NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

JUNE 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: NEW-ENERGY VEHICLE ENGINEER

LEVEL: NTA 7

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ABBREVIATIONS

BMS	Battery Management System
CBET	Competency Based Education and Training
EKK	Electric Air Conditioning Compressor
EPS	Electric Power Steering System
MCU	Motor Control Unit
MOPP	Maintenance Operation Processes and Procedures
MSD	Manual Service Disconnect
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OBC	On-board Charger
OS	Occupational Standards
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 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 the 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 New-Energy Vehicle Engineer 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 New-Energy Vehicle Engineers 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 surveys 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 NEW-ENERGY VEHICLE ENGINEERS

The standards cover a broad range of duties and tasks that can be performed by a New-Energy Vehicle Engineer. 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 New-Energy Vehicle Engineer 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.

The important differences that distinguish new energy vehicles from traditional vehicles are: electric drive system, power battery system and electronic control system. Therefore, on the basis of traditional vehicles, the New-Energy Vehicle Engineer focuses on solving the problems of electric drive system, power battery system and electronic control system. Generally, the New-Energy Vehicle Engineer performs the following responsibilities:

a) Management of the diagnostic and maintenance stations of new energy vehicles

b) Development of the fault diagnosis plan for new energy vehicles

c) Diagnosis of the electronic control system of new energy vehicles

d) Troubleshooting of the high voltage electrical system in new energy vehicles

e) Troubleshooting of the low voltage electrical system in new energy vehicles

f) Development of the dual-fuel power system

g) Troubleshooting of the vehicle safety and comfort system

h) Development of the maintenance plan and process of new energy vehicles

i) Automotive maintenance workshop management

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA level 7 and 8.

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 NEW-ENERGY VEHICLE ENGINEER - NTA 7

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	MANAGEMENT OF THE DIAGNOSTIC AND MAINTENANCE STATIONS OF NEW ENERGY VEHICLES	**DUTY NO.**	701
TASK TITLE	MANAGEMENT OF THE SAFETY OF DIAGNOSTIC AND MAINTENANCE STATIONS	**TASK NO.**	7011
PERFORMANCE CRITERIA	The person performing this task must be able to manage the safety of diagnostic and maintenance stations of new energy vehicles in accordance with technical requirements and safety specifications.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Maintenance stations of new energy vehicles; 2. Fire extinguishers; 3. Fire alarms; 4. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.); 5. Insulating mats; 6. Rescue tools (insulated pliers, rescue hooks, etc.); 7. Safety warning signs; 8. Warning strips; 9. Wheel chocks; 10. Charging facilities; 11. Work lights; 12. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Develop safety operation specifications of new energy vehicle diagnosis and maintenance; 2. Develop the emergency response program for dangerous incidents of new energy vehicles; 3. Conduct safety operation training of new energy vehicle diagnosis and maintenance; 4. Conduct emergency drills; 5. Supervise the safety operation of	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Develop safety specifications of station operation in combination with site and equipment conditions; 1.2 Conduct targeted safety training in combination with personnel and equipment conditions; 1.3 Conduct emergency drills based on site security risks. **2.0 Principles** The person performing this task must be able to explain the following principles:

new energy vehicle diagnosis and maintenance; 6. Develop daily lists of safety incidents and related improvement measures.	2.1 Principle of high voltage electric shock; 2.2 Principle of first aid for electric shock; 2.3 Principle of thermal runaway disposal measures for high voltage batteries; 2.4 Principle of safety risk disposal measures of new energy vehicle diagnosis and maintenance; 2.5 Principle of using safety warning signs; 2.6 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types of safety risks in new energy vehicle diagnosis and maintenance; 3.2 Human resources management theory. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The safety of diagnostic and maintenance stations of new energy vehicles is managed in accordance with technical requirements and safety specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	MANAGEMENT OF THE DIAGNOSTIC AND MAINTENANCE STATIONS OF NEW ENERGY VEHICLES	**DUTY NO.**	701
TASK TITLE	MAINTENANCE AND MANAGEMENT OF DIAGNOSTIC AND MEASURING EQUIPMENT	**TASK NO.**	7012
PERFORMANCE CRITERIA	The person performing this task must be able to manage and repair the diagnostic and measuring equipment of diagnostic and maintenance stations of new energy vehicles in accordance with technical requirements.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Diagnostic equipment (fault diagnostic apparatus, etc.); 2. Measuring equipment (oscilloscopes, multimeters, insulation testers, etc.); 3. Auxiliary equipment (junction boxes, insulation tools, etc.); 4. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.); 5. Working station safety protection equipment (safety warning signs, warning strips, insulating mats, fire extinguishers, wheel chocks, etc.); 6. Rescue tools (insulated pliers, rescue hooks, etc.); 7. Charging facilities; 8. Work lights; 10. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Develop the usage and maintenance files of new energy vehicle diagnostic and measuring equipment; 2. Develop the usage and maintenance specifications of diagnostic and measuring equipment for new energy vehicles; 3. Conduct the usage and maintenance training of diagnostic and measuring equipment for new energy vehicles; 4. Conduct regualr inspection of the function of diagnostic and measuring equipment for new	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Develop the usage and maintenance specifications of diagnostic and measuring equipment based on equipment conditions; 1.2 Develop the usage and maintenance files diagnostic and measuring equipment; 1.3 Conduct the regular usage and maintenance training of diagnostic and measuring equipment in accordance with personnel changes and equipment updates; 1.4 Conduct the functional inspection of diagnostic and measuring equipment in accordance with technical requirements. **2.0 Principles** The person performing this task must be able to explain

