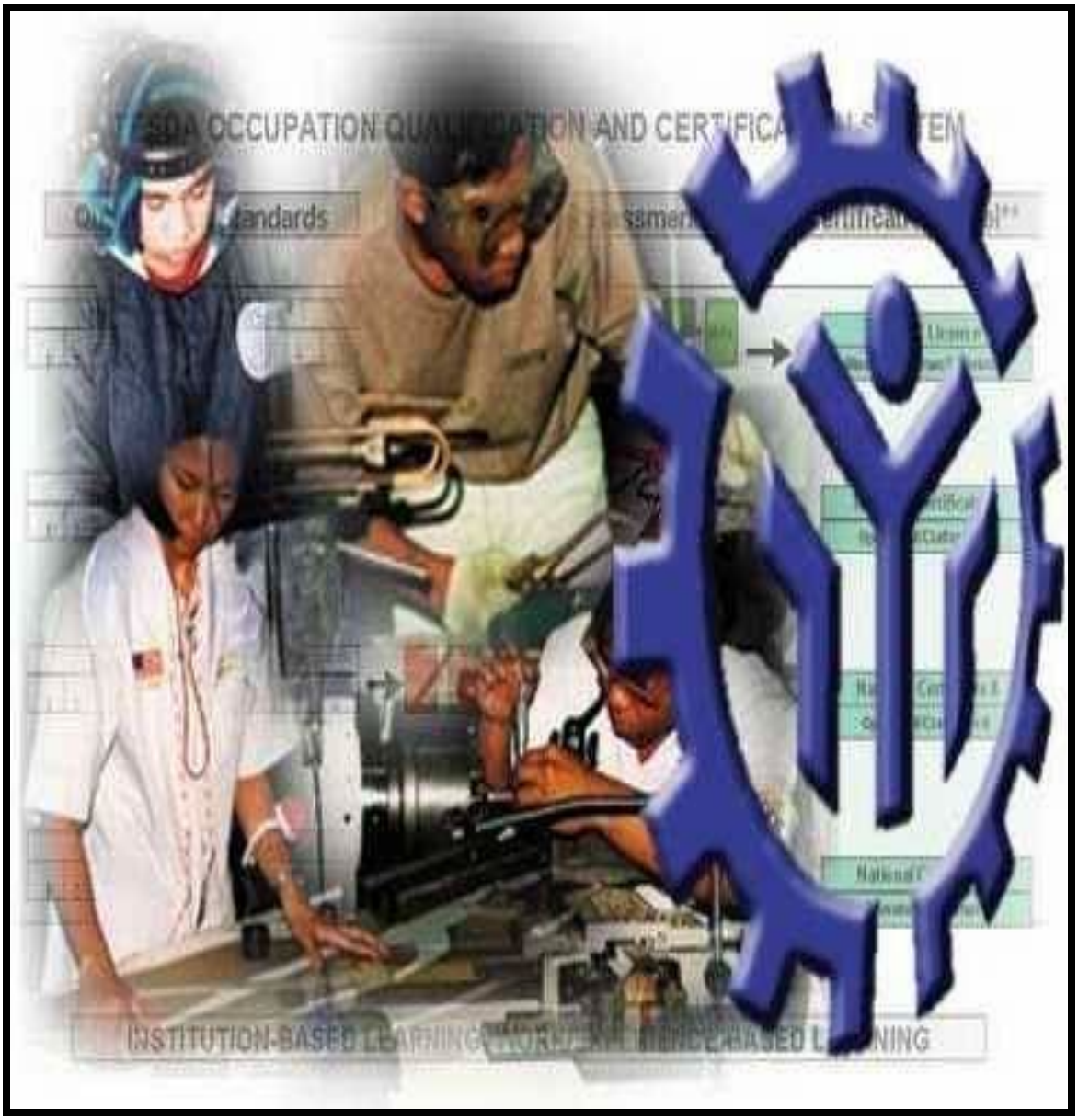
TRAINING REGULATIONS

DIESEL POWER PLANT OPERATION AND MAINTENANCE NC II



UTILITIES SECTOR

Technical Education and Skills Development Authority
East Service Road, South Superhighway, Taguig, Metro Manila

Technical Education and Skills Development Act of 1994
(Republic Act No. 7796)

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

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

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

Each TR has four sections:

Section 1 Definition of Qualification - refers to the group of competencies that describes the different functions of the qualification.

Section 2 Competency Standards - gives the specifications of competencies required for effective work performance.

Section 3 Training Standards - contains information and requirements in designing training program for certain Qualification. It includes curriculum design, training delivery; trainee entry requirements; tools and requirements; tools and equipment; training facilities and trainer's qualification.

Section 4 National Assessment and Certification Arrangements - describe the policies governing assessment and certification procedure

TABLE OF CONTENTS
UTILITIES SECTOR

DIESEL POWER PLANT OPERATION AND MAINTENANCE NC II

TRAINING REGULATIONS FOR
DIESEL POWER PLANT OPERATION AND MAINTENANCE NC II

SECTION 1 DIESEL POWER PLANT OPERATION AND MAINTENANCE NC II QUALIFICATIONS

The DIESEL POWER PLANT OPERATION AND MAINTENANCE NC II Qualification consists of competencies that a person must achieve to enhance the knowledge, skills and attitudes of a trainee/student in tending diesel engine operation as well as maintaining and repairing diesel engine.

This Qualification is packaged from the competency map of the Utility Industry Sector as shown in Annex A.

The Units of Competency comprising this Qualification include the following:

CODE	BASIC COMPETENCIES
500311105	Participate in Workplace Communication
500311106	Work in Team Environment
500311107	Practice Career Professionalism
500311108	Practice Occupational Health and Safety Procedures

CODE	COMMON COMPETENCIES
UTL311202	Perform Mensuration and Calculation
UTL723203	Read, Interpret and Apply Specifications and Manuals
UTL723205	Perform Shop Maintenance
UTL713202	Perform Basic Bench Works
UTL724201	Perform Basic Electrical Works

CODE	CORE COMPETENCIES
UTL723206	Tend Diesel Engine
UTL723208	Maintain and Repair Diesel Engine Systems and Alternator

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

- **Diesel power plant operator**
- **Diesel power plant maintenance technician**

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in Diesel Power Plant Operation and Maintenance NC II.

BASIC COMPETENCIES

UNIT OF COMPETENCY : **PARTICIPATE IN WORKPLACE COMMUNICATION**

UNIT CODE : **500311105**

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
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 ***storage*** of information are used 1.7 Personal interaction is carried out clearly and concisely
2. Participate in workplace meetings and discussions	2.1 Team meetings are attended on time 2.2 Own opinions are clearly expressed and those of others are listened to without interruption 2.3 Meeting inputs are consistent with the meeting purpose and established ***protocols*** 2.4 ***Workplace interactions*** are conducted in a courteous manner 2.5 Questions about simple routine workplace procedures and matters concerning working conditions of employment are tasked and responded to 2.6 Meetings outcomes are interpreted and implemented
3. Complete relevant work related documents	3.1 Range of ***forms*** relating to conditions of employment are completed accurately and legibly 3.2 Workplace data are recorded on standard workplace forms and documents 3.3 Basic mathematical processes are used for routine calculations 3.4 Errors in recording information on forms/ documents are identified and properly acted upon 3.5 Reporting requirements to supervisor are completed according to organizational guidelines

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	1.1 Team members 1.2 Suppliers 1.3 Trade personnel 1.4 Local government 1.5 Industry bodies
2. Medium	2.1 Memorandum 2.2 Circular 2.3 Notice 2.4 Information discussion 2.5 Follow-up or verbal instructions 2.6 Face-to-face communication
3. Storage	3.1 Manual filing system 3.2 Computer-based filing system
4. Forms	4.1 Personnel forms, telephone message forms, safety reports
5. Workplace interactions	5.1 Face-to-face interactions 5.2 Telephone conversation 5.3 Electronic and two-way radio communication 5.4 Written communication including electronic mail, memos, instruction and forms 5.5 Non-verbal communication including gestures, signals, signs and diagrams
6. Protocols	6.1 Observing meeting 6.2 Compliance with meeting decisions 6.3 Obeying meeting instructions

