NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

MARCH 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: METROLOGY TECHNICIAN

LEVEL: NTA 4

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ABBREVIATIONS

A	Ampere
CBET	Competency Based Education and Training
cd	Candela
K	Kelvin
kg	Kilogram
m	Meter
mol	Mole
NACTE	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
s	Second
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 Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
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 a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation.
Performance Criteria:	Indicate expected end results or outcomes in the 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:	A set of statements, 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, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.
Underpinning Knowledge:	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.

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 and Vocational Education and Training of Tanzania 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 Occupational 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 circuits, performs fault 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 Metrology 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 experts 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 Metrology Technicians were key informants in the survey to discover occupational trends. The 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 METROLOGY TECHNICIANS

The standards cover a broad range of duties and tasks that can be performed by a Metrology 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 Metrology 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.

Metrology Technicians are supervised by Engineers to inspect, use, calibrate, repair, check, confirm, verify and maintain measuring instruments and systems. In the metrology room, technicians can apply metrological standards and standardization skills to promote quality control and conformity assessment. Generally, the Metrology Technician performs the following responsibilities:

(1) Measurement of geometric quantities

a) Measurement of gauge blocks

b) Measurement of work linear scales

c) Measurement of conventional angle measuring instruments

d) Measurement of shape measuring instruments

e) Measurement of vernier species measuring tools

f) Measurement of differential type measuring tools

g) Measurement of indicator type measuring tools

h) Measurement of angle measuring tools

(2) Mechanical measurement

a) Measurement of mass

b) Measurement of weighing

c) Measurement of capacity

d) Measurement of force value

e) Measurement of hardness

f) Measurement of pressure gauges

(3) Temperature measurement

a) Measurement of thermocouples

b) Measurement of expansion thermometers

c) Measurement of resistance thermometers

(4) Electromagnetic measurement

a) Measurement of DC resistance and instruments

b) Measurement of DC voltage and instruments

c) Measurement of strain gauge and calibrator

d) Measurement of AC electric quantity

e) Measurement of electric energy

(5) Radio measurement

a) Measurement of high-frequency voltage

b) Measurement of high-frequency microwave power

c) Measurement of high-frequency microwave noise

d) Measurement of pulse parameters

e) Measurement of video parameters

f) Measurement of communication measuring instruments

g) Measurement of transistors and integrated circuit measuring instruments

h) Measurement of cardiac and EEG medical testers

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

4.0. VALID 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 METROLOGY TECHNICIAN - NTA 4

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MEASUREMENT OF GEOMETRIC QUANTITIES	**DUTY NO.**	401
TASK TITLE	LENGTH AND END MEASUREMENT	**TASK NO.**	4011
PERFORMANCE CRITERIA	The person performing this task must be able to complete length and end measurement in accordance with the usage specifications of vernier species measuring tools.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Current Caliper; 3. Thermometer and hygrometer; 4. Workpiece and drawing.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select a caliper with appropriate stroke and function; 2. Check the appearance and interaction of various parts of the current caliper; 3. Check and wipe the appearance of the workpiece; 4. Record the environmental conditions; 5. Check the zero error of the current caliper; 6. Measure the length and end size; 7. Record the measured data; 8. Provide a test report for the workpiece; 9. Maintain the current caliper; 10. Clean the workplace; 11. Store the current caliper.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Check the zero error of the current caliper; 1.2 Use the current caliper; 1.3 Maintain the current caliper. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The counting principle of vernier species measuring tools. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for current calipers; 3.2 The process of workpiece detection; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of current calipers. **4.0 Essential Skills** 4.1 Communication skills;

