



Model Curriculum

QP Name: Electric Vehicle Assembly Operator

QP Code: ASC/Q3606

QP Version: 1.0

NSQF Level: 3

Model Curriculum Version: 1.0

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Training Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Assembly Operation
Country	India
NSQF Level	3
Aligned to NCO/ISCO/ISIC Code	NCO-2015/ 8211.1201
Minimum Educational Qualification and Experience	8th + 1 year ITI with 1 year experience in relevant field OR 8th + 2 year ITI OR 10th Class with 2 Years of relevant experience OR Certificate-NSQF (Automotive Assembly Assistant Level 2) with 2 Years of relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	20/04/2021
Next Review Date	20/04/2026
NSQC Approval Date	24/06/2021
QP Version	1.0
Model Curriculum Creation Date	20/04/2021
Model Curriculum Valid Up to Date	20/04/2026
Model Curriculum Version	1.0
Minimum Duration of the Course	320 Hours 00 Minutes
Maximum Duration of the Course	320 Hours 00 Minutes

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Interpret assembly drawing/work instructions/SOPs for identification of raw material, tools and equipment required for the assembly operations.
- Carry out pre-assembling activities such as lifting of workpiece, inspection of tools and equipment etc. in co-ordination with Electric Vehicle Assembly Technician.
- Carry out assembling operations such as bolting, tightening, riveting, fastening, adhesive clamping, crimping etc. and post-assembly operations such as cleaning and testing of vehicle in co-ordination with Electric Vehicle Assembly Technician.
- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Optimize the use of resources to ensure less wastage and maximum conservation.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module	8:00	0:00			8:00
Module 1: Introduction to the role of an Electric Vehicle Assembly Operator	8:00	0:00			8:00
ASC/N9803 – Organize work and resources (Manufacturing) NOS Version No. – 1.0 NSQF Level – 3	16:00	24:00			40:00
Module 2: Organize work and resources according to safety and conservation standards	16:00	24:00			40:00
ASC/N9802 – Interact effectively with colleagues, customers and others NOS Version No. – 1.0 NSQF Level - 3	12:00	20:00			32:00
Module 3: Communicate effectively and efficiently	12:00	20:00			32:00
ASC/N9805 – Interpret engineering drawing	16:00	16:00			32:00

NOS Version No. – 1.0 NSQF Level - 4					
Module 4: Interpret engineering drawing	16:00	16:00			32:00
ASC/N3618 – Support the technician in electric vehicle assembly operations NOS Version No. – 1.0 NSQF Level - 3	68:00	140:00			208:00
Module 5: Prepare for electric vehicle assembly activities	32:00	56:00			88:00
Module 6: Support in electric vehicle assembly and post-assembly activities	36:00	84:00			120:00
Total Duration	120:00	200:00			320:00

Module Details

Module 1: Introduction to the role of an Electric Vehicle Assembly Operator

Bridge module

Terminal Outcomes:

- Discuss the role and responsibilities of an Electric Vehicle Assembly Operator.

Duration: <08:00>	Duration: <00:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List the role and responsibilities of an Electric Vehicle Assembly Operator. • Discuss the job opportunities of an Electric Vehicle Assembly Operator in an automobile industry. • Explain about Indian electric vehicle manufacturing market. • List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them. • Discuss the standards and procedures involved in the different processes of electric vehicle assembly. • Identify the standard checklists and schedules recommended by OEM. 	
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	

Module 2: Organize work and resources according to safety and conservation standards

Mapped to ASC/N9803, v1.0

Terminal Outcomes:

- Employ appropriate ways to maintain safe and secure working environment.
- Perform work as per the quality standards.
- Apply conservation practices at the workplace.

Duration: <16:00>	Duration: <24:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List the potential workplace related risks and hazards, their causes and preventions. • Identify PPE to be used at workplace. • Identify various warning signs used at the workplace. • Describe appropriate strategies to deal with emergencies and accidents at the workplace. • Outline the organizational structure to be followed to report about health, safety and security breaches to the concerned authorities. • Discuss the importance of keeping work area clean and tidy. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. • Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any to the concerned authorities. • Discuss the ways of dealing with stress and anxiety. • Discuss how to complete the given work within the stipulated time period. • Explain how to maintain a proper balance between team and individual goals. • Explain 5S guidelines at workplace. • List the various materials used at the workplace. • Explain organisational recommended procedure for storage of tools, equipment and material after completion of work. • Explain the ways to optimize usage of 	<ul style="list-style-type: none"> • Apply appropriate safety practices to ensure safety of people at the workplace • Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate the use of fire extinguisher. • Apply basic first aid procedure in case of emergencies. • Perform routine cleaning of tools, equipment and machines. • Employ various techniques for checking malfunctions in the equipment as per Standard Operating Procedure (SOP). • Show how to sanitize and disinfect one's work area regularly. • Demonstrate the correct way of washing hands using soap and water. • Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs. • Demonstrate how to evacuate the workplace in case of an emergency. • Demonstrate sorting of materials, tools and equipment and spare parts after completion of work. • Demonstrate the steps involved in storage of tools, equipment and material after completion of work. • Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. • Demonstrate different disposal techniques depending upon types of waste. • Employ different ways to check if equipment/machines are functioning as per requirements and report

