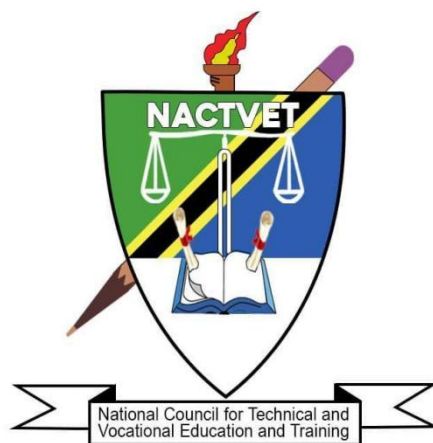


**NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND
TRAINING**



APRIL 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN

LEVEL: NTA 4

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ABBREVIATIONS

CBET	Competency Based Education and Training
GMP	Good Manufacturing Practice
HACCP	Hazard Analysis and Critical Control Point
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
OSHA	Occupational Safety and Health Administration
SOPs	Standard Operating Procedures
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks - essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as performance tool of assessment of the prescribed outcomes.
Performance Criteria:	Indicate the expected end results or outcome in form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standards:	It is a set of statement, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.

Task Analysis:	The process of analysing each task to determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to a product, service, or decision.
Underpinning Knowledge:	This is crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification Process:	The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.
Occupational Competence:	The application of knowledge and skills to perform consistently to the standards required in the work context.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs troubleshooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programmes. TET institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical

education and training (TET).

The Mechanical Equipment Maintenance Technician Occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM Charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The *10-year National Skills Development Strategy (2016-2026)* was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes.

These sectors include: Transport and logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The occupational standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the Occupational Standards. Engineers, supervisory technicians on the job, and experienced Mechanical Equipment Maintenance Technicians were key informants in the survey to discover occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of online surveys were completed by experts from the labour market across the country. Apart from the survey aiding in defining the scope for the occupational analysis, they also served to engage a wide cross-section of experts in the occupation. Apart from this, the stakeholders' forum was attended by participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR MECHANICAL EQUIPMENT MAINTENANCE TECHNICIANS

The standards cover a broad range of duties and tasks that can be performed by an Mechanical Equipment Maintenance Technician. However, the occupational standards are not meant to replace individual job descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Mechanical Equipment

Maintenance Technician may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

Scope of occupational standards for Mechanical Equipment Maintenance Technician: Personnel engaged in installation, debugging, maintenance and repair of mechanical part and playing an important role in the fields such as mechanical product collection, transportation, storage and processing. Mechanical equipment maintenance technicians assemble and debug the mechanical parts, components or product assembly with fitter's tool, drilling machine, tooling or other tools. Staff in this post shall strictly abide by internal agreement, standard operation procedures (SOP) and current good manufacturing practice (cGMP). Generally, the Mechanical Equipment Maintenance Technician performs the following responsibilities:

- a) Open-box inspection of mechanical equipment;
- b) Reading of installation drawings of mechanical equipment;
- c) Selection of installation and maintenance tools;
- d) Safety protection for mechanical equipment installation;
- e) Powering on/off and simple maintenance of the mechanical equipment
- f) Cleaning of the internal and external equipment parts
- g) Selection of suitable lubricant for equipment lubrication
- h) Filling in the maintenance record
- i) Reading of the mechanical equipment drawings
- j) Identification of the common mechanical faults
- k) Implementation of the safety measures for workplace
- l) Preparation before mechanical equipment installation
- m) Installation of the ordinary cutting equipment
- n) Debugging of the ordinary cutting equipment
- o) Basic operation for benching of mechanical components
- p) Hole and thread machining of mechanical components
- q) Diagnosis of the faults of ordinary cutting equipment
- r) Repairing of the transmission mechanism of mechanical equipment

- s) Repairing of the hydraulic/pneumatic system of mechanical equipment
- t) Standard operation and maintenance of mechanical equipment

The Occupational standards have been clustered into NTA qualification levels, i.e. NTA Level 4, 5 and 6.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN – NTA 4