	4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The length and end measurement is completed using vernier species measuring tools in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MEASUREMENT OF GEOMETRIC QUANTITIES	**DUTY NO.**	401
TASK TITLE	ANGULAR MEASUREMENT	**TASK NO.**	4012
PERFORMANCE CRITERIA	The person performing this task must be able to complete angular measurement in accordance with the usage specifications of angle measuring tools.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Universal angle ruler; 3. Angular gauge block; 4. Thermometer and hygrometer; 5. Workpiece and drawing.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select angle ruler accessories with appropriate stroke; 2. Check the appearance and interaction of various parts of the universal angle ruler; 3. Check the appearance of angular gauge blocks; 4. Check and wipe the appearance of the workpiece; 5. Record the environmental conditions; 6. Use an angular gauge block to check the zero error of the universal angle ruler; 7. Measure angular dimensions; 8. Record the measured data; 9. Provide a test report for the workpiece; 10. Maintain universal angle rulers; 11. Clean the workplace; 12. Store universal angle rulers.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Check the zero error of the universal angle ruler; 1.2 Use universal angle rulers; 1.3 Maintain current calipers. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The counting principle of universal angle rulers; 2.2 The conversion method for angle units. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for universal angle rulers; 3.2 The process of workpiece detection; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of universal angle rulers. **4.0 Essential Skills** 4.1 Communication skills;

	4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The angular measurement is completed using angle measuring tools in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MEASUREMENT OF GEOMETRIC QUANTITIES	**DUTY NO.**	401
TASK TITLE	THREAD PARAMETER MEASUREMENT	**TASK NO.**	4013
PERFORMANCE CRITERIA	The person performing this task must be able to complete thread pitch diameter measurement in accordance with the usage specifications of micrometer type measuring tools.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Measuring rod for calibration; 4. Thread micrometer; 5. Three-needle device; 6. Gear tooth micrometer; 7. Thread workpiece and drawing.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select measuring tools with appropriate stroke; 2. Check the appearance and interaction of various parts of the thread micrometer; 3. Check the appearance and interaction of various parts of the gear tooth micrometer; 4. Check the appearance of the three-needle device; 5. Check the appearance of the measuring rod for calibration; 6. Check and wipe the appearance of the thread workpiece; 7. Record the environmental conditions; 8. Check the zero error of the thread micrometer; 9. Check the zero error of the gear tooth micrometer; 10. Use a thread micrometer to measure the thread pitch diameter; 11. Use the three-needle method to measure the thread pitch diameter;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Check the zero error of the thread micrometer; 1.2 Check the zero error of the gear tooth micrometer; 1.3 Use a thread micrometer to measure the thread pitch diameter size; 1.4 Use the three-needle method to measure the thread pitch diameter; 1.5 Maintain the thread micrometer; 1.6 Maintain the gear tooth micrometer. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The measuring principle of thread micrometers; 2.2 The measuring principle of three-needle method. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for thread

12. Record the measured data; 13. Provide a test report for the workpiece; 14. Maintain the thread micrometer; 15. Maintain the gear tooth micrometer; 16. Clean the workplace; 17. Store the thread micrometer; 18. Store the gear tooth micrometer.	micrometers; 3.2 The qualification judgment method for gear tooth micrometer; 3.3 The process of thread micrometer detection; 3.4 The process of three-needle method detection; 3.5 Requirements for detection environment; 3.6 Requirements for the storage environment of thread micrometers; 3.7 Requirements for the storage environment of gear tooth micrometers. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The thread pitch diameter measurement is completed using micrometer type instruments in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MEASUREMENT OF GEOMETRIC QUANTITIES	**DUTY NO.**	401
TASK TITLE	ENGINEERING PARAMETER (SHAFT KIT) MEASUREMENT	**TASK NO.**	4014
PERFORMANCE CRITERIA	The person performing this task must be able to complete the measurement of roundness and coaxiality errors in accordance with the usage specifications of indicator type measuring tools.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Dial gauge; 4. Dial gauge stand; 5. Shaft kit and drawing; 6. V-block.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select measuring tools with appropriate stroke; 2. Check the appearance and interaction of various parts of the dial gauge; 3. Check the appearance of workpieces; 4. Record the environmental conditions; 5. Measure roundness; 6. Measure coaxiality; 7. Record the measured data; 8. Provide a test report for the workpiece; 9. Maintain dial gauges; 10. Clean the workplace; 11. Store dial gauges.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use a dial gauge to measure roundness; 1.2 Use a dial gauge to measure coaxiality; 1.3 Maintain dial gauges. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The measuring principle of roundness; 2.2 The measuring principle of coaxiality. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for dial gauges; 3.2 The process of dial gauge detection; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of dial gauges. **4.0 Essential Skills**