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 communication equipment 1.3 Made use of relevant terms as an aid to transfer information effectively 1.4 Conveyed information effectively adopting the formal or informal communication
2. Underpinning knowledge	2.1 Effective communication 2.2 Different modes of communication 2.3 Written communication 2.4 Organizational policies 2.5 Communication procedures and systems 2.6 Technology relevant to the enterprise and the individual's work responsibilities
3. Underpinning skills	3.1 Follow simple spoken language 3.2 Perform routine workplace duties following simple written notices 3.3 Participate in workplace meetings and discussions 3.4 Complete work related documents 3.5 Estimate, calculate and record routine workplace measures 3.6 Basic mathematical processes of addition, subtraction, division and multiplication 3.7 Ability to relate to people of social range in the workplace 3.8 Gather and provide information in response to workplace requirements
4. Resource implications	The following resources **MUST** be provided: 4.1 Fax machine 4.2 Telephone 4.3 Writing materials 4.4 Internet
5. Method of assessment	Competency **MUST** be assessed through: 5.1 Direct Observation 5.2 Oral interview and written test
6. Context of assessment	6.1 Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY : **WORK IN TEAM ENVIRONMENT**

UNIT CODE : **500311106**

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes to identify role and responsibility as a member of a team.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
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
2. Identify own role and responsibility within team	2.1. Individual role and responsibilities within the team environment are identified 2.2. Roles and responsibility of other team members are identified and recognized 2.3. Reporting relationships within team and external to team are identified
3. Work as a team member	3.1. Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives 3.2. Effective and appropriate contributions made to complement team activities and objectives, based on individual skills and competencies and ***workplace context*** 3.3. Observed protocols in reporting using standard operating procedures 3.4. Contribute to the development of teamwork plans based on an understanding of team's role and objectives and individual competencies of the members.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	1.1 Work activities in a team environment with enterprise or specific sector 1.2 Limited discretion, initiative and judgment may be demonstrated on the job, either individually or in a team environment
2. Sources of information	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 Occupational Health and Safety (OHS) and environmental standards
3. Workplace context	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 Operated 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 1.6 Reported outcomes
2. Underpinning knowledge	2.1 Communication process 2.2 Team structure 2.3 Team roles 2.4 Group planning and decision making
3. Underpinning skills	3.1 Communicate appropriately, consistent with the culture of the workplace
4. Resource implications	The following resources **MUST** be provided: 4.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 4.2. Materials relevant to the proposed activity or tasks
5. Method of assessment	Competency may be assessed through: 5.1 Observation of the individual member in relation to the work activities of the group 5.2 Observation of simulation and or role play involving the participation of individual member to the attainment of organizational goal 5.3 Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
6. Context of assessment	6.1 Competency may be assessed in workplace or in a simulated workplace setting 6.2 Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY : **PRACTICE CAREER PROFESSIONALISM**

UNIT CODE : **500311107**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in promoting career growth and advancement.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Integrate personal objectives with organizational goals	1.1 Personal growth and work plans are pursued towards improving the qualifications set for the profession 1.2 Intra- and interpersonal relationships ~~is~~ are maintained in the course of managing oneself based on performance ***evaluation*** 1.3 Commitment to the organization and its goal is demonstrated in the performance of duties
2. Set and meet work priorities	2.1 Competing demands are prioritized to achieve personal, team and organizational goals and objectives. 2.2 ***Resources*** are utilized efficiently and effectively to manage work priorities and commitments 2.3 Practices along economic use and maintenance of equipment and facilities are followed as per established procedures
3. Maintain professional growth and development	3.1 ***Trainings and career opportunities*** are identified and availed of based on job requirements 3.2 ***Recognitions*** are sought/received and demonstrated as proof of career advancement 3.3 ***Licenses and/or certifications*** relevant to job and career are obtained and renewed

RANGE OF VARIABLES

VARIABLE	RANGE
1. Evaluation	1.1 Performance Appraisal 1.2 Psychological Profile 1.3 Aptitude Tests
2. Resources	2.1 Human 2.2 Financial 2.3 Technology 2.3.1 Hardware 2.3.2 Software
3. Trainings and career opportunities	3.1 Participation in training programs 3.1.1 Technical 3.1.2 Supervisory 3.1.3 Managerial 3.1.4 Continuing Education 3.2 Serving as Resource Persons in conferences and workshops
4. Recognitions	4.1 Recommendations 4.2 Citations 4.3 Certificate of Appreciations 4.4 Commendations 4.5 Awards 4.6 Tangible and Intangible Rewards
5. Licenses and/or certifications	5.1 National Certificates 5.2 Certificate of Competency 5.3 Support Level Licenses 5.4 Professional Licenses

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Attained job targets within key result areas (KRAs) 1.2 Maintained intra - and interpersonal relationship in the course of managing oneself based on performance evaluation 1.3 Completed trainings and career opportunities which are based on the requirements of the industries 1.4 Acquired and maintained licenses and/or certifications according to the requirement of the qualification
2. Underpinning knowledge and attitudes	2.1 Work values and ethics (Code of Conduct, Code of Ethics, etc.) 2.2 Company policies 2.3 Company-operations, procedures and standards 2.4 Fundamental rights at work including gender sensitivity 2.5 Personal hygiene practices
3. Underpinning skills	3.1 Appropriate practice of personal hygiene 3.2 Intra- and Interpersonal skills 3.3 Communication skills
4. Resource implications	The following resources **MUST** be provided: 4.1 Workplace or assessment location 4.2 Case studies/scenarios
5. Method of assessment	Competency may be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Simulation/Role-plays 5.4 Observation 5.5 Third Party Reports 5.6 Exams and Tests
6. Context of assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

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

UNIT CODE : **500311108**

UNIT DESCRIPTOR : This unit covers the outcomes required to comply with regulatory and organizational requirements for occupational health and safety.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify hazards and risks	1.1 ***Safety regulations*** and workplace safety and hazard control practices and procedures are clarified and explained based on organization procedures 1.2 ***Hazards/risks*** in the workplace and their corresponding indicators are identified to minimize or eliminate risk to co-workers, workplace and environment in accordance with organization procedures 1.3 ***Contingency measures*** during workplace accidents, fire and other emergencies are recognized and established in accordance with organization procedures
2. Evaluate hazards and risks	2.1 Terms of maximum tolerable limits which when exceeded will result in harm or damage are identified based on threshold limit values (TLV) 2.2 Effects of the hazards are determined 2.3 OHS issues and/or concerns and identified safety hazards are reported to designated personnel in accordance with workplace requirements and relevant workplace OHS legislation
3. Control hazards and risks	3.1 Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace are consistently followed 3.2 Procedures for dealing with workplace accidents, fire and emergencies are followed in accordance with organization OHS policies 3.3 ***Personal protective equipment (PPE)*** is correctly used in accordance with organization OHS procedures and practices 3.4 Appropriate assistance is provided in the event of a workplace emergency in accordance with established organization protocol
4. Maintain OHS awareness	4.1 ***Emergency-related drills and trainings*** are participated in as per established organization guidelines and procedures 4.2 ***OHS personal records*** are completed and updated in accordance with workplace requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Safety regulations	May include but are not limited to: 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 Philippine Occupational Safety and Health Standards 1.6 DOLE regulations on safety legal requirements 1.7 ECC regulations
2. Hazards/Risks	May include but are not limited to: 2.1 Physical hazards – impact, illumination, pressure, noise, vibration, temperature, radiation 2.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, insects 2.3 Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors 2.4 Ergonomics • Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles • Physiological factors – monotony, personal relationship, work out cycle
3. Contingency measures	May include but are not limited to: 3.1 Evacuation 3.2 Isolation 3.3 Decontamination 3.4 (Calling designed) emergency personnel
4. PPE	May include but are not limited to: 4.1 Mask 4.2 Gloves 4.3 Goggles 4.4 Hair Net/cap/bonnet 4.5 Face mask/shield 4.6 Ear muffs 4.7 Apron/Gown/coverall/jump suit 4.8 Anti-static suits
5. Emergency-related drills and training	5.1 Fire drill 5.2 Earthquake drill 5.3 Basic life support/CPR 5.4 First aid 5.5 Spillage control 5.6 Decontamination of chemical and toxic 5.7 Disaster preparedness/management
6. OHS personal records	6.1 Medical/Health records 6.2 Incident reports 6.3 Accident reports 6.4 OHS-related training completed

