सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

Qualification Pack

Electric Vehicle Test Engineer

QP Code: ASC/Q8406

Version: 1.0

NSQF Level: 5

Automotive Skills Development Council || 153, GF, Okhla Industrial Area, Phase 3
New Delhi 110020

Contents

ASC/Q8406: Electric Vehicle Test Engineer

Brief Job Description

The individual in this job is responsible for conducting various types of tests on the electric vehicle inside the laboratory as well as on the road.

Personal Attributes

The person should be patient, organised, team-oriented and have the ability to work for long hours in adverse conditions. They should be keen observers and have an eye for detail and quality.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ASC/N9810: Manage work and resources (Manufacturing)
2. ASC/N9812: Interact effectively with team, customers and others
3. ASC/N9805: Interpret engineering drawing
4. ASC/N8410: Perform testing of electric vehicle

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Testing and Validation
Country	India
NSQF Level	5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7231.0201
Minimum Educational Qualification & Experience	B.E./B.Tech (Mechanical/Electrical/Electronics/Automobile/Instrumentation) OR 3 years Diploma (Mechanical/Electrical/Electronics/Automobile/Instrumentation) from recognised body

	with 1 year experience after Class 12th OR 10th Pass + ITI (Mechanic Motor Vehicle/Mechanic Auto Electrical and ELectronics) with 2 years relevant experience
Minimum Level of Education for Training in School	

Pre-Requisite License or Training	Valid Driving License
Minimum Job Entry Age	21 Years
Last Reviewed On	24/06/2021
Next Review Date	24/06/2026
NSQC Approval Date	24/06/2021
Version	1.0
Reference code on NQR	2021/AUT/ASDC/04300
NQR Version	1.0

ASC/N9810: Manage work and resources (Manufacturing)

Description

This NOS unit is about implementing safety, planning work, adopting sustainable practices for optimising the use of resources.

Scope

The scope covers the following :

- Maintain safe and secure working environment
- Maintain Health and Hygiene
- Effective waste management practices
- Material/energy conservation practices

Elements and Performance Criteria

Maintain safe and secure working environment

To be competent, the user/individual on the job must be able to:

PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace

PC2. implement safe working practices for dealing with hazards to ensure safety of self and others

PC3. conduct regular checks of the machines with support of the maintenance team to identify potential hazards

PC4. ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions

PC5. organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices

PC6. fill daily check sheet to report improvements done and risks identified

PC7. ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others

PC8. report any identified breaches in health, safety and security policies and procedures to the designated person

Maintain Health and Hygiene

To be competent, the user/individual on the job must be able to:

PC9. ensure workplace, equipment, restrooms etc. are sanitized regularly

PC10. ensure team is aware about hygiene and sanitation regulations and following them on the shop floor

PC11. ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace

PC12. report advanced hygiene and sanitation issues to appropriate authority

PC13. follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc

PC14. wear and dispose PPEs regularly and appropriately

Effective waste management practices

To be competent, the user/individual on the job must be able to:

PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP

PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste

Material/energy conservation practices

To be competent, the user/individual on the job must be able to:

PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively

PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water

PC19. identify possibilities of using renewable energy and environment friendly fuels

PC20. identify processes where material and energy/electricity utilization can be optimized

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organisation procedures for health, safety and security, individual role and responsibilities in this context

KU2. the organisation's emergency procedures for different emergency situations and the importance of following the same

KU3. evacuation procedures for workers and visitors

KU4. how and when to report hazards as well as the limits of responsibility for dealing with hazards

KU5. potential hazards, risks and threats based on the nature of work

KU6. various types of fire extinguisher

KU7. various types of safety signs and their meaning

KU8. appropriate first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.