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PREPARATION BEFORE MECHANICAL EQUIPMENT INSTALLATION	DUTY NO.	401
TASK TITLE	OPEN-BOX INSPECTION OF MECHANICAL EQUIPMENT	TASK NO.	4011
PERFORMANCE CRITERIA	The person performing this task must be able to conduct open-box inspection according to the equipment composition and purchasing list.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Wrench, crowbar, hammer, vice and scissors; 2. Gloves and googles.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Select proper tools and equipment; 3. Refer to the equipment purchasing contract as well as relevant documents and technical data; 4. Analyze the technical functions, installation conditions and relevant requirements of equipment; 5. Check whether the inner/outer package is intact, free of damage, bruise, soaking, damp or deformation and the logo is clear or not; 6. Inspect the appearance of instruments, equipment and accessories for damage, rust, bump, etc.; 7. Check the specification, model, configuration and quantity of equipment and accessories, and check one by one; 8. Check whether the attached data are complete, such as the instrument instruction, operation regulations, overhaul manual, warranty card and product inspection certificate.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Organize equipment mobilization and formulate the acceptance content/method; 1.2 Check and accept the equipment foundation and accessories and control the acceptance process safety. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Equipment open-box specifications; 2.2 Checking process; 2.3 Equipment storage principles. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Preparation of open-box inspectors; 3.2 Preparation of open-box technologies; 3.3 Implementation process of open-box inspection; 3.4 Use of unpacking tools; 3.5 Common problems during open-box inspection. 4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The open-box inspection is conducted according to the equipment purchasing contract, relevant documents and technical data.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and general safety knowledge; 2. Basic first-aid knowledge of production site; 3. Maintenance knowledge of tools and instruments.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PREPARATION BEFORE MECHANICAL EQUIPMENT INSTALLATION	DUTY NO.	401
TASK TITLE	READING OF INSTALLATION DRAWINGS OF MECHANICAL EQUIPMENT	TASK NO.	4012
PERFORMANCE CRITERIA	The person performing this task must be able to read the mechanical equipment installation drawings according to national mechanical drawing standards and computer-aided drafting software.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Computers; 2. Installation drawings of mechanical equipment;		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Select proper tools and equipment; 3. Refer to the technical data; 4. Read the construction drawings; 5. Analyze equipment structure and performance; 6. Decompose technical requirements on equipment installation; 7. Review and confirm the construction drawings; 8. Prepare the construction organization plan.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Read the mechanical part drawing; 1.2 Read the mechanical equipment assembly drawing; 1.3 Read the construction drawing for mechanical equipment installation. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Current national specifications and standards for mechanical drafting; 2.2 Current industrial specifications and standards for mechanical drafting. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Basic drafting principles of mechanical drawings; 3.2 Computer-aided drafting principles and operation. 4.0 Essential Skills 4.1 Communication skills; 4.2 Scheme design skills; 4.3 Teamwork skills; 4.4 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The mechanical equipment installation drawings are read and the construction organization plan is prepared.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and general safety knowledge; 2. Basic first-aid knowledge of production site; 3. Maintenance knowledge of tools and instruments.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PREPARATION BEFORE MECHANICAL EQUIPMENT INSTALLATION	DUTY NO.	401
TASK TITLE	SELECTION OF INSTALLATION AND MAINTENANCE TOOLS	TASK NO.	4013
PERFORMANCE CRITERIA	The person performing this task must be able to choose installation and maintenance tools reasonably according to the construction organization plan for mechanical equipment installation.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Lifting and transportation equipment; 2. Measuring tools; 3. Scraping and grinding tools; 4. Cleaning and derusting tools.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Select proper tools and equipment; 3. Prepare the hoisting plan for equipment; 4. Draw the pareto diagram of pad iron; 5. Carry out measurement for equipment installation engineering; 6. Detect the linearity error; 7. Detect the flatness error; 8. Detect the parallelism error; 9. Detect the coaxiality error;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Choose the lifting and transportation method during equipment installation engineering; 1.2 Align the installation position of equipment with instruments; 1.3 Measure the equipment error in installation position. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Structure of common lifting and transportation equipment; 2.2 Measurement tools and indexes. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Hoisting theory; 3.2 Basic theory of geometric tolerance analysis. 4.0 Essential Skills 4.1 Communication skills; 4.2 Scheme design skills; 4.3 Teamwork skills; 4.4 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The installation and maintenance tools for mechanical equipment are prepared.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and general safety knowledge; 2. Basic first-aid knowledge of production site; 3. Maintenance knowledge of tools and instruments.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PREPARATION BEFORE MECHANICAL EQUIPMENT INSTALLATION	DUTY NO.	401
TASK TITLE	SAFETY PROTECTION FOR MECHANICAL EQUIPMENT INSTALLATION	TASK NO.	4014
PERFORMANCE CRITERIA	The person performing this task must be able to formulate safety education training contents, safety management measures and safety technical measures according to the installation requirements of mechanical equipment.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Work clothes, safety helmet, goggles, gloves and safety boots; 2. Hearing protection devices; 3. Tool kit; 4. Warning signs in operation area.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Select proper tools and equipment; 3. Wear and use labor protective gear; 4. Set up safety signs; 5. Set the protective fence and cover; 6. Implement emergency rescue drills.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Comply with safety requirements on operators; 1.2 Comply with safety requirements on the construction site; 1.3 Comply with safety requirements for lifting and transportation equipment; 1.4 Comply with safety requirements for environmental factors. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Knowledge of safe production; 2.2 Fire safety knowledge; 2.3 Self-protection knowledge; 2.4 Safety production rules and regulations; 2.5 Security operation specifications.	

