

# AC Specialist

QP Code: ASC/Q1416

NSQF Level: 4

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## Qualification Pack

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## Qualification Pack

### ASC/Q1416: AC Specialist

#### Brief Job Description

An AC Specialist is responsible for installing, servicing and repairing an air conditioning system of a vehicle. The individual also performs routine maintenance of the various components associated with the air conditioning system of the vehicle.

#### Personal Attributes

An individual on this job must have good communication and interpersonal skills in addition to being a team player, as the job requires coordination with other technicians. The individual must have a technical bend of mind to understand the technical aspects of air conditioning system requirements in a vehicle. The individual must be patient and good listening ability is highly desirable to understand various requirements from the customers.

#### Applicable National Occupational Standards (NOS)

##### Compulsory NOS:

1. [ASC/N0001: Plan and organise work to meet expected outcomes](#)
2. [ASC/N0002: Work effectively in a team](#)
3. [ASC/N0003: Maintain a healthy, safe and secure working environment](#)
4. [ASC/N1425: Install an automotive air conditioning system](#)
5. [ASC/N1426: Service and routine maintenance of an air conditioning system](#)
6. [ASC/N1427: Repair the automotive air conditioning 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>	4
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7231.0102

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<b>Minimum Educational Qualification &amp; Experience</b>	I.T.I (Electrical/Mechanical) with 3-5 years of experience For other qualifications
<b>Minimum Level of Education for Training in School</b>	
<b>Pre-Requisite License or Training</b>	On the job training: Desirable for ASDC AC Specialist Certificate or Diploma in Automotive Repair Compulsory for all other qualifications
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	01/08/2013
<b>Next Review Date</b>	31/03/2020
<b>NSQC Approval Date</b>	20/07/2015
<b>Version</b>	1.0

## Qualification Pack

### ASC/N0001: Plan and organise work to meet expected outcomes

#### Description

This NOS unit is about planning and organising an individuals work in order to complete it to the required standards on time.

#### Scope

This unit/task covers the following: work requirements including various activities, deliverables or work output required in the given time, maintain set quality standards appropriate use of resources (both material / equipment's and manpower

#### Elements and Performance Criteria

*Work requirements including various activities within the given time and set quality standards*

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

- PC1.** keep immediate work area clean and tidy
- PC2.** treat confidential information as per the organisations guidelines
- PC3.** work in line with organisations policies and procedures
- PC4.** work within the limits of job role
- PC5.** obtain guidance from appropriate people, where necessary
- PC6.** ensure work meets the agreed requirements

*Appropriate use of resources*

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

- PC7.** establish and agree on work requirements with appropriate people
- PC8.** manage time, materials and cost effectively
- PC9.** use resources in a responsible manner

#### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the organisations policies, procedures and priorities for area of work, role and responsibilities in carrying out that work
- KU2.** the limits of responsibilities and when to involve others
- KU3.** specific work requirements and who these must be agreed with
- KU4.** the importance of having a tidy work area and how to do this
- KU5.** how to prioritize workload according to urgency and importance and the benefits of this
- KU6.** the organisations policies and procedures for dealing with confidential information and the importance of complying with these
- KU7.** the purpose of keeping others updated with the progress of work
- KU8.** who to obtain guidance from and the typical circumstances when this may be required

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- KU9.** the purpose and value of being flexible and adapting work plans
- KU10.** how to complete tasks accurately by following standard procedures
- KU11.** technical resources needed for work and how to obtain and use these

## Generic Skills (GS)

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

- GS1.** write in at least one language
- GS2.** read instructions, guidelines/procedures
- GS3.** ask for clarification and advice from appropriate persons
- GS4.** communicate orally with colleagues
- GS5.** make a decision on a suitable course of action appropriate for accurately completing the task within resources
- GS6.** agree objectives and work requirements
- GS7.** plan and organise work to achieve targets and deadlines
- GS8.** deliver consistent and reliable service to customers
- GS9.** check own work and ensure it meets customer requirements
- GS10.** anomalies to the concerned persons
- GS11.** analyse problems and identify work-arounds taking help from
- GS12.** apply own judgement to identify solutions in different situations