	4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The measurement of workpiece roundness and coaxiality errors is completed in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MEASUREMENT OF GEOMETRIC QUANTITIES	**DUTY NO.**	401
TASK TITLE	ENGINEERING PARAMETER (BOX KIT) MEASUREMENT	**TASK NO.**	4015
PERFORMANCE CRITERIA	The person performing this task must be able to complete the measurement of flatness, verticality and parallelism errors in accordance with the usage specifications of indicator type measuring tools.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Dial gauge; 4. Dial gauge stand; 5. Box kit and drawing; 6. Marble slab; 7. Square box; 8. Leveling equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select measuring tools with appropriate stroke; 2. Check the appearance and interaction of various parts of the dial gauge; 3. Check the appearance of workpieces; 4. Record the environmental conditions; 5. Measure flatness; 6. Measure verticality; 7. Measure parallelism; 8. Record the measured data; 9. Provide a test report for the workpiece; 10. Maintain dial gauges; 11. Clean the workplace; 12. Store dial gauges.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use a dial gauge to measure flatness; 1.2 Use a dial gauge to measure verticality; 1.3 Use a dial gauge to measure parallelism. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The measuring principle of flatness; 2.2 The measuring principle of verticality; 2.3 The measuring principle of parallelism. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for dial gauges; 3.2 The process of dial gauge detection; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of dial

	gauges. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The measurement of workpiece flatness, verticality and parallelism errors is completed in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	THERMAL MEASUREMENT	**DUTY NO.**	402
TASK TITLE	TEMPERATURE MEASUREMENT	**TASK NO.**	4021
PERFORMANCE CRITERIA	The person performing this task must be able to measure the medium temperature in accordance with the usage specifications of pressure type thermometers.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Pressure type thermometer; 4. Measured medium (non corrosive to copper).		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of pressure type thermometers; 2. Check the medium; 3. Record the environmental conditions; 4. Determine the qualification of pressure type thermometers; 5. Measure the temperature of the measured medium; 6. Record the measured data; 7. Issue a measurement report; 8. Maintain pressure type thermometers; 9. Clean the workplace; 10. Store pressure type thermometers.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use a pressure type thermometer to measure the temperature of the measured medium; 1.2 Maintain pressure type thermometers. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of pressure type thermometers; 2.2 Calibration specifications for pressure type thermometers. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for pressure type thermometers; 3.2 The usage process of pressure type thermometers; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of pressure type thermometers. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills;

	4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The medium temperature measurement is completed using pressure type thermometers in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	THERMAL MEASUREMENT	**DUTY NO.**	402
TASK TITLE	RADIATION TEMPERATURE MEASUREMENT	**TASK NO.**	4022
PERFORMANCE CRITERIA	The person performing this task must be able to complete the measurement of human body surface temperature in accordance with the usage specifications of infrared thermometers.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Infrared thermometer; 3. Human body.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select the model of infrared thermometers; 2. Check the appearance of infrared thermometers; 3. Determine the qualification of infrared thermometers; 4. Emit infrared light; 5. Receive infrared reflection signals; 6. Record the measured data; 7. Issue the test report; 8. Maintain infrared thermometers; 9. Clean the workplace; 10. Store infrared thermometers.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use an infrared thermometer to measure body surface temperature; 1.2 Maintain infrared thermometers. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of infrared thermometers; 2.2 Calibration specifications for infrared thermometers. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for infrared thermometers; 3.2 Requirements for the storage environment of infrared thermometers. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills.

	5.0 Math Skills 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The measurement of human body surface temperature is completed in accordance with the operation specifications and requirements of the infrared thermometers.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	THERMAL MEASUREMENT	**DUTY NO.**	402
TASK TITLE	HUMIDITY MEASUREMENT	**TASK NO.**	4023
PERFORMANCE CRITERIA	The person performing this task must be able to measure the environment humidity in accordance with the usage specifications of mechanical hygrometers.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Mechanical hygrometer; 3. Ventilated psychrometer; 4. Temperature and humidity calibration chamber; 5. Atmospheric pressure gauge; 6. Thermometer.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of mechanical hygrometers; 2. Determine the qualification of mechanical hygrometers; 3. Complete the static placement of the mechanical hygrometer in the tested environment; 4. Open the cover of the mechanical hygrometer to circulate air; 5. Rotate the mechanical hygrometer adjustment ring; 6. Record the measured data; 7. Close the mechanical hygrometer cover; 8. Issue the test report; 9. Maintain mechanical hygrometers; 10. Clean the workplace; 11. Store mechanical hygrometers.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use a mechanical hygrometer to measure environment humidity; 1.2 Maintain mechanical hygrometers. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of mechanical hygrometers; 2.2 The calibration specifications for mechanical hygrometers. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for mechanical hygrometers; 3.2 The usage process of mechanical hygrometers; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of mechanical hygrometers. **4.0 Essential Skills**