<p>resources.</p> <ul style="list-style-type: none"> • Discuss various methods of waste management and its disposal. • List the different categories of waste for the purpose of segregation • Differentiate between recyclable and non-recyclable waste • State the importance of using appropriate colour dustbins for different types of waste. • Discuss common practices for conserving electricity at workplace. • Discuss the common sources of pollution and ways to minimize it. 	<p>malfunctioning, if observed.</p> <ul style="list-style-type: none"> • Employ ways for efficient utilization of material and water.
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<ul style="list-style-type: none"> • Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher • Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit 	

Module 3: Communicate Effectively and Efficiently

Mapped to ASC/N9802, v1.0

Terminal Outcomes:

- Use effective communication and interpersonal skills.
- Apply sensitivity while interacting with different genders and people with disabilities.

Duration: <12:00>	Duration: <20:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the organizational structure for communicating with colleagues, seniors and others. • Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD). • Explain the importance of respecting personal space of colleagues. • State the procedure to receive work instructions and report problems to the supervisor. • List the various organizational policies and procedures to be followed at the workplace. • Describe different ways to rectify commonly occurring errors. • Explain the importance of complying with the instructions/guidelines and procedures while performing tasks related to the job specifications. • Discuss the importance of PwD and gender sensitization. 	<ul style="list-style-type: none"> • Employ different means of communication depending upon the requirement while interacting with others. • Demonstrate using new ways to maintain good relationships with colleagues and supervisor. • Prepare a sample report to send the work status to the supervisor. • Demonstrate how to communicate with different genders and persons with disability (PwD) in a sensitive manner.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Sample of escalation matrix, organisation structure.	

Module 4: Interpret engineering drawing

Mapped to ASC/N9805, v1.0

Terminal Outcomes:

- Describe the basics of engineering drawing.
- Interpret the machine drawings and symbols for understanding the job requirements.

Duration: <16:00>	Duration: <16:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Identify uniqueness, dimensioning and important features of 2D and 3D shapes. • Identify types of lines, angles, points and their symmetry in shapes. • Differentiate between first angle and third angle projection. • Interpret 3 axis (x, y and z axis) of projection and machine symbols used in drawing. • Describe GD&T and use of its symbols in the drawings. • Identify required limits and tolerances of component from drawing. • Explain standards used in India for making assembly drawings. • Identify organisational drawing standards for interpreting the work requirements appropriately. 	<ul style="list-style-type: none"> • Read an object in first angle and third angle projection. • Demonstrate appropriate way of reading and interpreting the shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection. • Interpret and read orthographic and isometric views. • Read GD&T symbols in the given drawing. • Employ appropriate ways of storing the drawings in a defined and appropriate place. • Role play a situation on how to communicate the changes in drawing to the concerned authority.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<ul style="list-style-type: none"> • Drawing tools • Engineering drawing handbook • Vehicle assembly drawings 	

Module 5: Prepare for electric vehicle assembly activities

Mapped to ASC/N3618, v1.0

Terminal Outcomes:

- Identify tools and equipment required for electric vehicle assembly operations.
- Perform the steps to carry out pre-assembly activities such as lifting of vehicle components, inspection of tools and equipment, inspection of vehicle components for defects etc.