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Safety education and training; 3.2 Safety management measures; 3.3 Safety technical measures. 4.0 Essential Skills 4.1 Communication skills; 4.2 Scheme design skills; 4.3 Teamwork skills; 4.4 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The safety protection articles are prepared according to the installation requirements of mechanical equipment.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and general safety knowledge; 2. Basic first-aid knowledge of production site; 3. Maintenance knowledge of tools and instruments.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	STANDARD OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT	DUTY NO.	402
TASK TITLE	POWERING ON/OFF AND SIMPLE MAINTENANCE OF THE MECHANICAL EQUIPMENT	TASK NO.	4021
PERFORMANCE CRITERIA	The person performing this task must be able to power on/off equipment correctly according to technical specification and manufacturer's maintenance manual, and completing simple maintenance of equipment.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Equipment wiping tools; 2. Lubricating oil and coolant; 3. PPE, such as safety boots, goggles and gloves.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Wipe the equipment with tools; 2. Fill coolant and lubricating oil as required; 3. Check whether the equipment circuit and access circuit are normal or not; 4. Start the equipment according to the manufacturer's maintenance manual; 5. Check whether the equipment operation is normal or not; 6. Check whether the lubricating/cooling system is blocked or not; 7. Shut down the equipment according to the manufacturer's maintenance manual.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Fill the coolant and lubricating oil; 1.2 Judge whether the equipment circuit and access circuit are normal or not; 1.3 Check whether the lubricating/cooling system is blocked or not. 2.0 Principle The person performing this task must be able to explain the following: 2.1 Equipment maintenance requirements; 2.2 Significance and method for correct powering on/off machine tools. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Significance of mechanical equipment maintenance; 3.2 Differences of daily maintenance, Level 1 maintenance and Level 2 maintenance. 4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Self-safety awareness.
DESCRIPTION OF THE END PRODUCT / SERVICE	The mechanical equipment is powered on/off correctly, the classification of equipment maintenance is learned and simple maintenance is completed according to technical specification and manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Classification of equipment maintenance; 2. Simple maintenance of equipment; 3. Operation of lubricating/cooling system; 4. Equipment start/shutdown process; 5. Occupational health and safety.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	STANDARD OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT	DUTY NO.	402
TASK TITLE	CLEANING OF THE INTERNAL AND EXTERNAL EQUIPMENT PARTS	TASK NO.	4022
PERFORMANCE CRITERIA	The person performing this task must be able to keep the equipment cleanliness according to technical specifications and manufacturer's maintenance manual.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Equipment wiping tools; 2. Oil line cleaning tools; 3. Equipment component removal tools.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Wipe the equipment and check whether there is yellow/oil scales, damage or the parts are complete; 2. Check whether the guide rail, rack, feed rod and lead screw have black oil or rust, and grind the scars and burr; 3. Clean and dredge the lubricating/cooling system and pipelines, including the filtration unit of oil hole, cup, line and felt; 4. Remove the protective covers and check the lubricating condition; 5. Remove the machining residuals in equipment; 6. Check whether the cleaning is qualified.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Wipe the equipment with suitable tools; 1.2 Wipe the guide rail, feed rod and lead screw and grind the scars and burr; 1.3 Clean and dredge the lubricating/cooling system and pipelines; 1.4 Remove the protective covers and check the lubricating condition. 2.0 Principle The person performing this task must be able to explain the following: 2.1 Significance for cleaning internal/external parts of equipment; 2.2 Methods for cleaning internal/external parts of equipment. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Methods for judging grinding scars and burr in equipment; 3.2 Methods for cleaning and dredging the lubricating/cooling system and pipelines. 4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Self-safety awareness.
DESCRIPTION OF THE END PRODUCT / SERVICE	The equipment is cleaned according to technical specifications and the manufacturer's manual
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Precautions for wiping guide rail, feed rod and lead screw; 2. Methods for cleaning and dredging lubricating/cooling system and pipelines; 3. Process and precautions for removal of protective covers; 4. Occupational health and safety; 5. Waste disposal methods.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	STANDARD OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT	DUTY NO.	402
TASK TITLE	SELECTION OF SUITABLE LUBRICANT FOR EQUIPMENT LUBRICATION	TASK NO.	4023