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Explained clearly established workplace safety and hazard control practices and procedures 1.2 Identified hazards/risks in the workplace and its corresponding indicators in accordance with company procedures 1.3 Recognized contingency measures during workplace accidents, fire and other emergencies 1.4 Identified terms of maximum tolerable limits based on threshold limit value- TLV. 1.5 Followed Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace 1.6 Used Personal Protective Equipment (PPE) in accordance with company OHS procedures and practices 1.7 Completed and updated OHS personal records in accordance with workplace requirements
2. Underpinning knowledge and attitudes	2.1 OHS procedures and practices and regulations 2.2 PPE types and uses 2.3 Personal hygiene practices 2.4 Hazards/risks identification and control 2.5 Threshold Limit Value -TLV 2.6 OHS indicators 2.7 Organization safety and health protocol 2.8 Safety consciousness 2.9 Health consciousness
3. Underpinning skills	3.1 Practice of personal hygiene 3.2 Hazards/risks identification and control skills 3.3 Interpersonal skills 3.4 Communication skills
4. Resource implications	The following resources **MUST** be provided: 4.1 Workplace or assessment location 4.2 OHS personal records 4.3 PPE 4.4 Health records
3. Method of assessment	Competency **MUST** be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Case Study/Situation
4. Context of assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

COMMON COMPETENCIES

UNIT OF COMPETENCY : **PERFORM MENSURATION AND CALCULATION**

UNIT CODE : **UTL311202**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in identifying caring, handling and using measuring instruments.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Select measuring instruments	1.1 Object or component to be measured is identified 1.2 Correct specifications are obtained from relevant source 1.3 Appropriate ***measuring instrument*** is selected according to job requirements
2. Carry out measurements and calculation	2.1 Measuring tools are selected in line with job requirements 2.2 Accurate measurements are obtained in accordance with job requirements. 2.3 ***Calculation*** needed to complete work tasks are performed using the four fundamental operation of addition (+), subtraction (-), multiplication (x) and division (/). 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks. 2.5 Numerical computation is self-checked and corrected for accuracy 2.6 Instruments are read to the limit of accuracy of the tool.
3. Maintain measuring instruments	3.1 Measuring instruments are kept free from corrosion 3.2 Measuring instruments are not dropped to avoid damage 3.3 Measuring instruments are cleaned before and after using.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring instruments	Measuring instruments includes: 1.1 Multitester 1.2 Micrometer (In-out, depth) 1.3 Vernier caliper (Out, inside) 1.4 Dial Gauge with Mag. Std. 1.5 Plastigauge 1.6 Straight Edge 1.7 Thickness gauge 1.8 Torque Gauge 1.9 Small Hole gauge 1.10 Telescopic Gauge 1.11 Try square 1.12 Protractor 1.13 Combination gauge 1.14 Steel rule
2. Calculation	Kinds of part mensuration 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 Oil clearance 2.12 End play/thrust clearance

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Selected measuring instruments 1.2 Carried-out measurements and calculations. 1.3 Maintained measuring instruments
2. Underpinning knowledge	2.1 Types of Measuring instruments and its uses 2.2 Safe handling procedures in using measuring instruments 2.3 Four fundamental operation of mathematics 2.2 Formula for Volume, Area, Perimeter and other geometric figures
3. Underpinning skills	3.1 Caring and Handling measuring instruments 3.2 Calibrating and using measuring instruments 3.1 Performing calculation by Addition, Subtraction, Multiplication and Division 3.2 Visualizing objects and shapes 3.3 Interpreting formula for volume, area, perimeter and other geometric figures
4. Resource implications	The following resources **MUST** be provided: 4.1 Workplace location 4.2 Measuring instrument appropriate to servicing processes 4.3 Instructional materials relevant to the propose activity
5. Method of assessment	Competency must be assessed through: 5.1 Observation with questioning 5.2 Written or oral examination 5.3 Interview 5.4 Demonstration with questioning
6. Context of assessment	6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment may be conducted in a workplace or simulated environment

UNIT OF COMPETENCY : **READ, INTERPRET AND APPLY SPECIFICATIONS AND MANUALS**.

UNIT CODE : **UTL723203**

UNIT DESCRIPTOR : This unit deals with identifying, interpreting and applying service specification manuals, maintenance procedure manuals and periodic maintenance manual.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify and access manual/ specification	1.1 Appropriate ***manuals*** are identified and accessed as per job requirements. 1.2 Version and date of manual is checked to ensure correct specification and procedure are identified.
2. Interpret manuals	2.1 Relevant sections, chapters of manuals/specifications are located in relations to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance to industry practices
3. Apply information in manual	3.1 Manual is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer specification 3.3 Manual data is applied according to the given task 3.4 All correct sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications
4. Store manuals	4.1 Manual or specification are stored appropriately to ensure prevention of damage, ready access and updating of information when required in accordance with company requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Manuals	Kinds of manuals: 1.1 Manufacturer's specification manual 1.2 Repair manual 1.3 Maintenance Procedure Manual 1.4 Periodic Maintenance Manual 1.5 Operation and maintenance instructions manual 1.6 Spare Parts Catalogue

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified and accessed manual/specification 1.2 Interpreted manuals 1.3 Applied information in manuals 1.4 Stored manuals
2. Underpinning knowledge	2.1 Types of manuals used in automotive industry 2.2 Identification of symbols used in the manuals 3.1 Identification of units of measurements 3.2 Unit conversion
3. Underpinning skills	3.1 Reading and comprehension skills required to identify and interpret automotive manuals and specifications 3.2 Accessing information and data
4. Resource Implications	The following resources **MUST** be provided: 4.1 All manuals/catalogues relative to Automotive 4.2 Job order, requisitions 4.3 Actual vehicle or simulator
5. Method of assessment	Competency **MUST** be assessed through: 5.1 Observation with questioning 5.2 Interview
6. Context of assessment	6.1 Assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 6.2 Assessment may be conducted in the workplace or a simulated environment.

UNIT OF COMPETENCY : **PERFORM SHOP MAINTENANCE**

UNIT CODE : **UTL723205**

UNIT DESCRIPTOR : This unit deals with inspecting and cleaning of work area including tools, equipment and facilities. Storage and checking of tools/ equipment and disposal of used materials are also incorporated in this competency.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Inspect/clean tools and work area	1.1 Cleaning solvent used as per workshop/tools ***cleaning requirement***
	1.2 Work area is checked and cleaned
	1.3 Wet surface/spot in work area is wiped and dried
2. Store/arrange tools and shop equipment	1.1 Tools/equipment are checked and stored in their respective shelves/location
	2.2 Corresponding labels are posted and visible
	2.3 Tools are safely secured and logged in the records
3. Dispose of waste materials	3.1 Containers for used materials are visibly labeled
	3.2 Waste materials are disposed as per workshop SOP
4. Report damaged tools/equipment	4.1 Complete inventory of tools/equipment is maintained
	4.2 Damaged tools/equipment/facilities are identified and repair recommendation is given
	4.3 Reports prepared have no error/discrepancy

RANGE OF VARIABLES

VARIABLE	RANGE
1 Cleaning requirement	1.1 Cleaning solvent 1.2 Inventory of supplies, tools, equipment, facilities 1.3 List of mechanics/technicians 1.4 Rags 1.5 Broom 1.6 Map 1.7 Pail 1.8 Dust/waste bin