Duration: <32:00>	Duration: <56:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List various components /aggregates and the manufacturer's specifications of an electric vehicle. • Discuss basic technology used, functioning and interconnections of various systems and components of the vehicle. • Recall fundamental terms, laws and principles of electricity used in EV. • Describe various symbols, units and terms used in wiring diagrams associated with electrical/electric systems/components of the vehicle. • Explain legal regulations that need to be taken into account for handling electric vehicles. • Discuss the information derived from the assembly drawings, work instructions, SOP's etc. • List the selection criteria of assembling method and required tools and equipment as per the requirement. • Explain various assembling operations such as bolting, tightening, riveting, fastening, adhesive clamping, crimping etc. • Discuss the impact of various assembly operations on the vehicle and its components. • Describe the process flow of assembly operations. • List tools, measuring instruments, equipment, auto components/parts and sub-assemblies required during assembling work. • Discuss the organisational process of collecting and arranging tools, measuring instruments, equipment, auto components/parts and sub- 	<ul style="list-style-type: none"> • Demonstrate the standard operating procedure to use tools, equipment and measuring instruments required during assembly process. • Role play a situation to co-ordinate with the Electric Vehicle Assembly Technician for selecting the appropriate assembling method and required tools and equipment. • Apply appropriate ways to check and clean the assembling tools, accessories, measuring instruments and equipment before use. • Show how to check and clean the battery terminals of electric vehicle. • Perform the steps of lifting and placing the auto components on the designated place by using lifting tools. • Demonstrate the correct method of the assembly operation such as angle for holding the tools and equipment, direction of application of torque, ergonomics of hand/ body etc.

<p>assemblies from the store.</p> <ul style="list-style-type: none"> • Summarise the steps to be performed for checking and cleaning the assembling tools, accessories, measuring instruments and equipment before use. • Discuss the process of filling CLRI sheet and reporting to the supervisor about the abnormalities identified and action taken in it. • Discuss the process of lifting and placing the auto component on the designated place as per the work instructions. 	
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<ul style="list-style-type: none"> • PPT's, teaching aids, torquing charts, assembly drawing / blue print, component assembly plan • Measuring and marking tools: Steel tape, steel rule, vernier calliper, micrometre, compass, divider, scribe, T Square, bevel protractor, pin set, torque meter etc. • Assembly tools and equipment: Riveting machine, drilling machine, riveting guns, pneumatic guns, fasteners, rubber seals, soldering iron, jigs, fixtures, adhesives , Pliers , Cutters, Electrical Tester etc. • Components: Bolts, nuts, screws, wires, fasteners, connectors, sealants, adhesive bonding material etc. • Lifting devices: Hoists, cranes, bins, part trolleys, pallet trucks • Safety materials: Fire extinguisher, portable welding curtains, leather safety gloves, leather aprons, safety glasses, helmet, safety shoe and first-aid kit • Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel 	

Module 6: Support in electric vehicle assembly and post-assembly activities

Mapped to ASC/N3618, v1.0

Terminal Outcomes:

- Demonstrate various assembly operations such as bolting, tightening, riveting, fastening, adhesive clamping, crimping etc.
- Perform steps to carry out post-assembly activities.

Duration: <36:00>	Duration: <84:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Discuss the necessary precautions to avoid any hazard and accident during assembly activities. • Outline the process of an electric vehicle mechanical components assembly operations such as bolting, riveting, tightening etc. and electrical components assembly operations such as wire connections, wire color identification, wire routing, wire stripping, crimping, soldering, high frequency welding etc. • List the steps to be performed for adjustment, alignment and setting of the parts, assemblies and aggregates as per Product Quality Standard (PQS). • List various sealing compounds. • Discuss the process of application of sealing compounds, gaskets and adhesives on a vehicle assembly. • List the steps to be performed for labelling the auto components. • Discuss the information needed to be mentioned on the labels of the auto components. • Recall the tasks to be performed post-assembly. • Discuss the importance of selecting correct lubricant. • Explain properties and specifications of lubricant required for lubricating the required component. • List commonly occurring defects in the assembled vehicle. • Discuss the impact of defects on the quality of assembled vehicle. • Explain the importance of supporting the assembly technician in inspection for identifying the defects and checking 	<ul style="list-style-type: none"> • Demonstrate how to support an Electric Vehicle Assembly Technician in setting of the assembly equipment as per the selected assembling methods and selection of the right programme in case of robotic assembly method. • Employ appropriate assembly method for assembling of safety parts i.e. bearings, shafts etc., battery systems, motors, electrical components such as electric wire harness, Electronic Control Unit (ECU) etc. and other similar parts in electric vehicle. • Demonstrate how to support Electric Vehicle Assembly Technician during installation of the various components of oil and lube system in the vehicle. • Show how to support the Electric Vehicle Assembly Technician in adjustment, alignment and setting of the parts, assemblies and aggregates as per Product Quality Standard (PQS). • Apply appropriate ways of sealing to prevent water leakage in vehicle components. • Demonstrate how to number the wires connected to batteries of the vehicle. • Demonstrate the organizational specified procedure for labelling the auto components as per the assembly process and quality standards followed. • Display how to lubricate the vehicle components. • Employ appropriate ways for checking the level of battery charge, battery water, brake oil, gear oil, engine oil etc. in the vehicle. • Demonstrate how to support the assembly technician in inspection for

