and fittings 2.7 OSHS 2.7.1 Rule 1410 and DO 13 ▪ 1412- General Provision ▪ 1413- Excavation 2.7.2 Rule 1080 ▪ 1081 – General Provision ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes 2.8 PNS PAES 413 – Biogas Plant 2.9 Construction Occupational, Safety and Health 2.10 RA 9003- Ecological Solid	2.1 Determining networks of pipes 2.2 Determining diameter and length of pipes and flexible hose 2.3 Determining fittings to be used 2.4 Directing installation activities 2.5 Practicing occupational health, safety and hazards elimination 2.6 Training on COSH 2.7 Completed required output

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
	immediate supervisor based on work schedule	Waste Management Act of 2000 2.11 Factors affecting productivity 2.12 Productivity work measurement 2.13 Ways of improving productivity 2.14 Attitude: • Workmanship • Patient • Obedient	
3.Perform quality control	3.1 Gas leak test for pipes is conducted based on industry protocol. * 3.2 ***Gas leak test result*** is reported based on industry protocol* 3.3 Pipe slope is checked following approved project plan* 3.4 Remedial actions methodologies are prepared and referred to the appropriate person * 3.5 Remedial actions are executed based on approved methodologies. * 3.6 Safety practices are applied following OSHS Rule 1080, Rule 1090, Rule 1945 and PNS PAES 413 3.7 Required output is completed as specified by the immediate supervisor based on work schedule	3.1 Basics of biogas 3.2 Reporting procedure 3.3 Gas leak test 3.4 Pipe slope check 3.5 Gas leak test result 3.6 Measurement of pressure 3.7 Approved methodologies 3.8 Use of compressor 3.9 OSHS 3.9.1Rule 1080 ▪ General Provision ▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes 3.9.2Rule 1090 ▪ 1093 – General Rules ▪ 1094-Hot and Corrosive Substances ▪ 1095 – Storage 3.9.3Rule 1945 - Flammable and Combustible Liquids ▪ 1945.01: Tank	3.1 Conducting gas leak test for pipes 3.2 Conducting gas leak test for pipes 3.3 Reporting findings 3.4 Determining remedial actions 3.5 Practicing occupational health, safety and hazards elimination 3.6 Completed required output

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
		Storage ▪ 1945.02: Design and Fabrication ▪ 1945.03: Installation of Outside Tank ▪ 1945.04: Drainage, Dikes and Walls of the Above Ground Tanks ▪ 1945.06: Installation of Underground Tanks 3.10 PNS PAES 413 – Biogas Plant 3.11 Construction Occupational, Safety and Health 3.12 Factors affecting productivity 3.13 Productivity work measurement 3.14 Ways of improving productivity 3.15 Attitude: • Tenacious • Workmanship	
4. Supervise post-installation activities*	4.1 Inspection activities are conducted following established workplace procedures 4.2 Clearing and cleaning operation in the area is directed following workplace practices and environmental laws. 4.3 Storage of materials and tools are managed according to workplace procedures 4.4 Housekeeping is performed following 5S 4.5 Verbal reporting	4.1 Inspection activities 4.2 As-built dimension check 4.3 Workplace procedures 4.4 5S of good housekeeping 4.5 Waste management 4.6 Reporting and documentation procedure 4.7 OSHS 4.7.1 Rule 1150 – Materials Handling and Storage ▪ 1150.01: General Provisions 4.7.2 Rule 1080 ▪ General Provision	4.1 Conducting inspection activities 4.2 Directing clearing and cleaning operation in the area 4.3 Managing storage of materials and tools 4.4 Implementing waste management 4.5 Verbal reporting during inspection of immediate head 4.6 Preparing and submitting report and photo

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE AND ATTITUDE	REQUIRED SKILLS
	during inspection of immediate head was done based on industry standards 4.6 Report and photo documentation are prepared and submitted to immediate head based on industry practice 4.7 Safety practices are applied following OSHS Rule 1150, Rule 1080,Rule 1945 and PNS PAES 413 4.8 Required output is completed as specified by the immediate supervisor based on work schedule	▪ 1082-Eye and Face Protection ▪ 1083 – Respiratory Protection ▪ 1084 – Head protection ▪ 1085 – Head and Arm Protection ▪ Use of Safety Shoes 4.7.3 Rule 1945 - Flammable and Combustible Liquids ▪ 1945.01: Tank Storage ▪ 1945.02: Design and Fabrication ▪ 1945.03: Installation of Outside Tank ▪ 1945.04: Drainage, Dikes and Walls of the Above Ground Tanks ▪ 1945.06: Installation of Underground Tanks 4.8 PNS PAES 413 – Biogas Plant Construction Occupational, Safety and Health 4.9 RA 9003- Ecological Solid Waste Management Act of 2000 4.10 Factors affecting productivity 4.11 Productivity work measurement 4.12 Ways of improving productivity 4.13 Attitude: • Trustworthy	documentation 4.7 Applying safety practices following OSHS rule 1150, 1080,1945 and PNS PAES 413 4.8 Practicing occupational health, safety and hazards elimination 4.9 Completed required output

RANGE OF VARIABLES

VARIABLE	RANGE
1. Tools, materials and supplies	Tools, materials and supplies may include: Tools 1.1 Wrench 1.1.1 Pipe wrench 1.1.2 Combination wrench 1.1.3 Adjustable wrench 1.1.4 Allen wrench 1.2 Hacksaw 1.3 Screw driver 1.4 Steel tape 1.5 Pail 1.6 Pipe cutter 1.7 Pipe fitter tool kit 1.8 Pipe fitter clamp Materials and supplies 1.9 Pipes and fittings, (PVC, PE, GI) 1.10 Valves (PVC, PE, brass) 1.11 Screw 1.12 Teflon tape 1.13 Sealant 1.14 Sand paper 1.15 Detergent soap 1.16 Solvent cement 1.17 Pipe support Equipment 1.18 Compressor 1.19 Grinder cutter
2. Fittings	Fittings may include but not limited to: 2.1 Tee elbow 2.2 Coupling 2.3 Lock 2.4 Valve 2.5 Elbow 2.6 Endcap 2.7 Flow meter 2.8 Check valve 2.8.1 Pressure gauge 2.8.2 Pressure relief valve 2.8.3 Gate valve 2.9 Flame arrester
3. Installation activities	Installation activities may include but not limited to: 3.1 Installation of pipes 3.2 Installation of fittings 3.3 Installation of water trap 3.4 Installation of gas valves
4. Precautionary measures	Precautionary measures may include: 4.1 Pipes must be away from: 4.1.1 Passage 4.1.2 Humans Traffic 4.1.3 Animals Traffic

