



# Automotive AC Technician

QP Code: ASC/Q1416

Version: 3.0

NSQF Level: 3

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## ASC/Q1416: Automotive AC Technician

### Brief Job Description

A Automotive AC technician performs the process of installing, service and repair of AC system in vehicles.

### Personal Attributes

An individual in this job must have good communication and interpersonal skills. The person should be organised, team-oriented, customer centric, able to multi-task, and have the ability to work for long hours in adverse conditions. The individual should be a keen observer and have an eye for detail and quality.

### Applicable National Occupational Standards (NOS)

#### Compulsory NOS:

1. [ASC/N9801: Organize work and resources \(Service\)](#)
2. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)
3. [ASC/N1425: Install an automobile AC system](#)
4. [ASC/N1426: Perform service and routine maintenance of the AC system](#)

### Qualification Pack (QP) Parameters

<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Automotive Vehicle Service
<b>Occupation</b>	Technical Service and Repair
<b>Country</b>	India
<b>NSQF Level</b>	3
<b>Credits</b>	14
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7231.0102

<b>Minimum Educational Qualification &amp; Experience</b>	10th Class (+ 2 years ITI (Mechanic Motor Vehicle/Diesel Mechanic/Mechanic Auto Electrical and Electronics) OR 10th Class with 2 Years of experience of relevant experience OR 12th Class with 1 Year of experience of relevant experience OR 11th grade pass OR Certificate-NSQF (Four Wheeler Service Assistant Level 2.5) with 2 Years of experience
<b>Minimum Level of Education for Training in School</b>	10th Class
<b>Pre-Requisite License or Training</b>	LMV Driving License
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	NA
<b>NSQC Approval Date</b>	
<b>Version</b>	3.0

## ASC/N9801: Organize work and resources (Service)

### 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
- Perform work as per quality standards
- Health and hygiene
- Material/energy conservation practices
- Effective waste management 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.** organise work as per organisation's current health, safety and security policies and procedures
- PC2.** report any identified breaches in health, safety, and security policies and procedures to the designated person
- PC3.** identify the risks and hazards associated with work activities, their causes and prevention

#### *Perform work as per quality standards*

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

- PC4.** ensure work area is clean and tidy
- PC5.** ensure that work is accomplished as per the requirements within the specified timeline
- PC6.** ensure team goals are given preference over individual goals

#### *Health and hygiene*

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

- PC7.** sanitize workstation and equipment regularly
- 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

#### *Material/energy conservation practices*

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

- PC13.** identify ways to optimise usage of material in various tasks/activities/processes
- PC14.** use resources, including water, in a responsible manner
- PC15.** check for spills/leakages in various tasks/activities/processes

- PC16.** plug spills/leakages and escalate to appropriate authority if unable to rectify
- PC17.** carry out routine cleaning of tools, machines and equipment
- PC18.** check if the equipment/machine is functioning normally before commencing work and rectify wherever required
- PC19.** report malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment
- PC20.** ensure electrical equipment and appliances are properly connected and turned off when not in use

#### *Effective waste management practices*

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

- PC21.** identify recyclable and non-recyclable, and hazardous waste generated
- PC22.** segregate waste into different categories
- PC23.** dispose non-recyclable waste appropriately
- PC24.** deposit recyclable and reusable material at identified location
- PC25.** follow processes specified for disposal of hazardous waste

### **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

- KU1.** organisation procedures for health, safety and security, and individual role and responsibilities in this context
- KU2.** the organisations 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.** the implications of own work on the schedule and work of others
- KU7.** efficient utilisation of material and water
- KU8.** basics of electricity and prevalent energy efficient devices
- KU9.** ways to recognise common electrical problems
- KU10.** common practices of conserving electricity
- KU11.** common sources of pollution and ways to minimize it
- KU12.** categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics
- KU13.** usage of different colours of dustbins
- KU14.** waste management and methods of waste disposal
- KU15.** significance of greening
- KU16.** organisation's policies to maintain personal health and hygiene at workplace