PERFORMANCE CRITERIA	The person performing this task must be able to choose and fill lubricating oil and grease correctly according to technical specifications and the manufacturer's maintenance manual.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Different lubricating oil/grease; 2. Filling tools of the lubricating oil and grease; 3. Cleaning tools for filter and tank strainer.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Distinguish the types of lubricating oil and grease; 2. Judge the remaining situation of lubricating oil and grease; 3. Choose the lubricating oil and grease according to equipment types; 4. Clean the filter and tank strainer; 5. Fill the lubricating oil and grease with filling tools; 6. Confirm whether the oil is clean and the oil line is free of blocking, seepage or grinding scars.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Judge the remaining situation of lubricating oil and grease; 1.2 Choose the types of lubricating oil and grease; 1.3 Add lubricating oil and grease with filling tools. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Classification of lubricating oil and grease; 2.2 Functions of lubricating oil and grease. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Usage of lubricating oil and grease; 3.2 Precautions for using lubricating oil and grease. 4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Self-safety awareness.
DESCRIPTION OF THE END PRODUCT / SERVICE	Correct types of lubricating oil and grease are chosen and lubricating oil/grease are added with filling tools according to technical specifications and the manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Waste disposal methods.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	STANDARD OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT	DUTY NO.	402
TASK TITLE	FILLING IN THE MAINTENANCE RECORD	TASK NO.	4024
PERFORMANCE CRITERIA	The person performing this task must be able to conduct maintenance according to technical specifications and manufacturer's manual, and filling in the maintenance record form.		
RANGE STATEMENT	The task can be performed in the maintenance site or workshop under the supervision of senior technicians or mechanical equipment maintenance engineers. The tools and equipment to be used include: 1. Equipment wiping tools; 2. Lubricating oil and coolant; 3. PPE, such as safety boots, goggles and gloves.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Check and adjust the clearance of structures; 2. Check the fastening parts; 3. Check all safety devices; 4. Check whether the electrical parts meet the requirement; 5. Clean the workplace; 6. Fill in the equipment maintenance record form.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Check and adjust the clearance and fastening parts; 1.2 Check the safety devices; 1.3 Check the electrical parts; 1.4 Fill in the equipment maintenance record form. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Standards for daily maintenance, Level 1 maintenance and Level 2 maintenance; 2.2 Filling in of the equipment maintenance record form. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Significance of Level 1 and 2 maintenance; 3.2 Use and maintenance requirements for equipment. 4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Self-safety awareness.
DESCRIPTION OF THE END PRODUCT / SERVICE	The maintenance is reasonably arranged and the equipment maintenance record form is filled in according to technical specifications, the manufacturer's manual and the service condition of equipment.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Equipment maintenance level; 2. Filling in of equipment maintenance record form; 3. Occupational health and safety; 4. Waste disposal methods.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	IDENTIFICATION OF THE FAULT OF MECHANICAL EQUIPMENT	DUTY NO.	403
TASK TITLE	READING OF THE MECHANICAL EQUIPMENT DRAWINGS	TASK NO.	4031
PERFORMANCE CRITERIA	The person performing this task must be able to read equipment drawings correctly according to technical specifications and manufacturer's manual, and identify the fault position based on working principle of equipment.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of senior technicians. The tools and equipment to be used include: 1. Equipment drawings; 2. Common dismounting tools (inner hexagon wrench and open-end wrench); 3. PPE, such as safety boots, goggles and gloves.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Choose suitable tools for tasks; 2. Identify the required drawings; 3. Dismount the equipment enclosure; 4. Read the working principles of equipment according to the equipment structure drawing; 5. Observe the safety regulations during operation; 6. Clean the workplace; 7. Arrange the tools and equipment.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Read the equipment drawings; 1.2 Judge the fault position. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Equipment structure; 2.2 Operating principles. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Equipment using methods. 4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Safety awareness.	
DESCRIPTION OF THE END PRODUCT / SERVICE		The working principles of common equipment are known and the fault position is judged correctly according to technical specifications,	