	4.1.4 Flame source 4.2 Installed pipes must be accessible and visible, and properly supported 4.3 Installing safety signs and warnings
5. Gas leak test result	Gas leak test result may include: 5.1 Unfitted pipe 5.2 Cracked pipe 5.3 Valve installation problem
6. Environmental laws	May include: 6.1 PD 1586 – Environmental Impact Assessment System 6.2 RA 9003-Ecological Solid Waste Management Act of 2000

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Managed preparation activities 1.2 Installed PVC pipes, gas conduits and fittings 1.3 Performed quality control 1.4 Supervised post-installation activities 1.5 Applied safety practices 1.6 Observed and complied with the productivity requirements
2. Resource implications	The following resources should be provided: 2.1 Simulated or actual biogas construction workplace 2.2 Tools, materials, supplies and equipment required to demonstrate required tasks on pipefitting works 2.3 Biogas System Operation Manual 2.4 Approved plan 2.5 PPEs
3. Methods of assessment	Competency in this unit may be assessed through: 3.1 Written exam 3.2 Demonstration/Direct observation Oral questioning 3.3 Third party report (should be supported with other assessment method) 3.4 Portfolio 3.5 Case study
4. Context for assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment. 4.2 Assessment may be performed on multiple occasions involving a combination of direct, indirect and supplementary forms of evidence.

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 **BIOGAS PLANT INSTALLATION NC III.**

They include information on curriculum design; training delivery; trainee entry requirements; tools and equipment; training facilities; and trainer's qualification.

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: **BIOGAS PLANT INSTALLATION Level NC III**

Nominal Training Duration:

40 Hours	Basic Competencies
24 Hours	Common Competencies
120 Hours	Core Competencies
164 Hours	
120 Hours	Supervised Industry Learning (SIL)
304 Hours	**Total Hours**

Course Description:

This course is designed to provide the learner with knowledge, practical skills and attitude, applicable in performing work activities involve in leading biogas plant site preparation, supervising biogas plant construction and leading installation of biogas conveyance system.

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

(40 HOURS)