### **Generic Skills (GS)**

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

- GS1.** read instructions/guidelines/standard operating procedures
- GS2.** complete statutory documents relevant to safety and hygiene
- GS3.** modify work practices to improve them
- GS4.** ask for clarifications from superior about the job requirement
- GS5.** work with supervisors/team members to carry out work related tasks
- GS6.** complete tasks efficiently and accurately within stipulated time
- GS7.** inform/report to concerned person in case of any problem
- GS8.** make timely decisions for efficient utilization of resources
- GS9.** write in at least one language and complete written work with attention to detail
- GS10.** record data on waste disposal at workplace
- GS11.** be punctual, utilize time and manage workload efficiently
- GS12.** evaluate strategies to maintain, enhance or reduce the intensity of heightened emotional response

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Maintain safe and secure working environment</i>	<b>8</b>	<b>4</b>	-	<b>3</b>
<b>PC1.</b> organise work as per organisation's current health, safety and security policies and procedures	-	2	-	1
<b>PC2.</b> report any identified breaches in health, safety, and security policies and procedures to the designated person	3	1	-	-
<b>PC3.</b> identify the risks and hazards associated with work activities, their causes and prevention	5	1	-	2
<i>Perform work as per quality standards</i>	<b>12</b>	<b>8</b>	-	<b>6</b>
<b>PC4.</b> ensure work area is clean and tidy	4	2	-	-
<b>PC5.</b> ensure that work is accomplished as per the requirements within the specified timeline	6	4	-	2
<b>PC6.</b> ensure team goals are given preference over individual goals	2	2	-	4
<i>Health and hygiene</i>	<b>12</b>	<b>8</b>	-	<b>5</b>
<b>PC7.</b> sanitize workstation and equipment regularly	2	2	-	2
<b>PC8.</b> clean hands with soap, alcohol-based sanitizer regularly	2	1	-	-
<b>PC9.</b> avoid contact with ill people and self-isolate in a similar situation	2	1	-	-
<b>PC10.</b> wear and dispose PPEs regularly and appropriately	2	2	-	1
<b>PC11.</b> report advanced hygiene and sanitation issues to appropriate authority	2	2	-	2
<b>PC12.</b> follow stress and anxiety management techniques	2	-	-	-
<i>Material/energy conservation practices</i>	<b>10</b>	<b>4</b>	-	<b>3</b>
<b>PC13.</b> identify ways to optimise usage of material in various tasks/activities/processes	2	-	-	1



Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC14.</b> use resources, including water, in a responsible manner	2	-	-	-
<b>PC15.</b> check for spills/leakages in various tasks/activities/processes	-	1	-	-
<b>PC16.</b> plug spills/leakages and escalate to appropriate authority if unable to rectify	-	1	-	1
<b>PC17.</b> carry out routine cleaning of tools, machines and equipment	2	-	-	-
<b>PC18.</b> check if the equipment/machine is functioning normally before commencing work and rectify wherever required	-	1	-	1
<b>PC19.</b> report malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment	2	1	-	-
<b>PC20.</b> ensure electrical equipment and appliances are properly connected and turned off when not in use	2	-	-	-
<i>Effective waste management practices</i>	<b>8</b>	<b>6</b>	-	<b>3</b>
<b>PC21.</b> identify recyclable and non-recyclable, and hazardous waste generated	2	-	-	1
<b>PC22.</b> segregate waste into different categories	-	2	-	-
<b>PC23.</b> dispose non-recyclable waste appropriately	2	2	-	1
<b>PC24.</b> deposit recyclable and reusable material at identified location	2	1	-	-
<b>PC25.</b> follow processes specified for disposal of hazardous waste	2	1	-	1
<b>NOS Total</b>	<b>50</b>	<b>30</b>	-	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N9801
<b>NOS Name</b>	Organize work and resources (Service)
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Generic
<b>Occupation</b>	Generic
<b>NSQF Level</b>	3
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	30/12/2021
<b>Next Review Date</b>	28/04/2025
<b>NSQC Clearance Date</b>	28/04/2022

## **DGT/VSQ/N0102: Employability Skills (60 Hours)**

### **Description**

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

### **Scope**

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

### **Elements and Performance Criteria**

#### *Introduction to Employability Skills*

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

- PC1.** identify employability skills required for jobs in various industries
- PC2.** identify and explore learning and employability portals