energy vehicles; 5. Conduct regualr maintenance, upgrade, or replacement of diagnostic and measuring equipment for new energy vehicles; 6. Supervise the use of diagnostic and measuring equipment for new energy vehicles; 7. Dispose of diagnostic and measuring equipment with abnormal functions; 8. Develop the overall configuration plan and update plan of diagnostic and measuring equipment for new energy vehicles.	the following principles: 2.1 Principles of voltage and current measurement; 2.2 Working principles of diagnostic equipment; 2.3 Working principles of measuring equipment; 2.4 Principles of configuring and using diagnostic and measuring equipment for new energy vehicles; 2.5 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types and functions of diagnostic equipment for new energy vehicles; 3.2 Types and functions of electrical measuring equipment for new energy vehicles; 3.3 Theories of equipment calibration and software upgrade. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Diagnostic and measuring equipment of new energy vehicles is managed and repaired in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DEVELOPMENT OF THE FAULT DIAGNOSIS PLAN FOR NEW ENERGY VEHICLES	**DUTY NO.**	702
TASK TITLE	FAULT VERIFICATION AND ANALYSIS OF NEW ENERGY VEHICLES	**TASK NO.**	7021
PERFORMANCE CRITERIA	The person performing this task must be able to verify the fault of new energy vehicles and preliminarily analyze fault causes in accordance with the owner's description and technical requirements.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Vehicle user manuals; 2. Diagnostic equipment (fault diagnostic apparatus, etc.); 3. Measuring equipment (oscilloscopes, multimeters, insulation testers, etc.); 4. Auxiliary equipment (junction boxes, insulation tools, etc.); 5. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.); 6. Working station safety protection equipment (safety warning signs, warning strips, insulating mats, fire extinguishers, wheel chocks, etc.); 7. Rescue tools (insulated pliers, rescue hooks, etc.); 8. Vehicle protective fenders and grille cloth; 9. Charging facilities; 10. Work lights; 11. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Make the fault inspection record sheets for new energy vehicles; 2. Verify the fault described by the owner; 3. Inspect the vehicle functions related to the fault; 4. Determine the faults range and direction of maintenance; 5. Fill in the fault inspection record sheets.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Make the fault inspection record sheets in accordance with inspection items; 1.2 Inspect the new energy vehicles in accordance with the fault inspection record sheets. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principles of the fault system; 2.2 Working principles of systems related to the fault; 2.3 6S management.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Functions of new energy vehicles; 3.2 Relationship between typical fault and functions of new energy vehicles. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The fault of new energy vehicles is verified and analyzed in accordance with the owner's description and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DEVELOPMENT OF THE FAULT DIAGNOSIS PLAN FOR NEW ENERGY VEHICLES	**DUTY NO.**	702
TASK TITLE	DEVELOPMENT OF THE FAULT DIAGNOSIS PLAN FOR NEW ENERGY VEHICLES	**TASK NO.**	7022
PERFORMANCE CRITERIA	The person performing this task must be able to develop the diagnostic plan in accordance with the fault of new energy vehicles.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Vehicle maintenance information (maintenance manuals, circuit diagrams, etc.); 2. Diagnostic equipment (fault diagnostic apparatus, etc.); 3. Measuring equipment (oscilloscopes, multimeters, insulation testers, etc.); 4. Auxiliary equipment (junction boxes, insulation tools, etc.); 5. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.); 6. Working station safety protection equipment (safety warning signs, warning strips, insulating mats, fire extinguishers, wheel chocks, etc.); 7. Rescue tools (insulated pliers, rescue hooks, etc.); 8. Vehicle protective fenders and grille cloth; 9. Charging facilities; 10. Work lights; 11. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Consult the relevant maintenance information in accordance with the faults; 2. Analyze the working principle of fault function; 3. Interpret fault codes and sensor data; 4. Choose appropriate detection methods; 5. Develop diagnosis and inspection plans of the fault; 6. Fix the fault; 7. Continuously learn and update knowledge.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the faults range of vehicles in accordance with the faults and related function verification; 1.2 Consult the relevant maintenance information in accordance with the faults. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Control principles of fault-related circuits; 2.2 Principles of electrical fault diagnosis; 2.3 Principles of new energy vehicle fault diagnosis;