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
1. Lead workplace communication	1.1 Communicate information about workplace processes	• Read ○ Effective verbal communication methods ○ Sources of information • Practice organizing information • Identify organization requirements for written and electronic communication methods • Follow organization requirements for the use of written and electronic communication methods • Perform exercises on understanding and conveying intended meaning scenario	• Lecture • Demonstration • Practical exercises • Role Play	• Written Test • Observation	2 Hours
	1.2 Lead workplace discussions	• Describe: ○ Organizational policy on production, quality and safety ○ Goals/ objectives and action plan setting • Read ○ Effective verbal communication methods • Prepare/set action plans based on organizational goals and objectives	• Group discussion • Lecture • Demonstration	• Oral evaluation • Written Test • Observation	2 Hours
	1.3 Identify and communicate issues arising in the workplace	• Describe: ○ Organizational policy in dealing with issues and problems • Read • Effective verbal communication methods	• Group discussion • Lecture	• Oral evaluation • Written Test	2 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
2. Lead small teams	2.1 Provide team leadership	• Discussion of Company policies and procedures • Read web pages on situational leadership • Role play on situational leadership	• Group work • Role Play • Lecture/ Discussion • Individual Work	• Role Play • Written Test	1 Hour
	2.2 Assign responsibilities	• Read web pages on performance management • Case study on allocating roles and responsibilities based on competencies of current staff	• Individual Work • Case Study	• Role Play • Written Test	1 Hour
	2.3 Set performance expectations for team members	• Role play to communicate performance expectations with staff • Discussion on performance issues	• Lecture/ Discussion • Role Play	• Role Play • Written Test	1 Hour
	2.4 Supervise team performance	• Discussion on performance monitoring • Role play on providing feedback on performance • Role play on performance coaching • Discussion on keeping the team informed of team performance • Case study on Team performance monitoring and feedback	• Lecture/ Discussion • Role Play • Case Study	• Role Play • Written Test	1 Hour
3. Apply critical thinking and problem-solving techniques in the workplace	3.1 Examine specific workplace strategies	• Show thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations • Show mastery of the current industry hardware and software products and	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		services • Discuss process of identification of fundamental causes of specific workplace challenges • Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations - Relevant equipment and operational processes - Enterprise goals, targets and measures - Enterprise quality OHS and environmental requirement - Enterprise information systems and data collation - Industry codes and standards			
	3.2 Analyze the causes of specific workplace challenges	• Show thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations • Show mastery of the current industry hardware and software products and services • Discuss process of identification of fundamental causes of specific workplace challenges • Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations - Relevant equipment and operational processes	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		- Enterprise goals, targets and measures - Enterprise quality OHS and environmental requirement - Enterprise information systems and data collation - Industry codes and standards • Identify extent and causes of specific challenges in the workplace • Use of range of analytical problem-solving techniques • Formulate clear-cut findings on the nature of each identified workplace challenges			
	3.3 Formulate resolutions to specific workplace challenges	• Show thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations • Show mastery of the current industry hardware and software products and services • Discuss process of identification of fundamental causes of specific workplace challenges • Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations - Relevant equipment and operational processes - Enterprise goals, targets and measures - Enterprise quality OHS and environmental requirement	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		- Enterprise information systems and data collation - Industry codes and standards • Identify extent and causes of specific challenges in the workplace • Use of range of analytical problem-solving techniques • Formulate clear-cut findings on the nature of each identified workplace challenges • Discus strategies on devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges			
	3.4 Implement action plans and communicate results	• Identify extent and causes of specific challenges in the workplace • Use of range of analytical problem-solving techniques • Formulate clear-cut findings on the nature of each identified workplace challenges • Discus strategies on devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour
4. Work in a diverse environment	4.1 Develop an individual's cultural awareness and sensitivity	• Show understanding of cultural diversity in the workplace • Recognize norms of behavior for interacting and dialogue with specific groups (e. g., Muslims and other non-Christians, non-Catholics, tribes/ethnic groups, foreigners) • Demonstrate different methods of	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Group discussions and interactive activities • Case studies/ problems involving	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		verbal and non-verbal communication in a multicultural setting • Apply cross-cultural communication skills (i.e. different business customs, beliefs, communication strategies) • Show affective skills – establishing rapport and empathy, understanding, etc. • Demonstrate openness and flexibility in communication • Recognize diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices		workplace diversity issues • Written examination • Role Playing	
	4.2 Work effectively in an environment that acknowledges and values cultural diversity	• Explain the value of diversity in the economy and society in terms of Workforce development • Discuss the importance of inclusiveness in a diverse environment • Discuss the importance of shared vision and understanding of and commitment to team, departmental, and organizational goals and objectives • Identify and exhibit strategies for customer service excellence • Demonstrate cross-cultural communication skills and active listening • Recognize diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices • Demonstrate collaboration skills	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Group discussions and interactive activities • Case studies/ problems involving workplace diversity issues • Written examination • Role Playing	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	4.3 Identify common issues in a multicultural and diverse environment	• Explain the value, and leverage of cultural diversity • Discuss the inclusivity and conflict resolution • Describe the workplace harassment • Explain the change management and cite ways to overcome resistance to change • Demonstrate advanced strategies for customer service excellence • Address diversity-related conflicts in the workplace • Eliminate discriminatory behavior towards customers and co-workers • Utilize change management policies in the workplace	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Group discussions and interactive activities • Case studies/ problems involving workplace diversity issues • Written examination • Role Playing	1 Hour
5. Propose methods of applying learning and innovation in the organization	5.1 Assess work procedures, processes and systems in terms of innovative practices	• Show mastery of the following practical concepts (e.g., 7 habits of highly effective people, character strengths that foster learning and innovation, five minds of the future, adaptation concepts and transtheoretical model of behavior change) • Demonstrate collaboration and networking skills • Show basic skills in research • Generate practical insights on how to improve organizational procedures, processes and systems	• 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	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
				virtues applied	
	5.2 Generate practical action plans for improving work procedures, processes	• Show mastery of the following practical concepts (e.g., 7 habits of highly effective people, character strengths that foster learning and innovation, five minds of the future, adaptation concepts and transtheoretical model of behavior change) • Demonstrate collaboration and networking skills • Show basic skills in research • Generate practical insights on how to improve organizational procedures, processes and systems • Set up action plans on how to apply innovative procedures in the organization • Set up action plans on how to apply innovative procedures in the organization • Generate practical insights on how to improve organizational procedures, processes and systems	• 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 Evaluate the effectiveness of the proposed action plans	• Show mastery of the following practical concepts (e.g., 7 habits of highly effective people, character strengths that foster learning and innovation, five minds of the future, adaptation concepts and transtheoretical model of behavior change) • Demonstrate collaboration and networking skills • Show basic skills in research • Generate practical insights on continuous improvement	• 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-	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
				job performance. • Standardized assessment of character strengths and virtues applied	
6. Use information systematically	6.1 Use technical information	• Lecture and discussion on: ○ Application in collating information ○ Procedures for inputting, maintaining and archiving information ○ Guidance to people who need to find and use information • Organizing information into a suitable form for reference and use • Classify stored information for identification and retrieval • Operate the technical information system by using agreed procedures	• Lecture • Group Discussion • Hands on • Demonstration	• Oral evaluation • Written Test • Observation • Presentation	4 Hours
	6.2 Apply information technology (IT)	• Lecture and discussion on: ○ Attributes and limitations of available software tool ○ Procedures and work instructions for the use of IT ○ Operational requirements for IT systems ○ Sources and flow paths of data ○ Security systems and measures that can be used ○ Methods of entering and processing information • Use procedures and work instructions for the use of IT • Extract data and format reports • Use WWW applications	• Lecture • Group Discussion • Self-paced handout/ module • Hands on • Demonstration	• Oral evaluation • Written Test • Observation • Presentation	2 Hours

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

	6.3 Edit, format and check information	• Lecture and discussion on:
		  ○ Basic file-handling techniques
		  ○ Techniques in checking documents
		  ○ Techniques in editing and formatting
		  ○ Proof reading techniques
		• Use different techniques in checking documents
		• Edit and format information applying different techniques
		• Proof read information applying different techniques
			• Lecture
			• Group Discussion
			• Self-paced handout/ module
			• Hands on
			• Demonstration
				• Oral evaluation
				• Written Test
				• Observation
				• Presentation
					2 Hours

7. Evaluate Occupational Safety and Health Work Practices	7.1 Interpret Occupational Safety and Health practices	• Discuss the OSH standards, principles and legislations • Identify OSH work practices issues • Discuss standard safety requirements	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / Questioning	1.5 Hours
	7.2 Set OSH work targets	• Discussion in actions plans that are necessary in achieving the OSH target	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / Questioning	1 Hour
	7.3 Evaluate effectiveness of Occupational Safety and Health work instructions	• Practice evaluating safety data (Historical or Simulated)	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews / Questioning	1.5 Hours

8. Evaluate Environmental Work Practices	8.1 Interpret environmental practices, policies and procedures	• Discussion Environmental Issues regarding
		  - Water Quality
		  - National and Local Government Issues
		  - Safety
			• Lecture
			• Group Discussion
			• Demonstration
				• Written Exam
				• Demonstration
				• Observation
				• Interviews / Questioning
					1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		- Endangered Species - Noise - Air Quality - Historic - Waste - Cultural • Updating of existing occupation practices			
	8.2 Establish targets to evaluate environmental practices	• Discussion on - lower production costs and energy consumption - Environmentally Sound Processes - Resource Efficient - Recycling and Waste Management • Simple case study regarding energy efficiency	• Lecture • Group Discussion • Demonstration	• Written Exam • Demonstration • Observation • Interviews / Questioning	1 Hour
	8.3 Evaluate effectiveness of environmental practices	• Identifying effective environmental practices relevant to the industry/occupation - Implementation of energy efficiency	• Lecture • Group Discussion • Demonstration • Case Study	• Written Exam • Demonstration • Observation • Interviews / Questioning • Third Party Reports	1 Hour
9. Facilitate Entrepreneurial Skills For Micro-Small-Medium Enterprises (MSMEs)	9.1 Develop and maintain micro-small-medium enterprise (MSMEs) skills in the organization	• Discussions on business models and strategies • Discussion on Types and categories of businesses and business internal control • Discussion on Relevant National and local legislations affecting businesses	• Lecture/ Discussion • Case Study • Demonstration	• Written Test • Portfolio • Work Related Project	2 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Prepare promotional materials • Practice basic bookkeeping			
	9.2 Establish and maintain client-base/market	• Role play on customer and employee relations • Discussion on Basic product promotion strategies • Preparation of Basic Feasibility study • Case studies on Basic Business ethics • Prepare basic advertising materials	• Role Play • Lecture Discussion • Case study	• Case problem • Written Test	2 Hours
	9.3 Apply budgeting and financial management skills	• Discussion on: - Basic cost-benefit analysis - Basic financial management - Basic financial accounting - Business internal controls	• Role Play • Lecture Discussion • Group work	• Written Test • Case problem	1 Hour