KU9. relevant standards, procedures and policies related to 5S followed in the company

KU10. the various materials used and their storage norms

KU11. importance of efficient utilisation of material and water

KU12. basics of electricity and prevalent energy efficient devices

KU13. common practices of conserving electricity

KU14. common sources and ways to minimize pollution

KU15. categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

KU16. waste management techniques

KU17. significance of greening

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read safety instructions/guidelines
GS2. modify work practices to improve them
GS3. work with supervisors/team members to carry out work related tasks
GS4. complete tasks efficiently and accurately within stipulated time
GS5. inform/report to concerned person in case of any problem
GS6. make timely decisions for efficient utilization of resources
GS7. write reports such as accident report, in at least English/regional language

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Maintain safe and secure working environment	20	13	-	8
PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace	4	2	-	2
PC2. implement safe working practices for dealing with hazards to ensure safety of self and others	3	1	-	2
PC3. conduct regular checks of the machines with support of the maintenance team to identify potential hazards	2	2	-	1
PC4. ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions	3	2	-	1
PC5. organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices	2	-	-	-
PC6. fill daily check sheet to report improvements done and risks identified	2	2	-	-
PC7. ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others	2	2	-	1
PC8. report any identified breaches in health, safety and security policies and procedures to the designated person	2	2	-	1
Maintain Health and Hygiene	13	7	-	5
PC9. ensure workplace, equipment, restrooms etc. are sanitized regularly	3	2	-	1
PC10. ensure team is aware about hygiene and sanitation regulations and following them on the shop floor	2	1	-	-
PC11. ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace	2	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1
PC13. follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc	2	1	-	1
PC14. wear and dispose PPEs regularly and appropriately	3	-	-	1
Effective waste management practices	6	4	-	1
PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP	3	2	-	-
PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste	3	2	-	1
Material/energy conservation practices	11	6	-	6
PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively	2	2	-	1
PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water	3	2	-	1
PC19. identify possibilities of using renewable energy and environment friendly fuels	3	1	-	2
PC20. identify processes where material and energy/electricity utilization can be optimized	3	1	-	2
NOS Total	**50**	**30**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9810
NOS Name	Manage work and resources (Manufacturing)
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/06/2021
Next Review Date	24/06/2026
NSQC Clearance Date	24/06/2021

ASC/N9812: Interact effectively with team, customers and others

Description

This unit is about communicating with team members, superior and others.

Scope

The scope covers the following :

- Communicate effectively with team members
- Interact with superiors
- Respect gender and ability differences

Elements and Performance Criteria

Communicate effectively with team members

To be competent, the user/individual on the job must be able to:

PC1. implement ways to share information with team members in line with organisational requirements

PC2. ensure that work requirements are clearly communicated to the team members through all means including face-to-face, telephonic and written

PC3. manage and co-ordinate with team members to integrate work as per requirements

PC4. work in a way that show respect for all team members and customers

PC5. carry out commitments made to team members and let them know in good time if there is any discrepancy with reasons

PC6. resolve conflicts within the team members at work to achieve smooth workflow

PC7. guide the team members to follow the organisation's policies and procedures

PC8. ensure team goals are given preference over individual goals

PC9. respect personal space of colleagues and customers

Interact with superiors

To be competent, the user/individual on the job must be able to:

PC10. report progress on job allocated and team performance to the superiors

PC11. escalate problems to superiors that cannot be handled

PC12. train the team members to report completed work and receive feedback on work done

PC13. encourage team members to rectify errors as per feedback and minimize mistakes in future

Respect gender and ability differences

To be competent, the user/individual on the job must be able to:

PC14. ensure team shows sensitivity towards all genders and PwD

PC15. adjust communication styles to reflect gender sensitivity and sensitivity towards person with disability

PC16. help PwD team members to overcome the challenges, if asked

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the importance of effective communication and establishing good working relationships with team members and superiors
KU2. different methods of communication as per the circumstances
KU3. gender based concepts, issues and legislation
KU4. organisation standards and guidelines to be followed for PwD
KU5. rights and duties at workplace with respect to PwD
KU6. organisation policies and procedures pertaining to written and verbal communication

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read safety instructions/guidelines
GS2. modify work practices to improve them
GS3. work with supervisors/team members to carry out work related tasks
GS4. complete tasks efficiently and accurately within stipulated time
GS5. make timely decisions for efficient utilization of resources
GS6. read instructions/guidelines/procedures
GS7. write in English/any one language

