COMPETENCY STANDARDS

PURE BATTERY PROPELLED ELECTRIC VEHICLE SERVICING LEVEL II

AUTOMOTIVE AND LAND TRANSPORTATION SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
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AUTOMOTIVE AND LAND TRANSPORTATION SECTOR

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COMPETENCY STANDARDS FOR
PURE BATTERY PROPELLED ELECTRIC VEHICLE SERVICING LEVEL II

Section 1 PURE BATTERY PROPELLED ELECTRIC VEHICLE SERVICING LEVEL II QUALIFICATIONS

The **PURE BATTERY PROPELLED ELECTRIC VEHICLE SERVICING LEVEL II** Qualification consists of competencies that a person must achieve to perform periodic maintenance of electric vehicle components in accordance with the manufacturer's specifications. It also covers troubleshooting and repair of electronic parts and components according to user and maintenance manual. It covers the servicing of 2-wheeled, 3-wheeled and 4-wheeled pure battery electric vehicle.

The units of competency comprising this qualification include the following:

Code	BASIC COMPETENCIES
400311210	Participate in workplace communication
400311211	Work in team environment
400311212	Solve/address general workplace problems
400311213	Develop career and life decisions
400311214	Contribute to workplace innovation
400311215	Present relevant information
400311216	Practice occupational safety and health policies and procedures
400311217	Exercise efficient and effective sustainable practices in the workplace
400311218	Practice entrepreneurial skills in the workplace
Code	**COMMON COMPETENCIES**
ALTXXXXXX	Validate electric vehicle specification
ALTXXXXXX	Move and position electric vehicle
ALT723214	Utilize automotive tools
ALT723215	Perform mensuration and calculation
ALT723216	Utilize workshop facilities and equipment
ALT723217	Prepare servicing parts and consumables
ALT723218	Prepare vehicle for servicing and releasing
Code	**CORE COMPETENCIES**
ALTXXXXXX	Repair electric motors and controls
ALTXXXXXX	Replace battery
ALTXXXXXX	Perform periodic maintenance

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

- Automotive Mechanic specialized in EV powered/propelled by pure battery
- Automotive Service Technician of EV powered/propelled by pure battery
- Electric Vehicle Technician

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 **PURE BATTERY PROPELLED VEHICLE SERVICING LEVEL II**.

BASIC COMPETENCIES

UNIT OF COMPETENCY : PARTICIPATE IN WORKPLACE COMMUNICATION

UNIT CODE : 400311210

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

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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	storage of information are used. 1.7 Personal interaction is carried out clearly and concisely.		workplace requirements 1.8 Basic business writing skills 1.9 Interpersonal skills in the workplace 1.10 Active-listening skills
2. Perform duties following workplace instructions	2.1 Written notices and instructions are read and interpreted in accordance with organizational guidelines. 2.2 Routine written instruction are followed based on established procedures. 2.3 Feedback is given to workplace supervisor based instructions/ information received. 2.4 ***Workplace interactions*** are conducted in a courteous manner. 2.5 Where necessary, clarifications about routine workplace procedures and matters concerning conditions of employment are sought and asked from ***appropriate sources***. 2.6 Meetings outcomes are interpreted and implemented.	2.1 Effective verbal and non-verbal communication 2.2 Different modes of communication 2.3 Medium of communication in the workplace 2.4 Organizational/ Workplace policies 2.5 Communication procedures and systems 2.6 Lines of communication 2.7 Technology relevant to the enterprise and the individual's work responsibilities 2.8 Effective questioning techniques (clarifying and probing) 2.9 Workplace etiquette	2.1 Following simple spoken instructions 2.2 Performing routine workplace duties following simple written notices 2.3 Participating in workplace meetings and discussions 2.4 Completing work- related documents 2.5 Estimating, calculating and recording routine workplace measures 2.6 Relating/ Responding to people of various levels in the workplace 2.7 Gathering and providing information in response to workplace requirements 2.8 Basic questioning/querying 2.9 Skills in reading for information 2.10 Skills in locating
3. Complete relevant work- related documents	3.1 Range of ***forms*** relating to conditions of	3.1 Effective verbal and non-verbal communication	3.1 Completing work- related documents

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

RANGE OF VARIABLES

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

EVIDENCE GUIDE

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

UNIT OF COMPETENCY : WORK IN A TEAM ENVIRONMENT

UNIT CODE : 400311211

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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Describe team role and scope	1.1 The ***role and objective of the team*** is identified from available ***sources of information***. 1.2 Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources.	1.1 Group structure 1.2 Group development 1.3 Sources of information	1.1 Communicating with others, appropriately consistent with the culture of the workplace 1.2 Developing ways in improving work structure and performing respective roles in the group or organization
2. Identify one's role and responsibility within a team	2.1 Individual roles and responsibilities within the team environment are identified. 2.2 Roles and objectives of the team is identified from available ***sources of information***. 2.3 Team parameters, reporting relationships and responsibilities are identified based on team discussions and appropriate external sources.	2.1 Team roles and objectives 2.2 Team structure and parameters 2.3 Team development 2.4 Sources of information	2.1 Communicating with others, appropriately consistent with the culture of the workplace 2.2 Developing ways in improving work structure and performing respective roles in the group or organization
3. Work as a team member	3.1 Effective and appropriate forms of communications are used and interactions undertaken with	3.1 Communication Process 3.2 Workplace communication protocol 3.3 Team planning	3.1 Communicating appropriately, consistent with the culture of the workplace 3.2 Interacting

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	team members based on company practices. 3.2 Effective and appropriate contributions made to complement team activities and objectives, based on ***workplace context***. 3.3 Protocols in reporting are observed based on standard company practices. 3.4 Contribute to the development of team work plans based on an understanding of team's role and objectives.	and decision making 3.4 Team thinking 3.5 Team roles 3.6 Process of team development 3.7 Workplace context	effectively with others 3.3 Deciding as an individual and as a group using group think strategies and techniques 3.4 Contributing to Resolution of issues and concerns

RANGE OF VARIABLES

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

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Worked in a team to complete workplace activity 1.2 Worked effectively with others 1.3 Conveyed information in written or oral form 1.4 Selected and used appropriate workplace language 1.5 Followed designated work plan for the job
2. Resource Implications	**The following resources should be provided:** 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Role play involving the participation of individual member to the attainment of organizational goal 3.2 Case studies and scenarios as a basis for discussion of issues and strategies in teamwork 3.3 Socio-drama and socio-metric methods 3.4 Sensitivity techniques 3.5 Written Test
4. Context for Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY : SOLVE/ADDRESS GENERAL WORKPLACE PROBLEMS

UNIT CODE : 400311212

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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify routine problems	1.1 Routine ***problems or procedural problem*** areas are identified. 1.2 Problems to be investigated are defined and determined. 1.3 Current conditions of the problem are identified and documented.	1.1 Current industry hardware and software products and services 1.2 Industry maintenance, service and helpdesk practices, processes and procedures 1.3 Industry standard diagnostic tools 1.4 Malfunctions and resolutions	1.1 Identifying current industry hardware and software products and services 1.2 Identifying current industry maintenance, services and helpdesk practices, processes and procedures. 1.3 Identifying current industry standard diagnostic tools 1.4 Describing common malfunctions and resolutions. 1.5 Determining the root cause of a routine malfunction
2. Look for solutions to routine problems	2.1 Potential solutions to problem are identified. 2.2 Recommendations about possible solutions are developed, ***documented***, ranked and presented to	2.1 Current industry hardware and software products and services 2.2 Industry service and helpdesk practices, processes and procedures 2.3 Operating	2.1 Identifying current industry hardware and software products and services 2.2 Identifying services and helpdesk practices,

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	appropriate person for decision.	systems 2.4 Industry standard diagnostic tools 2.5 Malfunctions and resolutions. 2.6 Root cause analysis	processes and procedures. 2.3 Identifying operating system 2.4 Identifying current industry standard diagnostic tools 2.5 Describing common malfunctions and resolutions. 2.6 Determining the root cause of a routine malfunction
3. Recommend solutions to problems	3.1 Implementation of solutions are ***planned***. 3.2 Evaluation of implemented solutions are planned. 3.3 Recommended solutions are documented and submit to appropriate person for confirmation.	3.1 Standard procedures 3.2 Documentation produce	3.1 Producing documentation that recommends solutions to problems 3.2 Following established procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Problems/Procedural Problem	May include: 1.1 Routine/non – routine processes and quality problems 1.2 Equipment selection, availability and failure 1.3 Teamwork and work allocation problem 1.4 Safety and emergency situations and incidents 1.5 Work-related problems outside of own work area
2. Appropriate person	May include: 2.1 Supervisor or manager 2.2 Peers/work colleagues 2.3 Other members of the organization
3. Document	May include: 3.1 Electronic mail 3.2 Briefing notes 3.3 Written report 3.4 Evaluation report
4. Plan	May include: 4.1 Priority requirements 4.2 Co-ordination and feedback requirements 4.3 Safety requirements 4.4 Risk assessment 4.5 Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determined the root cause of a routine problem. 1.2 Identified solutions to procedural problems. 1.3 Produced documentation that recommends solutions to problems. 1.4 Followed established procedures. 1.5 Referred unresolved problems to support persons.
2. Resource Implications	2.1 Assessment will require access to a workplace over an extended period, or a suitable method of gathering evidence of operating ability over a range of situations.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Case Formulation 3.2 Life Narrative Inquiry 3.3 Standardized test The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DEVELOP CAREER AND LIFE DECISIONS

UNIT CODE : 400311213

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

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Manage one's emotion	1.1 ***Self-management strategies*** are identified. 1.2 Skills to work independently and to show initiative, to be conscientious, and persevering in the face of setbacks and frustrations are developed. 1.3 Techniques for effectively handling negative emotions and ***unpleasant situation*** in the workplace are examined.	1.1 Self-management strategies that assist in regulating behavior and achieving personal and learning goals (e.g. Nine self-management strategies according to Robert Kelley) 1.2 Enablers and barriers in achieving personal and career goals 1.3 Techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.	1.1 Managing properly one's emotions and recognizing situations that cannot be changed and accept them and remain professional 1.2 Developing self-discipline, working independently and showing initiative to achieve personal and career goals 1.3 Showing confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace
2. Develop reflective practice	2.1 Personal strengths and achievements, based on self-assessment strategies and teacher feedback are contemplated. 2.2 Progress when seeking and	2.1 Basic SWOT analysis 2.2 Strategies to improve one's attitude in the workplace 2.3 Gibbs' Reflective Cycle/Model (Description,	2.1 Using the basic SWOT analysis as self-assessment strategy 2.2 Developing reflective practice through realization of