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Cleaned workshop tools/facilities 1.2 Maintained equipment, tools and facilities 1.3 Disposed wastes and used lubricants/fluid as per required procedure
2. Underpinning knowledge and attitudes	2.1 5 S or Total Quality Management (TQM) 2.2 Service procedures 2.3 Relevant technical information 2.4 Safe handling of Equipment and tools 2.5 Equipment safety requirements 2.6 Workshop policies 2.7 Personal safety procedures 2.8 Fire Extinguishers and prevention 2.9 Storage/Disposal of Hazardous/flammable materials 2.10 Positive Work Values (Perseverance, Honesty, Patience, Attention to Details)
3. Underpinning skills	3.1 Handling/Storing of tools/equipment/supplies and material 3.2 Disposing of wastes and fluid 3.3 Preparing inventory of s/m and tools and equipment 3.4 Monitoring of supplies/materials and tools/equipment
4. Resource implications	The following resources **MUST** be provided: 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity
5. Method of assessment	Competency **MUST** be assessed through: 5.1 Written/Oral Questioning 5.2 Demonstration Assessment of underpinning knowledge and practical skills may be combined.
6. Context of assessment	6.1 Competency must be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

UNIT OF COMPETENCY : **PERFORM BASIC BENCHWORK**

UNIT CODE : **UTL713202**

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes in preparing materials, tools and equipment, lay-outing dimensions and performing basic benchwork based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Prepare materials, tools and equipment	1.1 ***Work plan*** is interpreted to determine job requirements 1.2 ***Materials, tools and equipment*** are identified and prepared according to job requirements 1.3 Materials are checked according to the required specifications 1.4 Tools and equipment conditions are checked following the standard operating procedures (SOPs)
2. Lay-out and mark dimensions/features on workplace	2.1 Metallic and non-metallic materials are selected according to the requirements specified in the blueprint 2.2 ***Dimensions/features*** are laid-out/marked according to job specifications/blueprint and within the required tolerance 2.3 Dimensions are checked against the actual work plan
3. Perform required benchworks	3.1 ***Work instructions are followed*** to ensure work safety 3.2 ***Benchworks*** are performed applying knowledge on safety procedures and according to job requirements 3.1 Workpieces are clamped in ***workholding device*** to avoid damage and accidents 3.2 Work pieces are cut, chipped or filed according to required measurements, tolerance specified in the blueprint and free from burrs and sharp edges 3.3 Drilling is performed according to recommended sequence and specifications 3.6 Proper usage of materials, tools and equipment is observed 3.7 Appropriate ***PPE*** and safety procedures are applied 3.8 Worksite is cleaned and cleared of all debris and left in safe state in accordance with OHS regulations

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Work plan	1.1 Job requirements 1.2 Schedule of work	
2. Materials	May include but not limited to: 2.1 Steel brackets 2.2 Grinding disc 2.3 Drill bit	 2.4 Flat/angle bars 2.5 Fastening screws 2.6 Masonry
3. Tools and equipment	May include but not limited to: 3.1 Portable grinder 3.2 Hacksaw 3.3 File 3.4 Bench vise 3.5 Markers 3.6 Screw drivers 3.7 Ballpen hammer	 3.8 L-square/steel square 3.9 Steel rule 3.10 Measuring tools 3.11 PPE 3.12 Portable electric drill 3.13 Bench wire 3.14 Tri-square
4. Metallic materials	May include but not limited to: 4.1 Mild steel plate 4.2 Flat bar 4.3 Square bar 4.4 Angle bar 4.5 Round bar	 4.6 G.I. sheet 4.7 B.I. sheet 4.8 Beam 4.9 G.I. and B.I. pipes
5. Non-metallic materials	May include but not limited to: 5.1 PVC 5.2 Rubber 5.3 Wood	 5.4 Fiber glass 5.5 Plastic 5.6 Ceramics
6. Dimensions	6.1 Measurements 6.2 Tolerances	
7. Work instructions	7.1 Work plan 7.2 Blueprint 7.3 Manufacturer's specifications	
8. Personal Protective Equipment (PPE)	May include but not limited to: 8.1 Safety shoes 8.2 Gloves 8.3 Goggles	
9. Benchworks	May include but not limited to: 9.1 Cutting 9.2 Filing 9.3 Drilling	
10. Workholding device	May include but not limited to: 10.1 Machine vise 10.2 Pliers 10.3 Vise grip	
11. Manual	May include but not limited to: 11.1 Procedures manual 11.2 Instructional manual	

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1 Interpreted work plan to determine job requirements 1.2 Identified and prepared supplies, materials, tools and equipment in accordance with job requirements 1.3 Selected and used appropriate processes, tools and equipment to carry out task 1.4 Laid-out and checked dimensions in accordance with job requirements and within the tolerances 1.5 Followed work instructions to ensure safety 1.6 Performed benchworks in accordance with job requirements 1.7 Cleaned worksite and left in safe state in accordance with OHSA regulations
2. Underpinning knowledge	2.1 **TRADE MATHEMATICS** • Linear measurements • Dimensions • Unit conversion 2.2 **TRADE THEORY** • Basic Benchwork 2.3 **SAFETY PRACTICES** • PPE • Handling of tools, supplies and equipment • Good housekeeping
3. Underpinning skills	3.1 Performing basic benchwork 3.2 Communicating effectively 3.3 Work safety 3.4 Preparing materials, tools and equipment 3.5 Proper handling of tools and equipment
4. Resource implications	The following resources should be provided: 4.1 Workplace 4.2 Work plan 4.3 Materials, tools and equipment relevant to the proposed activity/task
5. Methods of assessment	Competency should be assessed through: 5.1 Actual demonstration 5.2 Direct observation 5.3 Written/questioning related to underpinning knowledge
6. Context of assessment	6.1 Competency assessment may occur in workplace or any appropriate simulated environment 6.2 Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY : **PERFORM BASIC ELECTRICAL WORKS**

UNIT CODE : **UTL724201**

UNIT DESCRIPTOR: This unit covers the knowledge, skills and attitudes in preparing materials, tools and equipment, testing electrical components and basic repairing in electricity based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Prepare electrical tools and test instruments	1.1 ***Work plan*** is interpreted to determine job requirements 1.2 ***Electrical tools and instruments*** are identified and prepared according to job requirements 1.3 Electrical tools and instruments are checked for conditions and calibrated as required
2. Test power supply and electrical components	2.1 Instruments are tested in accordance with PEC 2.2 Power supply and electrical components are checked in accordance with manufacturer's specifications/PEC 2.3 Defects of power supply and electrical components are identified and recorded 2.4 Safe working habits is observed
3. Perform basic electrical repair	3.1 ***Work instructions*** are followed to ensure safety work 3.2 Loose connections are tightened in accordance with PEC 3.3 Defective electrical components are replaced and tested in accordance with PEC 3.4 Work place is cleaned and in safe state in line with OHSA regulations

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work plan	1.1 Job requirements 1.2 Schedule of work
2. Materials	May include but not limited to: 2.1 Solid, stranded wire 2.2 Service plug/outlet 2.3 Electrical components 2.4 Soldering lead 2.5 Terminal clips 2.6 Terminal lugs 2.7 Fuses 2.8 PVC/Flexible non-metallic conduit 2.9 Electrical tape
3. Tools and equipment	May include but not limited to: 3.1 Clamp ammeter 3.2 Multi tester 3.3 Insulation tester 3.4 PPE 3.5 Soldering gun/iron 3.6 Wire stripper 3.7 Measuring tool 3.8 Markers 3.9 Crimping tools 3.10 Screw drivers 3.11 Electrician pliers 3.12 Electric drill 3.13 Long nose
4. Work instructions	May include but not limited to: 4.1 Work plan 4.2 Schematic diagrams 4.3 Installation instruction

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1 Interpreted work plan to determine job requirements 1.2 Selected and used appropriate processes, tools and equipment to carry out task 1.3 Identified electrical tools and instruments are tested in accordance with PEC 1.4 Replaced defective tools and instruments 1.5 Checked power supply and electrical components in accordance with PEC 1.6 Cleaned work place and left in safe state in line with OHSA regulations 1.7 Completed wiring electrical system based in working drawings and PEC 1.8 Communicated effectively to ensure safety works
2. Underpinning knowledge	2.1 **TRADE MATHEMATICS** • Linear measurements • Dimensions • Unit conversion 2.2 **TRADE THEORY** • Basic electricity 2.3 **SAFETY PRACTICES** • PPE • Handling of tools and equipment • Good housekeeping
3. Underpinning skills	3.1 Installing and repairing electrical fixtures 3.2 Communicating effectively 3.3 Work safety 3.4 Proper handling of materials, tools and equipment 3.5 Preparing materials, tools and equipment 3.6 Wiring components 3.7 Testing power supply and electrical component
4. Resource Implications	The following resources should be provided: 4.1 Work place 4.2 Work plan 4.3 Materials, tools and equipment relevant to the proposed activity/task
5. Methods of Assessment	Competency should be assessed through: 5.1 Direct observation 5.2 Written test/questioning relevant to underpinning knowledge
6. Context of Assessment	6.1 Competency assessment may occur in workplace or any appropriate simulated environment 6.2 Assessment shall be observed while task are being undertaken whether individually or in group 6.3 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

CORE COMPETENCIES

This section gives the details of the contents of the core units of competency required in DIESEL POWER PLANT OPERATION AND MAINTENANCE NC II.