#### *Constitutional values – Citizenship*

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

- PC3.** recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.
- PC4.** follow environmentally sustainable practices

#### *Becoming a Professional in the 21st Century*

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

- PC5.** recognize the significance of 21st Century Skills for employment
- PC6.** practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

#### *Basic English Skills*

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

- PC7.** use basic English for everyday conversation in different contexts, in person and over the telephone
- PC8.** read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC9.** write short messages, notes, letters, e-mails etc. in English

#### *Career Development & Goal Setting*

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

- PC10.** understand the difference between job and career
- PC11.** prepare a career development plan with short- and long-term goals, based on aptitude

#### *Communication Skills*

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

- PC12.** follow verbal and non-verbal communication etiquette and active listening techniques in various settings
- PC13.** work collaboratively with others in a team

#### *Diversity & Inclusion*

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

- PC14.** communicate and behave appropriately with all genders and PwD
- PC15.** escalate any issues related to sexual harassment at workplace according to POSH Act

#### *Financial and Legal Literacy*

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

- PC16.** select financial institutions, products and services as per requirement
- PC17.** carry out offline and online financial transactions, safely and securely
- PC18.** identify common components of salary and compute income, expenses, taxes, investments etc
- PC19.** identify relevant rights and laws and use legal aids to fight against legal exploitation

#### *Essential Digital Skills*

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

- PC20.** operate digital devices and carry out basic internet operations securely and safely
- PC21.** use e- mail and social media platforms and virtual collaboration tools to work effectively
- PC22.** use basic features of word processor, spreadsheets, and presentations

#### *Entrepreneurship*

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

- PC23.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC24.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC25.** identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

#### *Customer Service*

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

- PC26.** identify different types of customers
- PC27.** identify and respond to customer requests and needs in a professional manner.
- PC28.** follow appropriate hygiene and grooming standards

### *Getting ready for apprenticeship & Jobs*

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

- PC29.** create a professional Curriculum vitae (Résumé)
- PC30.** search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively
- PC31.** apply to identified job openings using offline /online methods as per requirement
- PC32.** answer questions politely, with clarity and confidence, during recruitment and selection
- PC33.** identify apprenticeship opportunities and register for it as per guidelines and requirements

### **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

- KU1.** need for employability skills and different learning and employability related portals
- KU2.** various constitutional and personal values
- KU3.** different environmentally sustainable practices and their importance
- KU4.** Twenty first (21st) century skills and their importance
- KU5.** how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up
- KU6.** importance of career development and setting long- and short-term goals
- KU7.** about effective communication
- KU8.** POSH Act
- KU9.** Gender sensitivity and inclusivity
- KU10.** different types of financial institutes, products, and services
- KU11.** how to compute income and expenditure
- KU12.** importance of maintaining safety and security in offline and online financial transactions
- KU13.** different legal rights and laws
- KU14.** different types of digital devices and the procedure to operate them safely and securely
- KU15.** how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.
- KU16.** how to identify business opportunities
- KU17.** types and needs of customers
- KU18.** how to apply for a job and prepare for an interview
- KU19.** apprenticeship scheme and the process of registering on apprenticeship portal

### **Generic Skills (GS)**

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

- GS1.** read and write different types of documents/instructions/correspondence
- GS2.** communicate effectively using appropriate language in formal and informal settings
- GS3.** behave politely and appropriately with all
- GS4.** how to work in a virtual mode

- GS5.** perform calculations efficiently
- GS6.** solve problems effectively
- GS7.** pay attention to details
- GS8.** manage time efficiently
- GS9.** maintain hygiene and sanitization to avoid infection

