AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

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GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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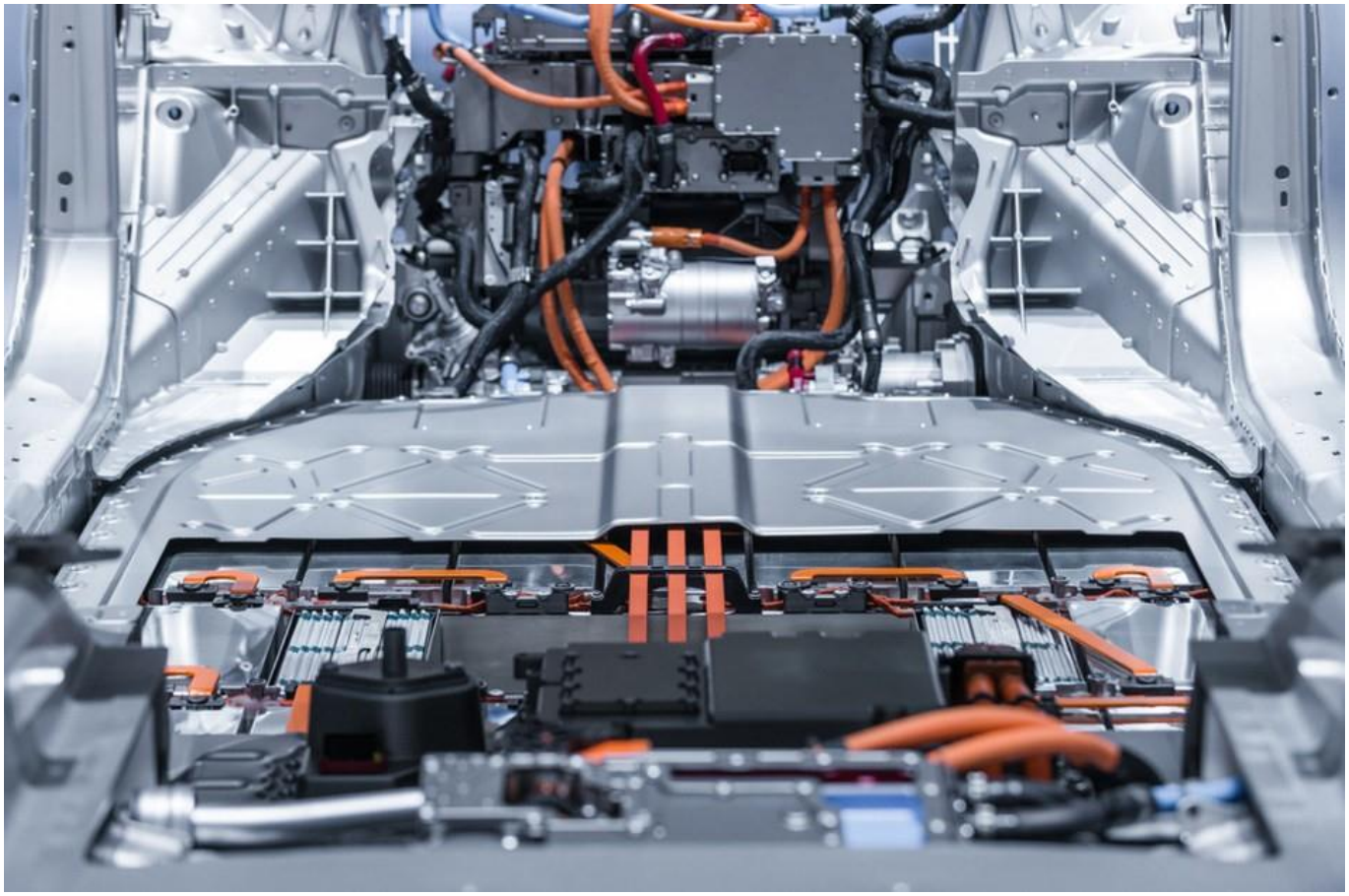
Transforming the skill landscape

**Qualification Pack**



# Electric Vehicle Assembly Technician

QP Code: ASC/Q3605

Version: 1.0

NSQF Level: 4

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

# Contents

# ASC/Q3605: Electric Vehicle Assembly Technician

## Brief Job Description

The individual at this job performs assembly of electric vehicle and its components.