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

RANGE OF VARIABLES

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

EVIDENCE GUIDE

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

UNIT OF COMPETENCY : CONTRIBUTE TO WORKPLACE INNOVATION

UNIT CODE : 400311214

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

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

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

RANGE OF VARIABLES

VARIABLE	RANGE
1. Opportunities for improvement	May include: 1.1 Systems 1.2 Processes 1.3 Procedures 1.4 Protocols 1.5 Codes 1.6 Practices
2. Information	May include: 2.1 Workplace communication problems 2.2 Performance evaluation results 2.3 Team dynamics issues and concerns 2.4 Challenges on return of investment 2.5 New tools, processes and procedures 2.6 New people in the organization
3. People who could provide input	May include: 3.1 Leaders 3.2 Managers 3.3 Specialists 3.4 Associates 3.5 Researchers 3.6 Supervisors 3.7 Staff 3.8 Consultants (external) 3.9 People outside the organization in the same field or similar expertise/industry 3.10 Clients
4. Critical inquiry method	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
5. Reporting skills	May include: 5.1 Data management 5.2 Coding 5.3 Data analysis and interpretation

VARIABLE	RANGE
	5.4 Coherent writing 5.5 Speaking

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified opportunities to do things better. 1.2 Discussed and developed ideas with others on how to contribute to workplace innovation. 1.3 Integrated ideas for change in the workplace. 1.4 Analyzed and reported rooms for innovation and learning in the workplace.
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 : PRESENT RELEVANT INFORMATION

UNIT CODE : 400311215

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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Gather data/ information	1.1 Evidence, facts and information are collected. 1.2 Evaluation, terms of reference and conditions are reviewed to determine whether data/information falls within project scope.	1.1 Organisational protocols 1.2 Confidentiality 1.3 Accuracy 1.4 Business mathematics and statistics 1.5 Data analysis techniques/procedures 1.6 Reporting requirements to a range of audiences 1.7 Legislation, policy and procedures relating to the conduct of evaluations 1.8 Organisational values, ethics and codes of conduct	1.1 Describing organisational protocols relating to client liaison 1.2 Protecting confidentiality 1.3 Describing accuracy 1.4 Computing business mathematics and statistics 1.5 Describing data analysis techniques/ procedures 1.6 Reporting requirements to a range of audiences 1.7 Stating legislation, policy and procedures relating to the conduct of evaluations 1.8 Stating organisational values, ethics and codes of conduct
2. Assess gathered data/ information	2.1 Validity of data/ information is assessed. 2.2 Analysis techniques are applied to assess data/ information. 2.3 Trends and	2.1 Business mathematics and statistics 2.2 Data analysis techniques/ procedures 2.3 Reporting requirements to a	2.1 Computing business mathematics and statistics 2.2 Describing data analysis techniques/ procedures

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	anomalies are identified. 2.4 ***Data analysis techniques*** and procedures are documented. 2.5 Recommendations are made on areas of possible improvement.	range of audiences 2.4 Legislation, policy and procedures relating to the conduct of evaluations 2.5 Organisational values, ethics and codes of conduct	2.3 Reporting requirements to a range of audiences 2.4 Stating legislation, policy and procedures relating to the conduct of evaluations 2.5 Stating organisational values, ethics and codes of conduct
3. Record and present information	Studied data/information are recorded. Recommendations are analysed for action to ensure they are compatible with the project's scope and terms of reference. Interim and final reports are analysed and outcomes are compared to the criteria established at the outset. Findings are presented to stakeholders.	3.1 Data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Legislation, policy and procedures relating to the conduct of evaluations 3.4 Organisational values, ethics and codes of conduct	3.1 Describing data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Stating legislation, policy and procedures relating to the conduct of evaluations 3.4 Stating organisational values, ethics and codes of conduct practices

RANGE OF VARIABLES

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

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determine data / information 1.2 Studied and applied gathered data/information 1.3 Recorded and studied data/information These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
2. Resource Implications	**Specific resources for assessment** 2.1 Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Written Test 3.2 Interview 3.3 Portfolio The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	4.1 In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

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

UNIT CODE : 400311216

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

ELEMENT	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
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.	2.1 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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.3 Required OSH materials, tools and equipment are arranged/ placed in accordance with OSH work standards.		
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 3.2 Interpersonal skills 3.3 Troubleshooting skills 3.4 Critical thinking skills 3.5 Observation skills

RANGE OF VARIABLES

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

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Convey OSH work non-conformities to appropriate personnel 1.2 Identify OSH preventive and control requirements in accordance with OSH work policies and procedures 1.3 Identify OSH work activity material, tools and equipment requirements in accordance with workplace policies and procedures 1.4 Arrange/Place required OSH materials, tools and equipment in accordance with OSH work standards 1.5 Execute work activities in accordance with OSH work standards 1.6 Report OSH activity non-compliance work activities to appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Facilities, materials tools and equipment necessary for the activity
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Observation/Demonstration with oral questioning 3.2 Third party report
4. Context for Assessment	4.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY : EXERCISE EFFICIENT AND EFFECTIVE SUSTAINABLE PRACTICES IN THE WORKPLACE

UNIT CODE : 400311217

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

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

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

RANGE OF VARIABLES

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

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Measured required resource utilization in the workplace using appropriate techniques 1.2 Recorded data in accordance with workplace protocol 1.3 Identified causes of inefficiency and/or ineffectiveness through deductive reasoning 1.4 Validate the identified causes of inefficiency and/or ineffectiveness thru established environmental procedures 1.5 Report efficiency and effectives of resource utilization to appropriate personnel 1.6 Clarify feedback on information/concerns raised with appropriate personnel
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace 2.2 Tools, materials and equipment relevant to the tasks 2.3 PPE 2.4 Manuals and references
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Demonstration 3.2 Oral questioning 3.3 Written examination
4. Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY : PRACTICE ENTREPRENEURIAL SKILLS IN THE WORKPLACE

UNIT CODE : 400311218

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

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply entrepreneurial workplace best practices	1.1 ***Good practices*** relating to workplace operations are observed and selected following workplace policy. 1.2 Quality procedures and practices are complied with according to workplace requirements. 1.3 Cost-conscious habits in ***resource utilization*** are applied based on industry standards.	1.1 Workplace best practices, policies and criteria 1.2 Resource utilization 1.3 Ways in fostering entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness • Safety-consciousness • Resourcefulness	1.1 Communication skills 1.2 Complying with quality procedures
2. Communicate entrepreneurial workplace best practices	2.1 Observed good practices relating to workplace operations are communicated to ***appropriate person***. 2.2 Observed quality procedures and practices are communicated to appropriate person 2.3 Cost-conscious habits in resource utilization are communicated based on industry standards.	2.1 Workplace best practices, policies and criteria 2.2 Resource utilization 2.3 Ways in fostering entrepreneurial attitudes: • Patience • Honesty • Quality-consciousness • Safety-consciousness • Resourcefulness	2.1 Communication skills 2.2 Complying with quality procedures 2.3 Following workplace communication protocol
3. Implement cost-effective	3.1 Preservation and optimization of	3.1 Optimization of workplace	3.1 Implementing preservation and

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

RANGE OF VARIABLES

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

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrated ability to identify and sustain cost-effective activities in the workplace 1.2 Demonstrated ability to practice entrepreneurial knowledge, skills and attitudes in the workplace.
2. Resource Implications	**The following resources should be provided:** 2.1 Simulated or actual workplace 2.2 Tools, materials and supplies needed to demonstrate the required tasks 2.3 References and manuals 2.3.1 Enterprise procedures manuals 2.3.2 Company quality policy
3. Methods of Assessment	**Competency in this unit should be assessed through:** 3.1 Interview 3.2 Third-party report
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group

COMMON COMPETENCIES

UNIT OF COMPETENCY : VALIDATE ELECTRIC VEHICLE SPECIFICATION

UNIT CODE : ALTXXXXXX

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude to check body type of the vehicle, check vehicle electric motor type, check vehicle specifications and complete validation of vehicle specification.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check body type of the vehicle	1.1 ***Kind of vehicle*** is determined according to job order. 1.2 ***Vehicle dimensions*** is determined according to manual. 1.3 ***Vehicle weight*** is determined according to the manual. 1.4 ***Body shape*** is determined according to the manual. 1.6 ***Power train*** is determined according to the manual. 1.7 Safety practices are applied following OSHS.	1.1 Kind of vehicle 1.1.1 Aerodyna-mics 1.1.2 Vehicle Dynamics 1.1.3 Body shapes 1.1.4 Power train 1.1.5 Major dimensions 1.2 Vehicle specifications 1.2.1 Vehicle performance 1.2.2 Weight & Measure-ments 1.3 Automotive history 1.4 Documentation/ Accomplishing checklist 1.5 Resources information 1.5.1 Bulletin 1.5.2 Shop manual 1.6 OSHS 1.7 PPEs 1.8 Attitude: 1.8.1 Patience 1.8.2 Attention to details	1.1 Identifying kind of vehicle, dimensions, weight, body shape, and power train 1.2 Accomplishing checklist 1.3 Estimating visually dimensions and masses 1.4 Utilizing resource information 1.5 Wearing PPEs 1.6 Applying safety practices
2. Check vehicle motor type	2.1 ***Electric motor type*** is identified according to	2.1 Principles of Operation, voltage and	2.1 Identifying motor type, parts & components

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	industry standards. 2.2 ***Electric motor power system*** is identified according to manual. 2.3 ***Electric motor components*** are identified following manual.	application 2.2 Principles of Electricity and motors 2.3 History of electric motors 2.4 Hybrid technology 2.5 Resources information 2.5.1 Bulletin 2.5.2 Shop manual	2.2 Identifying electric motor power system 2.3 Utilizing resource information
3. Check vehicle specifications	3.1 VIN plate is inspected for specification of vehicle according to manual. 3.2 Vehicle specification is verified according to ***vehicle reference materials***. 3.3 Vehicle modifications and conversions are checked following the manual. 3.4 Vehicle conversions are inspected following the manual.	3.1 Fundamentals of Automotive engineering: 3.1.1 Understan-ding of power & torque 3.1.2 Gear Ratios 3.1.3 Vehicle Regulations 3.1.4 Knowledge of vehicle performance 3.1.5 Knowledge in Vehicle manufactu-ring process 3.1.6 Knowledge of vehicle use 3.1.7 Automotive history 3.2 Knowledge in specifications 3.3 Reading of brochure, owner's manuals 3.4 Reading of Resources information 3.4.1 Bulletin 3.4.2 Shop manual	3.1 Reading vehicle reference materials 3.2 Conducting vehicle inspection for modification and conversion 3.3 Comparing actual vehicle and specification sheets 3.4 Utilizing resource information
4. Complete validation of vehicle specification	4.1 Vehicle ownership is verified using repair order and vehicle reference	4.1 Reporting to immediate superior 4.2 Documentation/	4.1 Verifying vehicle ownership 4.2 Accomplishing dealers check