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### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Work requirements including various activities within the given time and set quality standards</i>	<b>16</b>	<b>47</b>	-	-
<b>PC1.</b> keep immediate work area clean and tidy	2	9	-	-
<b>PC2.</b> treat confidential information as per the organisations guidelines	2	6	-	-
<b>PC3.</b> work in line with organisations policies and procedures	3	8	-	-
<b>PC4.</b> work within the limits of job role	3	6	-	-
<b>PC5.</b> obtain guidance from appropriate people, where necessary	3	7	-	-
<b>PC6.</b> ensure work meets the agreed requirements	3	11	-	-
<i>Appropriate use of resources</i>	<b>9</b>	<b>28</b>	-	-
<b>PC7.</b> establish and agree on work requirements with appropriate people	3	9	-	-
<b>PC8.</b> manage time, materials and cost effectively	3	11	-	-
<b>PC9.</b> use resources in a responsible manner	3	8	-	-
<b>NOS Total</b>	<b>25</b>	<b>75</b>	-	-

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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N0001
<b>NOS Name</b>	Plan and organise work to meet expected outcomes
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing and R&D, Sales and Service, Road Transportation
<b>Occupation</b>	Auto Components /Aggregates Repair
<b>NSQF Level</b>	4
<b>Credits</b>	NA
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	10/06/2013
<b>Next Review Date</b>	10/06/2015
<b>NSQC Clearance Date</b>	20/07/2015



## Qualification Pack

### ASC/N0002: Work effectively in a team

#### Description

This NOS unit is about working effectively with colleagues, either in individuals own work group or in other work groups within organisation

#### Scope

This unit/task covers the following: Colleagues: Superiors Members of own work group People in other work groups within or outside the organisation Communicate: Face-to-face By telephone In writing

#### Elements and Performance Criteria

##### *Effective communication*

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

- PC1.** maintain clear communication with colleagues
- PC2.** work with colleagues
- PC3.** pass on information to colleagues in line with organisational requirements
- PC4..** work in ways that show respect for colleagues
- PC5.** carry out commitments made to colleagues
- PC6.** let colleagues know in good time if cannot carry out commitments, explaining the reasons
- PC7.** identify problems in working with colleagues and take the initiative to solve these problems
- PC8.** follow the organisations policies and procedures for working with colleagues
- PC9.** ability to share resources with other members as per priority of tasks

#### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the organisations policies and procedures for working with colleagues, role and responsibilities in relation to this
- KU2.** the importance of effective communication and establishing good working relationships with colleagues
- KU3.** different methods of communication and the circumstances in which it is appropriate to use these
- KU4.** benefits of developing productive working relationships with colleagues
- KU5.** the importance of creating an environment of trust and mutual respect
- KU6.** whether not meeting commitments, will have implications on individuals and the organisation
- KU7.** different types of information that colleagues might need and the importance of providing this information when it is required
- KU8.** the importance of problems, from colleagues perspective and how to provide support, where necessary, to resolve these

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### Generic Skills (GS)

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

- GS1.** complete well written work with attention to detail
- GS2.** read instructions, guidelines/procedures
- GS3.** listen effectively and orally communicate information
- GS4.** make decisions on a suitable course of action or response
- GS5.** plan and organise work to achieve targets and deadlines
- GS6.** check that the work meets customer requirements
- GS7.** deliver consistent and reliable service to customers
- GS8.** apply problem solving approaches in different situations
- GS9.** apply balanced judgements to different situations
- GS10.** apply good attention to detail
- GS11.** check that the work is complete and free from errors
- GS12.** get work checked by peers
- GS13.** work effectively in a team environment

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### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Effective communication</i>				
<b>PC1.</b> maintain clear communication with colleagues	4	10	-	-
<b>PC2.</b> work with colleagues	2	7	-	-
<b>PC3.</b> pass on information to colleagues in line with organisational requirements	3	8	-	-
<b>PC4..</b> work in ways that show respect for colleagues	3	8	-	-
<b>PC5.</b> carry out commitments made to colleagues	2	8	-	-
<b>PC6.</b> let colleagues know in good time if cannot carry out commitments, explaining the reasons	2	8	-	-
<b>PC7.</b> identify problems in working with colleagues and take the initiative to solve these problems	4	9	-	-
<b>PC8.</b> follow the organisations policies and procedures for working with colleagues	3	9	-	-
<b>PC9.</b> ability to share resources with other members as per priority of tasks	2	8	-	-
<b>NOS Total</b>	<b>25</b>	<b>75</b>	-	-

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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N0002
<b>NOS Name</b>	Work effectively in a team
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing and R&D, Sales and Service, Road Transportation
<b>Occupation</b>	Maintenance
<b>NSQF Level</b>	4
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	23/09/2013
<b>Next Review Date</b>	30/09/2015
<b>NSQC Clearance Date</b>	28/09/2015