	2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Diagnostic process of new energy vehicles; 3.2 Importance of fault diagnosis plans; 3.3 Interpretation and analysis of fault codes; 3.4 Analysis of sensor data. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Diagnosis plans are developed in accordance with the verification and analysis of new energy vehicle faults.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DIAGNOSIS OF THE ELECTRONIC CONTROL SYSTEM OF NEW ENERGY VEHICLES	**DUTY NO.**	703
TASK TITLE	READING AND ANALYZING FAULT CODES OF ELECTRONIC CONTROL SYSTEM OF NEW ENERGY VEHICLES	**TASK NO.**	7031
PERFORMANCE CRITERIA	The person performing this task must be able to read and analyze the electronic control system fault code of new energy vehicles in accordance with technical requirements and operation specifications.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.); 2. Fault diagnostic apparatus; 3. Working station protective equipment (safety warning signs, warning strips, insulating mats, etc.); 4. Insulating workbenches; 5. Insulating tools; 6. Charging facilities; 7. Vehicle protective fenders and grille cloth; 8. Insulating testers; 9. Multimeters; 10. Wheel chocks; 11. Fire extinguishers; 12. Rescue tools (insulated pliers, rescue hooks, etc.); 13. Work lights; 14. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Wear personal protective equipment correctly; 2. Conduct working station and vehicle safety protection; 3. Choose and inspect the fault code reading and analysis equipment and tools; 4. Connect the fault diagnostic apparatus to vehicles; 5. Read the fault codes of each system of new energy vehicles in	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Connect the fault diagnostic apparatus to vehicles; 1.2 Use the fault diagnostic apparatus to read, analyze and clear vehicle fault codes. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of inquiring the maintenance manual;

accordance with the maintenance manual; 6. Analyze the meaning of fault codes of each system of new energy vehicles in accordance with the maintenance manual; 7. Clear the fault codes of each system of new energy vehicles in accordance with the maintenance manual; 8. Disconnect the fault diagnostic apparatus from vehicles; 9. Clean the equipment, tools, and workplaces; 10. Store equipment and tools.	2.2 Insulation measurement theory; 2.3 Principle of using insulating tools; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Reading and analyzing vehicle fault codes; 3.2 Generation mechanism of fault codes; 3.3 Principle of personal protective equipment inspection. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Fault codes of the new energy vehicle electronic control system are read and analyzed in accordance with technical requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DIAGNOSIS OF THE ELECTRONIC CONTROL SYSTEM OF NEW ENERGY VEHICLES	**DUTY NO.**	703
TASK TITLE	PERFORMANCE TESTING OF SENSORS IN THE ELECTRONIC CONTROL SYSTEM OF NEW ENERGY VEHICLES	**TASK NO.**	7032
PERFORMANCE CRITERIA	The person performing this task must be able to test the performance of sensors in the electronic control system of new energy vehicles in accordance with technical requirements and operation specifications.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.); 2. Fault diagnostic apparatus; 3. Working station protective suits (safety warning signs, warning strips, insulating mats, etc.); 4. Insulating workbenches; 5. Insulating tools; 6. Charging facilities; 7. Vehicle protective fenders and grille cloth; 8. Insulating testers; 9. Multimeters; 10. Oscilloscopes; 11. Multi-function junction boxes; 12. Wheel chocks; 13. Ramp, inspection pit, and lifting machine; 14. Fire extinguishers; 15. Rescue tools (insulated pliers, rescue hooks, etc.); 16. Work lights; 17. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Wear personal protective equipment correctly; 2. Conduct working station and vehicle safety protection; 3. Choose and inspect equipment and tools for the sensor performance test; 4. Connect the fault diagnostic	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use the diagnostic apparatus to read the dynamic value of sensors. **2.0 Principles** The person performing this task must be able to

apparatus to vehicles; 5. Develop the performance test flow of sensors in accordance with the maintenance manual; 6. Conduct the performance test of sensors in accordance with the maintenance manual; 7. Check if the sensor performance is normal in accordance with the maintenance manual; 8. Disconnect the fault diagnostic apparatus from vehicles; 9. Clean the equipment, tools, and workplaces; 10. Store the equipment and tools.	explain the following principles: 2.1 Principle of inquiring the maintenance manual; 2.2 Principle of sensor performance test; 2.3 Principle of using insulating tools; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Insulation measurement theory; 3.2 Principle of sensor performance test; 3.3 Principle of personal protective equipment inspection. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The performance of sensors in electronic control system of new energy vehicles is tested in accordance with technical requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DIAGNOSIS OF THE ELECTRONIC CONTROL SYSTEM OF NEW ENERGY VEHICLES	**DUTY NO.**	703
TASK TITLE	PERFORMANCE TESTING OF ACTUATORS IN THE ELECTRONIC CONTROL SYSTEM OF NEW ENERGY VEHICLES	**TASK NO.**	7033
PERFORMANCE CRITERIA	The person performing this task must be able to test the performance of actuators in the electronic control system of new energy vehicles in accordance with technical requirements and operation specifications.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.); 2. Fault diagnostic apparatus; 3. Working station protective suits (safety warning signs, warning strips, insulating mats, etc.); 4. Insulating workbenches; 5. Insulating tools; 6. Charging facilities; 7. Vehicle protective fenders and grille cloth; 8. Insulating testers; 9. Multimeters; 10. Oscilloscopes; 11. Multi-function junction boxes; 12. Wheel chocks; 13. Ramp, inspection pit, and lifting machine; 14. Fire extinguishers; 15. Rescue tools (insulated pliers, rescue hooks, etc.); 16. First aid kits; 17. Work lights.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Wear personal protective equipment correctly; 2. Conduct working station and vehicle safety protection; 3. Choose and inspect equipment and tools for the actuator performance	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use the diagnostic apparatus to read the dynamic value of actuators. 1.2 Use the diagnostic apparatus to conduct the actuator drive test.