	4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The environment humidity measurement is completed using mechanical hygrometers in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MECHANICAL MEASUREMENT	**DUTY NO.**	403
TASK TITLE	MASS MEASUREMENT	**TASK NO.**	4031
PERFORMANCE CRITERIA	The person performing this task must be able to complete product mass measurement in accordance with the usage specifications of mechanical balances.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Mechanical balance; 3. Standard weight; 4. Thermometer and hygrometer; 5. Product.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select the appropriate measurement tool; 2. Check the appearance of mechanical balances; 3. Check the structure of mechanical balances; 4. Determine the qualification of mechanical balances; 5. Record the on-site environmental parameters; 6. Adjust the mechanical balance screws to calibrate the level; 7. Adjust the balance graduation value so that each graduation value corresponds to the determined weighing weight; 8. Measure product mass; 9. Record the measured data; 10. Issue the test report; 11. Maintain mechanical balances; 12. Clean the workplace; 13. Store mechanical balances.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use a mechanical balance to measure product mass; 1.2 Maintain mechanical balances. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of mechanical balances; 2.2 Calibration specifications for mechanical balances. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for mechanical balances; 3.2 The usage process of mechanical balances; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of mechanical balances. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills;

	4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The product mass measurement is completed using mechanical balances in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MECHANICAL MEASUREMENT	**DUTY NO.**	403
TASK TITLE	PRESSURE MEASUREMENT	**TASK NO.**	4032
PERFORMANCE CRITERIA	The person performing this task must be able to complete pressure measurement in accordance with the usage specifications of gas piston pressure gauges.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Gas piston pressure gauge; 3. Standard instrument; 4. Weight; 5. Thermometer and hygrometer; 6. Products to be measured.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the piston system; 2. Check load-bearing plates and special weights; 3. Record the on-site environmental parameters; 4. Determine the qualification of gas piston pressure gauges; 5. Use a gas piston pressure gauge to measure product pressure; 6. Record the measured data; 7. Issue a measurement report; 8. Maintain the equipment used; 9. Clean the workplace; 10. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use a gas piston pressure gauge to measure pressure; 1.2 Maintain gas piston pressure gauges. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of gas piston pressure gauges; 2.2 Calibration specifications for gas piston pressure gauges. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for gas piston pressure gauges; 3.2 The usage process of gas piston pressure gauges; 3.3 Requirements for detection environment; 3.4 Requirements for the storage environment of gas piston pressure gauges. **4.0 Essential Skills** 4.1 Communication skills;