UNIT OF COMPETENCY : **TEND DIESEL ENGINE**
UNIT CODE : **UTL723206**
UNIT DESCRIPTOR: This unit covers the required performance in executing the preparation and tending of diesel engine and its auxiliary equipment.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Perform pre-operation check of diesel engine and auxiliary equipment	1.1. ***Walk around check*** of plant system is performed in accordance with enterprise procedure. 1.2. ***Fluid deficiencies*** are refilled/ topped–up in accordance with enterprise procedures 1.3. ***Non-fluid deficiencies*** are identified and corrected in accordance with enterprise procedures. 1.4. Result of walk around check are recorded and reported to shift in charge.
2. Perform operation check	2.1. Engine running condition is monitored for normal operation based on ***indicating parameters***. 2.2. ***Routine check*** is performed during operation in accordance with equipment checklist. 2.3. Unit abnormalities are recorded and reported to shift in charge.
3. Perform post-operation procedure	3.1. Shutdown procedure is coordinated with the control operator in accordance with enterprise policy. 3.2. Emergency stop push button is engaged in accordance with the operations manual. 3.3. ***Daily operation*** is recorded and reported in accordance with the enterprise policy.

RANGE OF VARIABLES

1. Walk-around check	Checking may include the following: 1.1 Pre-operation: 1.1.1 Emergency stop button initial position 1.1.2 Cooling system 1.1.3 Fuel system 1.1.4 Lube oil system 1.1.5 Aspiration system 1.1.6 DC system 1.1.7 Speed regulating system 1.1.8 Compressed air system 1.1.9 Leaks 1.1.10 Loose parts connection 1.1.11 Missing parts
2. Routine check	Routine check may include the following: 2.1 Temperature and Pressure checking 2.2 Leaks inspection 2.3 Fuel level checking 2.4 Oil level checking 2.5 Coolant level checking 2.6 Smoke emission monitoring 2.7 Abnormal sound, smell and vibration monitoring
3. Fluid deficiencies	3.1 Coolant quality and level 3.2 Impurities in fuel and fuel level 3.3 Lube oil quality and level 3.4 Electrolyte level
4. Non-fluid deficiencies	4.1 Activated air restriction indicator 4.2 Incorrect belt tension 4.3 Clogged fuel/water filter 4.4 Dirty fuel/water separator 4.5 Loose bolts, wiring connection and/or components 4.6 Leaky components
5. Indicating Parameters	May include but not limited to: 5.1 Temperature 5.2 Pressure
6. Daily operation	May include but not limited to: 6.1 Computation of fuel consumption 6.2 Computation of lube oil consumption 6.3 Consumption of water and inhibitor 6.4 Records of parameter readings

EVIDENCE GUIDE

1. Critical Aspect of Competency	Assessment requires that the candidate: 1.1 Conducted walk-around check while the engine is running and not running. 1.2 Performed pre and post operation activities in diesel power plant 1.3 Recorded power plant operation
2. Underpinning Knowledge	2.1 Diesel Power Plant Operation 2.1.1 duties and responsibilities 2.1.2 pre-operation activities 2.1.3 operation activities 2.1.4 post-operation activities 2.2 Familiarity with generating set operation with 15kW to 750 kW and 1.2 MW 2.2.1 Plant systems 2.2.2 System function 2.2.3 System flowpath 2.2.4 Interrelationship of plant systems/components 2.2.5 System component function, location and description 2.2.6 System controls and indications 2.2.7 Required maintenance 2.3 Plant Safety procedures and environmental awareness
3. Underpinning Skills	3.1 Checking of plant systems and components 3.2 Correcting minor/operational defects in plant systems and components 3.3 Refilling of deficient fluid levels 3.4 Replacing filters 3.5 Recording operation activities 3.6 Monitoring of generating set operation 3.7 Cleaning and replacing battery terminals 3.8 Using hand tools and test instruments
4. Resource Implications	4.1 Diesel generating set 4.2 PPE 4.3 Mechanical/electrical tools and test instruments 4.4 Coolant, diesel fuel, lube oil and cleaning materials 4.5 Diesel Power Plant Operation Manual
5. Method of Assessment	5.1 Written 5.2 Direct observation with oral questioning 5.3 Third party report 5.4 Portfolio 5.5 Interview 5.6 Demonstration with oral questioning
6. Context of Assessment	6.1 Competency may be assessed on the job or simulated environment 6.2 The assessment of practical skills may take place after a period of supervised practice and repetitive experience

UNIT OF COMPETENCY : **MAINTAIN AND REPAIR DIESEL ENGINE SYSTEMS AND ALTERNATOR**

UNIT CODE : **UTL723208**

UNIT DESCRIPTOR: This unit identifies the competence required to maintain and service the diesel engine systems and alternator. This includes servicing aspiration system, lube oil system, cooling system, fuel system as well as performing minor servicing of alternator unit.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Service Aspiration (intake and exhaust) System	1.1. Turbocharger is maintained based on ***PMS*** 1.2. Cleaning or replacement of air filter is done as indicated by air restriction indicator 1.3. Air filter casing is cleaned and freed of dust or foreign particles as cleaning or replacement of filter occurs.
2. Service Lube Oil System	2.1. Oil cooler assembly is uninstalled and installed in accordance with the manufacturer's instruction 2.2. Oil cooler assembly are disassembled and assembled without causing damage to the fins, oil cooler tubes and oil seals (o-rings) and in accordance with manufacturer's instruction. 2.3. Oil cooler tubes are cleaned and freed of scale or restrictions. 2.4. Change oil is performed according to SOP
3. Service of Cooling System	3.1. ***Cooling System*** is checked for leaks visually. 3.2. Radiator is serviced following enterprise policy 3.3. Thermostat is checked in accordance with its ***operating temperature***. 3.4. Replace or repair system components based on ***test result.*** 3.5. Coolant is refilled in accordance to the manufacturer's instruction. 3.6. Maintain coolant pump in accordance with PMS.
4. Service Fuel System	4.1. Fuel filter is replaced in accordance with manufacturer's instruction and PMS. 4.2. Fuel oil/water separator is drained to ensure that the system is free from ***foreign elements***. 4.3. Servicing and calibration of fuel injector is recommended in accordance with enterprise policy.
5. Check condition of alternator	5.1. Loose connections are remedied and restored to normal conditions in accordance with manufacturer's instructions. 5.2. Insulation and ***winding*** resistance are checked in accordance with manufacturer's manual. 5.3. Revolving diodes and bridge rectifiers are checked in accordance with manufacturer's manual. 5.4. AVR functionality is tested based on enterprise policy. 5.5. ***Air gap clearances*** are checked in accordance with manufacturer's manual. 5.6. Service report is prepared and submitted in accordance with enterprise policy.