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	<b>1</b>	<b>1</b>	-	-
<b>PC1.</b> identify employability skills required for jobs in various industries	-	-	-	-
<b>PC2.</b> identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values – Citizenship</i>	<b>1</b>	<b>1</b>	-	-
<b>PC3.</b> recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
<b>PC4.</b> follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	<b>2</b>	<b>4</b>	-	-
<b>PC5.</b> recognize the significance of 21st Century Skills for employment	-	-	-	-
<b>PC6.</b> practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	<b>2</b>	<b>3</b>	-	-
<b>PC7.</b> use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
<b>PC8.</b> read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
<b>PC9.</b> write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development &amp; Goal Setting</i>	<b>1</b>	<b>2</b>	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> understand the difference between job and career	-	-	-	-
<b>PC11.</b> prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	<b>2</b>	<b>2</b>	-	-
<b>PC12.</b> follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
<b>PC13.</b> work collaboratively with others in a team	-	-	-	-
<i>Diversity &amp; Inclusion</i>	<b>1</b>	<b>2</b>	-	-
<b>PC14.</b> communicate and behave appropriately with all genders and PwD	-	-	-	-
<b>PC15.</b> escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	<b>2</b>	<b>3</b>	-	-
<b>PC16.</b> select financial institutions, products and services as per requirement	-	-	-	-
<b>PC17.</b> carry out offline and online financial transactions, safely and securely	-	-	-	-
<b>PC18.</b> identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
<b>PC19.</b> identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	<b>3</b>	<b>4</b>	-	-
<b>PC20.</b> operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
<b>PC21.</b> use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
<b>PC22.</b> use basic features of word processor, spreadsheets, and presentations	-	-	-	-
<i>Entrepreneurship</i>	<b>2</b>	<b>3</b>	-	-



Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC23.</b> identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
<b>PC24.</b> develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
<b>PC25.</b> identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	<b>1</b>	<b>2</b>	-	-
<b>PC26.</b> identify different types of customers	-	-	-	-
<b>PC27.</b> identify and respond to customer requests and needs in a professional manner.	-	-	-	-
<b>PC28.</b> follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship &amp; Jobs</i>	<b>2</b>	<b>3</b>	-	-
<b>PC29.</b> create a professional Curriculum vitae (Résumé)	-	-	-	-
<b>PC30.</b> search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
<b>PC31.</b> apply to identified job openings using offline /online methods as per requirement	-	-	-	-
<b>PC32.</b> answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
<b>PC33.</b> identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
<b>NOS Total</b>	<b>20</b>	<b>30</b>	-	-

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	DGT/VSQ/N0102
<b>NOS Name</b>	Employability Skills (60 Hours)
<b>Sector</b>	Cross Sectoral
<b>Sub-Sector</b>	Professional Skills
<b>Occupation</b>	Employability
<b>NSQF Level</b>	4
<b>Credits</b>	2
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	31/08/2023
<b>Next Review Date</b>	31/08/2026
<b>NSQC Clearance Date</b>	31/08/2023

## ASC/N1425: Install an automobile AC system

### Description

This NOS unit is about an individual installing the air conditioning system in the vehicles.

### Scope

The scope covers the following :

- Prepare for installation of AC system
- Install the appropriate AC system
- Perform post installation activity

### Elements and Performance Criteria

#### *Prepare for installation of AC system*

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

- PC1.** review the job card and understand work to be carried out to install AC system
- PC2.** identify the vehicle and AC system manufacturer specifications related to the various brand/model/variant
- PC3.** collect appropriate tools, equipment, fittings or materials as required for AC system installation and check their condition/calibration
- PC4.** report the malfunctions if any, in the tools/equipment/material to the person concerned for rectification

#### *Install the appropriate AC system*

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

- PC5.** take precautions to avoid damage to the vehicle and its components
- PC6.** comply with standard operating procedures for fitment of the AC system in the vehicle as specified by the OEM
- PC7.** make holes/cuts on various surfaces such as metal sheet, plastic, fabric etc., for fitting AC system components and wiring
- PC8.** remove dummy plug or covers and clean surrounding areas prior to installing AC system components
- PC9.** install and fit all AC system component in engine and passenger compartment as specified by OEM
- PC10.** perform refrigerant and wiring circuit connection as specified by the OEM
- PC11.** test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution
- PC12.** follow SOP to fill unit with specified quantity of refrigerant and PAG oil

#### *Perform post installation activity*

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

- PC13.** ensure all AC system components are installed/fitted/functioning properly
- PC14.** follow standard operating procedure to check the performance of AC system post installation
- PC15.** ensure completeness of tasks assigned before releasing the vehicle