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Communicate effectively with team members	20	14	-	8
PC1. implement ways to share information with team members in line with organisational requirements	2	2	-	-
PC2. ensure that work requirements are clearly communicated to the team members through all means including face-to-face, telephonic and written	2	2	-	2
PC3. manage and co-ordinate with team members to integrate work as per requirements	2	1	-	2
PC4. work in a way that show respect for all team members and customers	3	1	-	2
PC5. carry out commitments made to team members and let them know in good time if there is any discrepancy with reasons	2	2	-	-
PC6. resolve conflicts within the team members at work to achieve smooth workflow	3	2	-	-
PC7. guide the team members to follow the organisation's policies and procedures	2	1	-	-
PC8. ensure team goals are given preference over individual goals	2	1	-	-
PC9. respect personal space of colleagues and customers	2	2	-	2
Interact with superiors	18	10	-	7
PC10. report progress on job allocated and team performance to the superiors	4	3	-	2
PC11. escalate problems to superiors that cannot be handled	4	2	-	1
PC12. train the team members to report completed work and receive feedback on work done	5	2	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. encourage team members to rectify errors as per feedback and minimize mistakes in future	5	3	-	2
Respect gender and ability differences	12	6	-	5
PC14. ensure team shows sensitivity towards all genders and PwD	4	2	-	2
PC15. adjust communication styles to reflect gender sensitivity and sensitivity towards person with disability	4	2	-	2
PC16. help PwD team members to overcome the challenges, if asked	4	2	-	1
NOS Total	**50**	**30**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9812
NOS Name	Interact effectively with team, customers and others
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/06/2021
Next Review Date	24/06/2026
NSQC Clearance Date	24/06/2021

ASC/N9805: Interpret engineering drawing

Description

This NOS unit is about reading and interpreting all concepts, symbols, methods, views, etc. of engineering drawing.

Scope

The scope covers the following :

- Interpret information from various views, projection, 2D and 3D shapes
- Identify drawing standards and symbols
- Modification and storage of drawing

Elements and Performance Criteria

Interpret information from various views, projection, 2D and 3D shapes

To be competent, the user/individual on the job must be able to:

PC1. interpret engineering drawing's uniqueness, dimensions and important features in 2D and 3D shapes

PC2. identify the difference between 2D and 3D shapes

PC3. explain difference between first angle projection and third angle projection in mechanical engineering drawing

PC4. interpret all the 3 axes (x, y and z axis) and geometrical shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection

PC5. identify details of the machine component which are not clearly visible by interpreting section views

Identify drawing standards and symbols

To be competent, the user/individual on the job must be able to:

PC6. interpret Geometric Dimensioning and Tolerencing (GD&T) symbols in the drawings

PC7. interpret symbols of Radius, controlled radius, spherical radius, diameter, spherical diameter, square, counterbore, spotface, depth, countersink, “by”, maximum dimension, minimum dimension, reference, dimension origin etc

PC8. identify the sequence of operations which enables the selection and prioritization of the datums

PC9. read and interpret information from Tolerance Zone boundaries for part features in terms of shape and size

Modification and storage of drawing

To be competent, the user/individual on the job must be able to:

PC10. observe any modification, changes required in the drawing and communicate the same to the concerned team in the organization

PC11. store the drawings in an easily accessible place, avoiding damage from moisture, chemicals and fire

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant organisational standards such as work standard, Standard Operating Procedure, quality process, maintenance standards etc. followed in the company
KU2. importance of cycle-time and required output as per work order and work instructions
KU3. drawing standards used by the company
KU4. use of drawing tools such as scales, compass, types of pencils, CAD and CAM software etc.
KU5. the basics of engineering drawing, orthographic projection, isometric projection, GD&T etc.
KU6. importance of various projections, views, symbols and dimensions of drawing
KU7. use of geometric shapes like lines, angles, circles, etc for interpreting the drawing