RANGE OF VARIABLES

1. PMS	Preventive Maintenance schedules can be: 1.1 400 RH 1.2 1200 RH 1.3 2400 RH 1.4 4800 RH 1.5 9600 RH 1.6 20000 RH 1.7 other schedules indicated on the manual or enterprise policy
2. Cooling System	Cooling system may consists of the following: 2.1 Radiator Assembly 2.2 Oil Cooler Assembly 2.3 Coolant Pump Assembly 2.4 Coolant Rail & Thermostat 2.5 Water Jackets 2.6 Charged Air Cooler Assembly 2.7 Cooling Fan
3. Operating Temperature	3.1 The first thermostatic valve opens at 78 – 79 ◦C 3.2 The second thermostatic valve opens at 80 – 84 ◦C 3.3 The third thermostatic valve fully opens at 92 – 98 ◦C
4. Test Result	4.1 Operating Temperature of Thermostat 4.2 Axial/Radial Test of Coolant Pump Shaft 4.3 Visual Leak Test/Hydro Test
5. Foreign Elements	May include but not limited to: 5.1 Dirt 5.2 Rust 5.3 Grease/Oil 5.4 Water
6. Winding	6.1 Potential transformer windings 6.2 Current transformer windings 6.3 Main stator windings 6.4 Main rotor windings 6.5 Exciter-rotor windings 6.6 Exciter-stator windings 6.7 Auxiliary windings 6.8 Compounding transformer windings
7. Air gap clearances	7.1 Exciter rotor-stator air gap clearance 7.2 Compounding transformer air gap clearance

EVIDENCE GUIDE

1. Critical Aspect of Competency	Assessment requires that the candidate serviced the following system : 1.1. Cooling system 1.2. Lube oil system 1.3. Fuel system 1.4. Aspiration
2. Underpinning Knowledge	2.1. Interpreting manufacturers manual & preparations of reports 2.2. Diesel engine components operation 2.3. Diesel engine systems operation 2.4. Parts & assembly of diesel engine components 2.5. Specifications of diesel engine components 2.6. Safety & environmental procedures related to servicing of diesel engine components
3. Underpinning Skills	3.1. Handling of tools & equipment 3.2. Handling of precision measuring tools & equipment 3.3. Taking component measurements 3.4. Analysis of acquired data 3.5. Non-destructive testing such as visual inspection and dye-penetrant testing 3.6. Communication skills
4. Resource Implication	4.1. Mechanical Tools 4.2. Precision measuring tools 4.3. Special tools 4.4. Lubricants & coolant 4.5. Gaskets & Sealants 4.6. Dye penetrate, developer & solvent 4.7. Cleaning tools & materials 4.8. PPE 4.9. Diesel engine with complete sub-assemblies
5. Method of Assessment	5.1. Written 5.2. Direct Observation w/ oral questioning 5.3. Third party report 5.4. Portfolio 5.5. Interview 5.6. Demonstration with oral questioning
6. Context of Assessment	6.1. Competency may be assessed on the job or simulated environment 6.2. The assessment of practical skills may take place after a period of supervised practice and repetitive experience

SECTION 3 TRAINING STANDARDS

These standards are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for Diesel Power Plant Operation and Maintenance NCII.

3.1 CURRICULUM DESIGN

Course Title: **DIESEL POWER PLANT OPERATION AND MAINTENANCE**
NC Level : **NC II**

Nominal Training Duration: **262 Hours**

Course Description:

This course is designed to enhance the knowledge, skills and attitudes of a trainee/student in tending diesel engine operation and maintaining and repairing diesel engine.

This course also includes participating in workplace communication, working in a team environment, practicing career professionalism, practicing occupational health and safety procedures and reading manuals.

BASIC COMPETENCIES

(56 Hours)

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Participate in workplace communication *8 hours*	1.1 Obtain and convey workplace information 1.2 Complete relevant work related documents 1.3 Participate in workplace meeting and discussion	• Group discussion • Interaction	• Written test • Practical/ performance test • Interview
1. Work in a team environment *4 hours*	2.1 Describe and identify team role and responsibility in a team. 2.2 Describe work as a team member.	• Group discussion • Interaction	• Observation • Simulation • Role playing
2. Practice career professionalism *4 hours*	3.1 Integrate personal objectives with organizational goals 3.2 Set and meet work problems 3.3 Maintain professional growth and development	• Group discussion • Interaction	• Demonstration • Observation • Interviews/ questioning
3. Practice occupational health and safety *40 hours*	4.1 Identify hazards and risks. 4.2 Evaluate hazards and risks 4.3 Control hazards and risks 4.4 Maintain occupational health and safety awareness	• Group Discussion • Plant tour • Symposium	• Observation • Interviews

COMMON COMPETENCIES

(80 Hours)

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Perform mensuration and calculation	1.1 Select measuring instrument and carry out measurement and calculations 1.2 Carry out measurement and calculation 1.3 Maintain measuring instruments	• Lecture • Discussion • Demonstration	• Written test • Oral questioning • Direct observation • Interview
2. Read, interpret and apply specifications and manual	2.1 Identify/access manuals and interpret data and specification 2.2 Apply information accessed in manual 2.3 Store manual	• Lecture • Discussion • Demonstration	• Written test • Oral questioning • Direct observation • Interview
3. Perform shop maintenance	3.1 Inspect/clean tools and work area 3.2 Store/arrange tools and shop equipment 3.3 Dispose waste/used lubricants 3.4 Report damaged tools/equipment	• Lecture • Discussion • Demonstration	• Written test • Oral questioning • Direct observation • Interview
4. Perform basic bench work	4.1. Prepare supplies, materials, tools, and equipment 4.2. Layout necessary dimensions 4.3. Perform grinding, cutting, filing, drilling and boring	• Lecture • Discussion • Demonstration	• Interview • Demonstration • Direct Observation
5. Perform basic electrical works	5.1. Test power supply and electrical components 5.2. Perform basic repairs and installation	• Lecture • Discussion • Demonstration	• Written test • Oral questioning • Direct observation • Interview

CORE COMPETENCIES

(126 Hours)

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Tend diesel engine	1.1 Perform pre-operation check of diesel engine and auxiliary equipment 1.2 Tend diesel engine	• Lecture/ Discussion • Demonstration • Practical application • Practicum	• Written examination • Demonstration of practical skills • Interview
2. Maintain and repair diesel engine systems and alternator	2.1 Service aspiration system 2.2 Service lube oil system 2.3 Service of cooling system 2.4 Service fuel system 2.5 Check condition of alternator	• Lecture/ Discussion • Demonstration • Practical application • Practicum	• Written examination • Demonstration of practical skills • Interview

3.2 TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of competency-based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is individualized and self-paced;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the-job components;
- Allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Approved training programs are nationally accredited.

The competency-based TVET system recognizes various types of delivery modes, both on and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in-school and in-industry training or fieldwork components. Details can be referred to the Practical application System (DTS) Implementing Rules and Regulations.
- Modular/self-paced learning is a competency-based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilitates the training delivery
- Peer teaching/mentoring is a training modality wherein fast learners are given the opportunity to assist the slow learners.
- Supervised industry training or on-the-job training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations.
- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.

3.3 TRAINEE ENTRY REQUIREMENTS

Trainees or students should possess the following requirements:

- can communicate both oral and written;
- physically and mentally fit;
- with good moral character; and
- can perform basic mathematical computation.

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.

3.4 LIST OF TOOLS, EQUIPMENT AND MATERIALS DIESEL ENGINE POWER PLANT OPERATION AND MAINTENANCE – NC II

Recommended list of tools, equipment and materials for the training in Diesel Power Plant Operation and Maintenance – NC II

TOOLS		EQUIPMENT		MATERIALS	
QTY		QTY		QTY	
2 sets	Pail and Funnel	2 units	Diesel generating set 163 KW	1 set	Turbo charger repair kit
1	Lube oil pump	1 set	PPE	1 pc	Bearing
1 unit	Fuel pump	1 unit	Injector calibrating equipment	10 sets	O-rings and washers
1 set	Combination wrench (8-32)	1 unit	Air compressor with spray gun	1 set	Coolant pump repair kit
1 set	Pliers and screw driver	1 set	Insulation tester	100 ltrs.	Lube oil
1 set	Micrometer 150mm (inside and outside)	2 set	Hydraulic jack at least 3 tonner	420 ltrs.	Diesel Fuel
1 pc	Vernier Caliper 150 mm	1 set	Multi tester	30 kg	Rags
1 pc	Hydrometer	1 pc	Chain block	2 pcs	Scrubbing pad
1 unit	Magnetic dial gauge			1 set	Log sheet/ Log book and writing tools
1 set	Pail and dipper			5 ltr	Inhibitor
1	Bench vise			500 ltr	Soft water
1	Bearing Puller			4 units	Automotive Battery, 12 V, 21-plates
1 set	Socket wrench (8-32”)			3 ltr	Distilled water
1 set	Allen wrench			4 pcs	Lube filter
1 set	Feeler gauge			2 pcs	Fuel filter
1 set	A-frame			2 pc	Air filter
2 set	Slings			2 kg	Grease
2 set	Eye bolts and shackles			2 kg	Hi temp grease
2 set	Wooden blocks			2 set	Battery terminal lugs and clamps
2 set	Heater			20 pc	Terminal lugs, ½” dia,
1	Bearing Puller			2 m.	Battery cable
1 unit	Bearing heater			10 m.	Automotive wire, no. 12 AWG