- PC16.** return leftover consumable/parts, tools/equipment, and report if any malfunctions are observed, to the person concerned
- PC17.** dispose off packing wraps/box/covers and other material as per organization's policies
- PC18.** maintain documentation required on the job regarding the overall process of AC system installation in the vehicle
- PC19.** follow standard operating procedure to identify, validate faults in retrofit AC system and report to supervisor/service advisor if further inspection is required by another specialist

## **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

- KU1.** the automotive industry in India, workshop structure and role and responsibilities of different people in the workshop
- KU2.** Standard Operating Procedures (SOP) for receiving vehicles, opening job card, allocation of work, invoicing, vehicle delivery, handling complaints etc
- KU3.** different components/aggregates as well as auto component manufacturer's specifications for the same
- KU4.** the overall functioning of an air conditioning and other associated systems
- KU5.** various methods to install different types of AC system components such as electrical/electronic, mechanical/plastic/interior/exterior etc.
- KU6.** interconnection of systems with each other and effect of one system on other system
- KU7.** fundamental terms, laws and principles of electricity and refrigeration such as ohms law, voltage, current, resistance, power, inductance, electromagnetism, evaporation, freezing, heat dissipation etc.
- KU8.** various provisions given by OEM in vehicles to install AC system such as markings, cuts, dummy plug, fasteners, fitting switches, connections etc.
- KU9.** various type of refrigerant and PAG oil used in AC systems
- KU10.** various electrical and electronic signals such as electrical inputs, outputs, voltage, pulse-width modulation, digital signal etc.
- KU11.** symbols, units and terms used in wiring diagrams associated with AC system
- KU12.** 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
- KU13.** fault finding with visual and functional assessment such as damage, corrosion, wear, refrigeration leakage etc.
- KU14.** how to clean, test, inspect and evaluate air conditioning components
- KU15.** AC system performance testing and typical symptoms of common faults and failures
- KU16.** safety, health and environmental policies and regulations for the work place as well as for automotive trade in general
- KU17.** SOPs of the organization/ dealership for inspection and diagnosis of faults in a vehicle as prescribed by the OEM/components manufacturer
- KU18.** SOP recommended by OEM for using tools/equipment related to AC system diagnosis service and repair, such as special service tools, measuring instrument, pressure indicators/gauges, refrigerant recycling/evacuation/fusing machine, refrigerant leak detection equipment, dedicated and computer based diagnostic tools etc.

- KU19.** documentation required on the job (including job card, worksheets, etc.) regarding the basic details of AC system installation and testing performance
- KU20.** legal regulations that need to be taken into account for handling refrigerant and hazardous waste
- KU21.** how to use computers

### **Generic Skills (GS)**

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

- GS1.** read and interpret workplace related documentation
- GS2.** interpret the needs of customers by understanding the key issues
- GS3.** communicate using terms, names, grades and other nomenclature pertaining to the automotive trade
- GS4.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS5.** identify potential workplace problem and take suitable action
- GS6.** read various sources of information available for assessing service and repair requirements
- GS7.** write any work related information
- GS8.** write in English/regional language