COMMON COMPETENCIES

24 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
1. Prepare construction materials and tools	1.1 Identify materials	• Different work specifications • Types, uses and description of plumbing materials and accessories • Types, uses and description of plumbing tools • List of materials as per company standards	• Identifying tools according to the job requirements • Identifying materials and accessories according to the job requirements	• Lecture-demonstration • Group discussion • PowerPoint presentation	• Direct observation • Questions or interview • Written test • Portfolio (credentials)	1 hour
	1.2 Requisition materials	• Work requirements • Types and uses of plumbing materials and tools • Material take-off • Requisition procedures	• Preparing material take-off • Requesting materials and tools	• Simulation • Discussion	• Direct observation • Questions or interview	1 hour
	1.3 Receive and inspect materials	• Policy on receiving material deliveries • Material and tools quality and defects • Material handling	• Checking and inspecting materials and tools • Storing/ stacking of tool and materials	• Practical Exercise • Demonstration	• Written / Oral Test • Demonstration	2 hours
2. Observe procedures, Specifications and Manuals of	2.1 Identify and access specification/ manuals	• Types of manuals used in plumbing • Identification of symbols used in the manuals	• Identifying manuals and specifications • Accessing information and	• Lecture-demonstration	• Oral questioning • Written test or examination	2 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
Instructions			data			
	2.2 Interpret manuals	• Types of manuals used in plumbing • Types of symbols used in manuals • System of measurements • Unit conversion	• Interpreting symbols and specifications • Accessing information and data • Applying conversion of units of measurements	• Actual demonstration • Group discussion	• Direct observation • Written test or examination	2 hours 2 hours
	2.3 Apply information in manual	• Types of manuals used in plumbing • Types and application of symbols in manuals • Unit conversion	• Applying information from manuals	• Demonstration • Group discussion	• Demonstration (able to impart knowledge and skills) • Practical and oral exam	2 hours
	.1 Store Manual	• Types of manuals used in plumbing • Manual storing and maintaining procedures	• Storing and maintaining manuals	• Demonstration • Group discussion	• Demonstration • Practical and oral exam	
3. Perform mensuration and calculation	3.1 Select measuring instruments	• Types of measuring tools and its uses	• Selecting measuring instruments	• Lecture-demonstration • Group discussion	• Direct observation • Oral questioning	2 hours
	3.2 Carry out measurements and	• Measurements • Linear measurement • Geometrical measurement	• Interpreting formulas for volume, areas, perimeters of plane and geometric	• Group discussion • Practical Lab • Demonstration	• Written test or examination • Third party report • Demonstration	2 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
	calculations	• Trade Mathematics • Unit conversion • Ratio and proportion • Area	figures • Handling of measuring instruments		(able to impart knowledge and skills)	
4. Maintain Tools and Equipment	4.1 Check condition of tools and equipment	• Safety practices - use of PPE - handling of tools and equipment - good housekeeping • Materials, tools and equipment - types and uses of lubricants - types and uses of cleaning materials - types and uses of plumbing tools - types and uses of plumbing equipment • Operational conditions of plumbing tools and equipment • Plumbing tools and equipment defects	• Maintaining tools and equipment • Handling of tools and equipment • Identifying tools and equipment defects	• Lecture-demonstration • Group discussion	• Direct observation • Oral questioning	2 hours
	4.2 Perform basic preventive maintenance	• Safety practices - use of PPE - handling of tools and equipment - good housekeeping • Materials, tools and equipment	• Handling of tools and equipment • Performing preventive maintenance	• Simulation • Group discussion • Practical Lab • Demonstration	• Written test or examination • Third party report • Demonstration (able to impart knowledge and skills)	3 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		- types and uses of lubricants - types and uses of cleaning materials • Preventive maintenance - Methods and techniques - Procedures				
	4.3 Store tools and equipment	• Safety practices - use of PPE - handling of tools and equipment - good housekeeping - Storing procedures and techniques - Storage conditions/ locations	• Storing tools and equipment • Handling of tools and equipment	• Demonstration • Group discussion • Practical Lab	• Practical exam • Direct observation • Written test	3 hours

CORE COMPETENCIES
120 HRS

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Methods	Nominal Duration
1. Lead biogas plant site preparation (30 hrs)	1.1 Perform preparatory activities	• Confirm project details • Direct preparation and acquisition of tools, materials and equipment • Source out labor and machineries • Apply safety practices • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing	• Demonstration • Written exam • Oral questioning • Case study	6 hours
	1.2 Confirm site location	• Perform ocular survey • Accomplish checklist of inspection criteria • Consult problems to immediate head • Conduct and supervise setting up boundaries and elevation on selected site • Apply safety practices • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing • Field visit	• Demonstration • Written exam • Oral questioning • Case study	12 hours

	1.3 Supervise land clearing activities	• Comply legal requirements of clearing activities • Oversee removal of obstructions • Monitor clearing activities • Monitor practice of safety measures • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing • Field visit	• Demonstration • Written exam • Oral questioning • Case study	12 hours
2. Supervise biogas plant construction (60 hrs)	2.1 Perform pre-construction activities	• Receive and check construction materials and supplies • Ensure tools availability • Prepare material and supplies receiving report • Source out equipment services • Schedule manpower requirement • Interpret technical drawing • Employ safety practices • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing	• Demonstration • Written exam • Oral questioning	4 hours