	4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The pressure measurement is completed using gas piston pressure gauges in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MECHANICAL MEASUREMENT	**DUTY NO.**	403
TASK TITLE	FORCE VALUE MEASUREMENT	**TASK NO.**	4033
PERFORMANCE CRITERIA	The person performing this task must be able to measure the tensile properties of the material in accordance with the usage specifications of the tensile testing machine.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Tensile testing machine; 4. Standard dynamometer; 5. Special weight; 6. Products to be measured.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of tensile testing machines; 2. Record the on-site environmental parameters; 3. Determine the qualification of tensile testing machines; 4. Clamp the products to be measured; 5. Set test parameters such as load and speed; 6. Use a tensile testing machine to measure the tensile properties of plastics; 7. Record the measured data; 8. Issue a measurement report; 9. Maintain the equipment used; 10. Clean the workplace; 11. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use tensile testing machines; 1.2 Maintain tensile testing machines. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of tensile testing machines; 2.2 Verification regulations for tensile testing machines. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for tensile testing machines; 3.2 Parameter settings for the use of tensile testing machines; 3.3 Standard range of tensile properties for different materials; 3.4 Requirements for detection environment; 3.5 Requirements for the storage environment of tensile testing machines.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The measurement of tensile properties of materials is completed using tensile testing machines in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MECHANICAL MEASUREMENT	**DUTY NO.**	403
TASK TITLE	HARDNESS MEASUREMENT	**TASK NO.**	4034
PERFORMANCE CRITERIA	The person performing this task must be able to measure material hardness in accordance with the usage specifications of portable Brinell (Rockwell) hardness testers.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Portable Brinell hardness tester; 4. Portable Rockwell hardness tester; 5. Measured product.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of portable Brinell hardness testers; 2. Check the relative movement of each movable part of portable Brinell hardness testers; 3. Determine the qualification of portable Brinell hardness testers; 4. Check the appearance of portable Rockwell hardness testers; 5. Check the relative movement of each movable part of portable Rockwell hardness testers; 6. Determine the qualification of portable Rockwell hardness testers; 7. Record the on-site environmental parameters; 8. Use a portable Brinell hardness tester to measure the hardness of the product; 9. Use a portable Rockwell hardness tester to measure the hardness of the product; 10. Record the measured data; 11. Issue a measurement report; 12. Maintain the equipment used; 13. Clean the workplace; 14. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use portable Brinell hardness testers; 1.2 Use portable Rockwell hardness testers; 1.3 Maintain portable Brinell hardness testers; 1.4 Maintain portable Rockwell hardness testers. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of portable Brinell hardness testers; 2.2 The working principle of portable Rockwell hardness testers; 2.3 Calibration specifications for portable Brinell (Rockwell) hardness testers. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for portable Brinell hardness testers; 3.2 The qualification judgment method for portable Rockwell hardness testers; 3.3 The usage process of portable Brinell hardness testers;

	3.4 The usage process of portable Rockwell hardness testers; 3.5 Requirements for detection environment; 3.6 Requirements for the storage environment of portable Brinell hardness testers; 3.7 Requirements for the storage environment of portable Rockwell hardness testers. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The material hardness measurement is completed using portable Brinell (Rockwell) hardness testers in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ELECTRICAL MEASUREMENT	**DUTY NO.**	404
TASK TITLE	VOLTAGE MEASUREMENT	**TASK NO.**	4041
PERFORMANCE CRITERIA	The person performing this task must be able to complete voltage measurement of electronic products in accordance with the usage specifications of voltmeters.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Voltmeter; 4. Electronic product.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of voltmeters; 2. Determine the qualification of voltmeters; 3. Adjust the range to the expected measurement range; 4. Use a voltmeter to measure the voltage of electronic products; 5. Record the measured data; 6. Turn off the voltmeter switch, and disassemble the test head; 7. Issue a measurement report; 8. Maintain the equipment used; 9. Clean the workplace; 10. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use voltmeters; 1.2 Maintain voltmeters. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of voltmeters; 2.2 Verification regulations for voltmeters. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for voltmeters; 3.2 Underpinning knowledge of electrical applications; 3.3 Precautions for using voltmeters. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills**

	5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The voltage measurement of electronic products is completed using voltmeters in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ELECTRICAL MEASUREMENT	**DUTY NO.**	404
TASK TITLE	CURRENT MEASUREMENT	**TASK NO.**	4042
PERFORMANCE CRITERIA	The person performing this task must be able to complete current measurement of electronic products in accordance with the usage specifications of ammeters.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Ammeter; 4. Electronic product.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of ammeters; 2. Determine the qualification of ammeters; 3. Adjust the range to the expected measurement range; 4. Use an ammeter to measure the current of electronic products; 5. Record the measured data; 6. Turn off the ammeter switch, and disassemble the test head; 7. Issue a measurement report; 8. Maintain the equipment used; 9. Clean the workplace; 10. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use ammeters; 1.2 Maintain ammeters. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of ammeters; 2.2 Verification regulations for ammeters. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for ammeters; 3.2 Underpinning knowledge of electrical applications; 3.3 Precautions for using ammeters. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills. **5.0 Math Skills**