TOOLS		EQUIPMENT		MATERIALS	
QTY		QTY		QTY	
1 set	Hacksaw			1 can	Battery terminal cleaner 16 oz
1 set	Electric hand drill with bits			1 can	Contact cleaner
2 set	Slings			3 can	Penetrating oil
2 set	Wooden blocks			1 gal	Rust remover
1 set	Crimping tool			1 gal	Carbon remover
2 set	Soldering set			1 roll	Foam
1 unit	Torque wrench, 0-300 ft-lb. , ½-drive, click-type			1 gal	Carbon remover
1 unit	Torque wrench, 0-500 ft-lb., ¾-drive, click-type			2 gal	Descaler
				10 pc	Steel brush
				3 set	Paint Brush, asstd. sizes
				1 pc	Plastic brush
				6 pcs	Nozzles
				20 ltr	Safety Solvent
				15 cans	Insulating varnish, aerosol type
				8 ltr	Electrical enamel
				10 roll	Electrical tapes
				10 roll	Rubber tapes
				3 roll	Cotton tapes
				5 m	Spaghetti tube, 10 mm
				1 kit	Wire marker
				24 pc	Cable ties 6”
					OTHER MATERIALS
					○ manufacturing specifications
					○ repair manual
					○ maintenance manual
					○ periodic maintenance manual
					INSTRUCTIONAL MATERIALS
					○ reference books
					○ professional emergency
					○ learning guides
					○ modules
					○ CD’s, VHS tapes, transparencies

3.5 TRAINING FACILITIES
DIESEL POWER PLANT OPERATION AND MAINTENANCE – NC II

The workshop must be made of reinforced concrete or steel structure. The size must be suited on the requirements of the competencies. The facility should accommodate a maximum of 20 students/trainees.

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
Workshop Component Areas			
• Laboratory/Workshop Area	-	-	100.00
• Lecture Room	6.00 x 5.00	30.00	30.00
• Tool, Supply & Storage Room	4.00 X 5.00	20.00	20.00
• Learning Resource Center	4.00 x 5.00	20.00	20.00
• Wash Room and Toilet	2.00 X 5.00	10.00	10.00
		Total (Workshop Component)	180.00
• Circulation Area (30% of Workshop Component Space)			54.00
Grand Total (Building Space)			**234.00**

Note: The entries in the size in meters column are recommendations only. The grand total (building space) is the minimum space requirement for registration.

3.6 TRAINERS' QUALIFICATION
UTILITIES SECTOR

DIESEL POWER PLANT OPERATION AND MAINTENANCE – NC II

TRAINER QUALIFICATION (TQ II)

- Must be a holder of Diesel Power Plant Operation and Maintenance NC III or equivalent
- Must have undergone training on Training Methodology II (TM II)
- Must be computer literate
- Must be physically and mentally fit
- Must have at least 2 years job/industry experience related to Diesel Power Plant Operation and Maintenance specifically in generating set servicing
- Must be a civil service eligible (for government position or appropriate professional license issued by the Professional Regulatory Commission)

Reference: TESDA Board Resolution No. 2004 03

3.7 INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency.

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1 To attain the National Qualification of Diesel Power Plant Operation and Maintenance NC II, the candidate must demonstrate competence in all the units of competency listed in Section 1. Successful candidates shall be awarded a National Certificate signed by the TESDA Director General.

4.2 Individual aspiring to be awarded the qualification of Diesel Power Plant Operation and Maintenance NC II must acquire Certificate of Competency in all the following core units of the qualification. Candidates may apply for assessment in any accredited assessment center.

4.2.1 Tend Diesel Engine

4.2.2 Maintain and Repair Diesel Engine Systems and Alternator

4.2.2.1 Tend Diesel Engine

4.2.2.2 Maintain and Repair Diesel Engine Systems and Alternator

Successful candidates shall be awarded Certificates of Competency (COC).

4.3 Accumulation and submission of all COCs acquired for the relevant units of competency comprising a qualification, an individual shall be issued the corresponding National Certificate.

4.4 Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

4.5 The following are qualified to apply for assessment and certification:

4.5.1 Graduates of formal, non-formal and informal including enterprise-based training programs.

4.5.2 Experienced workers (wage employed or self employed)

4.6 The guidelines on assessment and certification are discussed in detail in the “Procedures Manual on Assessment and Certification” and “Guidelines on the Implementation of the Philippine TVET Qualification and Certification System (PTOQCS)”..

ANNEX A - COMPETENCY MAP – DIESEL POWER PLANT OPERATION AND MAINTENANCE NC II

BASIC COMPETENCIES

Receive and Respond to Workplace Communication	Work with Others	Demonstrate work values	Practice basic housekeeping procedures	**Participate in Workplace Communication**
Work in a Team Environment	**Practice career professionalism**	**Practice occupational health and safety procedures**	Lead Workplace Communication	Lead Small Team
Develop and practice negotiation skills	Solve Problems Related to Work Activities	Use mathematical concepts and techniques	Use relevant technologies	Utilize Specialist Communication Skills
Develop Team and Individuals	Apply Problem Solving Techniques in the Workplace	Collect, analyze and organize information	Plan and Organize Work	Promote environmental protection

COMMON COMPETENCIES

Apply Appropriate Sealant/Adhesive	**Perform Mensuration and Calculation**	**Read, Interpret and Apply Specifications and Manuals**	**Use and Apply Lubricants/Coolants**	**Perform Shop Maintenance**
Perform Basic Bench Works	**Perform Basic Electrical Works**			

CORE COMPETENCIES

Tender Diesel Engine	Operate Diesel Power plant	Service Alternator/ Generator	**Maintain and Repair Diesel Engine Systems and Alternator**	Diagnose and Repair Diesel Engine
Diagnose and Repair Electrical System	Overhaul Diesel Engine			

DEFINITION OF TERMS

GENERAL

1) **Certification -** is the process of verifying and validating the competencies of a person through assessment

2) **Certificate of Competency (COC)** – is a certification issued to individuals who pass the assessment for a single unit or cluster of units of competency

3) **Common Competencies** - are the skills and knowledge needed by all people working in a particular industry

4) **Competency** - is the possession and application of knowledge, skills and attitudes to perform work activities to the standard expected in the workplace

5) **Competency Assessment -** is the process of collecting evidence and making judgments on whether competency has been achieved

6) **Competency Standard (CS)** - is the industry-determined specification of competencies required for effective work performance

7) **Context of Assessment** - refers to the place where assessment is to be conducted or carried out

8) **Core Competencies -** are the specific skills and knowledge needed in a particular area of work - industry sector/occupation/job role

9) **Critical aspects of competency -** refers to the evidence that is essential for successful performance of the unit of competency

10) **Elective Competencies -** are the additional skills and knowledge required by the individual or enterprise for work

11) **Elements** - are the building blocks of a unit of competency. They describe in outcome terms the functions that a person performs in the workplace.