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	materials. 4.2 ***Dealers check sheet*** is accomplished following industry standards. 4.3 ***Dealers check sheet*** is submitted to immediate superior following industry standards.	Accomplishing checklist 4.3 Attitude: 4.3.1 Accuracy	sheet 4.3 Reporting skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Kind of vehicle	May include: 1.1 Motorized 1.2 Not Motorized 1.3 On-Road 1.4 Off-Road 1.5 Passenger 1.6 Commercial 1.7 Utility 1.8 Manned 1.9 Unmanned 1.10 Remote control 1.11 Automated/Self Driving 1.12 Guided
2. Vehicle dimensions	May include: 2.1 Overall length 2.2 Overall width 2.3 Overall height 2.4 Wheelbase 2.5 Tread 2.6 Minimum running ground clearance 2.7 Room Length 2.8 Room Width 2.9 Room Height 2.10 Overhang front 2.11 Overhang rear 2.12 Angle of approach 2.13 Angle of departure
3. Vehicle Weight	May include: 3.1 Gross weight 3.2 Curb weight 3.3 Tare weight 3.4 Net weight
4. Body shape	May include: 4.1 Sedan 4.2 Coupe 4.3 Hardtop 4.4 Convertible 4.5 Multipurpose vehicle (MPV) 4.6 Sports utility vehicle (SUV) 4.7 Truck 4.8 Tractor Head 4.9 Trailer 4.10 Special Utility Truck 4.11 Bus 4.12 Mini Bus 4.13 Articulated bus

VARIABLE	RANGE
	4.14 Asian Utility Vehicle (AUV)
5. Power train	May include: 5.1 4x2 5.2 4x4 5.3 Transmission 5.4 Differential
6. Electric Motor Type	May include: 6.1 DC series motor 6.2 Brushless DC motor 6.3 Permanent Magnet Synchronous motor 6.4 Three-phase induction motor
7. Electrical Motor Power System	May include: 7.1 Motor 7.2 Battery 7.3 On-board charger 7.4 Electric Power Control Unit
8. Electric motor components	May include: 8.1 Rotor 8.2 Stator Core 8.3 Conducting wire 8.4 Frame
9. Vehicle reference materials	May include: 9.1 Warranty booklet 9.2 Brochure of the vehicle 9.3 Vehicle registration
10. Dealers check sheet	May include: 10.1 Vehicle mileage 10.2 Owner’s information 10.3 Damage

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Checked body type of the vehicle 1.2 Checked vehicle motor type 1.3 Checked vehicle specifications 1.4 Completed validation of vehicle specification
2. Resource Implications	The following resources should be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate vehicle or model equivalent 2.3 Materials relevant to the activity 2.4 Resource information, references, and manual
3. Method of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation 3.2 Interview 3.3 Third Party Report 3.4 Written exam 3.5 Demonstration with Oral questioning
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : MOVE AND POSITION ELECTRIC VEHICLE

UNIT CODE : ALTXXXXXX

UNIT DESCRIPTOR : This unit involves the skills and knowledge and attitudes required to move and position vehicle safely including systematic and efficient control of all vehicle functions.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare vehicle for operation	1.1 Vehicle ***multi point inspection*** is conducted according to industry practice. 1.2 ***Cockpit drill*** is performed according to industry practice. 1.3 Vehicle is start-up following owner's manual. 1.4 Parking brake is engaged according to industry practice.	1.1 Revolutions per minute during idle 1.2 Transmission and Differential System 1.3 Vehicle parts, components and functions 1.4 Inspection procedures 1.5 Owner's manual 1.6 Safety procedures	1.1 Performing Cockpit Drill 1.2 Conducting Vehicle Multi point inspection 1.3 Starting the engine 1.4 Using owner's manual
2. Position vehicle	2.1 ***Workshop hazards*** are identified and avoided as per standard operating procedures. 2.2 Vehicle is moved according to Occupational Health and Safety Standards. 2.3 Workshop rules and regulations are recognized according to standard procedures.	2.1 Revolutions per minute in running condition 2.2 Kilometer per hour 2.3 Estimation/ timing 2.4 Transmission and Differential System 2.5 Electric Motors for EV 2.6 Vehicle parts, components and functions 2.7 Defensive driving 2.8 Owner's Manual 2.9 Safety procedures	2.1 Skills in positioning vehicle 2.2 Vehicle positioning estimation skill 2.3 Identifying workshop signs and markings
3. Park and stop the vehicle	3.1 Vehicle is positioned according to ***parking rules and regulations***.	3.1 Vehicle parts, components and functions 3.2 Inspection procedures	3.1 Vehicle positioning estimation skills 3.2 Identifying parking signs

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.2 Parking brake is engaged according to industry practice. 3.3 ***Electrical devices*** are turned off based on manufacturer's specification. 3.4 Vehicle is shut-off following owner's manual	3.3 Owner's Manual 3.4 Procedure in shutting-off vehicle 3.5 Safety procedures 3.6 Parking rules and regulations	and markings

RANGE OF VARIABLES

VARIABLE	RANGE
1. Multi point inspection	May include: 1.1 Check for any obstruction 1.2 Check external condition 1.3 Check internal condition 1.3.1 Transmission 1.3.2 Electric Motor 1.4 Check vehicle drivability
2. Cockpit Drill	May include: 2.1 Car mirror adjustments 2.2 Steering the car 2.3 How to change gears 2.4 Use of parking brake 2.5 Doors, Seat, Steering, Seat belt and Mirrors 2.6 Foot controls 2.7 Hand controls 2.8 Auxiliary controls (indicators)
3. Workshop hazards	May include: 3.1 Workshop tools and materials 3.2 Workshop equipment 3.3 Other vehicles 3.4 Other people 3.5 Oil spills 3.6 Loose parts
4. Parking rules and regulation	May include: 4.1 Parallel parking 4.2 Horizontal parking 4.3 Park facing the wall
5. Electrical devices	May include: 5.1 Lights 5.2 Air conditioning 5.3 Wiper 5.4 Radio

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared vehicle for operation 1.2 Positioned the vehicle 1.3 Parked and stopped the vehicle 1.4 Used owner's manual
2. Resource implication	The following resources MUST be provided: 2.1 Workshop range/area 2.2 Service working bay 2.3 Appropriate vehicle for moving and positioning 2.4 Owner's manual
3. Method of assessment	Competency MUST be assessed through: 3.1 Demonstration with oral questioning 3.2 Written exam 3.3 Interview 3.4 Direct observation
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY : UTILIZE AUTOMOTIVE TOOLS

UNIT CODE : ALT723214

UNIT DESCRIPTOR : This unit covers the knowledge and skills in selecting and using automotive power tools, hand tools and tool keeping.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare automotive tools	1.1 ***Automotive tools*** are identified according to their classification and specification. 1.2 ***Automotive tools and attachments*** are selected according to job requirements. 1.3 ***Automotive tools and attachments*** are inspected for ***defects and damages*** according to manufacturers and work place procedures. 1.4 Safety practices are applied following OSHS.	1.1 Understanding power to size ratio 1.2 Leverage 1.3 Types of power tools and hand tools 1.4 Uses of automotive power tools and hand tools 1.5 Defects and damages of automotive tools and attachments 1.6 Handling of tools 1.7 Interpretation of contents of users manuals 1.8 Safety procedures 1.9 Wearing of PPE	1.1 Identifying defects or damages of tools before use 1.2 Knowledgeable in proper handling of tools 1.3 Identifying tools required for the job 1.4 Inspecting the area were power tools will be use
2. Use automotive tools	2.1 ***Attachments*** are mounted to ***automotive tools*** according to job requirements. 2.2 Power tools are connected to ***power sources*** according to operation's manual. 2.3 Power tools are operated according to operation's manual. 2.4 ***Hand tools*** are utilized according to operation's manual.	2.1 Use of automotive tools 2.2 Application of Torque and pressure 2.3 Unit conversion of torque 2.4 English and metric system 2.5 Types of hand tools 2.6 Types of power tools 2.7 Fundamentals of automotive hand tools and power tools	2.1 Analytical skills 2.2 Technical literacy 2.3 Mounting attachments to automotive tools 2.4 Connecting power tools to power sources 2.5 Operating power tools 2.6 Utilizing hand tools 2.7 Wearing PPEs 2.8 Applying safety practices 2.9 Following

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.5 ***PPEs*** are worn in accordance to OSHS.	2.8 Interpretation of contents of users manuals 2.9 OSHS 2.10 Resources information 2.10.1 Bulletin 2.10.2 Shop manual	manuals
3. Maintain automotive tools	3.1 ***Automotive tools and attachments*** are cleaned according to user's manual. 3.2 ***Automotive tools and attachments*** are checked for serviceability according to workplace and manufacturers procedures. 3.3 ***Defects and damages*** are reported to immediate superior following industry standards. 3.4 ***Automotive tools and attachments*** are stored according to workplace procedures. 3.5 Safety practices are applied following OSHS. 3.6 ***Wastes*** are disposed following environmental law and regulations.	3.1 Different types of power tools and hand tools 3.2 Techniques in tool Arrangement 3.3 Fundamentals of automotive tools 3.4 Cleaning of automotive tools 3.5 Labeling and arranging of power tools and hand tools 3.6 Safety practices 3.7 Procedures in maintaining of power tools and hand tools 3.8 Tagging of damaged/ worn power tools and hand tools 3.9 Reporting damage power tools and hand tools 3.10 Proper disposal of damaged tools 3.11 Proper disposal of chemicals used for cleaning 3.12 OSHS 3.13 Environmental law and regulations 3.14 5S of good housekeeping 3.15 3Rs	3.1 Sorting of tools 3.2 Skills in creating reports 3.3 Cleaning of tools 3.4 Checking, cleaning and storing automotive tools and attachments 3.5 Reporting defects and damages 3.6 Disposing wastes 3.7 Practicing safety procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Automotive tools	May include: 1.1 Power tools 1.1.1 Electric power tools 1.1.1.1 Electric drill 1.1.2 Pneumatic tools 1.2 Basic tools 1.3 Special service tools (SST)
2. Power sources	May include: 2.1 Electric source 2.2 Pneumatic or air 2.3 Hydraulic
3. Basic tools	May include: 3.1 Wrenches 3.2 Pliers 3.3 Screw drivers 3.4 Power handle 3.5 Ratchet 3.6 Multitester 3.7 Flash light 3.8 Rubber mallet 3.9 Hammer 3.10 Jack 3.11 Jack stand 3.12 Choke
4. Attachments	May include: 4.1 Bits 4.2 Sockets 4.3 Extension
5. Defects and damages	May include: 5.1 Tools 5.1.1 Cracks 5.1.2 Breakage 5.1.3 Deformity 5.1.4 Looseness 5.1.5 Corrosions 5.1.6 Leaks 5.2 Attachments 5.2.1 Cracks 5.2.2 Breakage 5.2.3 Deformity 5.2.4 Looseness 5.2.5 Corrosions
6. Personal protective equipment (PPEs)	May include: 6.1 Goggles 6.2 Gloves 6.3 Hard hat 6.4 Safety shoes

VARIABLE	RANGE
	6.5 Dust mask
7. Wastes	May include: 7.1 Dead batteries 7.2 Deformed, cracked, broken bits/sockets/extensions 7.3 Used cleaning chemicals 7.4 Used oil 7.5 Contaminated cleaning materials