	2.2 Lead biogas plant construction activities	• Conduct field lay-out • Direct construction activities • Orient construction team on job assignments • Monitor construction activities • Employ safety measures • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing • Field visit	• Demonstration • Written exam • Oral questioning	40 hours
	2.3 Manage post construction activities	• Conduct inspection activities • Supervise removal of formwork and scaffolding • Direct clearing and cleaning operation • Manage storage of materials and tools • Implement waste management • Perform verbal reporting during inspection of immediate head • Prepare and submit report and photo documentation to immediate head • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing	• Demonstration • Written exam • Oral questioning	16 hours

3. Lead installation of biogas conveyance system (30 hrs)	3.1 Manage preparation activities	• Receive and check tools, materials and supplies • Prepare material and supplies receiving report • Schedule manpower requirement • Interpret technical drawing • Employ safety practices • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing	• Demonstration • Written exam • Oral questioning	4 hours
	3.2 Install PVC pipes, gas conduits and fittings	• Determine branches/networks of pipes • Determine diameter and length of pipes and flexible hose • Determine fittings to be used • Direct installation activities • Practice safety measures during installation • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing • Field visit	• Demonstration • Written exam • Oral questioning	14 hours

	3.3 Perform quality control	• Conduct gas leak test for pipes • Report gas leak test result is reported • Check pipe slope • Prepare and refer remedial actions methodologies • Execute remedial actions • Wear PPE • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing • Field visit	• Demonstration • Written exam • Oral questioning	8 hours
	3.4 Supervise post-installation activities	• Conduct inspection activities • Direct clearing and cleaning operation in the area • Manage storage of materials and tools • Implement waste management • Perform verbal reporting during inspection of immediate head • Prepare and submit report and photo documentation to immediate head • Factors affecting productivity • Productivity work measurement • Ways of improving productivity	• Demonstration • Lecture • Discussion • Film viewing	• Demonstration • Written exam • Oral questioning	4 hours

3.2 TRAINING DELIVERY

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 trainees 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 performance of all specified competencies.

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 School/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 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 technologies 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 Training (SIT) 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

- 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)

3.3 TRAINEE ENTRY REQUIREMENTS

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

- Good communication skills
- At least Senior High School level or 2 years industry experience within the last 5 years, preferably with experience relevant to Construction and Plumbing

3.4 LIST OF TOOLS, EQUIPMENT, AND MATERIALS

BIOGAS PLANT INSTALLATION NC III

Recommended list of tools, equipment and materials for the training of 25 trainees for **BIOGAS PLANT INSTALLATION NC III**.

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

QTY	TOOLS	QTY	EQUIPMENT	QTY	MATERIALS
6 pcs	Rake	1 unit	Air compressor	5L	Gasoline fuel
6 pcs	Bolo (scythe)	3units	Grass cutter	5 sets	Staking and lay outing materials
6pcs	Wetstone (hasaan)	1unit	Backhoe*	50pcs	2”x2”x10’ lumber
6 pcs	Mattock (Piko)	1unit	Dozer*	5kg	Common nail 2”
6 pcs	Spade	1unit	Dump truck*	5kg	Common nail 3”
6 pcs	Digging bars	3 units	Grinder cutter	5kg	Common nail 4”
12 pcs	Pail (2gal capacity)	3 units	Hand drill	200 m	Nylon string
3pcs	Construction Cart	1 unit	Chipping gun	25 pcs	Sack
6pcs	Measuring tape (50m)	1 unit	Mixer(capacity one-bagger)	6 cans	Spray paint
6pcs	Pruning cutter	1 unit	Concrete vibrator	4 pcs	Reinforce concrete pipe (RCP)
25 pcs	Steel tape (5m)			1 galon	Water proofing Sealant
6 pcs	Hammer			25 pcs	Construction book
6 pcs	Shovel			25 pcs	Ball pen
6 pcs	Saw			25 pcs	Pencil
6pcs	Pliers			150 m (1 roll)	Rope, 10 mm diameter
6 pcs	Skuala (for research)12”			**PPEs**	
6 pcs	Screw driver			25 pcs	Masks
6 pcs	Level hose, 5m			25 pcs	Goggles
				25 pair	Gloves
6 pcs	Long digging bars			25 pair	Boots

				25 pcs	Long sleeves
6 pcs	Spade shovel			25 pcs	Safety hats
12 pcs	Cement pail			6 pcs	Flexible hose, 6m
12 pcs	Rotella (metal)			**PVC pipes**	
6 pcs	Plumb bob			4 pcs	PVC pipes, 2inches diam.
20 m	Water hose			4pcs	PVC pipes, 4 inches diam
6 pcs	Paint brush, 4-inch			4 pcs	PVC pipes, 6 inches diam
6pcs	Firebrick knife				Coupling
6 pcs	Cement trowels			3 pcs	Coupling, 2 inches diam
6 sets	Plastic level hose, 6m			3 pcs	Coupling,4 inches diam
6 sets	Wooden measuring box (1' x 1' x 1.2')			3 pcs	Coupling, 6 inches diam
10 m	Construction cloth(1/4-inch mesh size)			**Elbow**	
6 pcs	Wrench			3 pcs	Elbow, 2 inches diam
6 pcs	Pipe wrench, 2 inch diam			3 pcs	Elbow, 4 inches diam
6 sets	Combination wrench			3 pcs	Elbow, 6 inches
6 pcs	Adjustable wrench,2 inch diam			**PVC ball valves**	
6 sets	Allen wrench			1 pc	PVC ball valves 2 inch diam
6 pcs.	Hacksaw			1 pc	PVC ball valves 4 inch diam
1 set	Pipe fitter tool kit			1 pc	PVC ball valves 6 inch diam
1 set	Pipe fitter clamp, 4 inches in diam			**PVC tee**	
6 pcs	Blow torch			3 pcs	PVC tee2 inch diam
6 sets	Laying out and staking materials			3 pcs	PVC tee4 inch diam
				3 pcs	PVC tee 6 inch diam
				9 bags	Cement
				5 cu. meter	Sand
				5 cu. m	Gravel
				10 pcs	Rebars, 10 mm diam
				10 pcs	Rebars, 12 mm diam
				6 sets	Staking and lay outing materials
				150 m	Rope, (10 mm in diameter)
				10 Kg	Paraffin wax
				1 L	Sealant
				150 m	Rope, 15m (10 mm in diameter)
				20 pcs	Teflon tape
				1 box	Screw