## Qualification Pack

### ASC/N0003: Maintain a healthy, safe and secure working environment

#### Description

This NOS unit is about monitoring the working environment and making sure it meets requirements for health, safety and security

#### Scope

This unit/task covers the following: Resources (both material & manpower) needed to maintain a safe working environment as per the prevalent norms & government policies including emergency procedures for illness, accidents, fires or any other reason which may involve evacuation of the premises

#### Elements and Performance Criteria

##### *Resources needed to maintain a safe, secure working environment*

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

- PC1.** comply with organisations 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..** Coordinate with other resources at the workplace to achieve the healthy, safe and secure environment for all incorporating all government norms esp. for emergency situations like fires, earthquakes etc.
- PC4.** identify and correct any hazards like illness, accidents, fires or any other natural calamity safely and within the limits of individuals authority
- PC5.** report any hazards outside the individuals authority to the relevant person in line with organisational procedures and warn other people who may be affected
- PC6.** follow organisations emergency procedures for accidents, fires or any other natural calamity
- PC7.** identify and recommend opportunities for improving health, safety, and security to the designated person
- PC8.** complete all health and safety records are updates and procedures well defined

#### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** legislative requirements and organisations procedures for health, safety and security and individuals role and responsibilities in relation to this
- KU2.** what is meant by a hazard, including the different types of health and safety hazards that can be found in the workplace
- KU3.** how and when to report hazards
- KU4.** the limits of responsibility for dealing with hazards
- KU5.** the organisations emergency procedures for different emergency situations and the importance of following these
- KU6.** the importance of maintaining high standards of health, safety and security

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- KU7.** implications that any non-compliance with health, safety and security may have on individuals and the organisation
- KU8.** different types of breaches in health, safety and security and how and when to report these
- KU9.** evacuation procedures for workers and visitors
- KU10.** how to summon medical assistance and the emergency services, where necessary
- KU11.** how to use the health, safety and accident reporting procedures and the importance of these

## Generic Skills (GS)

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

- GS1.** complete accurate, well written work with attention to detail
- GS2.** read instructions, guidelines/procedures/rules
- GS3.** listen and orally communicate information
- GS4.** make decisions on a suitable course of action or response
- GS5.** plan and organise work to achieve targets and deadlines
- GS6.** build and maintain positive and effective relationships with colleagues and customers
- GS7.** apply problem solving approaches in different situations
- GS8.** analyse data and activities
- GS9.** apply balanced judgements to different situations
- GS10.** apply good attention to detail
- GS11.** check that the work is complete and free from errors
- GS12.** get work checked by peers
- GS13.** work effectively in a team environment

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Resources needed to maintain a safe, secure working environment</i>				
<b>PC1.</b> comply with organisations current health,safety and security policies and procedures	3	9	-	-
<b>PC2.</b> report any identified breaches in health,safety, and security policies and procedures to the designated person	3	10	-	-
<b>PC3..</b> Coordinate with other resources at the workplace to achieve the healthy, safe and secure environment for all incorporating all government norms esp. for emergency situations like fires,earthquakes etc.	3	10	-	-
<b>PC4.</b> identify and correct any hazards like illness, accidents, fires or any other natural calamity safely and within the limits of individuals authority	5	10	-	-
<b>PC5.</b> report any hazards outside the individuals authority to the relevant person in line with organisational procedures and warn other people who may be affected	3	9	-	-
<b>PC6.</b> follow organisations emergency procedures for accidents, fires or any other natural calamity	3	10	-	-
<b>PC7.</b> identify and recommend opportunities for improving health,safety, and security to the designated person	3	8	-	-
<b>PC8.</b> complete all health and safety records are updates and procedures well defined	2	9	-	-
<b>NOS Total</b>	<b>25</b>	<b>75</b>	-	-

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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N0003
<b>NOS Name</b>	Maintain a healthy, safe and secure working environment
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing and R&D, Sales and Service, Road Transportation
<b>Occupation</b>	Auto Components/Aggregates Repair
<b>NSQF Level</b>	4
<b>Credits</b>	NA
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	10/06/2013
<b>Next Review Date</b>	10/06/2015
<b>NSQC Clearance Date</b>	20/07/2015



## Qualification Pack

### ASC/N1425: Install an automotive air conditioning system

#### Description

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

#### Scope

This unit/task covers the following: decide on the appropriate air conditioning system required for the vehicle install the appropriate air conditioning system