	5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The current measurement of electronic products is completed using ammeters in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ELECTRICAL MEASUREMENT	**DUTY NO.**	404
TASK TITLE	RESISTANCE MEASUREMENT	**TASK NO.**	4043
PERFORMANCE CRITERIA	The person performing this task must be able to complete resistance measurement of electronic products in accordance with the usage specifications of resistance meters.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Resistance meter; 4. Electronic product.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of resistance meters; 2. Determine the qualification of resistance meters; 3. Adjust the range to the expected measurement range; 4. Use a resistance meter to measure the resistance of electronic products; 5. Record the measured data; 6. Turn off the resistance meter switch, and disassemble the test head; 7. Issue a measurement report; 8. Maintain the equipment used; 9. Clean the workplace; 10. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use resistance meters; 1.2 Maintain resistance meters. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of resistance meters; 2.2 Verification regulations for resistance meters. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for resistance meters; 3.2 Underpinning knowledge of electrical applications; 3.3 Precautions for using resistance meters. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Instrument operation skills.

	5.0 Math Skills 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The resistance measurement of electronic products is completed using resistance meters in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ELECTROMAGNETIC MEASUREMENT	**DUTY NO.**	405
TASK TITLE	POWER, FIELD STRENGTH, AND PHASE MEASUREMENT	**TASK NO.**	4051
PERFORMANCE CRITERIA	The person performing this task must be able to complete power measurement of electronic products in accordance with the usage specifications of power meters.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Power meter; 4. Electronic product.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of power meters; 2. Determine the qualification of power meters; 3. Disconnect the power supply of the power meter, and connect the test head; 4. Turn on the circuit meter, and connect the test head to the power end and load end of the tested circuit; 5. Observe the power meter, and record the measured data; 6. Turn off the power meter, and disassemble the test head; 7. Issue a measurement report; 8. Maintain the equipment used; 9. Clean the workplace; 10. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use power meters; 1.2 Maintain power meters. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of power meters; 2.2 Verification regulations for power meters. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for power meters; 3.2 Underpinning knowledge of electrical applications; 3.3 Precautions for using power meters. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills;

	4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The power measurement of electronic products is completed using power meters in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

OCCUPATION	METROLOGY TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ELECTROMAGNETIC MEASUREMENT	**DUTY NO.**	405
TASK TITLE	MAGNETIC MEASUREMENT (MAGNETIC FIELD INTENSITY MEASUREMENT)	**TASK NO.**	4052
PERFORMANCE CRITERIA	The person performing this task must be able to measure the magnetic field intensity in accordance with the usage specifications of magnetometers.		
RANGE STATEMENT	The task can be performed in the metrology room under the supervision of a Senior Technician or a Metrology Engineer. The tools and equipment to be used include: 1. Personal protective equipment, such as safety shoes, and gloves; 2. Thermometer and hygrometer; 3. Magnetometer; 4. Magnetic field environment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Check the appearance of magnetometers; 2. Check the power-up state of magnetometers; 3. Record the calibration environmental conditions; 4. Determine the qualification of magnetometers; 5. Use a magnetometer to measure the magnetic field intensity; 6. Record the measured data; 7. Issue a measurement report; 8. Maintain the equipment used; 9. Clean the workplace; 10. Store the equipment used.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use magnetometers; 1.2 Maintain magnetometers. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The working principle of magnetometers; 2.2 Calibration specifications for magnetometers. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 The qualification judgment method for magnetometers; 3.2 Underpinning knowledge of electrical applications; 3.3 Precautions for using magnetometers. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Customer service skills; 4.3 Teamwork skills; 4.4 Report writing skills;

	4.5 Instrument operation skills. **5.0 Math Skills** 5.1 Numerical calculation skills; 5.2 Geometric quantity calculation skills; 5.3 Linear algebraic calculation skills; 5.4 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The magnetic field intensity measurement is completed using magnetometers in accordance with the operation specifications and requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation procedures; 2. Knowledge of safe use of electricity; 3. Knowledge of energy conservation and emission reduction, and environmental protection; 4. Occupational health and safety; 5. Underpinning knowledge of production and quality control.