				6 sets	Condensation trap: Saddle clamp, 2 inch x 1 inch Nipple, 1 inch in diam by 4 inch PVC ball valve, 1 inch diam
				PE pipes	
				1 roll	PE pipes, 1inches diam.
				1 roll	PE pipes, 2 inches diam
				PE Coupling	
				3 pcs	Coupling, 1 inches diam
				3 pcs	Coupling,2 inches diam
				PE elbow	
				3 pcs	PE Elbow, 1 inches diam
				3 pcs	PE Elbow, 2inches diam
					PVC ball valves
				1 pc	PVC ball valves 1 inch diam
				1 pc	PVC ball valves 2 inch diam
				10 pcs	Sand paper
				1 L	Detergent soap
				5 cans	Solvent cement, 200 ml
				5 sets	Pipe support
				5 pcs	Endcap, 1 inch diam
				5 pcs	Endcap, 2 inch diam
				1 pc	Flow meter
				3 pcs	GI pipe, 1inch diam
				3 pcs	Check valve, 1 inch diam, brass
				3 pcs	Gate valve,1 inch diam, brass
				10 pcs	GI elbow, 1 inch diam
				10 pcs	GI tee, 1 inch diam
				10 pcs	GI coupling, 1 inch diam
				10 pcs	GI endcap, 1 inch diam
				3 sets	Pressure gauge, 1 to 20 kpa
				1 set	Pressure relief valve
				1 set	Flame arrester

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements of MOA with other partner-companies/institutions.

B. COC

COC 1 LEAD BIOGAS PLANT SITE PREPARATION

QTY	TOOLS	QTY	EQUIPMENT	QTY	MATERIALS
6pcs	Bolo (scythe)	3units	Grass cutter	5L	Gasoline fuel
6pcs	Wetstone (hasaan)	1unit	Backhoe*	5 sets	Staking and lay outing materials
6pcs	Rake	1unit	Dozer*	50pcs	2"x2"x10' lumber
6pcs	Mattock (piko)	1unit	Dump truck*	5kg	Common nail 2"
6pcs	Spade			5kg	Common nail 3"
6pcs	Digging bars			5kg	Common nail 4"
12pcs	Pail (2gal capacity)			200 m	Nylon string
3pcs	Construction Cart			25 pcs	Sack
6pcs	Measuring tape (50m)			6 cans	Spray paint
6pcs	Pruning cutter			4 pcs	Reinforce concrete pipe (RCP)
25 pcs	Steel tape (5m)			25 pcs	Construction book
6 pcs	Hammer			25 pcs	Ball pen
6 pcs	Shovel			25 pcs	Pencil
6 pcs	Saw			150 m (1 roll)	Rope, 10 mm diameter
6pcs	Pliers				

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements of MOA with other partner-companies/institutions. *Sourcing of machinery services

COC2 SUPERVISE BIOGAS PLANT CONSTRUCTION

QTY	TOOLS	QTY	EQUIPMENT	QTY	MATERIALS
6 pcs	Rake	1 unit	air compressor	6cans	Spray paint
6 pcs	Bolo (scythe)	3 units	Grinder cutter	1 galon	Water proofing Sealant
6 pcs	Mattok (Piko)	3 units	Hand drill	25 pcs	Construction book
6 pcs	Spade	1unit	Backhoe*	25 pcs	Ball pen
6 pcs	Digging bars	1unit	Dozer*	25 pcs	Pencil
12 pcs	Pail, (2 gal capacity)	1unit	Dump truck*	6 pcs	Flexible hose, 6m
6pcs	Measuring tape (50m)	1 unit	Chipping gun	PVC pipes	
25 pcs	Steel tape (5m)	1 unit	Mixer(capacity one-bagger)	4 pcs	PVC pipes, 2inches diam.
6 pcs	Skuala (for research)12"	1 unit	Concrete vibrator	4pcs	PVC pipes, 4 inches diam
6 pcs	Screw driver			4 pcs	PVC pipes, 6 inches diam
6 pcs	Level hose, 5m				Coupling
6 pcs	Hammer			3 pcs	Coupling, 2 inches diam
6 pcs	Long digging bars			3 pcs	Coupling,4 inches diam
6 pcs	Shovel			3 pcs	Coupling, 6 inches diam
6 pcs	Spade shovel				elbow

12 pcs	Cement pail			3 pcs	Elbow, 2 inches diam
12 pcs	Rotella (metal)			3 pcs	Elbow, 4 inches diam
6 pcs	Plumb bob			3 pcs	Elbow, 6 inches
20 m	Water hose				PVC ball valves
6 pcs	Paint brush, 4-inch			1 pc	PVC ball valves 2 inch diam
6pcs	Firebrick knife			1 pc	PVC ball valves 4 inch diam
6 pcs	Cement trowels			1 pc	PVC ball valves 6 inch diam
6 pcs	Saw			PVC tee	
6 pcs	Pliers			3 pcs	PVC tee2 inch diam
6 sets	Plastic level hose, 6m			3 pcs	PVC tee4 inch diam
3 units	Cartilla (construction cart)			3 pcs	PVC tee 6 inch diam
6 sets	Wooden measuring box (1' x 1' x 1.2')			9 bags	Cement
10 m	Construction cloth(1/4-inch mesh size)			5 cu. meter	Sand
				5 cu. m	Gravel
				10 pcs	Rebars, 10 mm diam
				10 pcs	Rebars, 12 mm diam
				6 sets	Staking and lay outing materials
				50pcs	2"x2"x10' lumber
				5kg	Common nail 2"
				5kg	Common nail 3"
				5kg	Common nail 4"
				200 m	Nylon string
				150 m	rope, (10 mm in diameter)
				PPEs	
				25 pcs	Masks
				25 pcs	Goggles
				25 pair	Gloves
				25 pair	Boots
				25 pcs	Long sleeves
				25 pcs	Safety hats

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements of MOA with other partner-companies/institutions. *Sourcing of machinery services