	manufacturer's equipment drawings and the equipment characteristics.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Waste disposal methods.

OCCUPATION	MECHANICAL EQUIPMENT MAINTENANCE TECHNICIAN	OCCUPATION CODE	400
DUTY TITLE	IDENTIFICATION OF THE FAULT OF MECHANICAL EQUIPMENT	DUTY NO.	403
TASK TITLE	IDENTIFICATION OF THE COMMON MECHANICAL FAULTS	TASK NO.	4032
PERFORMANCE CRITERIA	The person performing this task must be able to diagnose the faults of small and simple equipment such as grinding machine according to technical specifications, and measure the geometric accuracy and machining precision.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of senior technicians. The tools and equipment to be used include: 1. General measuring tools; 2. Tools for trial processing; 3. PPE, such as safety boots, goggles and gloves.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Choose suitable tools for tasks; 2. Wipe the equipment and measuring tools with cleaning items; 3. Detect the geometric accuracy of small and simple equipment with measuring tools; 4. Detect the machining precision of small and simple equipment such as bench drill and grinding machine with trial processing method; 5. Observe the safety regulations during operation; 6. Clean the workplace; 7. Arrange the tools and equipment.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Wipe the equipment and measuring tools with cleaning items; 1.2 Detect the geometric accuracy of small and simple equipment with measuring tools; 1.3 Detect the machining precision of small and simple equipment such as bench drill and grinding machine with trial processing method. 2.0 Principle The person performing this task must be able to explain the following: 2.1 Cleaning requirements of equipment and measuring tools; 2.2 Detection principles of geometric accuracy of small and simple equipment; 2.3 Processing methods of small and simple equipment; 2.4 Structure and working principles of bench drill and grinding machine. 3.0 Theories The person performing this task must be able to explain the following:	

	3.1 Significance for detecting geometric accuracy of mechanical equipment; 3.2 Quality requirements for products machined by small and simple equipment; 3.3 Common faults of bench drill and grinding machine. 4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Self-safety awareness.
DESCRIPTION OF THE END PRODUCT / SERVICE	Common faults of mechanical equipment are removed correctly according to technical specifications and the manufacturer's manual, and trial processing is completed with relevant methods.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Classification and purpose of common measuring instruments and tools; 2. Occupational health and safety; 3. Waste disposal methods.

**TABLE 1: DACUM CHARTS FOR MECHANICAL EQUIPMENT MAINTENANCE
TECHNICIAN - NTA 4**

DUTIES	TASKS	ENABLERS
1.0 Preparation before mechanical equipment installation	1.1 Open-box inspection of mechanical equipment.	General skills and knowledge • Cooperating with others using communication skills and reporting to the superiors • Use of the manufacturer's manual • Knowledge of installation and maintenance tools • Knowledge of using protection articles • Reading of mechanical equipment installation drawings • Basic materials science • Mechanical basics Tools and equipment • Unpacking tools • Whole set of mechanical equipment maintenance toolbox • PPE such as safety boots, goggles, gloves, hearing protection device and safety helmet Materials • Installation drawings of mechanical equipment and elements Requirements for employees • Teamwork spirit, integrity, time management and commitment
	1.2 Reading of equipment installation diagrams.	
	1.3 Selection of installation and maintenance tools.	
	1.4 Safety protection for mechanical equipment installation.	
2.0 Standard operation and maintenance of mechanical equipment	2.1 Powering on/off and simple maintenance of the mechanical equipment.	General skills and knowledge • Cooperating with others using communication

	2.2	Cleaning of the internal and external equipment parts.	skills and reporting to the superiors • Use of the manufacturer's manual • Knowledge of cleaning mechanical equipment and parts • Knowledge of lubricants • Basic materials science • Mechanical basics Tools and equipment • Filling tools of the lubricating oil and grease • PPE such as safety boots, goggles, gloves, hearing protection device and safety helmet Materials • Mechanical equipment/elements and lubricating oil/agent Requirements for employees • Teamwork spirit, integrity, time management and commitment
	2.3	Selection of suitable lubricant for equipment lubrication.	
	2.4	Filling in the maintenance record.	
3.0 Identification of the fault of mechanical equipment	3.1	Reading of the mechanical equipment drawings.	General skills and knowledge • Cooperating with others using communication skills and reporting to the superiors • Use of the manufacturer's manual • Knowledge of installation and maintenance tools • Knowledge of using protection articles • Drawing reading • Basic materials science • Mechanical basics Tools and equipment
	3.2	Identification of the common mechanical faults.	

		• Detection tools of mechanical equipment/devices; • PPE such as safety boots, goggles, gloves, hearing protection device and safety helmet Materials • Drawings of mechanical equipment and elements Requirements for employees • Teamwork spirit, integrity, time management and commitment
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