## 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/N9803: Organize work and resources (Manufacturing)
2. ASC/N9802: Interact effectively with colleagues, customers and others
3. ASC/N9805: Interpret engineering drawing
4. ASC/N3619: Perform electric vehicle assembly operations

## Qualification Pack (QP) Parameters

| | |
|---|---|
| **Sector** | Automotive |
| **Sub-Sector** | Manufacturing |
| **Occupation** | Assembly Operation |
| **Country** | India |
| **NSQF Level** | 4 |
| **Aligned to NCO/ISCO/ISIC Code** | NCO-2015/8211.1201 |
| **Minimum Educational Qualification & Experience** | 8th Class + 2 years ITI with 2 years of relevant experience<br>OR<br>10th Class pass with 2 years of relevant experience<br>OR<br>10th Class + 2 years ITI |

| | |
|---|---|
| | OR<br>12th Class with 1 Year of experience<br>OR<br>Certificate-NSQF (Electric Vehicle Assembly Operator Level 3) with 2<br>Years of relevant experience |

| | |
|---|---|
| **Minimum Level of Education for Training in School** | |
| **Pre-Requisite License or Training** | NA |
| **Minimum Job Entry Age** | 17 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/04299 |
| **NQR Version** | 1.0 |

# ASC/N9803: Organize work and resources (Manufacturing)

## Description

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

## Scope

The scope covers the following :

- Maintain safe and secure working environment
- Health and hygiene
- Perform work as per quality standards
- 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.** follow safe working practices while dealing with hazards to ensure safety of self and others

**PC3.** carry out routine check of the machine for identifying potential hazards

**PC4.** use appropriate protective clothing/equipment for specific tasks and work

**PC5.** follow safety hazards and preventive techniques during fire drill

**PC6.** report any identified breaches in health, safety and security policies and procedures to the designated person

*Health and hygiene*

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

**PC7.** ensure workstation and equipment are regularly clean and sanitized

**PC8.** clean hands with soap, alcohol-based sanitizer regularly

**PC9.** avoid contact with ill people and self-isolate in a similar situation

**PC10.** wear and dispose PPEs regularly and appropriately

**PC11.** report advanced hygiene and sanitation issues to appropriate authority

**PC12.** follow stress and anxiety management techniques

*Perform work as per quality standards*

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

**PC13.** ensure that work is accomplished as per the requirements within the specified timeline

**PC14.** ensure team goals are given preference over individual goals

*Effective waste management practices*

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

**PC15.** follow the fundamentals of 5S for waste management

**PC16.** segregate waste into different categories

**PC17.** follow processes specified for disposal of hazardous waste

**PC18.** identify recyclable, non-recyclable and hazardous waste

**PC19.** dispose non-recyclable, recyclable and reusable waste appropriately at identified location

*Material/energy conservation practices*

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

**PC20.** identify ways to optimize usage of material in various tasks/activities/processes

**PC21.** check for spills/leakages in various tasks/activities/processes

**PC22.** plug spills/leakages and escalate to appropriate authority if unable to rectify

**PC23.** check if the equipment/machine is functioning normally before commencing work and rectify wherever required

**PC24.** report malfunctioning (fumes/ sparks/emission/vibration/noise) and lapse in maintenance of equipment

**PC25.** ensure electrical equipment and appliances are properly connected and turned off when not in use

## 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.** preventative and remedial actions to be taken in case of exposure to toxic material

**KU7.** various types of fire extinguisher

**KU8.** various types of safety signs and their meaning

**KU9.** appropriate first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.

**KU10.** relevant standards, procedures and policies related to 5S followed in the company

**KU11.** the various materials used and their storage norms

**KU12.** efficient utilisation of material and water

**KU13.** basics of electricity and prevalent energy efficient devices

**KU14.** common practices of conserving electricity

**KU15.** common sources and ways to minimize pollution

**KU16.** categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

**KU17.** usage of different colors of dustbins

**KU18.** waste management techniques
**KU19.** 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.** ask for clarifications from superior about the job requirement
**GS4.** work with supervisors/team members to carry out work related tasks
**GS5.** complete tasks efficiently and accurately within stipulated time
**GS6.** inform/report to concerned person in case of any problem
**GS7.** make timely decisions for efficient utilization of resources
**GS8.** write reports such as accident report, in at least English/regional language
**GS9.** be punctual and utilize time efficiently