#### Elements and Performance Criteria

##### *Decide appropriate AC system & install it*

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

- PC1.** . understand the AC manufacturer specifications related to the various components/ aggregates in the air conditioning system
- PC2..** follow standard operating procedures for using workshop tools and equipment especially in the AC system of the vehicle
- PC3..** ensure any malfunctions observed in tools and equipment used in the air conditioning systems are reported to the concerned persons
- PC4. .** inspect the vehicle to check and decide an appropriate air conditioning system which can be powered by the exiting capacity of the vehicle
- PC5..** select appropriate fittings and materials as required for installation
- PC6. .** install air conditioning system without causing damage to any other component or system powering the vehicle
- PC7..** install, connect, and adjust thermostats, humidistats timers, and other components of the air conditioning system using hand tool
- PC8. .** install the compressor and its drive from the engine, the evaporator unit (under the dashboard, in the boot or on the roof) and the electrical wiring to the units, power source and controls
- PC9..** fill the unit with an appropriate refrigerant and test it for potential leaks and malfunctions
- PC10. .** join pipes or tubing to equipment and to fuel, water, or refrigerant source, to form complete circuit
- PC11. .** test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution
- PC12. .** charge the air conditioning system before first time usage
- PC13. .** test the system performance along with any adverse performance of other aggregates using prescribed methods and equipment
- PC14. .** carry out the final inspection to ensure that:
- PC15..** protective guards, safety features and cowlings are in place
- PC16..** the system is functional, without any leaks
- PC17. .** clean and maintain the work place area

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**PC18..** ensure that trainings organized by the OEM from time-to-time are attended and knowledge levels are upgraded (esp. in case of newly launched products, product refreshes)

### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the standard operating procedures to be followed related to new installation of an air conditioning system as per manufacturer guidelines
- KU2.** the standard operating procedures recommended by the dealership/ AC suppliers/OEM for using tools and equipment for installation of the specific variant of AC systems
- KU3.** safety requirements for various equipment and auto components/ aggregates
- KU4.** documentation requirements for each procedure carried out as part of roles and responsibilities as specified by the OEM in the manual or AC manufacturer
- KU5.** organisational and professional code of ethics and standards of practice
- KU6.** safety and health policies and regulations for the workplace as well as for automotive trade in general (e.g. safe practices while working in pits/ under vehicles)
- KU7.** the overall functioning of an air conditioning system
- KU8.** how to identify the specific technical requirements of air conditioning for each make/ variant of the OEM vehicles
- KU9.** how to clean, test, inspect and evaluate air conditioning components
- KU10.** how to install various air conditioning components: compressor evaporator condenser receiver/ dryer and expansion valve accumulator and orifice tube minor components like rubber hoses, metal pipes etc. any other component in the AC unit of the vehicle
- KU11.** how to use following tools and equipment : hand tools refrigerant leak detecting equipment thermometers evacuation equipment refrigerant recovery and recycling equipment refrigerant re-gassing equipment refrigerant and refrigerant oils
- KU12.** the methods for: adjustment refrigerant leak detection performance testing refrigerant re-gassing and de-gassing system evacuation mechanical removal and replacement of components system and component testing dismantling and reassemble cleaning components
- KU13.** how to perform system test and carry out the final inspection along with the overall performance of the vehicle post the installation of the air conditioning unit

### Generic Skills (GS)

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

- GS1.** record and document the requirements of air conditioning for the OEM vehicle
- GS2.** read and document the basic details of installations performed
- GS3.** write in at least one language
- GS4.** read work orders, specifications etc. related to the job
- GS5.** interact with the customers
- GS6.** interact with superiors and other support staff function
- GS7.** analyse information and evaluate results to choose the best solution and solve problems

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- GS8.** analyse all options available for cooling & air conditioning in the OEM vehicle before the installation of the AC unit
- GS9.** plan work according to the required schedule and location
- GS10.** organise the installation schedule to complete the work on the vehicle timely in case other aggregate repairs/ maintenance work is also required to be done
- GS11.** ensure that customers requirements regarding the cooling and air conditioning of the automotive vehicle are assessed and satisfactory service is provided
- GS12.** identify various models, brands, air conditioning capacity unit available in the market and suggest appropriate AC unit for the OEM vehicle
- GS13.** analyse available information and evaluate results to identify the best AC unit available for installation
- GS14.** use logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to any issue faced during installation