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and interpret workplace related drawing
GS2. communicate the changes and requirements to supervisor by using relevant drawing terms and nomenclature
GS3. attentively listen and comprehend the information given by the supervisor/team members
GS4. write in English/regional language
GS5. recognise problem in drawing and take suitable action
GS6. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Interpret information from various views, projection, 2D and 3D shapes	21	11	-	10
PC1. interpret engineering drawing's uniqueness, dimensions and important features in 2D and 3D shapes	5	3	-	2
PC2. identify the difference between 2D and 3D shapes	4	2	-	2
PC3. explain difference between first angle projection and third angle projection in mechanical engineering drawing	4	-	-	2
PC4. interpret all the 3 axes (x, y and z axis) and geometrical shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection	5	3	-	2
PC5. identify details of the machine component which are not clearly visible by interpreting section views	3	3	-	2
Identify drawing standards and symbols	23	15	-	8
PC6. interpret Geometric Dimensioning and Tolerencing (GD&T) symbols in the drawings	6	4	-	2
PC7. interpret symbols of Radius, controlled radius, spherical radius, diameter, spherical diameter, square, counterbore, spotface, depth, countersink, “by”, maximum dimension, minimum dimension, reference, dimension origin etc	6	4	-	2
PC8. identify the sequence of operations which enables the selection and prioritization of the datums	5	3	-	2
PC9. read and interpret information from Tolerance Zone boundaries for part features in terms of shape and size	6	4	-	2
Modification and storage of drawing	6	4	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. observe any modification, changes required in the drawing and communicate the same to the concerned team in the organization	3	2	-	1
PC11. store the drawings in an easily accessible place, avoiding damage from moisture, chemicals and fire	3	2	-	1
NOS Total	**50**	**30**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9805
NOS Name	Interpret engineering drawing
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	24/06/2021
Next Review Date	24/06/2026
NSQC Clearance Date	24/06/2021

ASC/N8410: Perform testing of electric vehicle

Description

This NOS is about performing various tests of electric vehicles and its aggregates in various system evaluation laboratories and on road

Scope

The scope covers the following :

- Prepare for testing process
- Perform inspection and repairing of vehicle and its components
- Test vehicle and its components for faults in laboratory
- Conduct testing of vehicle under running condition
- Perform post-testing activities

Elements and Performance Criteria

Prepare for testing process

To be competent, the user/individual on the job must be able to:

PC1. interpret the vehicle drawings, testing sheet and coordinate with the superior for confirming the testing tasks and type of tests required to be conducted on the component or on the vehicle

PC2. identify, select and arrange the testing equipment, measuring instruments, gauges, parts etc. required during the testing process

PC3. check the tools, gauges and testing appratus for defects and calibration status before use

PC4. identify the testing parameters which need to be measured during the test procedure

Perform inspection and repairing of vehicle and its components

To be competent, the user/individual on the job must be able to:

PC5. follow safety practices recommended by organisation during inspection and testing process

PC6. conduct test drive to assess the need for repairs, calibration or any other adjustments in the electrical and mechanical components of the vehicle

PC7. dismantle and reassemble aggregates of the vehicle for fault diagnosis

PC8. conduct visual inspection of the bundled wiring, circuits, Integrated Circuits (IC's), Printed Circuit Boards (PCB's), wiring harnesses etc. for wear and tear, damage etc.

PC9. check the connections of the instruments like sensors, actuators, instrument clusters, ECU, motors and other electronic circuits

PC10. calibrate, align and adjust the settings of vehicle components as per the SOP and organisational standards

PC11. ensure part clearances as specified in the Work Instructions (WI)/Standard Operating Processes (SOP)

Test vehicle and its components for faults in laboratory

To be competent, the user/individual on the job must be able to:

PC12. set the test apparatus as per the selected testing process and SOPs/WI

PC13. connect the various data capturing meters and gauges such as load cells, pneumatic/PLC testing gauges, strain gauges, displacement transducers, accelerometers, GPS data collection devices and data loggers to capture the data points

PC14. diagnose faults in the various sensors, actuators, power supply lines, electronic circuits and aggregates etc. in a vehicle by following senior's instructions

PC15. conduct various tests as per Automotive Industry Standard (AIS) 38, 39, 40, 41, 48, 49 and short circuit/open circuit test under the supervision of the Electric Vehicle test supervisor

PC16. record observations/ readings as per the parameters mentioned in the testing manual/WI

PC17. make minor modification in test setup/ vehicle/component under testing to take reading under different scenarios as per the requirement

PC18. conduct battery tests like abuse, altitude, electrochemical impedance spectroscopy (SoH)

PC19. observe any deviations, noise or vibrations during the testing process and inform the Electric Vehicle test supervisor about the same

PC20. change or repair the vehicle components as per requirement

Conduct testing of vehicle under running condition

To be competent, the user/individual on the job must be able to:

PC21. check motor and converter status, battery charge health and status, oil/lubricant level, cooling water level, tyre pressure, etc. before starting the on road testing of the vehicle prototype as per the checklist and testing manual

PC22. check working of all the safety features and system warning indicators showing system failures, loose connections, malfunctioning, etc. of vehicle as per the vehicle safety check list and testing manual

Perform post-testing activities

To be competent, the user/individual on the job must be able to:

PC23. maintain and update the records of test results, data log etc. as per SOP

PC24. report the malfunctions/repairs in the vehicle beyond own scope to the concerned person

PC25. clean and store the tools, equipment and process auxiliaries as per organisational guidelines after completion of work

PC26. dispose scrap or waste material in accordance with the company policies and environmental regulations

PC27. perform scheduled checks, calibration and timely repairs for workshop tools, equipment and workstations

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. company's inspection, testing standards and processes

KU2. different components/aggregates of electric vehicle

KU3. basic technology used in and functioning of various systems and components of the vehicle such as batteries, body management system, telematics, brake system, air-conditioning systems, active & passive safety system, media and other systems (including electrical machines and devices used in electric vehicles such as: generator, DC/AC and DC/DC converters, AC motor, DC motor, charging systems etc.)

KU4. interconnection of systems with each other and effect of one system on other system

KU5. fundamental terms, laws and principles of electricity used in EV such as: principles of storing electrical voltage, ohms law, voltage, current (AC/DC/HV), resistance, power, capacitance, electrostatics, magnetic, inductance, discrete electronic components, and radio frequency, automotive communication protocols such as CAN, LIN, etc.

KU6. Standard Operating Procedures (SOP) recommended by OEM for using testing equipment, tools, gauges and measuring instruments

KU7. symbols, units and terms used in wiring diagrams associated with electrical/electric systems/components of the vehicle

KU8. various sources of information available for assessing service and repair requirements of the vehicle including diagnostic displays, visual inspections, test drives, vehicle/equipment manufacturer specifications, and tolerance limits of components

KU9. typical symptoms of common faults and failures in vehicle's mechanical, electrical and electronic systems

KU10. safety, health and environmental policies and regulations for the work place as well as for automotive trade in general

KU11. legal regulations that need to be taken into account for handling electric vehicles in the workshop

KU12. various methods for removal, dismantling, cleaning, adjusting, reassembling and testing of components for proper functioning

KU13. process for setting up of test benches, test platforms and test apparatus

KU14. electrical and electronic testing equipment: volt meters, AM meters, OHM meters, battery testing equipment, dedicated and computer based diagnostic equipment, oscilloscopes, Digital Storage Oscilloscope (DSO), Megger, etc.

KU15. mandatory checks required to be conducted on the Electric Vehicle before trial run

KU16. different parameters used to evaluate the performance of the automobile

KU17. how to read and interpret sketches and electrical engineering drawings

KU18. various defects related to running automobiles and their potential impact on the working of the final vehicle

KU19. various sources and potential causes of noises and vibrations in the vehicle

KU20. various types of tests like vehicle level test, component level test, EMI/EMC test, Accelerated/Highly Accelerated Life Test (HALT/HASS)

KU21. process of key joining activities like soldering or welding

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and interpret workplace related documentation

GS2. communicate effectively at the workplace

GS3. prepare reports related to inspection and testing process in English/regional language