test; 4. Connect the fault diagnostic apparatus to vehicles; 5. Develop the performance test flow of actuators in accordance with the maintenance manual; 6. Conduct the performance test of actuators in accordance with the maintenance manual; 7. Check if the actuator performance is normal in accordance with the maintenance manual; 8. Disconnect the fault diagnostic apparatus from vehicles; 9. Clean the equipment, tools, and workplaces; 10. Store equipment and tools and restore the site.	**2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of inquiring the maintenance manual; 2.2 Principle of actuator performance test; 2.3 Principle of using insulating tools; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Insulation measurement theory; 3.2 Actuator performance test theory; 3.3 Principle of personal protective equipment inspection. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The performance of actuators in electronic control system of new energy vehicles is tested in accordance with technical requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	TROUBLESHOOTING OF THE HIGH VOLTAGE ELECTRICAL SYSTEM IN NEW ENERGY VEHICLES	**DUTY NO.**	704
TASK TITLE	TROUBLESHOOTING OF THE DRIVING MOTOR	**TASK NO.**	7041
PERFORMANCE CRITERIA	The person performing this task must be able to troubleshoot the driving motor of new energy vehicles in accordance with technical requirements and manufacturer's manual specifications.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Full set of new energy vehicle toolbox; 2. Diagnostic apparatus/Decoding apparatus; 3. Multimeters; 4. Vehicle tester; 5. Junction box; 6. Work lights; 7. Ramps, inspection pits, and lifting machines; 8. Oscilloscopes; 9. Safety helmets, insulating gloves, fenders, and other high and low voltage maintenance and protection devices for vehicles and personnel.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Wear personal protective equipment correctly; 2. Conduct working station and vehicle safety protection; 3. Choose and inspect test equipment and tools; 4. Analyze the fault code of driving motor system; 5. Find the corresponding pins of the driving motor system in accordance with the circuit diagram; 6. Measure the voltage, resistance and waveform of the driving motor system with instruments and apparatus and determine the fault causes; 7. Repair the driving motor system harnesses; 8. Repair the sensor and actuator of the	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use instruments and apparatus to diagnose the driving motor system in accordance with the maintenance manual; 1.2 Collect fault data; 1.3 Analyze fault code; 1.4 Inspect the battery system to determine its operating state and charging state; 1.5 Conduct troubleshooting and tests. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Structural principle of the driving motor; 2.2 Control principle of the driving motor; 2.3 Diagnosis and testing principle of the electrical

driving motor system; 9. Diagnose and repair faults in the power supply, fuse, relay, etc. of the driving motor system; 10. Clear the fault code; 11. Inspect the performance of driving motor system; 12. Conduct completion inspection in accordance with the factory standard of driving motor system; 13. Clean the tools, equipment and workplaces; 14. Arrange and store the tools and equipment.	system; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Components and operation principles of the driving motor system; 3.2 Daily maintenance and fault diagnosis strategy of the driving motor system. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Data storage skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Computer application skills; 4.8 Data analysis skills; 4.9 Skills of using safety protection and rescue tools.
DESCRIPTION OF THE END PRODUCT / SERVICE	The driving motor system is repaired and operated in accordance with technical requirements and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	TROUBLESHOOTING OF THE HIGH VOLTAGE ELECTRICAL SYSTEM IN NEW ENERGY VEHICLES	**DUTY NO.**	704
TASK TITLE	TROUBLESHOOTING OF POWER BATTERY SYSTEM	**TASK NO.**	7042
PERFORMANCE CRITERIA	The person performing this task must be able to troubleshoot the power battery in accordance with technical requirements and manufacturer's manual.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment; 2. Safety protection of maintenance stations; 3. Full set of vehicle toolbox; 4. Diagnostic apparatus/Decoding apparatus; 5. Digital multimeter; 6. Insulation resistance tester; 7. Work lights; 8. Oscilloscopes.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Wear personal protective equipment correctly; 2. Conduct working station and vehicle safety protection; 3. Choose and inspect test equipment and tools; 4. Analyze the fault code of power batteries; 5. Find the corresponding pins of the power battery system in accordance with the circuit diagram; 6. Measure the voltage, signal voltage and waveform of the power battery system with instruments and apparatus and determine the fault causes; 7. Diagnose and repair the fault caused by damaged or disconnected wiring harnesses, connectors, and terminals of the	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use instruments and apparatus to diagnose the power battery system in accordance with the maintenance information 1.2 Use fault diagnostic tools and equipment, such as battery diagnostic apparatus, voltmeters, ammeters, etc.; 1.3 Dismantle and install the battery module, battery cell or components of the battery management system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Structural principle of the power battery; 2.2 Control principle of charging and discharging the power battery; 2.3 Diagnosis and testing principle of the electrical system; 2.4 6S management.