## Assessment Criteria

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| *Maintain safe and secure working environment* | 11 | 5 | - | 7 |
| PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace | 2 | 1 | - | 2 |
| PC2. follow safe working practices while dealing with hazards to ensure safety of self and others | 2 | - | - | 1 |
| PC3. carry out routine check of the machine for identifying potential hazards | 2 | 1 | - | 1 |
| PC4. use appropriate protective clothing/equipment for specific tasks and work | 2 | 1 | - | 1 |
| PC5. follow safety hazards and preventive techniques during fire drill | 2 | 1 | - | 1 |
| PC6. report any identified breaches in health, safety and security policies and procedures to the designated person | 1 | 1 | - | 1 |
| *Health and hygiene* | 7 | 5 | - | 2 |
| PC7. ensure workstation and equipment are regularly clean and sanitized | 2 | 2 | - | 1 |
| PC8. clean hands with soap, alcohol-based sanitizer regularly | 1 | 1 | - | 1 |
| PC9. avoid contact with ill people and self-isolate in a similar situation | 1 | - | - | - |
| PC10. wear and dispose PPEs regularly and appropriately | 1 | - | - | - |
| PC11. report advanced hygiene and sanitation issues to appropriate authority | 1 | 1 | - | - |
| PC12. follow stress and anxiety management techniques | 1 | 1 | - | - |
| *Perform work as per quality standards* | 5 | 3 | - | 2 |
| PC13. ensure that work is accomplished as per the requirements within the specified timeline | 2 | 2 | - | 1 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| PC14. ensure team goals are given preference over individual goals | 3 | 1 | - | 1 |
| *Effective waste management practices* | 15 | 10 | - | 4 |
| PC15. follow the fundamentals of 5S for waste management | 3 | 2 | - | 1 |
| PC16. segregate waste into different categories | 2 | 1 | - | - |
| PC17. follow processes specified for disposal of hazardous waste | 2 | 2 | - | 1 |
| PC18. identify recyclable, non-recyclable and hazardous waste | 4 | 2 | - | 1 |
| PC19. dispose non-recyclable, recyclable and reusable waste appropriately at identified location | 4 | 3 | - | 1 |
| *Material/energy conservation practices* | 12 | 7 | - | 5 |
| PC20. identify ways to optimize usage of material in various tasks/activities/processes | 2 | 1 | - | 1 |
| PC21. check for spills/leakages in various tasks/activities/processes | 2 | 1 | - | 1 |
| PC22. plug spills/leakages and escalate to appropriate authority if unable to rectify | 2 | 1 | - | - |
| PC23. check if the equipment/machine is functioning normally before commencing work and rectify wherever required | 2 | 2 | - | 1 |
| PC24. report malfunctioning (fumes/ sparks/emission/vibration/noise) and lapse in maintenance of equipment | 2 | 1 | - | 1 |
| PC25. ensure electrical equipment and appliances are properly connected and turned off when not in use | 2 | 1 | - | 1 |
| **NOS Total** | **50** | **30** | **-** | **20** |

## National Occupational Standards (NOS) Parameters

| | |
|---|---|
| **NOS Code** | ASC/N9803 |
| **NOS Name** | Organize work and resources (Manufacturing) |
| **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/N9802: Interact effectively with colleagues, customers and others

## Description

This NOS unit is about communicating with customers and colleagues/superiors, either in own work group or in other work groups within organisation.

## Scope

The scope covers the following :

- Communicate effectively with colleagues, customers and others
- Interact with supervisor or superior

## Elements and Performance Criteria

*Communicate effectively with colleagues, customers and others*

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

**PC1.** maintain clear communication with colleagues, customers and others, wherever needed, through all means i.e. face-to-face, telephonic or written