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment require evidence that the candidate understands the applications and guidelines specified by the manufacturer. 1.1 Prepared automotive tools 1.2 Used Power tools 1.3 Used Hand tools 1.4 Maintained and stored automotive tools 1.5 Disposed wastes 1.6 Applied safety measures
2. Resource implication	The following resource MUST be provided: 2.1 Appropriate power tools and hand tools 2.2 Tools and materials relevant for training 2.3 Proper place for storage and disposal 2.4 Work shop manuals
3. Method of assessment	Competency MUST be assessed through: 3.1 Written examination 3.2 Demonstrations with oral questioning 3.3 Direct observation 3.4 Third party report 3.5 Interview
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY : PERFORM MENSURATION AND CALCULATION

UNIT CODE : ALT723215

UNIT DESCRIPTOR : This unit covers the knowledge and skills on how to use automotive measuring tools.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select measuring instruments	1.1 Component to be measured is identified based on job requirements. 1.2 ***Automotive measuring instrument*** is identified based on job requirements. 1.3 Correct specifications are obtained from repair manual. 1.4 Measuring tools are calibrated in line with job requirements. 1.5 Measuring instruments are checked for accuracy and adjusted according to manufacturer's manual. 1.6 Defective measuring instruments are reported and returned to toolkeeper following industry standards. 1.7 Safety practices are applied following OSHS.	1.1 Category of measuring instruments 1.2 Types and uses of measuring instruments 1.3 Shapes and Dimensions 1.4 Use of user's manual 1.5 Workshop procedures in reporting defective instruments 1.6 Characteristics of defective measuring instruments 1.7 Procedure in preparing report 1.8 OSHS in calibrating measuring instruments 1.9 Calibration of measuring tools 1.10 Inspection of measuring tools 1.11 Segregation and reporting of defective measuring instruments	1.1 Identifying and selecting measuring instruments 1.2 Visualizing objects and shapes 1.3 Calibration skills 1.4 Identifying defective measuring instruments 1.5 Reporting skills 1.6 Applying safety practices 1.7 Obtaining correct specifications 1.8 Checking measuring instruments for accuracy 1.9 Reporting and segregating defective measuring instruments
2. Carry out measurements and calculation	2.1 ***Automotive measuring instrument*** is selected to achieve required outcome in line with job	2.1 Formulas for volume, areas, perimeters of plane and geometric figures 2.2 Different	2.1 Performing calculation 2.2 Applying formulas for volume, areas, perimeters of

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	requirements. 2.2 Accurate measurements are obtained in line with job requirements. 2.3 ***Calculation*** needed to complete work tasks are performed using ***mathematical operations***. 2.4 Numerical computation is self-checked and corrected for accuracy following manufacturer's workshop manual. 2.3 Tools' limit of accuracy are read following manufacturer's workshop manual. 2.4 Report is submitted to immediate supervisor following industry standard operating procedure. 2.5 Safety practices are applied following OSHS.	automotive measuring instruments 2.3 Calculation & measurement 2.4 Four fundamental operation 2.5 Linear measurement 2.6 Dimensions 2.7 Unit conversion 2.8 Ratio and proportion 2.9 Handling of measuring instruments 2.10 Tools' limit of accuracy 2.11 OSHS 2.12 PPEs	plane and geometric figures 2.3 Handling measuring instruments 2.4 Selecting automotive measuring instruments 2.5 Obtaining accurate measurements 2.6 Performing calculation 2.7 Self-checking and correcting numerical computation 2.8 Reading tools' limit of accuracy 2.9 Applying OSHS 2.10 Wearing of PPEs
3. Maintain measuring instruments	3.1 Measuring instruments are handled following manufacturer's manual. 3.2 Measuring instruments are cleaned following manufacturer's manual. 3.3 Instruments are stored according to manufacturer's specifications and standard operating procedures. 3.4 Safety practices are	3.1 Types of measuring instruments and their uses 3.2 Safe handling procedures in using measuring instruments 3.3 Four fundamental operation of mathematics 3.4 Formula for volume, area, perimeter and other geometric figures 3.5 5S of good	3.1 Handling and maintaining measuring instruments 3.2 Disposing wastes 3.3 Practicing good housekeeping 3.4 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	applied.	housekeeping 3.6 Waste management 3.7 Storing of measuring instruments 3.8 OSHS	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Automotive measuring instruments	May include: 1.1 Torque wrench 1.2 Vernier caliper 1.3 Micrometer (inside and outside) 1.4 Dial gauge 1.5 Feeler gauge 1.7 Pitch/thread gauge 1.8 Multi-tester (analog/digital) 1.9 Vacuum Gauge 1.10 Tire depth gauge 1.11 Battery tester 1.12 Steel tape 1.13 Ruler
2. Calculation	May include: 2.1 Volume 2.2 Area 2.3 Displacement 2.4 Inside diameter 2.5 Circumference 2.6 Length 2.7 Thickness 2.8 Outside diameter 2.9 Taper 2.10 Out of roundness 2.11 Voltage 2.12 Resistance 2.13 Current 2.14 Pressure 2.15 Clearance 2.16 Distortion/run-out 2.17 Torque conversion 2.18 Temperature
3. Mathematical operations	Includes: 3.1 Addition 3.2 Subtraction 3.3 Multiplication 3.4 Division 3.5 Fractions 3.6 Percentages 3.7 Mixed numbers

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate perform the following: 1.1 Selected measuring instruments 1.2 Performed measurements and calculation 1.3 Maintained measuring instruments 1.4 Applied safety practices
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Automotive Measuring Tools & equipment 2.3 Materials relevant to the activity 2.4 Training vehicle or simulators 2.5 User's manual 2.6 Repair manual
3. Method of assessment	Competency MUST be assessed through: 3.1 Written exam 3.2 Demonstration with oral questioning 3.3 Third party report 3.4 Interview
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : UTILIZE WORKSHOP FACILITIES AND EQUIPMENT

UNIT CODE : ALT723216

UNIT DESCRIPTOR : This unit deals with inspecting and cleaning of work area including tools, equipment and facilities. Storage of equipment, including operating of basic workshop equipment.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Perform pre-operation activities	1.1 ***Workshop facilities*** are prepared according to work requirements. 1.2 ***Equipment*** are prepared according to work requirements. 1.3 ***Equipment*** are calibrated following users' manual. 1.4 ***Minor repairs*** are carried out based on users' ***manual***. 1.5 Defective equipment are reported to immediate supervisor following company procedures. 1.6 Safety practices are applied following OSHS.	1.1 Different areas of an automotive service facilities 1.2 Preparation procedures of automotive service facilities 1.3 Different equipment in the automotive service facilities 1.4 Preparation procedures of automotive equipment 1.5 Minor repairs of automotive equipment 1.6 Report of defective equipment 1.7 Reporting procedures for defective equipment 1.8 OSHS practices related to the preparation of facilities and equipment 1.9 Workshop facilities and equipment	1.1 Preparing work area 1.2 Preparing equipment 1.3 Calibrating equipment 1.4 Repairing minor equipment issues 1.5 Reporting defective equipment 1.6 Applying safety practice 1.7 Following manuals

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Use facilities and equipment	2.1 Equipment is operated according to operation ***manual***. 2.2 Facilities are utilized according to workshop procedures. 2.3 Equipment performance is monitored following users' ***manual***. 2.4 Facilities functionalities are monitored following workplace procedures. 2.5 Safety practices are applied following OSHS.	2.1 Operate Equipment 2.2 Identify facilities required for task 2.3 Evaluate equipment operation 2.4 Inspect facility functionalities 2.5 OSHS practices related to operation of facilities and equipment 2.6 Manuals in utilizing facility and equipment 2.7 Monitoring procedure of equipment's performance 2.8 Evaluate equipment operation 2.9 Inspection of facility functionalities	2.1 Operating equipment 2.2 Utilizing facility 2.3 Monitoring equipment performance 2.4 Monitoring functionalities of facility 2.5 Practicing safety 2.6 Following manual
3. Conduct post-operation activities	3.1 Workshop facilities are restored according to 5S of good housekeeping. 3.2 ***Equipment*** are cleaned and stored according to good housekeeping. 3.3 Wastes are disposed following waste management procedure and OSHS. 3.4 ***PPEs*** and Safety practices are applied following OSHS. 3.5 Report is prepared based on workshop procedure.	3.1 5S of Good housekeeping 3.2 3Rs/ Waste segregation and disposal 3.3 Restoration of the facilities 3.4 Maintenance and storage of Equipment 3.5 OSHS 3.6 Preparation of report	3.1 Restoring workshop facilities properly 3.2 Cleaning Equipment 3.3 Storing equipment in proper location 3.4 Disposing waste materials 3.5 Reporting facilities and equipment condition 3.6 Practicing safety 3.7 Practicing 5S and 3Rs

RANGE OF VARIABLES

VARIABLE	RANGE
1. Equipment	May include: 1.1 Lifter (Two Post Lifter / Four Post Lifter/ Scissor type) 1.2 Crocodile Jack 1.3 Jack Stand 1.4 Air Compressor 1.5 Oil drain
2. Workshop facilities	May include: 2.1 Service Stall / Working Bay / Workshop areas for servicing/repairing light and/or heavy vehicle and/or plant transmissions and/or outdoor power equipment 2.2 Overhauling Room 2.3 Electrical / Air-con Room 2.4 Inspection Area 2.5 Open workshop/garage and enclosed, ventilated office area 2.6 Car wash area 2.7 Other variables may include workshop with: 2.7.1 Mess hall 2.7.2 Wash room 2.7.3 Comfort room 2.7.4 Storage Room 2.7.5 Training Room
3. Manuals	May include: 3.1 Vehicle/plant manufacturer specifications 3.2 Company operating procedures 3.3 Industry/Workplace Codes of Practice 3.4 Product manufacturer specifications 3.5 Industry Occupational Health &Safety 3.6 Equipment Operation Guidelines 3.7 Service/workshop/repair manual
4. PPEs	May include: 4.1 Gloves 4.2 Apron 4.3 Goggles 4.4 Safety shoes 4.5 Uniforms 4.6 Cap 4.7 Safety helmet
5. Minor repairs	May include: 5.1 Lubrication 5.2 Bolt tightening 5.3 Worn-out parts replacement

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Performed pre-operation activities 1.2 Used facilities and equipment 1.3 Conducted post-operation activities 1.4 Applied safety practices and good housekeeping 1.5 Disposed wastes
2. Resource implications	The following resources should be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Equipment 2.3 Materials relevant to the activity 2.4 Manuals/references 2.5 PPEs 2.6 Fire Extinguishers
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Written exam 3.2 Demonstration with oral questioning 3.3 Direct observation
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : PREPARE SERVICING PARTS AND CONSUMABLES