power battery system; 8. Diagnose and repair the fault of power battery leakage; 9. Diagnose and repair the fault that the vehicle cannot be powered on; 10. Diagnose and repair the fault caused by power battery heating and cooling system; 11. Clear the fault code; 12. Inpsect the performance of the power battery system; 13. Conduct completion inspection in accordance with the factory standard of power battery system; 14. Clean the tools, equipment and workplaces; 15. Arrange and store the tools and equipment.	**3.0 Theories** The person performing this task must be able to explain the following: 3.1 Power battery control logic; 3.2 Diagnosis strategy of power battery fault; 3.3 Safety protection measures and environmental protection; 3.4 Replacement and maintenance of battery components. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Computer application skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Data analysis skills; 4.8 Skills of using safety protection and rescue tools.
DESCRIPTION OF THE END PRODUCT / SERVICE	Troubleshooting of the power battery is conducted in accordance with technical requirements and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	TROUBLESHOOTING OF THE HIGH VOLTAGE ELECTRICAL SYSTEM IN NEW ENERGY VEHICLES	**DUTY NO.**	704
TASK TITLE	TROUBLESHOOTING OF THE CHARGING SYSTEM	**TASK NO.**	7043
PERFORMANCE CRITERIA	The person performing this task must be able to troubleshoot the charging system in accordance with technical requirements and manufacturer's manual.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Full set of vehicle toolbox; 2. Special tools for electric vehicles; 3. Diagnostic apparatus/Decoding apparatus; 4. Digital multimeter; 5. Vehicle tester; 6. Ramp, inspection pit, and lifting machine; 7. Insulation resistance tester; 8. Oscilloscopes; 9. Fire extinguishers; 10. Fire sand; 11. Personal protective equipment for high voltage operation (insulating shoes, goggles, insulating gloves, etc.).		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Wear personal protective equipment correctly; 2. Conduct working station and vehicle safety protection; 3. Choose and inspect test equipment and tools; 4. Analyze the fault code of charging system; 5. Measure the charging system signals with instruments and apparatus and determine the fault causes; 6. Disassemble and replace the on-board chargers; 7. Test the funtion of emergency unlocking of the on-board chargers; 8. Test the charging control signals;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Demonstrate the charging circuit operation on a real vehicle; 1.2 Use instruments and apparatus to troubleshoot the circuit fault in combination with maintenance information; 1.3 Use instruments and apparatus to test the performance of circuits. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Structural principle of the charging system; 2.2 Control principle of the charging system; 2.3 Diagnosis and testing principle of the electrical system;

9. Overhaul the charging circuits; 10. Test the electronic equipment; 11. Clean the tools, equipment and workplaces; 12. Arrange and store the tools and equipment.	2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Components and operations of the charging system; 3.2 Possible faults of the charging system and their causes; 3.3 Troubleshooting of the charging system. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Management skills; 4.3 Computer application skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Computer application skills; 4.8 Data analysis skills; 4.9 Skills of using safety protection and rescue tools.
DESCRIPTION OF THE END PRODUCT / SERVICE	Troubleshooting of the charging system is conducted in accordance with technical requirements and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Disposal methods of waste; 3. Safety operations of measuring instruments; 4. Safety operation of operating equipment and tools; 5. Handling of electric shock and first aid.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	TROUBLESHOOTING OF THE LOW VOLTAGE ELECTRICAL SYSTEM IN NEW ENERGY VEHICLES	**DUTY NO.**	705
TASK TITLE	TROUBLESHOOTING OF THE POWER WINDOW	**TASK NO.**	7051
PERFORMANCE CRITERIA	The person performing this task must be able to troubleshoot the in accordance with technical requirements and manufacturer's manual.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves); 2. Fault diagnostic apparatus; 3. Working station protective suits (safety warning signs, warning strips, and insulating mats); 4. Insulating workbenches; 5. Insulating tools; 6. AC charging piles; 7. New energy vehicles; 8. Vehicle protective fenders and grille cloth; 9. Insulating testers; 10. Multimeters; 11. Oscilloscopes; 12. Multi-function junction boxes; 13. Wheel chocks; 14. Ramps, inspection pits, and lifting machines; 15. Fire extinguishers; 16. Rescue tools (insulated pliers, rescue hooks); 17. Work lights; 18. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Develop troubleshooting and diagnosis process of the power window; 2. Choose various tools and equipment in accordance with operation specifications; 3. Assemble and disassemble the power window and related	Detailed knowledge about: **1.0 Methods** The person performing this task must be able to explain how to: 1.0 Use multimeters, oscilloscopes, and fault diagnostic apparatus. **2.0 Principles** The person performing this task must be able to explain