**PC2.** adjust communication styles to reflect gender and persons with disability (PwD) sensitivity

**PC3.** work in a way that shows respect for colleagues and others

**PC4.** follow the organisation's policies and procedures while working in a team

**PC5.** respect personal space of colleagues and customers

*Interact with supervisor or superior*

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

**PC6.** identify work requirements by receiving instructions from reporting supervisor

**PC7.** escalate problems to supervisors that cannot be handled including repairs and maintenance of machine

**PC8.** report the completed work

**PC9.** rectify errors as per feedback

## 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 colleagues and supervisor

**KU2.** different methods of communication as per the circumstances

**KU3.** gender based concepts, issues and legislation

## Generic Skills (GS)

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

GS1. read instructions/guidelines/procedures
GS2. listen effectively and orally communicate information
GS3. ask for clarification and advice from the concerned person
GS4. maintain positive and effective relationships with colleagues and customers
GS5. evaluate the possible solution(s) to the problem
GS6. deliver consistent and reliable service to customers
GS7. complete written work with attention to detail
GS8. check that the work meets customer requirements

## Assessment Criteria

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| *Communicate effectively with colleagues, customers and others* | 36 | 11 | - | 14 |
| PC1. maintain clear communication with colleagues, customers and others, wherever needed, through all means i.e. face-to-face, telephonic or written | 8 | - | - | 4 |
| PC2. adjust communication styles to reflect gender and persons with disability (PwD) sensitivity | 8 | - | - | - |
| PC3. work in a way that shows respect for colleagues and others | 7 | 4 | - | 3 |
| PC4. follow the organisation's policies and procedures while working in a team | 7 | 4 | - | 3 |
| PC5. respect personal space of colleagues and customers | 6 | 3 | - | 4 |
| *Interact with supervisor or superior* | 14 | 19 | - | 6 |
| PC6. identify work requirements by receiving instructions from reporting supervisor | 7 | 4 | - | - |
| PC7. escalate problems to supervisors that cannot be handled including repairs and maintenance of machine | - | 5 | - | 3 |
| PC8. report the completed work | 7 | 5 | - | - |
| PC9. rectify errors as per feedback | - | 5 | - | 3 |
| **NOS Total** | **50** | **30** | **-** | **20** |

## National Occupational Standards (NOS) Parameters

| | |
|---|---|
| **NOS Code** | ASC/N9802 |
| **NOS Name** | Interact effectively with colleagues, customers and others |
| **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/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/N3619: Perform electric vehicle assembly operations

## Description

This NOS is about performing assembly of electric vehicle and its systems like ECU, battery system, transmission system, braking, steering, electrical and electronic components, aesthetic parts, seating arrangements etc.

## Scope

The scope covers the following :

- Perform pre-assembly activities
- Conduct the assembly operation
- Conduct the post-assembly operations

## Elements and Performance Criteria

*Perform pre-assembly activities*

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

**PC1.** identify the work to be done by interpreting the assembly drawing/work instructions/SOPs

**PC2.** select the appropriate method of assembly on the basis of drawing information

**PC3.** identify the tools, measuring instruments, equipment, auto components/parts and sub-assemblies as per the SOP and job requirements

**PC4.** check the assembling tools, accessories, measuirng instruments and equipment for any defects and clean dust and impurities from them before use

**PC5.** check the terminals of battery and clean them by oxidants

**PC6.** fill CLRI (clean, lubricate, retighten & inspection) check sheet and report to the supervisor about any abnormalities identified and action taken to resolve them

**PC7.** setup the equipment required as per the selected assembling method

**PC8.** ensure that the right programme is selected in case of robotic assembly method as defined in the SOP

**PC9.** lift the auto component manually or by hoist and place the same securely on the designated slot/space as indicated in the drawing/work instructions

**PC10.** check adhesion of roof-lining, insulation material, roof-rail etc. of the auto component

*Conduct the assembly operation*

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

**PC11.** follow safety practices during assembly process as per organisational SOP

**PC12.** perform assembly operations and assemble the semi-precision and safety parts i.e. bearings, shafts, battery systems, motors such as electric wire harness, Electronic Control Unit (ECU), automatic lock system and other similar parts

**PC13.** perform installation of the Oil and Lube systems by placing and fitting the funnel, filters, hose pipes, glands, sockets, suction guns and regulator valves as prescribed in the Work Instructions/ SOPs/Control Plans

**PC14.** adjust, align and set (gap and flushness) semi- precision parts, assemblies and aggregates by following Product Quality Standard (PQS)

**PC15.** ensure that there is no leakage of water, oil, air etc. where the battery system has to be placed in the assembly