UNIT CODE : ALT723217

UNIT DESCRIPTOR : This unit of competency covers the ability to prepare parts and consumables for gasoline and diesel engines in conducting preventive maintenance.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify parts and consumables	1.1 ***Parts and consumables*** are ***determined*** according to job requirements. 1.2 Availability of parts and consumables are confirmed based on stock. 1.3 ***Indirect materials*** are identified according to job requirements. 1.4 ***Hazardous parts and consumables*** are identified according International standards. 1.5 Safety practices are applied according to OSHS.	1.1 Job requirements 1.2 Safety practices 1.3 Understanding manuals 1.4 Hazardous parts and consumables 1.5 Solid waste management act (RA 6969) 1.6 Wearing of PPE's 1.7 OSHS 1.8 Proper storage of materials 1.9 Chemical contents of consumables 1.10 Composition of consumables 1.11 Quality of parts and consumables 1.12 Computation for quantity of parts and consumables 1.13 Vehicle specifications 1.14 Identifying Part no. 1.15 Awareness in part number 1.16 Updated type of parts and consumables	1.1 Determining parts and consumables 1.2 Reading and interpreting job requirements 1.3 Identifying required parts & consumables 1.4 Understanding safety practices 1.5 Determining quantity and quality of parts and consumables 1.6 Confirming availability of parts and consumables 1.7 Identifying indirect materials 1.8 Identifying hazardous parts and consumables 1.9 Applying safety practices 1.10 Understanding safety practices 1.11 Following manuals
2. Retrieve and withdraw parts and consumables	2.1 Requisition slip is prepared according to identified parts and consumables. 2.2 Withdrawal of parts	2.1 Job requirements 2.2 Safety practices 2.3 Understanding manuals 2.4 Hazardous parts	2.1 Reading and interpreting requisition slip 2.2 Validating quantity of parts

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	and materials are recorded. 2.3 Quantity of parts and consumables are validated according to job requirements. 2.4 Parts and materials are handled following safety procedures.	and consumables 2.5 Solid waste management act (RA 6969) 2.6 Wearing of PPE's 2.7 Updated types of parts & consumables for proper usage	and materials 2.3 Handling parts and consumables
3. Complete work process	3.1 Used parts and consumables are labeled and segregated. 3.2 Used parts are packed and returned to customers. 3.3 Consumables are collected for recycling. 3.4 PPEs are worn following OSHS. 3.5 ***Wastes*** are disposed according to RA 6969.	3.1 Labeling and segregation of used parts and consumables 3.2 Job requirements 3.3 Safety practices 3.4 3Rs 3.5 Solid waste management act (RA 6969) 3.6 Wearing of PPE's	3.1 Waste segregation and disposal of parts & consumables according to RA 6969

RANGE OF VARIABLES

VARIABLE	RANGE
1. Parts and consumables	May include: 1.1 Engine oil 1.2 Clutch fluid 1.3 Transmission oil 1.4 Differential oil 1.5 Power steering fluid 1.6 Brake fluid 1.7 Engine coolant 1.8 Engine oil filter 1.9 Fuel filter 1.10 Air cleaner element 1.11 Feed pump strainer 1.12 Sparkplugs (Gasoline engine) 1.13 Battery 1.14 Air cleaner 1.15 Tire 1.16 Wiper blade 1.17 A/C pollen filter 1.18 Bulb 1.19 Brake pad/brake shoe 1.20 Clutch lining
2. Determining parts and consumables	May include: 2.1 Quantity 2.2 Quality
3. Indirect materials	May include: 3.1 Rags 3.2 Saw dust 3.3 Cleaning fluids 3.4 Sand paper
4. Hazardous parts consumables	May include: 4.1 Batteries 4.2 Used oil 4.3 Used fluids 4.4 Used coolant 4.5 Used parts 4.6 Used oil filter
5. Wastes	May include: 5.1 Contaminated consumables 5.2 Contaminated parts

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified parts and consumables 1.2 Retrieved and withdrawn parts and consumables 1.3 Completed work process 1.4 Applied safety practices
2. Resource implications	The following resources should be provided: 2.1 Workplace: Real or simulated work area 2.2 Materials relevant to the activity 2.3 Repair manuals and related reference materials
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Direct observation 3.2 Interview 3.3 Written examination 3.4 Demonstration with oral questioning 3.5 Third party report
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

UNIT OF COMPETENCY : PREPARE VEHICLE FOR SERVICING AND RELEASING

UNIT CODE : ALT723218

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes needed in identifying and preparing the vehicle for servicing and releasing.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Receive vehicle	1.1 Vehicle is located following company standard. 1.2 Checklist is validated for exterior and interior items in accordance with ***vehicle checklist***. 1.3 Job Order is checked for proper assignment according to ***work classification***. 1.4 ***Work bay*** for vehicle is designated based from Job Order. 1.5 Vehicle is moved on the designated ***work bay***.	1.1 Identification of basic vehicle components 1.2 Types of defects 1.3 Read & understand Job Order 1.4 Flat rate time 1.5 Use of PPEs 1.6 Adherence to safety procedures 1.7 Vehicle checklist 1.8 Work classification 1.9 Work bay 1.10 Attitudes 1.10.1 Patient 1.10.2 Attention to details 1.10.3 Honest 1.10.4 Time Conscious	1.1 Completing vehicle checklist 1.2 Classifying work to be performed 1.3 Assigning work bay 1.4 Validating checklist for exterior and interior items 1.5 Checking job order for proper assignment 1.6 Identifying vehicle 1.7 Moving vehicle to designated work bay
2. Prepare vehicle for servicing	2.1 ***Protective covers*** are installed prior to servicing based on workshop operating standards. 2.2 Vehicle is positioned and set-up for lifting according to repair order. 2.3 Vehicle is lifted for servicing following manufacturer's manual. 2.4 Safety practices are applied following	2.1 Familiarization on equipment & facilities 2.2 Time estimation of completion 2.3 Vehicle tagging 2.4 Types of protective covers 2.5 Setting-up of vehicle for lifting 2.6 Read & understand repair order 2.7 Use of PPEs 2.8 Use of safety gears	2.1 Understanding of vehicle status 2.2 Installation of protective covers 2.3 Positioning vehicle 2.4 Operating lifter 2.5 Moving vehicle 2.6 Setting-up vehicle for lifting 2.7 Practicing safety

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	safety procedures.	2.9 OSHS 2.10 Adherence to safety procedures 2.11Attitudes: 2.11.1 Patient 2.11.2 Attention to details 2.11.3 Honest 2.11.4 Time Conscious	
3. Prepare vehicle for releasing	3.1 Job done is confirmed according to repair order. 3.2 Quality check is done based from repair order. 3.3 Transfer of vehicle to wash bay is coordinated according to SOP. 3.3 Vehicle is endorsed to quality control person following workplace procedure.	3.1 Familiarization of equipment & facilities 3.2 Read & understand repair order 3.3 Confirmation of job done 3.4 Quality standards checking 3.5 Coordination of transferring vehicle 3.6 Endorsement procedures for vehicle 3.7 Attitudes 3.7.1 Patient 3.7.2 Attention to details 3.7.3 Honest 3.7.4 Time Conscious	3.1 Confirming job done 3.2 Performing quality checking 3.3 Coordinating transfer of vehicle to wash bay 3.4 Endorsing and turning-over vehicle

RANGE OF VARIABLES

VARIABLE	RANGE
1. Vehicle checklist	May include: 1.1 External scratches, accessories, items, dents, damages and cracks 1.2 Internal items, scratches, noticeable damages, including spare tire, tools, and loose items 1.3 Standard items that are not present during inspection 1.4 Valuable/personal belongings
2. Work classification	May include: 2.1 Body and Paint repair 2.2 General Job repair 2.3 Periodic maintenance service (PMS)
3. Work bay	May include: 3.1 Service Stall / Working Bay / Workshop areas for servicing/repairing light and/or heavy vehicle and/or plant transmissions and/or outdoor power equipment 3.2 Overhauling Room 3.3 Electrical / Air-con Room 3.4 Inspection Area 3.5 Open workshop/garage and enclosed, ventilated office area
5. Protective covers	May include but not limited to: 5.1 Seat Cover 5.2 Steering Wheel Cover 5.3 Handbrake Cover 5.4 Shift Knob Cover 5.5 Fender Cover 5.6 Paper mat

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Received vehicle 1.2 Prepared vehicle for servicing 1.3 Prepared vehicle for releasing 1.4 Applied safety practices
2. Resource implications	The following resources MUST be provided: 2.1 Workplace: Real or simulated work area 2.2 Appropriate Tools & Equipment 2.3 Materials relevant to the activity 2.4 Manuals and references
3. Method of assessment	Competency may be assessed through: 3.1 Direct observation 3.2 Demonstration with Oral questioning 3.3 Interview 3.4 Written Evaluation 3.5 Third Party Report
4. Context of assessment	4.1 Competency may be assessed individually in the actual workplace or through accredited institution.

CORE COMPETENCIES

UNIT OF COMPETENCY : REPAIR ELECTRIC MOTORS AND CONTROLS

UNIT CODE : ALTXXXXXX

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required in the inspection, troubleshooting, repair and testing of electric vehicle motor parts and controllers. It also includes road test and commissioning of electric vehicle after the repair and completion of work process.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare to repair electric motors and controls	1.1 ***Job request*** is secured based on workplace procedure. 1.2 ***Servicing information*** is sourced and interpreted following ***industry criteria***. 1.3 Hazards associated with the work are identified and risks are managed. 1.4 ***Tools, equipment, and materials*** are selected and checked for serviceability. 1.5 Defective and damaged tools and equipment are reported following workplace procedures. 1.6 Availability of materials are checked and reported following workplace procedures. 1.7 ***PPEs*** are prepared and used in line with the job to be performed. 1.8 Safety practices are	1.1 Job request 1.2 Servicing information 1.3 Types of manuals used in the automotive industry 1.4 Identification of symbols used in the manuals 1.5 Identification of work-associated hazards 1.6 Risk management 1.7 Identification of appropriate tools, equipment and test instrument 1.8 Defective and damaged tools and equipment 1.9 Checking and reporting the availability of materials 1.10 PPEs 1.11 OSHS 1.12 Identification of appropriate tools, equipment and test instrument 1.13 Units of measurements 1.14 Unit conversion	1.1 Reading and interpreting automotive manuals and specifications 1.2 Accessing information and data 1.3 Identifying work-associated hazards 1.4 Managing risks 1.5 Selecting and checking tools, equipment and materials 1.6 Reporting defective and damaged tools and equipment 1.7 Checking and reporting availability of materials 1.8 Using tools, equipment and test instrument 1.9 Using PPEs and applying personal safety procedures 1.10 Applying proper inspection procedures

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	applied following OSHS.		
2. Perform repair of electric motors and controls	2.1 Electrical power source and connection are inspected following manufacturer's manual. 2.2 Controllers are checked and adjusted based on the manufacturer's standards. 2.3 Electric motor and controllers are tested and evaluated based on manufacturer's manual. 2.4 Electric motor is disassembled and assembled according to industry procedure. 2.5 ***Parts of electric motor*** are inspected following industry procedure. 2.6 ***Damaged parts*** are identified following industry procedure. 2.7 ***Damaged parts*** are ***repaired and replaced*** based on manufacturer's procedure. 2.8 Safety practices are applied following OSHS.	2.1 Type of electric motor 2.2 Types of manuals used for troubleshooting and repair 2.3 Identification of symbols used in the manuals 2.4 Appropriate tools, equipment and test instrument 2.5 Component parts of DC electric motors and its functions 2.6 Parts of motor controllers and its functions 2.7 Automotive electronic repair 2.8 PNS IEC/TR 60786:2012 Controllers for electric road vehicles 2.9 PNS IEC/TR 60783:2012 Wiring and connectors for electric road vehicles 2.10 IEC 60034-23 Rotating electrical machines - Part 23: Repair, overhaul and reclamation	2.1 Reading and interpreting automotive manuals and specifications 2.2 Using tools, equipment and test instrument 2.3 Using PPEs and applying personal safety procedures 2.4 Applying proper procedures in troubleshooting and repair 2.5 Disassembling/ assembling DC electric motor 2.6 Conducting automotive electrical and electronic repair 2.7 Testing and evaluating diagnosed and repaired unit
3. Check electric vehicle	3.1 Electrical system and other related components are checked based on the manufacturer's manual. 3.2 Electrical power is checked based on motor	3.1 Types of manuals used for electric vehicle maintenance 3.2 Identification of symbols used in the manuals 3.3 Appropriate tools, equipment and	3.1 Reading and interpreting automotive manuals and specifications 3.2 Using testing and measuring instruments 3.3 Conducting