accessories; 4. Overhaul related circuits of the power window; 5. Test the power window; 6. Clean the tools, equipment and workplaces; 7. Arrange and store the tools and equipment.	the following principles: 2.1 Structural principle of the power window; 2.2 Control principle of the power window; 2.3 Diagnosis and testing principle of the electrical system; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types of faults of the power window; 3.2 Fault mechanism of the power window. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Basic electrical detection and maintenance skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Diagnosis and troubleshooting of the power window on new energy vehicles are conducted in accordance with technical requirements and safety specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety inspection of working station fire-fighting facilities; 2. Inspection and usage of personal protective equipment; 3. Inspection and usage of rescue tools; 4. Safe and standardized layout of the working station; 5. Usage of maintenance and diagnosis test instruments; 6. Occupational health and safety; 7. Disposal methods of waste; 8. Safety operations of measuring instruments; 9. Safety operation of operating equipment and tools.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	TROUBLESHOOTING OF THE LOW VOLTAGE ELECTRICAL SYSTEM IN NEW ENERGY VEHICLES	**DUTY NO.**	705
TASK TITLE	TROUBLESHOOTING OF THE POWER MIRROR	**TASK NO.**	7052
PERFORMANCE CRITERIA	The person performing this task must be able to troubleshoot the power mirror in accordance with technical requirements and manufacturer's manual.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves); 2. Fault diagnostic apparatus; 3. Working station protective suits (safety warning signs, warning strips, and insulating mats); 4. Insulating workbenches; 5. Insulating tools; 6. AC charging piles; 7. New energy vehicles; 8. Vehicle protective fenders and grille cloth; 9. Insulating testers; 10. Multimeters; 11. Oscilloscopes; 12. Multi-function junction boxes; 13. Wheel chocks; 14. Ramps, inspection pits, and lifting machines; 15. Fire extinguishers; 16. Rescue tools (insulated pliers, rescue hooks,); 17. Work lights; 18. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Develop troubleshooting and diagnosis process of the power mirror; 2. Choose various tools and equipment in accordance with operation specifications; 3. Assemble and disassemble the power mirror and related	Detailed knowledge about: **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use multimeters, oscilloscopes, and fault diagnostic apparatus. **2.0 Principles** The person performing this task must be able to explain

accessories; 4. Overhaul the related circuits of the power mirror; 5. Test the power mirror; 6. Clean the tools, equipment and workplaces; 7. Arrange and store the tools and equipment.	the following principles: 2.1 Structural principle of the power mirror; 2.2 Control principle of the power mirror; 2.3 Diagnosis and testing principle of the electrical system; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types of faults of the power mirror; 3.2 Fault mechanism of the power mirror. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Report writing skills; 4.3 Skills of using safety protection and rescue tools; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Diagnosis and troubleshooting of the power mirror on new energy vehicles are conducted in accordance with technical requirements and safety specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety inspection of working station fire-fighting facilities; 2. Inspection and usage of personal protective equipment; 3. Inspection and usage of rescue tools; 4. Safe and standardized layout of the working station; 5. Usage of maintenance and diagnosis test instruments; 6. Occupational health and safety; 7. Disposal methods of waste; 8. Safety operations of measuring instruments; 9. Safety operation of operating equipment and tools.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	TROUBLESHOOTING OF THE LOW VOLTAGE ELECTRICAL SYSTEM IN NEW ENERGY VEHICLES	**DUTY NO.**	705
TASK TITLE	TROUBLESHOOTING OF THE WINDSHIELD WIPER	**TASK NO.**	7053
PERFORMANCE CRITERIA	The person performing this task must be able to troubleshoot windshield wipers in accordance with technical requirements and manufacturer's manuals.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves); 2. Fault diagnostic apparatus; 3. Working station protective suits (safety warning signs, warning strips, and insulating mats); 4. Insulating workbenches; 5. Insulating tools; 6. AC charging piles; 7. New energy vehicles; 8. Vehicle protective fenders and grille cloth; 9. Insulating testers; 10. Multimeters; 11. Oscilloscopes; 12. Multi-function junction boxes; 13. Wheel chocks; 14. Ramps, inspection pits, and lifting machines; 15. Fire extinguishers; 16. Rescue tools (insulated pliers, rescue hooks); 17. Work lights; 18. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Develop troubleshooting and diagnosis process of the windshield wiper; 2. Choose various tools and equipment in accordance with operation specifications; 3. Assemble and disassemble the windshield wiper and related accessories;	Detailed knowledge about: **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use multimeters, oscilloscopes, and fault diagnostic apparatus. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Structural principle of the windshield wiper;