COC3 LEAD INSTALLATION OF BIOGAS CONVEYANCE SYSTEM

QTY	TOOLS	QTY	EQUIPMENT	QTY	MATERIALS
6pcs	Measuring tape (50m)	1 unit	Air compressor	6 cans	Spray paint
25 pcs	Steel tape (5m)	3 units	Grinder cutter	10 Kg	Paraffin wax
6 pcs	Skuala (for research)12"	3 units	Hand drill	1 L	Sealant
6 pcs	Screw driver			25 pcs	Construction book
6 pcs	Pipe cutter			25 pcs	Ball pen

6 pcs	Wrench			25 pcs	Pencil
6 pcs	Pipe wrench, 2 inch diam			6 pcs	Flexible hose, 6m
6 sets	Combination wrench			**PE pipes**	
6 pcs	Adjustable wrench,2 inch diam			1 roll	PE pipes, 1inches diam.
6 sets	Allen wrench			1 roll	PE pipes, 2 inches diam
6 pcs.	Hacksaw			**PE Coupling**	
1 set	Pipe fitter tool kit			3 pcs	Coupling, 1 inches diam
1 set	Pipe fitter clamp, 4 inches in diam			3 pcs	Coupling,2 inches diam
6 pcs	Blow torch			**PE elbow**	
6 pcs	Level hose, 5m			3 pcs	PE Elbow, 1 inches diam
6 pcs	Hammer			3 pcs	PE Elbow, 2inches diam
6 sets	Laying out and staking materials				PVC ball valves
6 pcs	Long digging bars			1 pc	PVC ball valves 1 inch diam
6 pcs	Shovel			1 pc	PVC ball valves 2 inch diam
6 pcs	Spade shovel			5 bags	Cement
12 pcs	Cement pail			3 cu. meter	Sand
12 pcs	Rotella (metal)			3 cu. m	Gravel
6 pcs	Plumb bob			200 m	Nylon string
20 m	Water hose			10 pcs	Rebars, 10 mm diam
6 pcs	Paint brush, 4-inch			150 m	Rope, 15m (10 mm in diameter)
6 pcs	Cement trowels			6 sets	condensation trap: • Saddle clamp, 2 inch x 1 inch • Nipple, 1 inch in diam by 4 inch • PVC ball valve, 1 inch diam
6 pcs	Saw			**PPEs**	
6 pcs	Pliers			25 pcs	Masks
6 sets	Plastic level hose, 6m			25 pcs	Goggles
6 sets	Wooden measuring box (1' x 1' x 1.2')			25 pair	Gloves
				25 pair	Boots
				25 pcs	Long sleeves
				25 pcs	Safety hats
				5 sets	Staking and lay outing materials
				50pcs	2"x2"x10' lumber
				5kg	Common nail 2"
				5kg	Common nail 3"
				5kg	Common nail 4"
				200 m	Nylon string
				20 pcs	Teflon tape
				1 box	Screw

				10 pcs	Sand paper
				1 L	Detergent soap
				5 cans	Solvent cement, 200 ml
				5 sets	Pipe support
				5 pcs	Endcap, 1 inch diam
				5 pcs	Endcap, 2 inch diam
				1 pc	Flow meter
				3 pcs	GI pipe, 1inch diam
				3 pcs	Check valve, 1 inch diam, brass
				3 pcs	Gate valve,1 inch diam, brass
				10 pcs	GI elbow, 1 inch diam
				10 pcs	GI tee, 1 inch diam
				10 pcs	GI coupling, 1 inch diam
				10 pcs	GI endcap, 1 inch diam
				3 sets	Pressure gauge, 1 to 20 kpa
				1 set	Pressure relief valve
				1 set	Flame arrester

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements of MOA with other partner-companies/institutions. *Sourcing of machinery services

3.5 TRAINING FACILITIES

BIOGAS PLANT INSTALLATION NC III

Based on a class size of 25 students/trainees.

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS	GRAND TOTAL AREA IN SQ. METERS
A. Building (permanent)				**133**
• Student/Trainee Lecture Room	2.00 x 1.00 per student/trainee	2.00 sq.m. x 25 students	**50.00**	
• Learning Resource Center	5.00 x 5.00	25.00	**25.00**	
• Wash room/Comfort room - Male - Female - PWD	 2.00 x 3.00 2.00 x 3.00 4.00 x 4.00		**28.00** 6.00 6.00 16.00	
• Store room	5.00 x 6.00		**30.00**	
B. Shop and Farm area				**1,000**
With temporary facility (4mx5m)-transfer to shop and farm area facilities				
		TOTAL AREA		**1,133**

Note: Access to and use of equipment/facilities can be provided through cooperative arrangements of MOA with other partner-companies/institutions.

3.6 TRAINER'S QUALIFICATIONS FOR BIOGAS PLANT INSTALLATION NC III

- Must be a holder of National TVET Trainer Certificate in Biogas Plant Installation NCIII **OR** BS Agricultural Engineering and NTTC in Biogas Plant Installation NC III
- Must have at least two (2) years job/industry experience within the last five (5) years

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 ASSESSMENT 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 a full qualification or employable unit(s) of competency in partial fulfillment of the requirements of the national qualification.

4.1. NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1.1 The Full National Qualification of **BIOGAS PLANT INSTALLATION NC III** shall be acquired through the accumulation of Certificates of Competency in the following units of competencies:

COC 1: Lead Biogas Plant Site Preparation

COC 2: Supervise Biogas Plant Construction

COC 3: Lead Installation of Biogas Conveyance System

4.1.2 Upon accumulation of the COCs acquired, an individual shall be issued the corresponding National Certificate for the Qualification.

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 education, informal training, and work or life experiences may apply for recognition in a particular qualification through competency assessment.

4.1.5 The following are qualified to apply for assessment:

4.1.5.1 Graduating students/trainees of WTR-registered programs, graduates of NTR programs or graduates of formal/non-formal/informal including enterprise-based training programs related to BIOGAS PLANT INSTALLATION

4.1.5.2 Industry workers in BIOGAS PLANT INSTALLATION

4.1.6 Re-assessment shall focus only on the specific area/s where the candidate has not satisfactorily achieved the required level of competence AND must be undertaken within two (2) years during the period of validity of the Training Regulations.

4.1.7 A candidate who fails the assessment for two (2) consecutive times shall be advised to go through a refresher course before taking another assessment.