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	requirements. 3.3 Electric motor performance is checked and recorded following manufacturer's manual. 3.4 Controller units are checked based on the manufacturer's manual standards. 3.5 Start-up is performed based on industry procedure. 3.6 Road test is performed following industry procedure.	testing instruments 3.4 Electric vehicle parts, components, subsystems and its functions 3.5 Automotive electrical/ electronic systems 3.6 Procedure on testing and evaluation of EV unit 3.7 Basic driving principles and techniques 3.8 PNS IEC/TR 60783:2012 Wiring and connectors for electric road vehicles 3.9 PNS ISO 6469 series – Electrically propelled road vehicles – Safety specifications	automotive electrical and electronic servicing 3.4 Applying procedures in starting-up, testing and commissioning of EV unit 3.5 Performing basic driving skills
4. Complete work processes	4.1 Electric vehicle is commissioned to immediate superior following industry procedure. 4.2 Work area is restored following 5S of good housekeeping. 4.3 Wastes are managed following environmental rules and regulations. 4.4 Tools and equipment are checked and stored according to workplace standards.	4.1 Fill-up and complete the checklist and job accomplishment report 4.2 Proper recording and reporting. 4.3 Principles of 5S good housekeeping 4.4 RA 9003 Ecological Solid Waste Management Act 4.5 Inspection and storage of tools and equipment	4.1 Commissioning electric vehicle 4.2 Performing record keeping and reporting 4.3 Restoring work area 4.4 Performing 5S of good housekeeping 4.5 Applying proper procedure on waste disposal management 4.6 Performing workplace safety procedures 4.7 Inspecting and storing tools and

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	4.5 Reports are accomplished and submitted to the immediate superior based on the procedures and policies.		equipment

RANGE OF VARIABLES

VARIABLE	RANGE
1. Job request	May include: 1.1 Overcharged battery 1.2 Electric motors and controls 1.2.1 Power supply 1.2.2 Sensors
2. Servicing information	May include: 2.1 Wiring diagram 2.2 Service manuals
3. Industry criteria	May include: 3.1 Manufacturer specifications 3.2 Service or Repair manual 3.3 Workplace procedures 3.4 Safety and environmental requirements 3.5 Service history
4. Tools, equipment and materials	May include: 4.1 Tools 4.1.1 Basic hand tools 4.1.2 Straight hexagon wrench 4.1.3 Torque wrench (Required torque 100kg cm) 4.1.4 Feeler gauge 4.1.5 Wrenches 4.1.6 Ball-peen hammer 4.1.7 Screwdrivers and pliers 4.2 Equipment 4.2.1 Service lamp 4.2.2 Multi-tester, Digital 4.2.3 Tachometer 4.3 Materials 4.3.1 Rags 4.3.2 Shaft seal 4.3.3 Cleaning agent 4.3.3.1 Brush 4.3.3.2 Cleaning solutions 4.3.4 Car protective equipment (CPE) 4.3.5 Insulation tape
5. PPEs	May include: 5.1 Mask 5.2 Safety shoes 5.3 Goggles 5.4 Insulated gloves
6. Parts of electric motor	May include: 6.1 2-wheeled 6.1.1 IC 6.1.2 Magnet 6.1.3 Carbon brush

VARIABLE	RANGE
	6.2 3-wheeled 6.2.1 Field winding and stator 6.2.2 Bearing 6.3 4-wheeled 6.3.1 Field winding and stator 6.3.2 Bearing
7. Damaged parts	May include: 7.1 AC/DC electric motor parts and components 7.1.1 Worn out carbon brush 7.1.2 Strong vibration and different sound from bearings 7.1.3 Burnt armature and field windings 7.2 Motor controllers 7.2.1 Unstable rpm of Pulse Width Modulation (PWM) 7.2.2 Unstable Proportional–Integral (PI) Controller 7.2.3 Malfunctioning sensors 7.3 Wiring harness 7.3.1 Short circuit of connectors 7.3.2 Short circuit of automotive wires 7.3.3 Tear and cracked convoluted tube
8. Repair and replacement of damaged parts	May include: 8.1 Repair of damaged parts: 8.1.1 AC/DC electric motor parts and components 8.1.1.1 Rewinding of armature and field windings 8.2 Replacement of damaged parts: 8.2.1 AC/DC electric motor parts and components 8.2.1.1 Replacement of carbon brush 8.2.1.2 Replacement of bearings 8.2.2 Motor controllers 8.2.2.1 Replacement of Pulse Width Modulation (PWM) 8.2.2.2 Replacement of Proportional–integral (PI) Controller 8.2.2.3 Replacement of sensors 8.2.3 Wiring harness 8.2.3.1 Replacement of connectors 8.2.3.2 Replacement of automotive wires 8.2.3.3 Replacement of convoluted tube

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared to repair electric motors and controls. 1.1.1 Secured job request. 1.1.2 Sourced and interpreted servicing information. 1.1.3 Identified hazards associated with the work and managed risks. 1.1.4 Selected and checked tools, equipment, and materials for serviceability. 1.1.5 Prepared and used PPEs. 1.1.6 Applied safety practices. 1.2 Performed repair of electric motors and controls. 1.2.1 Inspected electrical power source and connection. 1.2.2 Disassembled and assembled electric motor. 1.2.3 Identified damaged parts. 1.2.4 Repaired and replaced damaged parts. 1.2.5 Applied safety practices. 1.3 Checked electric vehicle. 1.3.1 Checked electrical system and other related components. 1.3.2 Performed road test. 1.4 Completed work processes. 1.4.1 Commissioned electric vehicle. 1.4.2 Restored work area. 1.4.3 Managed wastes. 1.4.4 Checked and stored tools and equipment. 1.4.5 Accomplished and submitted reports.
2. Resource Implications	The following resources MUST be provided: 2.1 Actual or simulated workplace 2.2 Materials, tools, and equipment needed to perform the required task 2.3 References and manuals
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration/Direct observation with oral questioning 3.2 Written exam
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 : REPLACE BATTERY

UNIT CODE : XXXXXXXXX

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to inspect and test electric vehicle battery. It also includes testing and reading battery performance, capacity to charge, and tracing and replacement of damage module.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Perform preparatory activities	1.1 Plan and prepare to check and inspect EV parts, component and accessories. 1.2 ***Servicing inspection information*** is sourced and interpreted following ***industry criteria***. 1.3 Wiring diagram, chart and manuals are interpreted in line with the job to be performed. 1.4 ***Tools, equipment, and materials*** are selected and checked for serviceability. 1.5 ***Hazards*** associated with the work are identified and risks are managed. 1.6 ***PPEs*** are prepared and used in line with the job to be performed. 1.7 Safety practices are applied following OSHS.	1.1 Types of manuals used in the automotive industry 1.2 Identification of symbols used in the manuals 1.3 Identification of appropriate tools, equipment and test instrument 1.4 Component parts of EV battery pack and its functions 1.5 Automotive electrical principles 1.6 Identification of work-associated hazards 1.7 Risk management 1.8 PPEs 1.9 Occupational Health and Safety Standards (OSHS)	1.1 Reading and interpreting automotive manuals and specifications 1.2 Accessing information and data 1.3 Identifying work-associated hazards 1.4 Managing risks 1.5 Using tools, equipment and test instrument 1.6 Using PPEs and applying personal safety procedures 1.7 Applying proper procedures in checking and inspecting EV battery pack 1.8 Applying automotive electrical principles
2. Perform inspection	2.1 ***Battery performance and condition*** are	2.1 Types of manuals used in the automotive	2.1 Reading and interpreting automotive

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	inspected according to the standard requirements. 2.2 ***EV battery parts and component*** are inspected following industry criteria. 2.3 ***Equipment*** are utilized for inspection purposes following manufacturer's manual. 2.4 Safety practices are applied according to OSH.	industry 2.2 Identification of symbols used in the manuals 2.3 Identification of appropriate tools, equipment and test instrument 2.4 Component parts of EV battery pack, its functions and charging element 2.5 Automotive electrical/ electronic servicing 2.6 Basic electrical units and measurement 2.7 Procedure in inspecting EV battery parts and components 2.8 PNS ISO 12405-1:2012 Electrically propelled road vehicles - Test specification for lithium-ion traction battery packs and systems - Part 1: High-power applications 2.9 PNS ISO 6469 series – Electrically propelled road vehicles – Safety specifications 2.10 PNS 06:1987 – Lead Acid storage batteries – Specification.	manuals and specifications 2.2 Accessing information and data 2.3 Using tools, equipment and test instrument 2.4 Using PPEs and applying personal safety procedures 2.5 Following proper procedures in checking and inspecting EV battery and Battery Management System 2.6 Testing wiring harness connections 2.7 Following procedures in determining the life cycle of the battery
3. Replace battery module	3.1 Battery module is removed and submitted to testing	3.1 Types of manuals used in the automotive	3.1 Reading and interpreting automotive

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	area for checking. 3.2 Recommendation is secured from testing area. 3.3 Below specification batteries are replaced following industry procedure. 3.4 Safety practices are applied following OSHS. 3.5 Incident report is accomplished following industry procedure.	industry 3.2 Identification of symbols used in the manuals 3.3 Identification of appropriate tools, equipment and test instrument 3.4 Component parts of EV battery pack and charger 3.5 Basic automotive electrical/ electronic servicing 3.6 Procedure in replacing batteries 3.7 Procedure in accomplishing incident report	manuals and specifications 3.2 Accessing information and data 3.3 Using tools, equipment 3.4 Using PPEs and applying personal safety procedures 3.5 Applying basic electronic troubleshooting technique 3.6 Disassembling/ assembling battery pack components 3.7 Disassembling/ assembling Electrical system connections
4. Complete work process	4.1 Final inspection is carried out following manufacturer's specification. 4.2 Electric vehicle is turned-over to superior for quality inspection. 4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools and equipment are checked and stored according to workplace procedures. 4.6 Reports are accomplished and submitted to the immediate superior	4.1 Procedure in inspecting 4.2 Checking and storage of tools and equipment 4.3 Fill-up and complete the checklist and job accomplishment report 4.4 Proper recording and reporting. 4.5 Principles of 5S good housekeeping 4.6 RA 9003 Ecological Solid Waste Management Act 4.7 Occupational Safety and Health Standards (OSHS)	4.1 Performing final inspection 4.2 Performing turn-over of electric vehicle 4.3 Restoring work area 4.4 Checking and storing tools and equipment 4.5 Performing record keeping and reporting 4.6 Applying proper procedure on waste disposal management 4.7 Performing 5S of good housekeeping 4.8 Performing workplace safety procedures

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	based on the procedures and policies. 4.7 Safety practices are applied following OSHS.		