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for installation of AC system</i>	<b>9</b>	<b>12</b>	-	<b>6</b>
<b>PC1.</b> review the job card and understand work to be carried out to install AC system	-	2	-	-
<b>PC2.</b> identify the vehicle and AC system manufacturer specifications related to the various brand/model/variant	3	4	-	2
<b>PC3.</b> collect appropriate tools, equipment, fittings or materials as required for AC system installation and check their condition/calibration	3	4	-	2
<b>PC4.</b> report the malfunctions if any, in the tools/equipment/material to the person concerned for rectification	3	2	-	2
<i>Install the appropriate AC system</i>	<b>16</b>	<b>28</b>	-	<b>9</b>
<b>PC5.</b> take precautions to avoid damage to the vehicle and its components	2	2	-	1
<b>PC6.</b> comply with standard operating procedures for fitment of the AC system in the vehicle as specified by the OEM	5	5	-	2
<b>PC7.</b> make holes/cuts on various surfaces such as metal sheet, plastic, fabric etc., for fitting AC system components and wiring	2	3	-	1
<b>PC8.</b> remove dummy plug or covers and clean surrounding areas prior to installing AC system components	-	2	-	-
<b>PC9.</b> install and fit all AC system component in engine and passenger compartment as specified by OEM	3	5	-	1
<b>PC10.</b> perform refrigerant and wiring circuit connection as specified by the OEM	2	5	-	2
<b>PC11.</b> test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution	-	3	-	-
<b>PC12.</b> follow SOP to fill unit with specified quantity of refrigerant and PAG oil	2	3	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform post installation activity</i>	5	10	-	5
<b>PC13.</b> ensure all AC system components are installed/fitted/functioning properly	-	2	-	-
<b>PC14.</b> follow standard operating procedure to check the performance of AC system post installation	-	2	-	-
<b>PC15.</b> ensure completeness of tasks assigned before releasing the vehicle	-	1	-	-
<b>PC16.</b> return leftover consumable/parts, tools/equipment, and report if any malfunctions are observed, to the person concerned	1	1	-	1
<b>PC17.</b> dispose off packing wraps/box/covers and other material as per organization's policies	1	1	-	1
<b>PC18.</b> maintain documentation required on the job regarding the overall process of AC system installation in the vehicle	1	1	-	1
<b>PC19.</b> follow standard operating procedure to identify, validate faults in retrofit AC system and report to supervisor/service advisor if further inspection is required by another specialist	2	2	-	2
<b>NOS Total</b>	<b>30</b>	<b>50</b>	<b>-</b>	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N1425
<b>NOS Name</b>	Install an automobile AC system
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Automotive Vehicle Service
<b>Occupation</b>	Technical Service & Repair
<b>NSQF Level</b>	4
<b>Credits</b>	TBD
<b>Version</b>	2.0
<b>Last Reviewed Date</b>	29/07/2021
<b>Next Review Date</b>	29/07/2026
<b>NSQC Clearance Date</b>	29/07/2021



## **ASC/N1426: Perform service and routine maintenance of the AC system**

### **Description**

This NOS unit is about an individual to service and carryout routine maintenance of the air conditioning system of vehicles.

### **Scope**

The scope covers the following :

- Prepare for service and repair of Air conditioning System and components
- Perform service and repair of Air conditioning System and components
- Perform post service/repair activities

### **Elements and Performance Criteria**

#### *Prepare for service and repair of Air conditioning System and components*

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

- PC1.** review the job card and understand work to be carried out
- PC2.** identify the auto components related to the various aggregates in the vehicle
- PC3.** check the functioning of air conditioning system
- PC4.** conduct test drive to check vehicle performance and identify/validate the faults related to AC system
- PC5.** conduct visual inspection of the vehicle to identify defects in AC system such as external damage or leakage, wear and tear etc.
- PC6.** determine the whether AC system need servicing/detailed diagnosis for poor performance
- PC7.** park the vehicle on appropriate platform according to nature of job to be performed such as detailed diagnosis, AC system service/performance testing/component replacement, or Refrigerant recovering or refilling
- PC8.** collect workshop tools/measuring device/equipment required for the job and check their condition/calibration
- PC9.** report the malfunctions if any, in the tools/equipment to the person concerned for rectification

#### *Perform service and repair of Air conditioning System and components*

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

- PC10.** take precautions to avoid damage to the vehicle and its components while working AC system
- PC11.** use workshop tools/measuring devices/equipment required for the job as per OEM Standard Operating Procedure (SOP)
- PC12.** diagnose indirect faults in vehicle related to AC system from other vehicle system such as engine cooling system, passenger cabin heater circuit etc.
- PC13.** recover, refill, flush and evacuate air and moisture AC system refrigerant circuit as per OEM SOP
- PC14.** remove components of AC system wherever applicable as per OEM SOP
- PC15.** test refrigerant circuit, wiring circuit and AC system component whenever required

- PC16.** plug the openings of refrigerant circuit joints and place removed components securely as specified by OEM
- PC17.** report the malfunctions/repairs in the vehicle beyond own scope to the concerned person
- PC18.** clean and condition dismantled components, including mechanical and electrical aggregates, prior to assemble as per OEM guidelines
- PC19.** follow SOP to service, repair and overhaul AC system components as per the job requirement
- PC20.** maintain the documentation related to inspection, servicing and repair of the vehicle