4. Overhaul the related circuits of the windshield wiper; 5. Test the windshield wiper; 6. Clean the tools, equipment and workplaces; 7. Arrange and store the tools and equipment.	2.2 Control principle of the windshield wiper; 2.3 Diagnosis and testing principle of the electrical system; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types of faults of the windshield wiper; 3.2 Fault mechanism of the windshield wiper; 3.3 Working principle of the windshield wiper system; 3.4 Replacement and maintenance of the windshield wiper. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Basic electrical detection and maintenance skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Diagnosis and troubleshooting of the windshield wiper on new energy vehicles are conducted in accordance with technical requirements and safety specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety inspection of working station fire-fighting facilities; 2. Inspection and usage of personal protective equipment; 3. Inspection and usage of rescue tools; 4. Safe and standardized layout of the working station; 5. Usage of maintenance and diagnosis test instruments; 6. Occupational health and safety; 7. Disposal methods of waste; 8. Safety operations of measuring instruments; 9. Safety operation of operating equipment and tools.

OCCUPATION	NEW-ENERGY VEHICLE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	TROUBLESHOOTING OF THE LOW VOLTAGE ELECTRICAL SYSTEM IN NEW ENERGY VEHICLES	**DUTY NO.**	705
TASK TITLE	TROUBLESHOOTING OF THE CENTRAL LOCKING	**TASK NO.**	7054
PERFORMANCE CRITERIA	The person performing this task must be able to troubleshoot the central locking in accordance with technical requirements and manufacturer's manual.		
RANGE STATEMENT	The task can be performed in the maintenance workshop of new energy vehicles under the supervision of new-energy vehicle engineers. The tools and equipment to be used include: 1. Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves); 2. Fault diagnostic apparatus; 3. Working station protective suits (safety warning signs, warning strips, and insulating mats); 4. Insulating workbenches; 5. Insulating tools; 6. AC charging piles; 7. New energy vehicles; 8. Vehicle protective fenders and grille cloth; 9. Insulating testers; 10. Multimeters; 11. Oscilloscopes; 12. Multi-function junction boxes; 13. Wheel chocks; 14. Ramps, inspection pits, and lifting machines; 15. Fire extinguishers; 16. Rescue tools (insulated pliers, rescue hooks); 17. Work lights; 18. First aid kits.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Develop troubleshooting and diagnosis process of the central locking; 2. Choose various tools and equipment in accordance with operation specifications; 3. Assemble and disassemble the	Detailed knowledge about: **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use multimeters, oscilloscopes, and fault diagnostic apparatus. **2.0 Principles** The person performing this task must be able to explain

central locking and related accessories; 4. Overhaul the related circuits of the central locking; 5. Test the central locking; 6. Clean the tools, equipment and workplaces; 7. Arrange and store the tools and equipment.	the following principles: 2.1 Structural principle of the central locking; 2.2 Control principle of the central locking; 2.3 Diagnosis and testing principle of the electrical system; 2.4 6S management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types of faults of the central locking; 3.2 Fault mechanism of the central locking. **4.0 Essential Skills** The person performing this task must have the following skills: 4.1 Communication skills; 4.2 Basic electrical detection and maintenance skills; 4.3 Report writing skills; 4.4 Skills of using safety protection and rescue tools; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Diagnosis and troubleshooting of the central locking on new energy vehicles are conducted in accordance with technical requirements and safety specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety inspection of working station fire-fighting facilities; 2. Inspection and usage of personal protective equipment; 3. Inspection and usage of rescue tools; 4. Safe and standardized layout of the working station; 5. Usage of maintenance and diagnosis test instruments; 6. Occupational health and safety; 7. Disposal methods of waste; 8. Safety operations of measuring instruments; 9. Safety operation of operating equipment and tools.

TABLE 1: DACUM CHARTS FOR NEW-ENERGY VEHICLE ENGINEER - NTA 7

DUTIES	TASKS	ENABLERS
1.0 Management of the diagnostic and maintenance stations of new energy vehicles	1.1 Management of the safety of diagnostic and maintenance stations. 1.2 Maintenance and management of diagnostic and measuring equipment.	**General skills and knowledge** · Communication skills · Management skills · Report writing skills · Skills of using safety protection and rescue tools · Teamwork skills · Principle of high voltage electric shock · Principle of first aid for electric shock · Principle of using safety warning signs **Tools and equipment** · Maintenance stations of new energy vehicles · Fire extinguishers · Fire alarms · Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.) · Insulating mats · Rescue tools (insulated pliers, rescue hooks, etc.) · Safety warning signs · Warning strips · Wheel chocks · Charging facilities · First aid kits **Materials** · Non-woven fabric · Oil-absorbing sheets · Record sheets **Requirements for employees** · Teamwork spirit, integrity, time management and commitment
2.0 Development of the fault diagnosis plan for new energy	2.1 Fault verification and analysis of new energy vehicles. 2.2 Development of the fault	**General skills and knowledge** · Communication skills · Management skills · Report writing skills