RANGE OF VARIABLES

VARIABLE	RANGE
1. Servicing inspection information	May include: 1.1 Wiring diagram 1.2 Service manuals
2. Industry criteria	May include: 2.1 Manufacturer specifications 2.2 Repair manual 2.3 Workplace procedures 2.4 Safety and environmental requirements 2.5 Service history
3. Tools, equipment, and materials	May include: 3.1 Tools 3.1.1 Basic hand tools 3.1.2 Wrenches 3.1.2.1 Open wrench 3.1.2.2 Combination wrench 3.1.3 Straight hexagon wrench 3.1.4 Torque wrench 3.1.5 Ball-peen hammer 3.1.6 Screwdrivers and pliers 3.1.7 Speedometer 3.2 Equipment 3.2.1 Service lamp 3.2.2 Multi-tester, Digital 3.2.3 Tachometer 3.3 Materials 3.3.1 Rags 3.3.2 Shaft seal 3.3.3 Cleaning agent Brush Cleaning solutions 3.3.4 Car protective equipment (CPE) 3.3.5 Insulation tape
4. Hazards	May include: 4.1 Electrical hazard 4.2 Leak of lead acid battery
5. PPEs	May include: 5.1 Mask 5.2 Safety shoes 5.3 Goggles 5.4 Insulated gloves
6. Battery performance and condition	May include: 6.1 Charging and discharging capacity 6.2 Battery voltage 6.3 Bloated battery

VARIABLE	RANGE
7. EV battery parts and components	May include: 7.1 Wiring harness 7.2 Attached electrical/electronic components of EV 7.3 Battery pack frame and casing 7.4 Battery modules 7.5 Battery cells 7.6 Busbars 7.7 Battery cooling system 7.8 Battery management system BMS 7.9 Sensors

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Performed preparatory activities. 1.1.1 Sourced and interpreted servicing inspection information. 1.1.2 Interpreted wiring diagram, chart and manuals. 1.1.3 Applied safety practices. 1.2 Performed inspection. 1.2.1 Inspected battery performance and condition. 1.2.2 Inspected EV battery parts and components. 1.2.3 Utilized equipment. 1.2.4 Applied safety practices. 1.3 Replaced battery module. 1.3.1 Removed and submitted battery module. 1.3.2 Replaced below specification batteries. 1.4 Completed work process. 1.4.1 Carried out final inspection. 1.4.2 Turned-over electric vehicle to superior. 1.4.3 Restored work area. 1.4.4 Managed wastes 1.4.5 Checked and stored tools and equipment 1.4.6 Accomplished and submitted reports. 1.4.7 Applied safety practices.
2. Resource Implications	The following resources MUST be provided: 2.1 Actual or simulated workplace 2.2 Materials, tools, and equipment needed to perform the required task 2.3 References and manuals
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration/Direct observation with oral questioning 3.2 Written exam
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 : PERFORM PERIODIC MAINTENANCE

UNIT CODE : ALTXXXXXX

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to inspect and conduct periodic maintenance of an electric vehicle.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare for periodic maintenance	1.1 Checking and inspection of EV parts, component and accessories are planned and prepared based on industry procedure. 1.2 ***Servicing inspection information*** is sourced and interpreted following ***industry criteria***. 1.3 Wiring diagram, chart and manuals are interpreted in line with the job to be performed. 1.4 ***Tools and equipment*** are selected and checked for serviceability. 1.6 ***PPEs*** are prepared and used in line with the job to be performed. 1.7 Safety practices are applied following OSHS.	1.1 Types of manuals used in the automotive industry 1.2 Identification of symbols used in the manuals 1.3 Identification of tools, equipment and test instrument 1.4 EV parts, components, subsystems and its functions 1.5 Automotive electrical and electronic systems 1.6 Procedure and standard of inspection 1.7 PPEs 1.8 Occupational Safety and Health and Standards (OSHS)	1.1 Reading and interpreting automotive manuals and specifications 1.2 Accessing information and data 1.3 Using tools, equipment and test instrument 1.4 Using PPEs and applying personal safety procedures 1.5 Applying proper procedures in checking and inspecting EV parts and components 1.6 Interpreting automotive electrical/ electronic system 1.7 Applying safety practices
2. Inspect EV parts and components	2.1 Gear oil is checked for leaks following manufacturer's manual. 2.2 Electric motor is tested following manufacturer's manual.	2.1 Types of manuals used in the automotive industry 2.2 Identification of symbols used in the manuals 2.3 Identification of	2.1 Reading and interpreting automotive manuals and specifications 2.2 Accessing information and data

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.3 Transmission gear is checked for noise following manufacturer's manual. 2.4 ***Electrical system and components*** are checked in accordance with manufacturer's manual. 2.5 ***Steering and suspension system components*** are checked in accordance with service manual. 2.6 ***Final drive system and components*** are checked according to symptoms. 2.7 ***Brake system components*** are checked in accordance with service manual. 2.8 ***Wheels and tires components*** are checked in accordance with service manual. 2.9 Safety practices are applied following OSHS.	appropriate tools, equipment and test instrument 2.4 Principle of operation and maintenance of transmission system and components 2.5 Principle of operation and maintenance of electrical system and components 2.6 Principle of operation and maintenance of steering and suspension system and components 2.7 Principle of operation and maintenance of final drive system and components 2.8 Principle of operation and maintenance of brake system and components 2.9 Principle of operation and maintenance of wheels and tires and components 2.10 Service manual 2.11 Safety and Health and (OSH) requirements 2.12 Waste Management and Segregation	2.3 Using tools, equipment and test instrument 2.4 Using PPEs and applying personal safety procedures 2.5 Applying proper procedures in checking and inspecting transmission system and components 2.6 Applying proper procedures in checking and inspecting electrical system and components 2.7 Applying proper procedures in checking and inspecting steering and suspension system and components 2.8 Applying proper procedures in checking and inspecting final drive system and components 2.9 Applying proper procedures in checking and inspecting brake system and components 2.10 Applying proper procedures in checking and inspecting wheels and tires and components 2.11 Applying safety practices

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Conduct periodic maintenance	3.1 Gasket is changed based on manufacturer's manual. 3.2 Terminals and connectors are cleaned following industry procedure. 3.3 Bolts and nuts are tightened in accordance with service manual 3.4 Electrical connectors, couplers and clamps are properly fitted in accordance to service manual. 3.5 Parts for replacement and repair are recommended following industry procedure. 3.6 Defective parts are replaced in accordance with service manual. 3.7 Final test is conducted to ensure safe and normal steering and suspension system operation following industry procedure. 3.8 Safety practices are applied following OSHS.	3.1 Types of manuals used in the automotive industry 3.2 Identification of symbols used in the manuals 3.3 Identification of appropriate tools, equipment and test instrument 3.4 Adjustment, repair and replacement, and maintenance of EV parts, components, subsystems and its functions in accordance with service manual 3.5 Automotive electrical/ electronics, steering and suspension system operation and maintenance 3.6 Procedure in testing and evaluation 3.7 Basic driving principles and techniques 3.8 Service manual 3.9 Safety and Health and (OSH) requirements 3.10 Waste Management and Segregation	3.1 Reading and interpreting automotive manuals and specifications 3.2 Accessing information and data 3.3 Using tools, equipment and test instrument 3.4 Using PPEs and applying personal safety procedures 3.5 Applying proper procedures in conducting adjustment, repair and replacement, and maintenance of EV parts and components 3.6 Performing automotive electrical/ electronics, steering and suspension system operation and maintenance 3.7 Testing and evaluation of parts and components functionalities, and EV performance in running condition 3.8 Performing basic driving 3.9 Applying safety practices
4. Complete work process	4.1 Final inspection is carried out following manufacturer's specification. 4.2 Electric vehicle is	4.1 Procedure in inspecting 4.2 Checking and storage of tools and equipment	4.1 Performing final inspection 4.2 Performing turn-over of electric vehicle

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	turned-over to superior for quality inspection. 4.3 Work area is restored following 5S of good housekeeping. 4.4 Wastes are managed following environmental rules and regulations. 4.5 Tools and equipment are checked and stored according to workplace procedures. 4.6 Reports are accomplished and submitted to the immediate superior based on the procedures and policies. 4.7 Safety practices are applied following OSHS.	4.3 Proper fill-up and completing the checklist and job accomplishment report 4.4 Proper recording and reporting 4.5 Principles of 5S good housekeeping 4.6 RA 9003 Ecological Solid Waste Management Act 4.7 Occupational Safety and health Standards (OSHS)	4.3 Restoring work area 4.4 Checking and storing tools and equipment 4.5 Performing record keeping and reporting 4.6 Applying proper procedure on waste disposal management 4.7 Performing 5S of good housekeeping 4.8 Accomplishing and submitting reports 4.9 Performing workplace safety procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Servicing inspection information	May include: 1.1 Wiring diagram 1.2 Service manuals
2. Industry criteria	May include: 2.1 Manufacturer specifications 2.2 Repair manual 2.3 Workplace procedures 2.4 Safety and environmental compliance requirements 2.5 Service history
3. Tools and equipment	May include: 3.1 Tools 3.1.1 Basic tools: 3.1.1.1 Combination Pliers 3.1.1.2 Long nose pliers 3.1.1.3 Screw drivers 3.1.1.4 Open end wrench 3.1.1.5 Box end wrench 3.1.1.6 Socket set 3.1.1.7 Vise grip 3.1.1.8 Hexagon wrench set 3.1.1.9 Ball peen hammer 3.1.1.10 Plastic / Rubber Mallet 3.1.1.11 Adjustable wrench 3.1.1.12 Chisel 3.1.2 Special tools 3.1.2.1 Oiler 3.1.2.2 T-handle 3.1.2.3 Impact driver set 3.1.2.4 Snap ring pliers 3.1.2.5 Vacuum Tester 3.1.2.6 Carburetor Synchronizer 3.1.2.7 Multi-Circuit Tester 3.1.2.8 Tachometer 3.1.2.9 Needle-point probe set 3.1.2.10 Mode Select Switch 3.1.2.11 Diagnostic Tool 3.1.3 Measuring tools 3.1.3.1 Steel rule 3.1.3.2 Vernier Caliper 3.1.3.3 Torque wrench 3.1.3.4 Graduated Cylinder 3.2 Equipment 3.2.1 Working table