TABLE 1: DACUM CHARTS FOR METROLOGY TECHNICIAN - NTA 4

DUTIES	TASKS	ENABLERS
1.0 Measurement of geometric quantities	1.1 Length and end measurement. 1.2 Angular measurement. 1.3 Thread parameter measurement. 1.4 Engineering parameter (shaft kit) measurement. 1.5 Engineering parameter (box kit) measurement.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Instructions for using measuring tools · Technical drawing interpretation · Operating skills of measuring tools and instruments · Measuring methods for dimensional and geometric tolerances · Mechanical underpinning knowledge **Tools and equipment** · Personal protective equipment, such as safety shoes, and gloves · Thermometer and hygrometer · Current caliper, universal angle ruler, thread micrometer, gear tooth micrometer, dial gauge, and other measuring tools · Angular gauge block, measuring rod for calibration, gauge block, and other calibration instruments · Three-needle device, dial gauge stand, V-block, marble slab, square box, leveling equipment, and other auxiliary tools **Materials** · Dust-free cloth · Anhydrous ethanol · Anti-rust oil **Requirements for employees** · Collaborative teamwork spirit · Rigorous and meticulous work style · Integrity spirit of keeping promises · Project planning capability in reasonable scheduling
2.0 Thermal measurement	2.1 Temperature measurement. 2.2 Radiation temperature measurement.	**General skills and knowledge** · Cooperating with others using communication skills and reporting

DUTIES	TASKS	ENABLERS
	2.3 Humidity measurement.	to the superiors · Use equipment instruction · Operating skills of measuring equipment · Underpinning knowledge of thermology **Tools and equipment** · Personal protective equipment, such as safety shoes, and gloves · Thermometer and hygrometer, pressure type thermometer, infrared thermometer, mechanical hygrometer, atmospheric pressure gauge, thermometer, and other measuring instruments **Materials** · Dust-free cloth · Anhydrous ethanol · Anti-rust oil **Requirements for employees** · Collaborative teamwork spirit · Rigorous and meticulous work style · Integrity spirit of keeping promises · Project planning capability in reasonable scheduling
3.0 Mechanical measurement	3.1 Mass measurement. 3.2 Pressure measurement. 3.3 Force value measurement. 3.4 Hardness measurement.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Use equipment instruction · Operating skills of measuring instruments · Underpinning knowledge of materialogy · Underpinning knowledge of mechanics **Tools and equipment** · Personal protective equipment, such as safety shoes, and gloves · Thermometer and hygrometer, mechanical balance, gas piston pressure gauge, tensile testing

DUTIES	TASKS	ENABLERS
		machine, standard dynamometer, portable Brinell hardness tester, portable Rockwell hardness tester, and other measuring instruments · Standard weight, standard instrument, and other calibration instruments **Materials** · Dust-free cloth · Anhydrous ethanol · Anti-rust oil **Requirements for employees** · Collaborative teamwork spirit · Rigorous and meticulous work style · Integrity spirit of keeping promises · Project planning capability in reasonable scheduling
4.0 Electrical measurement	4.1 Voltage measurement. 4.2 Current measurement. 4.3 Resistance measurement.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Use equipment instruction · Operating skills of measuring instruments · Underpinning knowledge of electricity **Tools and equipment** · Personal protective equipment, such as safety shoes, and gloves · Thermometer and hygrometer · Voltmeter, ammeter, resistance meter and other measuring equipment **Materials** · Dust-free cloth **Requirements for employees** · Collaborative teamwork spirit · Rigorous and meticulous work style · Integrity spirit of keeping promises · Project planning capability in

DUTIES	TASKS	ENABLERS
		reasonable scheduling
5.0 Electromagnetic measurement	5.1 Power, field strength, and phase measurement. 5.2 Magnetism temperature measurement.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Use equipment instruction · Operating skills of measuring instruments · Underpinning knowledge of electromagnetism **Tools and equipment** · Personal protective equipment, such as safety shoes, and gloves · Thermometer and hygrometer · Power meter, magnetometer, and other measuring equipment **Materials** · Dust-free cloth **Requirements for employees** · Collaborative teamwork spirit · Rigorous and meticulous work style · Integrity spirit of keeping promises · Project planning capability in reasonable scheduling