*Perform post service/repair activities*

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

- PC21.** check the performance of vehicle/aggregate post repair and report to supervisor/service advisor if further inspection is required by another specialist
- PC22.** ensure completeness of tasks assigned before releasing the vehicle for the next procedure
- PC23.** dispose off materials such as waste oil, scrap of failed parts/aggregates, as per organisation policies
- PC24.** return leftover consumable/parts, tools/equipment to the person concerned and report if any malfunction observed
- PC25.** 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.** the automotive industry in India, workshop structure and role and responsibilities of different people in the workshop
- KU2.** Standard Operating Procedure (SOP) for receiving vehicles, opening job card, allocation of work, invoicing, vehicle delivery, handling complaints etc
- KU3.** different components/aggregates as well as auto component manufacturer's specifications for the same
- KU4.** the overall functioning of an air conditioning and other associated systems
- KU5.** interconnection of systems with each other and effect of one system on other system
- KU6.** fundamental terms, laws and principles of electricity and refrigeration such as ohms law, voltage, current, resistance, power, inductance, electromagnetism, evaporation, freezing, heat dissipation etc.
- KU7.** various type of refrigerant and PAG oil used in AC systems
- KU8.** various electrical and electronic signals such as electrical inputs, outputs, voltage, pulse-width modulation, digital signal etc.
- KU9.** symbols, units and terms used in wiring diagrams associated with AC system
- KU10.** 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
- KU11.** fault finding with visual and functional assessment such as damage, corrosion, wear, refrigeration leakage etc.
- KU12.** how to clean, test, inspect and evaluate air conditioning components
- KU13.** AC system performance testing and typical symptoms of common faults and failures

- KU14.** safety, health and environmental policies and regulations for the work place as well as for automotive trade in general
- KU15.** SOPs of the organization/ dealership for inspection and diagnosis of faults in a vehicle as prescribed by the OEM/components manufacturer
- KU16.** SOP recommended by OEM for using tools/equipment related to AC system diagnosis service and repair, such as special service tools, measuring instrument, pressure indicators/gauges, refrigerant recycling/evacuation/fusing machine, refrigerant leak detection equipment, dedicated and computer based diagnostic tools etc.
- KU17.** legal regulations that need to be taken into account for handling refrigerant and hazardous waste

## **Generic Skills (GS)**

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

- GS1.** read and interpret workplace related documentation
- GS2.** interpret the needs of customers by understanding the key issues
- GS3.** communicate using terms, names, grades and other nomenclature pertaining to the automotive trade
- GS4.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS5.** identify potential workplace problem and take suitable action
- GS6.** read various sources of information available for assessing service and repair requirements
- GS7.** write any work related information
- GS8.** write in English/regional language