DUTIES	TASKS	ENABLERS
vehicles	diagnosis plan for new energy vehicles.	· Skills of using safety protection and rescue tools · Teamwork skills **Tools and equipment** · Maintenance stations of new energy vehicles · Vehicle user manuals · Diagnostic equipment (fault diagnostic apparatus, etc.) · Measuring equipment (oscilloscopes, multimeters, insulation testers, etc.) · Auxiliary equipment (junction boxes, insulation tools, etc.) · Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.) · Working station safety protection equipment (safety warning signs, warning strips, insulating mats, fire extinguishers, wheel chocks, etc.) · Rescue tools (insulated pliers, rescue hooks, etc.) · Vehicle protective fenders and grille cloth · Four-piece protective set for vehicles · Charging facilities · First aid kits **Materials** · Non-woven fabric · Oil-absorbing sheets · Record sheets **Requirements for employees** · Teamwork spirit, integrity, time management and commitment
3.0 Diagnosis of the electronic control system of new energy vehicles	3.1 Reading and analyzing fault codes of electronic control system of new energy vehicles. 3.2 Performance testing of sensors in the electronic	**General skills and knowledge** · Communication skills · Management skills · Maintenance data inquiry skills · Report writing skills

DUTIES	TASKS	ENABLERS
	control system of new energy vehicles. 3.3 Performance testing of actuators in the electronic control system of new energy vehicles.	· Skills of using safety protection and rescue tools · Teamwork skills · Principle of personal protective equipment inspection · Principle of using safety warning signs **Tools and equipment** · Maintenance stations of new energy vehicles · Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves, etc.) · Fault diagnostic apparatus · Working station protective equipment (safety warning signs, warning strips, insulating mats, etc.); · Insulating workbenches · Insulating tools · Charging facilities · Vehicle protective fenders and grille cloth · Four-piece protective set for vehicles · Insulating testers · Multimeters · Wheel chocks · Fire extinguishers · Rescue tools (insulated pliers, rescue hooks, etc.) · First aid kits **Materials** · Record sheets · Non-woven fabric · Oil-absorbing sheets **Requirements for employees** · Teamwork spirit, integrity, time management and commitment
4.0 Troubleshooting of	4.1 Troubleshooting of the driving motor. 4.2 Troubleshooting of	**General skills and knowledge** · Communication skills

DUTIES	TASKS	ENABLERS
the high voltage electrical system in new energy vehicles	power battery system. 4.3 Troubleshooting of the charging system.	· Management skills · Data storage skills · Customer service skills · Teamwork skills · Report writing skills · Computer application skills · Skills of using safety protection and rescue tools **Tools and equipment** · Full set of new energy vehicle toolboxes · Diagnostic apparatus/Decoding apparatus · Multimeters · Vehicle testers · Junction boxes · Work lights · Ramps, inspection pits, and lifting machines · Oscilloscopes · Safety helmets, insulating gloves, fenders, and other high and low voltage maintenance and protection devices for vehicles and personnel **Materials** · Record sheets · Non-woven fabric · Oil-absorbing sheets · Lubricating grease · Cleaner **Requirements for employees** · The person performing this task must be able to troubleshoot the driving motor of new energy vehicles in accordance with technical requirements and manufacturer's manual specifications.
5.0 Troubleshooting of the low voltage electrical system in new energy	5.1 Troubleshooting of the power window. 5.2 Troubleshooting of the power mirror. 5.3 Troubleshooting of the windshield wiper. 5.4 Troubleshooting of the	**General skills and knowledge** · Communication skills · Basic electrical detection and maintenance skills · Report writing skills · Skills of using safety protection and rescue tools

DUTIES	TASKS	ENABLERS
vehicles	central locking.	· Teamwork skills **Tools and equipment** · Maintenance stations of new energy vehicles · Personal protective equipment (insulating shoes, safety helmets, goggles, insulating gloves) · Fault diagnostic apparatus · Working station protective suits (safety warning signs, warning strips, and insulating mats) · Insulating workbenches · Insulating tools · AC charging piles · New energy vehicles · Vehicle protective fenders and grille cloth · Insulating testers · Multimeters · Oscilloscopes · Multi-function junction boxes · Wheel chocks · Ramps, inspection pits, and lifting machines · Fire extinguishers · Rescue tools (insulated pliers, rescue hooks) · First aid kits **Materials** · Record sheets · Non-woven fabric · Oil-absorbing sheets · Insulation tape · Cleaner **Requirements for employees** · Teamwork spirit, integrity, time management and commitment