<p>the quality of assembled vehicle as per the control plan.</p> <ul style="list-style-type: none"> Recall organisational recommended procedure for storage of tools, equipment and fixture after completion of work. List different methods for disposing off waste material and scrap. 	<p>identifying the defects and checking the quality of assembled vehicle.</p> <ul style="list-style-type: none"> Perform steps to check the current in battery by using multimeter. Demonstrate the organisational procedure involved in storage of tools, equipment and fixtures after completion of work. Show how to dispose scrap or waste as per organisational guidelines.
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<ul style="list-style-type: none"> PPT's, teaching aids, torqueing charts, assembly drawing / blue print, component assembly plan Measuring and marking tools: Steel tape, steel rule, vernier calliper, micrometre, compass, divider, scribe, T Square, bevel protractor, pin set, torque meter etc. Assembly tools and equipment: Riveting machine, drilling machine, riveting guns, pneumatic guns, fasteners, rubber seals, soldering iron, jigs, fixtures, adhesives, Electrical Tester , Pliers, Cutters etc. Components: Bolts, nuts, screws, wires, fasteners, connectors, sealants, adhesive bonding material etc. Lifting devices: Hoists, cranes, bins, part trolleys, pallet trucks Safety materials: Fire extinguisher, portable welding curtains, leather safety gloves, leather aprons, safety glasses, helmet, safety shoe and first-aid kit Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel 	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Turner/Fitter/Electrician	3	Turner/Fitter/Electrician	1	Turner/Fitter/Electrician	NA
ITI	Turner/Fitter/Electrician	4	Turner/Fitter/Electrician	0	Turner/Fitter/Electrician	NA
Diploma	Mechanical/Electrical/Automobile	2	Mechanical/Electrical/Automobile	1	Mechanical/Electrical/Automobile	NA
Diploma	Mechanical/Electrical/Automobile	3	Mechanical/Electrical/Automobile	0	Mechanical/Electrical/Automobile	NA

Trainer Certification	
Domain Certification	Platform Certification
“Electric Vehicle Assembly Operator, ASC/Q3606, version 1.0”. Minimum accepted score is 80%.	“Trainer, MEP/Q2601 v1.0” Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Turner/Fitter/Electrician	4	Turner/Fitter/Electrician	1	Turner/Fitter/Electrician	NA
ITI	Turner/Fitter/Electrician	5	Turner/Fitter/Electrician	0	Turner/Fitter/Electrician	NA
Diploma	Mechanical/Electrical/Automobile	3	Mechanical/Electrical/Automobile	1	Mechanical/Electrical/Automobile	NA
Diploma	Mechanical/Electrical/Automobile	4	Mechanical/Electrical/Automobile	0	Mechanical/Electrical/Automobile	NA

Assessor Certification	
Domain Certification	Platform Certification
“Electric Vehicle Assembly Operator, ASC/Q3606, version 1.0”. Minimum accepted score is 80%.	“Assessor; MEP/Q2701 v1.0” Minimum accepted score is 80%.

Assessment Strategy

1. Assessment System Overview:
 - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
 - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
 - Assessment agency deploys the ToA certified Assessor for executing the assessment
 - SSC monitors the assessment process & records
2. Testing Environment:
 - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
 - Check the duration of the training.
 - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
 - If the batch size is more than 30, then there should be 2 Assessors.
 - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
 - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
 - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
 - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
 - Question papers created by the Subject Matter Experts (SME)
 - Question papers created by the SME verified by the other subject Matter Experts
 - Questions are mapped with NOS and PC
 - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
 - Assessor must be ToA certified & trainer must be ToT Certified
 - Assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
 - Time-stamped & geotagged reporting of the assessor from assessment location
 - Centre photographs with signboards and scheme specific branding
 - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
 - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:
 - Surprise visit to the assessment location
 - Random audit of the batch
 - Random audit of any candidate
6. Method for assessment documentation, archiving, and access
 - Hard copies of the documents are stored
 - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
 - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
SOP	Standard Operating Procedure
WI	Work Instructions
PPE	Personal Protective equipment