VARIABLE	RANGE
	3.2.2 Pans 3.2.3 Bench vise 3.2.4 Bench grinder 3.2.5 Battery Charger 3.2.6 Pressure washer 3.2.7 Injector cleaner 3.2.8 Multi-Circuit Tester 3.2.9 Diagnostic Tool
4. PPEs	May include: 4.1 Mask 4.2 Safety shoes 4.3 Goggles 4.4 Gloves 4.5 Coverall suit
5. Electrical system	May include: 5.1 Electrical systems in the engine 5.1.2 Battery 5.2 Electrical systems in the body 5.2.1 Illumination devices 5.2.2 Horn 5.2.3 Meters and gauges 5.2.4 Switches 5.2.5 Wiring System 5.2.6 Contactor
6. Electrical components	May include: 6.1 Electrical systems in the engine 6.1.1 Starting device 6.1.1.1 Contactors 6.1.1.2 Interlock mechanisms 6.1.1.3 Starter switch 6.1.1.4 Side stand switch 6.1.2 Ignition devices 6.1.2.1 Engine stop switch 6.1.2.2 Engine Control Module/ Unit 6.1.2.3 Fuse 6.1.2.4 Battery 6.1.3 Charging devices 6.1.3.1 Regulator rectifier 6.1.3.2 Battery charger 6.1.3.3 Fuse 6.2 Electrical systems in the body 6.2.1 Illumination and signaling devices 6.2.1.1 Headlight 6.2.1.2 Taillight 6.2.1.3 Brake light 6.2.1.4 Turn Signal lights 6.2.1.5 License plate light

VARIABLE	RANGE
	6.2.1.6 Fuses 6.2.2 Horn, Meters and Gauges 6.2.3 Wiring System
7. Steering and suspension system components	May include: 7.1 Steering components 7.1.1 Handlebar 7.1.2 Handlebar holder 7.1.3 Steering stem nut and lock nuts 7.1.4 Steering stem upper and lower bracket 7.1.5 Steering races and balls set 7.1.6 Steering damper 7.2 Suspension components 7.2.1 Front fork Assembly 7.2.2 Spring, front fork 7.2.3 Rear shock 7.2.4 Swing arm 7.2.5 Swing arm bushings 7.2.6 Pivot shaft 7.2.7 Suspension linkages 7.2.8 Damping rod 7.2.9 Oil seal, O-ring 7.2.10 Suspension bushing
8. Final drive system and components	May include: 8.1 Final drive system 8.1.1 Power transmission 8.2 Final drive system components 8.2.1 Differential 8.2.2 Axle
9. Brake system components	May include: 9.1 Mechanical Drum Brakes 9.1.1 Front and rear brake panel 9.1.2 Front and rear brake drum 9.1.3 Front and rear brake drum bearings 9.1.4 Front and rear brake shoe 9.1.5 Brake shoe return springs 9.1.6 Brake cam shafts 9.1.7 Torque link 9.1.8 Brake rod 9.1.9 Brake pedal 9.1.10 Brake lever/s 9.1.11 Brake cable/s

VARIABLE	RANGE
	9.2 Hydraulic Disc Brakes 9.2.1 Brake caliper assembly 9.2.2 Brake master cylinder 9.2.3 Brake pads 9.2.4 Brake disc plates 9.2.5 Brake hoses
10. Wheels and tires components	May include: 10.1 Tire 10.2 Inner tube 10.3 Rims/ Mags/ spokes 10.4 Axles 10.5 Bearings 10.6 Seals 10.7 Tire valve 10.8 Hub and rubber damper

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Prepared for periodic maintenance. 1.1.1 Sourced and interpreted servicing inspection information. 1.1.2 Interpreted wiring diagram, chart and manuals. 1.1.3 Applied safety practices. 1.2 Inspected EV parts and components. 1.2.1 Checked gear oil. 1.2.2 Tested electric motor. 1.2.3 Checked transmission gear. 1.2.4 Checked electrical system and components. 1.2.5 Checked steering and suspension system components. 1.2.6 Checked final drive system and components. 1.2.7 Checked brake system components. 1.2.8 Checked wheels and tires components. 1.3 Conducted periodic maintenance. 1.3.1 Changed gasket. 1.3.2 Cleaned terminals and connectors 1.3.3 Bolts and nuts are tightened. 1.3.4 Fitted electrical connectors, couplers and clamps. 1.3.5 Recommended parts for replacement and repair. 1.3.6 Replaced defective parts. 1.3.7 Conducted final test. 1.4 Completed work process. 1.4.1 Carried out final inspection. 1.4.2 Turned-over electric vehicle to superior. 1.4.3 Restored work area. 1.4.4 Managed wastes 1.4.5 Checked and stored tools and equipment 1.4.6 Accomplished and submitted reports. 1.4.7 Applied safety practices.
2. Resource Implications	The following resources MUST be provided: 2.1 Actual or simulated workplace 2.2 Materials, tools, and equipment needed to perform the required task 2.3 References and manuals
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration/Direct observation with oral questioning 3.2 Written exam
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

SECTION 3 TRAINING ARRANGEMENTS

3.1 TRAINEE ENTRY REQUIREMENTS

Trainees or students wishing to enroll in this course should possess the following requirements.

- Must have basic communication skills
- Must have basic arithmetic skills

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

3.2 TRAINER'S QUALIFICATIONS FOR AUTOMOTIVE AND LAND TRANSPORTATION SECTOR

Trainers who will deliver the training on **PURE BATTERY PROPELLED ELECTRIC VEHICLE SERVICING LEVEL II** should have the following:

- Must be a holder of any Training of Trainer's Certificate (e.g. Trainer's Methodology Certificate (TMC) OR must be a practicing trainer for two (2) years within the last five (5) years;

- Must have two (2) years industry experience within the last five (5) years relevant to Pure Battery Propelled Electric Vehicle

GLOSSARY OF TERMS

1) 4x2	Or 2WD is a vehicle that has a two-wheel drive (2WD) with four wheels.
2) 4x4	Also called 4WD, means a system in which a car's engine powers all 4 wheels evenly.
3) 5S	Is a system for organizing spaces so work can be performed efficiently, effectively, and safely.
4) Aerodynamics	Is the way air moves around things.
5) Arithmetic	Is the branch of mathematics that deals with the study of numbers using various operations on them.
6) Asian Utility Vehicle	A.k.a. AUV were designed to be sold in developing countries – primarily in East Asia.
7) Aspect	A particular part or feature of something.
8) Assessment	A systematic process of documenting and using empirical data on the knowledge, skill, attitudes, and beliefs to refine programs and improve student learning.
9) Battery	Is a device consisting of one or more electrochemical cells with external connections for powering electrical devices.
10) Battery Management System	Is any electronic system that manages a rechargeable battery),monitoring its state, calculating secondary data, reporting that data and controlling its environment.
11) Battery modules	Consists of individual battery cells and modules organized in series and parallel.
12) Busbars	Is a metallic strip or bar, typically housed inside switchgear, panel boards, and busway enclosures for local high current power distribution.
13) Chart	Is a graphical representation for data visualization, in which the data is represented by symbols, such as bars in a bar chart and lines in a line chart.
14) Checklist	A basic example is the "to do list". A more advanced checklist would be a schedule, which lays out tasks to be done according to time of day or other factors.
15) Cockpit	The cockpit is the section where the operator manage the vehicle.

16) Commissioned	Also known as releasing of vehicle.
17) Competency	A set of demonstrable characteristics and skills that enable, and improve the efficiency or performance of a job
18) Component	Part or element of a larger whole, especially a part of a machine or vehicle.
19) Diagram	Is a symbolic representation of information using visualization techniques.
20) Dynamics	The branch of mechanics concerned with the motion of bodies under the action of forces.
21) Element	A part or aspect of something abstract, especially one that is essential or characteristic.
22) Environment	A surroundings or conditions in which a person, works or operates.
23) Etiquette	The conduct or procedure required by good breeding or prescribed by authority to be observed in social or official life.
24) Evidence guide	The evidence guide provides advice to inform and support appropriate assessment of this unit. It contains an overview of the assessment requirements followed by identification of specific aspects of evidence of competency.
25) Fuel Cell	Work like batteries, but they do not run down or need recharging. They produce electricity and heat as long as fuel is supplied.
26) Inspection	Examination or formal evaluation exercise of vehicle part, it involves the measurements, tests, and gauges applied to certain characteristics.
27) Internal Combustion Engine	Is a heat engine in which the combustion of a fuel occurs with an oxidizer (usually air) in a combustion chamber that is an integral part of the working fluid flow circuit.
28) Leverage	To use something that you already have in order to achieve something new or better.
29) Liaison	is a person who acts to arrange and assist interaction between parties.

30) Literacy	Ability to read and write in at least one method of writing, an understanding reflected by mainstream dictionaries.
31) Manuals	An instructional book or booklet that is supplied with almost all technologically advanced consumer products such as vehicles.
32) Mensuration	Measuring of geometric magnitudes, lengths, areas, and volumes.
33) Multi-Purpose Vehicle (MPV)	The term MPV stands for Multi-Purpose Vehicle (MPV). This vehicle type is primarily designed to carry a number of passengers.
34) Occupational Safety and Health	also commonly referred to as OHS is a multidisciplinary field concerned with the safety, health, and welfare of people at occupation.
35) Performance	It is also defined as the action or process of carrying out or accomplishing an action, task, or function.
36) Periodic Maintenance Service	Periodic maintenance is a strategy that requires maintenance tasks to be performed at set time intervals while the vehicle is operational.
37) Personal Protective Equipment	Commonly referred to as "PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses.
38) Policy	Refers to a deliberate system of principles to guide decisions and achieve rational outcomes.
39) Power tools	is a tool that is actuated by an additional power source and mechanism other than the solely manual labor used with hand tools.
40) Power train	Encompasses every component that converts the engine's power into movement. This includes the engine, transmission, the driveshaft, differentials, axles; basically anything from the engine through to the rotating wheels.
41) Procedure	A series of actions conducted in a certain order or manner.
42) Propelled	To drive forward or onward by or as if by means of a force that imparts motion.

43) Regulation	Management of complex systems according to a set of rules and trends.
44) Repair	Includes adjustment and replacement.
45) Requirement	A necessary condition or a functional need that a particular design, parts or process aims to satisfy.
46) Sensors	Are sophisticated devices that are frequently used to detect and respond to electrical or optical signals.
47) Service	Perform routine maintenance or repair work on a vehicle or machine.
48) Solar Cell	Is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect, which is a physical and chemical phenomenon.
49) Specifications	Often refers to a set of documented requirements to be satisfied by a material, design, product, or service of certain industry.
50) Sports utility vehicle (SUV)	Is a car classification that combines elements of road-going passenger cars with features from off-road vehicles, such as raised ground clearance and four-wheel drive.
51) Standards	Something established by authority, custom, or general consent as a model, it contain technical specifications or other precise criteria designed to be used consistently as a rule, guideline, or definition.
52) Subsystems	A set of elements, which is a system itself, and a component of a larger system of vehicle
53) SWOT	Stands for Strengths, Weaknesses, Opportunities, and Threats, and so a SWOT Analysis is a technique for assessing these four aspects of your business.
54) Torque	Is a measure of the force that can cause an object to rotate about an axis.
55) Warranty	Is a type of guarantee that a manufacturer or similar party makes regarding the condition of its product.

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