GS4. recognise a workplace problem and take suitable action

GS5. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

GS6. complete the assigned tasks as per schedule

GS7. plan and organise work according to the work requirements

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare for testing process	5	6	-	5
PC1. interpret the vehicle drawings, testing sheet and coordinate with the superior for confirming the testing tasks and type of tests required to be conducted on the component or on the vehicle	1	1	-	1
PC2. identify, select and arrange the testing equipment, measuring instruments, gauges, parts etc. required during the testing process	1	1	-	1
PC3. check the tools, gauges and testing appratus for defects and calibration status before use	1	2	-	2
PC4. identify the testing parameters which need to be measured during the test procedure	2	2	-	1
Perform inspection and repairing of vehicle and its components	8	16	-	6
PC5. follow safety practices recommended by organisation during inspection and testing process	2	1	-	1
PC6. conduct test drive to assess the need for repairs, calibration or any other adjustments in the electrical and mechanical components of the vehicle	-	2	-	-
PC7. dismantle and reassemble aggregates of the vehicle for fault diagnosis	1	2	-	1
PC8. conduct visual inspection of the bundled wiring, circuits, Integrated Circuits (IC's), Printed Circuit Boards (PCB's), wiring harnesses etc. for wear and tear, damage etc.	2	3	-	1
PC9. check the connections of the instruments like sensors, actuators, instrument clusters, ECU, motors and other electronic circuits	1	3	-	1
PC10. calibrate, align and adjust the settings of vehicle components as per the SOP and organisational standards	1	3	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. ensure part clearances as specified in the Work Instructions (WI)/Standard Operating Processes (SOP)	1	2	-	1
Test vehicle and its components for faults in laboratory	13	23	-	6
PC12. set the test apparatus as per the selected testing process and SOPs/WI	2	6	-	1
PC13. connect the various data capturing meters and gauges such as load cells, pneumatic/PLC testing gauges, strain gauges, displacement transducers, accelerometers, GPS data collection devices and data loggers to capture the data points	1	2	-	1
PC14. diagnose faults in the various sensors, actuators, power supply lines, electronic circuits and aggregates etc. in a vehicle by following senior's instructions	2	3	-	-
PC15. conduct various tests as per Automotive Industry Standard (AIS) 38, 39, 40, 41, 48, 49 and short circuit/open circuit test under the supervision of the Electric Vehicle test supervisor	2	3	-	1
PC16. record observations/ readings as per the parameters mentioned in the testing manual/WI	2	2	-	1
PC17. make minor modification in test setup/ vehicle/component under testing to take reading under different scenarios as per the requirement	2	3	-	1
PC18. conduct battery tests like abuse, altitude, electrochemical impedance spectroscopy (SoH)	1	2	-	1
PC19. observe any deviations, noise or vibrations during the testing process and inform the Electric Vehicle test supervisor about the same	1	1	-	-
PC20. change or repair the vehicle components as per requirement	-	1	-	-
Conduct testing of vehicle under running condition	1	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC21. check motor and converter status, battery charge health and status, oil/lubricant level, cooling water level, tyre pressure, etc. before starting the on road testing of the vehicle prototype as per the checklist and testing manual	-	1	-	1
PC22. check working of all the safety features and system warning indicators showing system failures, loose connections, malfunctioning, etc. of vehicle as per the vehicle safety check list and testing manual	1	-	-	-
Perform post-testing activities	3	4	-	2
PC23. maintain and update the records of test results, data log etc. as per SOP	-	1	-	-
PC24. report the malfunctions/repairs in the vehicle beyond own scope to the concerned person	1	-	-	-
PC25. clean and store the tools, equipment and process auxiliaries as per organisational guidelines after completion of work	1	1	-	-
PC26. dispose scrap or waste material in accordance with the company policies and environmental regulations	-	1	-	1
PC27. perform scheduled checks, calibration and timely repairs for workshop tools, equipment and workstations	1	1	-	1
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8410
NOS Name	Perform testing of electric vehicle
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Testing and Validation
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/06/2021
Next Review Date	24/06/2026
NSQC Clearance Date	24/06/2021

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.

3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).

4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training centre based on these criteria.

5. In case of successfully passing only certain number of NOSs, the trainee is eligible to take

subsequent assessment on the balance NOS's to pass the Qualification Pack.

6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Minimum Aggregate Passing % at QP Level : 70

(**Please note:** Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N9810.Manage work and resources (Manufacturing)	50	30	-	20	100	10
ASC/N9812.Interact effectively with team, customers and others	50	30	-	20	100	5
ASC/N9805.Interpret engineering drawing	50	30	-	20	100	10
ASC/N8410.Perform testing of electric vehicle	30	50	-	20	100	75
Total	**180**	**140**	**-**	**80**	**400**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
PPE	Personal Protective Equipment
PwD	Person with Disability
SOP	Standard Operating Practices
GD&T	Geometric Dimensioning & Tolerancing
CAD	Computer-Aided Drafting
CAM	Computer-Aided Manufacturing

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.