**PC16.** carry out numbering of the wires connected to the batteries during the assembly process

**PC17.** carry out sealing of the required areas to prevent any leakage of water/air etc. during the usage of the component

**PC18.** carry out labeling on the auto components like High voltage sticker indication etc. specifying the information related to assembly process and quality standards followed

*Conduct the post-assembly operations*

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

**PC19.** apply appropriate lubricant on the component as per manufacturer's specifications

**PC20.** check and confirm that battery charge, battery water, brake oil, gear oil, engine oil etc. are filled as per the required volume and type

**PC21.** check the assembled auto components as per the control plan, work instructions for product quality

**PC22.** inspect the final assembly for defects such as loose electrical connections, battery leakage, improper use and placement of electronic components i.e. battery, motor, ECU, sensors & actuators and body surface for paint, dents, grooves, cracks, rough edges, improper part clearances etc.

**PC23.** check the current in the battery, using multimeter

**PC24.** store the tools, equipment and fixtures by following organisational policies and procedures after completion of work

**PC25.** dispose scrap or waste material into the disposal area in accordance with the company's policies and environmental regulations

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

**KU1.** relevant standards and procedures followed in the company

**KU2.** different types of EVs manufactured by the company

**KU3.** functional processes like procurement, store operation (LIFO and FIFO), inventory, quality system and key contact points for query resolution

**KU4.** different components/aggregates as well as auto component manufacturer's specifications for the same

**KU5.** 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, Direct Current (DC)/Electric Charge (AC) and DC/DC converters, AC motor, DC motor, charging systems etc.)

**KU6.** interconnection of systems with each other and effect of one system on other system

**KU7.** 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, radio frequency, automotive communication protocols such as CAN, LIN, etc.

**KU8.** symbols, units and terms used in wiring diagrams associated with electrical/electric systems/ components of the vehicle

**KU9.** legal regulations that need to be taken into account for handling electric vehicles in the workshop

**KU10.** various assembly operations and methods

**KU11.** the process flow of the assembly operations

**KU12.** the correct method of the assembly operation such as angle for holding the soldering gun/pneumatic tools/pulse tools/DC nut-runner/ riveting guns/battery tools, direction of application of torque, ergonomics of hand/ body to complete the assembly operation keeping in mind safe working procedures

**KU13.** SOP recommended by the manufacturer for using tools, measuring instruments, accessories and equipment required during the assembly process

**KU14.** impact of various assembly process like bolting, torqueing, tightening, fitting, greasing, hammering, sealing, clamping on the final component/vehicle