12) **Evidence Guide** - is a component of the unit of competency that defines or identifies the evidences required to determine the competence of the individual. It provides information on critical aspects of competency, underpinning knowledge, underpinning skills, resource implications, assessment method and context of assessment

13) **Level -** refers to the category of skills and knowledge required to do a job

14) **Method of Assessment** - refers to the ways of collecting evidence and when, evidence should be collected

15) **National Certificate (NC)** – is a certification issued to individuals who achieve all the required units of competency for a national qualification defined under the Training Regulations. NCs are aligned to specific levels within the PTQF

16) **Performance Criteria** - are evaluative statements that specify what is to be assessed and the required level of performance

17) **Qualification** - is a cluster of units of competencies that meets job roles and is significant in the workplace. It is also a certification awarded to a person on successful completion of a course in recognition of having demonstrated competencies in an industry sector

18) **Range of Variables** - describes the circumstances or context in which the work is to be performed

19) **Recognition of Prior Learning (RPL)** – is the acknowledgement of an individual's skills, knowledge and attitudes gained from life and work experiences outside registered training programs

20) **Resource Implications -** refers to the resources needed for the successful performance of the work activity described in the unit of competency. It includes work environment and conditions, materials, tools and equipment

21) **Basic Competencies -** are the skills and knowledge that everyone needs for work

22) **Training Regulations (TR)** – refers to the document promulgated and issued by TESDA consisting of competency standards, national qualifications and training guidelines for specific sectors/occupations. The TR serves as basis for establishment of qualification and certification under the PTQF. It also serves as guide for development of competency-based curricula and instructional materials including registration of TVET programs offered by TVET providers

23) **Underpinning Knowledge -** refers to the competency that involves in applying knowledge to perform work activities. It includes specific knowledge that is essential to the performance of the competency

24) **Underpinning Skills** - refers to the list of the skills needed to achieve the elements and performance criteria in the unit of competency. It includes generic and industry specific skills

25) **Unit of Competency** – is a component of the competency standards stating a specific key function or role in a particular job or occupation; it is the smallest component of achievement that can be assessed and certified under the PTQF

SECTOR SPECIFIC

1. Cooling system	A closed system of the generator set that provides a continuous flow of coolant (soft water with 0-40 ppm hardness) primarily to reduce the heat at the cylinder heads and liners. It also reduces the heat from the lubricating oil.
2. Lube oil system	A closed system of the generator set that provides a continuous flow of lubricating oil that reduces heat and friction to all moving parts of the engine.

3.	**Fuel system**	An open system of the generator set that provides a continuous flow of clean, high pressure and atomized fuel to the combustion chamber.
4.	**Aspiration system**	An open system of the generator set that provides clean, high density compressed air to the combustion chamber by utilizing the exhaust gas to drive the turbocharger.
5.	**DC system**	A system of the generator set that supplies 12, 24 or 110 volts DC power to the various DC equipment, protections and controls.
6.	**Alternator**	A system of the generator set that converts mechanical energy into electrical energy. It includes the exciter component and main windings.
7.	**Speed regulating system**	A system of the generator set that maintains the rated speed of the engine at various load.
8.	**Enterprise policy**	Also refer as corporate policy
9.	**PMS**	refers as preventive maintenance schedule
10.	**coolants**	Refers to the cooling medium of the cooling system which is the soft water with a hardness of 0-40 ppm.
11.	**indicating parameters**	Also refers to as engine and control panel parameters
12.	**SOP**	Refers to the plant system normal operating procedure

ACKNOWLEDGEMENTS

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

THE TECHNICAL EXPERTS PANEL

FROM NAPOCOR

HILARIO S. AÑO
Principal Engineer C
Patnanungan DPP

TEOFE C. CADIZ
Superintendent
Southern Palawan S/S & 69 KV TL

LEO G. CINCO
Principal Engineer C
Tingloy DPP

LOUIE C. LIBARRA
Superintendent, Busuanga DPP

EUGENE WILLY G. FRANCISCO
Principal Engineer C
Banton DPP

LARRY I. SABELLINA
Superintendent
Puerto Princesa DPP

JESUS J. MENDOZA
Plant Superintendent
Kabugao DPP

ROBERTO R. ESPINO III
Principal Engineer A
WMTSD

RICKY M. UMBAN
Plant Superintendent
Romblon DPP

CESAR C. FERNANDO
Training Specialist A
TTMSD-TDD

PAQUITO G. ALMENDRAL
Principal Engineer C
Taytay DPP

CLEMETE J. CORDERO
Senior Engineer
TTMSD-TDD

The PARTICIPANTS in the National Validation of this Training Regulation

ARTEMIO C. DIFUNTORUM, JR. Balut DPP, NPC – SPUG Mindanao		**FELIPE F. GONZALES** Camotes DPP, NPC – SPUG - Visayas
JEROME C. TIMBANG Palimbang DPP, NPC – SPUG-EMOD		**CARLOS C. SUMAGANG** Siquijor DPP, NPC – SPUG - Visayas
JEFFREY N. LAHAMAN Tandubas DPP, NPC – SPUG - WMOD		**FERNAN Q. ISAW** Sto Niño Mini Grid, NPC–SPUG-Visayas
JIMMY T. HAGONOY Balimbing DPP, NPC – SPUG - WMOD		**ALLAN T. NAZARIO** Caluya DPP, NPC – SPUG - Visayas
SALI A. DIMAN Sibutu DPP, NPC – SPUG - WMOD		**REMIGIO A. MARIGOMEN** Power Barge 113, NPC–SPUG-Visayas

The PARTICIPANTS in the National Validation of this Training Regulation (cont.)

NICOLAS M. ARCENA OM, NPC – SPUG - Mindanao		**HIPOLITO T. TO-ONG** Power Barge 116, NPC–SPUG-Visayas
JOB C. CANSANCIO Hikdop DPP, NPC – SPUG- EMOD		**VIVENCIO B. CORTES** Bantayan DPP, NPC – SPUG - Visayas
MARVIE L. CASTROVERDE Kalamansig DPP, NPC–SPUG-EMOD		**NATHANIEL G. GUERRA** Sto. Niño DPP, NPC – SPUG - Visayas
RUEL R. JUGALBOT VMTS, NPC – SPUG - Visayas		**ERICK R. SARINO** NPC–SPUG– Eastern Visayas Optn. Div.
ELVIS P. SABETE Zumarraga DPP, NPC – SPUG - Visayas		**EDUARDO P. VILLEGAS** VMTS, NPC – SPUG - Visayas
PERFECTO G. LUMAUAG Gigantes DPP, NPC – SPUG - Visayas		**DEOGRACIAS D. BURLAS, JR.** Biri DPP, NPC – SPUG - Visayas

MEMBERS OF THE TESDA BOARD – Standards Setting and Systems Development Committee

THE MANAGEMENT AND STAFF OF THE TESDA SECRETARIAT

- **Qualifications and Standards Office**
    - **Competency Standards Division**
    - **Curriculum and Training Aids Division**

List of Published Training Regulations

- ❑ Animal Production NC II
- ❑ Aquaculture NC II
- ❑ Automotive Body Painting/Finishing NC II
- ❑ Automotive Body Repair NC II
- ❑ Auto Engine Rebuilding NC II
- ❑ Automotive Servicing NC II
- ❑ Bartending NC II
- ❑ Building Wiring Installation NC II
- ❑ Carpentry NC II
- ❑ Commercial Cooking NC II
- ❑ Computer Hardware Servicing NC II
- ❑ Deck Seafaring NC II
- ❑ Dressmaking NC II
- ❑ **Diesel Power Plant Operation & Maintenance NC II**
- ❑ Diesel Power Plant Operation & Maintenance NC III
- ❑ Diesel Power Plant Maintenance NC III
- ❑ Driving NC II
- ❑ Engine Seafaring NC II
- ❑ Food and Beverage Services NC II
- ❑ Footwear Making NC II
- ❑ Heavy Equipment Operation NC II
- ❑ Horticulture NC II
- ❑ Household Services NC II
- ❑ Housekeeping NC II
- ❑ Machining NC II
- ❑ Masonry NC II
- ❑ Motorcycle and Small Engine Servicing NC II
- ❑ Plumbing NC II
- ❑ Pyrotechnics NC II
- ❑ RAC Servicing NC I
- ❑ RAC Servicing NC II
- ❑ Security Services NC II
- ❑ Tailoring NC II
- ❑ Tour Guiding Services NC II
- ❑ Transport RAC Servicing NC II
- ❑ Travel Services NC II
- ❑ Welding NC II

These materials are available in both printed and electronic copies. For more information please contact:

Technical Education and Skills Development Authority (TESDA)
Telephone Nos.: 893-8303, 893-2139; 817-4076 to 82 loc. 615 to 617
or visit our website: www.tesda.gov.ph