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 to assessment

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.

4.2.4 For Trainer-Assessor

- Holder of National TVET Trainer Certificate Level I (NTTC) on BIOGAS PLANT INSTALLATION NC III
- Have at least 2 years relevant industry experience
- Have assisted in the actual conduct of assessment to at least two (2) candidates.

4.2.5 For Industry Assessor

- Holder of National Certificate on BIOGAS PLANT INSTALLATION NC III
- Holder of Certificate of Competency (COC) in Conduct Competency Assessment under the Trainers Methodology Level I (TM I)
- Have at least two (2) years relevant industry experience
- Have assisted in the actual conduct of assessment to at least two (2) candidates.

Annex A

COMPETENCY MAP FOR AGRICULTURE, FORESTRY AND FISHERY SECTOR
BIOGAS PLANT INSTALLATION NC III

BASIC COMPETENCIES

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

COMMON COMPETENCIES

Prepare construction materials and tools	Observe procedures, specifications and manuals of instruction	Interpret technical drawings and plans	Perform mensuration and calculations	Maintain tools and equipment

CORE COMPETENCIES

Lead Biogas Plant Site Preparation	Supervise Biogas Plant Construction	Lead Installation of Biogas Conveyance System

GLOSSARY OF TERMS

3 R'S	Reduce, Reuse and Recycle
AIR TIGHTNESS TEST	Test to show the gas chamber is air leak proof. This process has to be done right after water tightness test. In fixed-dome model the outlet tank is filled with water until the pressure reach 0.4m water column while the gas valve is closed. Water and air pressure develops inside the digester and water level at the outlet tank rises and measured. Leave for 24 hours. Allowable decrease in level must not exceed 5 mm after 24 hours otherwise the system is not air leak proof. (Reference: Philippine Agricultural Engineering Standards).
BIOGAS	The gas produced when organic wastes decompose in the absence of oxygen. The biogas is composed of 57 to 70% methane, 27 to 43% carbon-dioxide and traces of hydrogen, carbon monoxide, nitrogen, hydrogen sulfide and water vapor. It has a heating value of 540 to 700 BTU per cu. ft.
SMALL BIOGAS SYSTEMS	Biogas system that accommodates 10 to 50 heads swine. Up to 12 cu m sized digester
MEDIUM BIOGAS SYSTEMS	Biogas system that accommodates 51 to 100 heads swine. More than 12 cu m
LARGE BIOGAS SYSTEM	Biogas system that accommodates more than 100 heads swine
CONFIRMATION OF APPROVED PROJECT PLANS	refers to the confirmation of project details
DIGESTER	The part of the biogas system where the slurry of organic waste is retained to digest or be converted into biogas. Most of the time, the digester also contains the biogas chamber.
HYDRAULIC RETENTION TIME	The number of days that organic waste slurry is supposed to remain inside the digester or in an anaerobic condition. The day the slurry enters the digester until the day it comes out. Recommended time is 35 days - This is the ideal time where methanogenic bacteria produce the most biogas. After HRT, the rate of biogas production decreases.
INFLUENT	The mixture of liquid and organic waste which is fed into the digester

INOCULANT OR STARTER MIX	A substrate with high concentration of active methanogenic bacteria used to hasten anaerobic digestion of organic waste; the best source is the digested slurry of an active biogas plant.
APPROVED METHODOLOGIES	refers to documented remedial actions, troubleshooting guide
LEGAL REQUIREMENT IN CLEARING	Laws and regulations in removing/uprooting trees.
METHANE	A compound of carbon and hydrogen (CH4). It is a colorless, odorless and flammable gas. It is the main components of natural gas, coal gas and biogas.
METHANOGENIC BACTERIA OR METHANOGENS	Bacteria that converts organic materials into biogas under anaerobic condition. These bacteria produce more biogas in higher temperature. Countries near the equator.
OSHS	Acronym for “Occupational Safety and Health Standards”
PAES	Acronym for “Philippine Agricultural Engineering Standards”.
PARAFFIN WAX	Wax used in making candle. In biogas, paraffin wax is used to seal minor leaks inside the digester
PERT CPM	Acronym for “Program Evaluation and Review Technique – Critical Path Method” – tool used to assist the project manager in scheduling the activities (i.e., when should each activity start). It includes flow of materials, labor and equipment. It assumes that activity durations are known with certainty.
PPE	Acronym for “Personal Protective Equipment”
QUALITY CONTROL	Overall assurance of quality of work. Mostly used in ensuring water proofing and air proofing of the digester chamber and peripherals. This includes piping works and appliance.
SCUM	The entrained solids caught up by the gas bubbles rising to the water surface. Cumulative formation of scum inhibits biogas production and to extreme extent scum may block the digester gas outlet pipe
SEDIMENT	Solid particles that separates from the slurry and sinks to the bottom of the digester i.e. stones, sand, soil, etc.

SLURRY	Mixture of manure and water usually coming from livestock pens.
ROUTINARY MAINTENANCE	Expected maintenance activities of a completed biogas system. i.e. a) formation of water vapor on gas conveyance pipes, b) removal of scum and sediments inside the digester
TOOLBOX MEETING	refers to orientation on construction jobs
WATER (LIQUID) TIGHTNESS TEST	The digester should be filled with water up to the inlet and outlet pipes level. Allow it to set for 3 to 5 hours until the walls are saturated with water and mark the water level. Set it overnight, if there is significant drop in water level leaks must be remedied. Reference “Philippine Agricultural Engineering Standards”.

TRAINING REGULATIONS (TRs)
DOCUMENT REVISION HISTORY

Qualification Title: **Biogas Plant Installation NCIII**
Qualification Code: **AFFBPI320**

Revision No.	Document Description Types*	Qualification Title	New Version (TESDA Board Resolution No./ Date)	Deployment Circular (TESDA Circular/ Implementing Guidelines)
00	Document Created	Biogas Plant Installation NC III	TB No. 2020-03 / 02/18/2020	TESDA Circular No. 072 series of 2020

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

ACKNOWLEDGEMENT

The Technical Education and Skills Development Authority (TESDA) would like to recognize the commitment of industry stakeholders who shared their time and expertise for the development of this Training Regulations. This TR is also dedicated in memory of Engr. George Q. Canapi, a member of technical experts panel.

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