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for service and repair of Air conditioning System and components</i>	<b>10</b>	<b>15</b>	-	<b>6</b>
<b>PC1.</b> review the job card and understand work to be carried out	-	1	-	-
<b>PC2.</b> identify the auto components related to the various aggregates in the vehicle	2	1	-	1
<b>PC3.</b> check the functioning of air conditioning system	2	1	-	1
<b>PC4.</b> conduct test drive to check vehicle performance and identify/validate the faults related to AC system	-	2	-	-
<b>PC5.</b> conduct visual inspection of the vehicle to identify defects in AC system such as external damage or leakage, wear and tear etc.	2	2	-	2
<b>PC6.</b> determine the whether AC system need servicing/detailed diagnosis for poor performance	2	1	-	-
<b>PC7.</b> park the vehicle on appropriate platform according to nature of job to be performed such as detailed diagnosis, AC system service/performance testing/component replacement, or Refrigerant recovering or refilling	-	2	-	-
<b>PC8.</b> collect workshop tools/measuring device/equipment required for the job and check their condition/calibration	2	3	-	1
<b>PC9.</b> report the malfunctions if any, in the tools/equipment to the person concerned for rectification	-	2	-	1
<i>Perform service and repair of Air conditioning System and components</i>	<b>15</b>	<b>25</b>	-	<b>10</b>
<b>PC10.</b> take precautions to avoid damage to the vehicle and its components while working AC system	2	2	-	1
<b>PC11.</b> use workshop tools/measuring devices/equipment required for the job as per OEM Standard Operating Procedure (SOP)	1	2	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC12.</b> diagnose indirect faults in vehicle related to AC system from other vehicle system such as engine cooling system, passenger cabin heater circuit etc.	2	5	-	2
<b>PC13.</b> recover, refill, flush and evacuate air and moisture AC system refrigerant circuit as per OEM SOP	2	2	-	1
<b>PC14.</b> remove components of AC system wherever applicable as per OEM SOP	2	2	-	-
<b>PC15.</b> test refrigerant circuit, wiring circuit and AC system component whenever required	2	3	-	2
<b>PC16.</b> plug the openings of refrigerant circuit joints and place removed components securely as specified by OEM	1	1	-	-
<b>PC17.</b> report the malfunctions/repairs in the vehicle beyond own scope to the concerned person	-	2	-	-
<b>PC18.</b> clean and condition dismantled components, including mechanical and electrical aggregates, prior to assemble as per OEM guidelines	1	2	-	-
<b>PC19.</b> follow SOP to service, repair and overhaul AC system components as per the job requirement	2	3	-	2
<b>PC20.</b> maintain the documentation related to inspection, servicing and repair of the vehicle	-	1	-	-
<i>Perform post service/repair activities</i>	<b>5</b>	<b>10</b>	-	<b>4</b>
<b>PC21.</b> check the performance of vehicle/aggregate post repair and report to supervisor/service advisor if further inspection is required by another specialist	2	3	-	1
<b>PC22.</b> ensure completeness of tasks assigned before releasing the vehicle for the next procedure	-	2	-	-
<b>PC23.</b> dispose off materials such as waste oil, scrap of failed parts/aggregates, as per organisation policies	2	3	-	2
<b>PC24.</b> return leftover consumable/parts, tools/equipment to the person concerned and report if any malfunction observed	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC25.</b> perform scheduled checks, calibration and timely repairs for workshop tools, equipment and workstations	-	-	-	-
<b>NOS Total</b>	<b>30</b>	<b>50</b>	<b>-</b>	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N1426
<b>NOS Name</b>	Perform service and routine maintenance of the AC system
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Automotive Vehicle Service
<b>Occupation</b>	Technical Service & Repair
<b>NSQF Level</b>	4
<b>Credits</b>	TBD
<b>Version</b>	2.0
<b>Last Reviewed Date</b>	29/07/2021
<b>Next Review Date</b>	29/07/2026
<b>NSQC Clearance Date</b>	29/07/2021

## Assessment Guidelines and Assessment Weightage

### Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Element/ Performance Criteria (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 Element/ PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
6. To pass the Qualification Pack assessment, every trainee should score the Recommended Pass % aggregate for the QP.
7. 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

<b>National Occupational Standards</b>	<b>Theory Marks</b>	<b>Practical Marks</b>	<b>Project Marks</b>	<b>Viva Marks</b>	<b>Total Marks</b>	<b>Weightage</b>
ASC/N9801.Organize work and resources (Service)	50	30	-	20	100	15
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	0	0	50	10
ASC/N1425.Install an automobile AC system	30	50	-	20	100	40
ASC/N1426.Perform service and routine maintenance of the AC system	30	50	-	20	100	35
<b>Total</b>	<b>130</b>	<b>160</b>	<b>-</b>	<b>60</b>	<b>350</b>	<b>100</b>



### Acronyms

<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training
<b>PwD</b>	Persons with Disability

## Glossary

<b>Sector</b>	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.
<b>Sub-sector</b>	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
<b>Occupation</b>	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
<b>Job role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>Occupational Standards (OS)</b>	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.
<b>Performance Criteria (PC)</b>	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
<b>National Occupational Standards (NOS)</b>	NOS are occupational standards which apply uniquely in the Indian context.
<b>Qualifications Pack (QP)</b>	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.
<b>Unit Code</b>	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
<b>Unit Title</b>	Unit title gives a clear overall statement about what the incumbent should be able to do.
<b>Description</b>	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.
<b>Scope</b>	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.
<b>Knowledge and Understanding (KU)</b>	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.

<b>Organisational Context</b>	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.
<b>Technical Knowledge</b>	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
<b>Core Skills/ Generic Skills (GS)</b>	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.
<b>Electives</b>	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.
<b>Options</b>	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.