**KU15.** application of various sealing compounds, gaskets and adhesives

**KU16.** how to diagnose electronic components

**KU17.** various types of defects and their effect on final assembly

**KU18.** the post assembling processes like inspection, cleaning etc.

**KU19.** the various inspection methods for inspecting the final assembly

**KU20.** safety requirements during the assembling work

## Generic Skills (GS)

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

**GS1.** read and interpret drawings, work instructions, equipment manuals and process documents

**GS2.** communicate the assembly process requirements to the lead technician and co-workers

**GS3.** attentively listen and comprehend the information given by the lead technician/team members

**GS4.** write any work related information in English/regional language

**GS5.** recognise a workplace problem and take suitable action

**GS6.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

**GS7.** plan and organise work according to the work requirements

**GS8.** complete the assigned tasks with minimum supervision

**GS9.** report to the supervisor or deal with a colleague individually, depending on the type of concern

## Assessment Criteria

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| *Perform pre-assembly activities* | 14 | 16 | - | 8 |
| PC1. identify the work to be done by interpreting the assembly drawing/work instructions/SOPs | 1 | 1 | - | 1 |
| PC2. select the appropriate method of assembly on the basis of drawing information | 1 | 1 | - | 1 |
| PC3. identify the tools, measuring instruments, equipment, auto components/parts and sub-assemblies as per the SOP and job requirements | 3 | 3 | - | 2 |
| PC4. check the assembling tools, accessories, measuirng instruments and equipment for any defects and clean dust and impurities from them before use | 2 | 2 | - | 2 |
| PC5. check the terminals of battery and clean them by oxidants | 1 | 1 | - | 1 |
| PC6. fill CLRI (clean, lubricate, retighten & inspection) check sheet and report to the supervisor about any abnormalities identified and action taken to resolve them | 1 | 2 | - | 1 |
| PC7. setup the equipment required as per the selected assembling method | 2 | 2 | - | - |
| PC8. ensure that the right programme is selected in case of robotic assembly method as defined in the SOP | 1 | 1 | - | - |
| PC9. lift the auto component manually or by hoist and place the same securely on the designated slot/space as indicated in the drawing/work instructions | 1 | 2 | - | - |
| PC10. check adhesion of roof-lining, insulation material, roof-rail etc. of the auto component | 1 | 1 | - | - |
| *Conduct the assembly operation* | 9 | 20 | - | 7 |
| PC11. follow safety practices during assembly process as per organisational SOP | 1 | 1 | - | 1 |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| PC12. perform assembly operations and assemble the semi-precision and safety parts i.e. bearings, shafts, battery systems, motors such as electric wire harness, Electronic Control Unit (ECU), automatic lock system and other similar parts | 2 | 5 | - | 2 |
| PC13. perform installation of the Oil and Lube systems by placing and fitting the funnel, filters, hose pipes, glands, sockets, suction guns and regulator valves as prescribed in the Work Instructions/ SOPs/Control Plans | 2 | 4 | - | 1 |
| PC14. adjust, align and set (gap and flushness) semi- precision parts, assemblies and aggregates by following Product Quality Standard (PQS) | 2 | 4 | - | 1 |
| PC15. ensure that there is no leakage of water, oil, air etc. where the battery system has to be placed in the assembly | - | 1 | - | 1 |
| PC16. carry out numbering of the wires connected to the batteries during the assembly process | - | 1 | - | - |
| PC17. carry out sealing of the required areas to prevent any leakage of water/air etc. during the usage of the component | 1 | 2 | - | - |
| PC18. carry out labeling on the auto components like High voltage sticker indication etc. specifying the information related to assembly process and quality standards followed | 1 | 2 | - | 1 |
| *Conduct the post-assembly operations* | **7** | **14** | **-** | **5** |
| PC19. apply appropriate lubricant on the component as per manufacturer's specifications | 1 | 2 | - | 1 |
| PC20. check and confirm that battery charge, battery water, brake oil, gear oil, engine oil etc. are filled as per the required volume and type | 1 | 3 | - | 1 |
| PC21. check the assembled auto components as per the control plan, work instructions for product quality | 1 | 2 | - | - |

| Assessment Criteria for Outcomes | Theory Marks | Practical Marks | Project Marks | Viva Marks |
|---|---|---|---|---|
| PC22. inspect the final assembly for defects such as loose electrical connections, battery leakage, improper use and placement of electronic components i.e. battery, motor, ECU, sensors & actuators and body surface for paint, dents, grooves, cracks, rough edges, improper part clearances etc. | 1 | 2 | - | 1 |
| PC23. check the current in the battery, using multimeter | 1 | 1 | - | - |
| PC24. store the tools, equipment and fixtures by following organisational policies and procedures after completion of work | 1 | 2 | - | 1 |
| PC25. dispose scrap or waste material into the disposal area in accordance with the company's policies and environmental regulations | 1 | 2 | - | 1 |
| **NOS Total** | **30** | **50** | **-** | **20** |

## National Occupational Standards (NOS) Parameters

| | |
|---|---|
| **NOS Code** | ASC/N3619 |
| **NOS Name** | Perform electric vehicle assembly operations |
| **Sector** | Automotive |
| **Sub-Sector** | Manufacturing |
| **Occupation** | Assembly Operation |
| **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 |

# 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/N9803.Organize work and resources (Manufacturing) | 50 | 30 | - | 20 | 100 | 10 |
| ASC/N9802.Interact effectively with colleagues, customers and others | 50 | 30 | - | 20 | 100 | 5 |
| ASC/N9805.Interpret engineering drawing | 50 | 30 | - | 20 | 100 | 10 |
| ASC/N3619.Perform electric vehicle assembly operations | 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 |
| **SOP** | Standard Operating Procedure |
| **ECU** | Electronic Control Unit |
| **CLRI** | Cleaning, Lubrication, Re-tightening and Inspection |
| **PQS** | Product Quality Standard |
| **LIFO** | Last in First Out |
| **FIFO** | First in First Out |
| **OEM** | Original Equipment Manufacturer |

## 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. |