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Decide appropriate AC system &amp; install it</i>				
<b>PC1.</b> . understand the AC manufacturer specifications related to the various components/ aggregates in the air conditioning system	2	4	-	-
<b>PC2.</b> .. follow standard operating procedures for using workshop tools and equipment especially in the AC system of the vehicle	1	3	-	-
<b>PC3.</b> .. ensure any malfunctions observed in tools and equipment used in the air conditioning systems are reported to the concerned persons	1	3	-	-
<b>PC4.</b> . inspect the vehicle to check and decide an appropriate air conditioning system which can be powered by the exiting capacity of the vehicle	2	4	-	-
<b>PC5.</b> .. select appropriate fittings and materials as required for installation	2	4	-	-
<b>PC6.</b> . install air conditioning system without causing damage to any other component or system powering the vehicle	3	6	-	-
<b>PC7.</b> .. install, connect, and adjust thermostats, humidistats timers, and other components of the air conditioning system using hand tool	2	6	-	-
<b>PC8.</b> . install the compressor and its drive from the engine, the evaporator unit (under the dashboard, in the boot or on the roof) and the electrical wiring to the units, power source and controls	2	6	-	-
<b>PC9.</b> .. fill the unit with an appropriate refrigerant and test it for potential leaks and malfunctions	1	6	-	-
<b>PC10.</b> . join pipes or tubing to equipment and to fuel, water, or refrigerant source, to form complete circuit	1	6	-	-
<b>PC11.</b> . test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution	1	5	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC12.</b> . charge the air conditioning system before first time usage	1	5	-	-
<b>PC13.</b> . test the system performance along with any adverse performance of other aggregates using prescribed methods and equipment	1	5	-	-
<b>PC14.</b> . carry out the final inspection to ensure that:	1	3	-	-
<b>PC15..</b> protective guards, safety features and cowlings are in place	1	2	-	-
<b>PC16..</b> the system is functional, without any leaks	1	2	-	-
<b>PC17.</b> . clean and maintain the work place area	1	3	-	-
<b>PC18..</b> ensure that trainings organized by the OEM from time-to-time are attended and knowledge levels are upgraded (esp. in case of newly launched products, product refreshes)	1	2	-	-
<b>NOS Total</b>	<b>25</b>	<b>75</b>	-	-

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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N1425
<b>NOS Name</b>	Install an automotive air conditioning 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>	1.0
<b>Last Reviewed Date</b>	01/08/2013
<b>Next Review Date</b>	01/08/2015
<b>NSQC Clearance Date</b>	

## Qualification Pack

# ASC/N1426: Service and routine maintenance of an air conditioning system

## Description

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

## Scope

This unit/task covers the following: service the air conditioning system routine maintenance of the air conditioning system

## Elements and Performance Criteria

### *Service & routine maintainance of the AC system*

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

- PC1..** understand the AC manufacturer specifications related to the various components/ aggregates in the air conditioning system
- PC2. .** follow standard operating proceduresfor using workshop tools and equipment especially in the AC system of the vehicle
- PC3..** ensure any malfunctions observed in tools and equipment used in the air conditioning systems are reported to the concerned persons
- PC4..** check operation of air conditioning system
- PC5. .** perform visual inspection and temperature and leak checks
- PC6..** test electrical circuits or components for continuity, using electrical test equipment
- PC7..** test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution
- PC8. .** perform routine maintenance ofany necessary service on the following : compressor evaporator condenser receiver/ dryer and expansion valve accumulator and orifice tube minor components like rubber hoses, metal pipes etc. any other component in the AC unit of the vehicle
- PC9. .** recharge refrigerant to recommended levels
- PC10. .** recover refrigerant, evacuate air and moisture from system
- PC11. .** perform any routine maintenance of other sensitive components in the vehicles controlled by microprocessors or small computers: ECU (Electron Control Unit) ATC (Automatic Temperature Control)

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** standard operating procedures to be followed related to air conditioning system repair and maintenance as per manufacturer instructions

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- KU2.** standard operating procedures recommended by the dealership/ AC suppliers/OEM for using tools and equipment for installation of the specific variant of AC systems
- KU3.** safety requirements for various equipment and auto components/ aggregates
- KU4.** documentation requirements for each procedure carried out as part of roles and responsibilities as specified by the OEM in the manual or AC manufacturer
- KU5.** organisational and professional code of ethics and standards of practice
- KU6.** safety and health policies and regulations for the workplaces as well as for automotive trade in general (e.g. safe practices while working in pits/ under vehicles)
- KU7.** the overall functioning of an air conditioning system
- KU8.** how to identify the specific technical requirements of air conditioning for each make/ variant of the OEM vehicles
- KU9.** how to clean, test, inspect and evaluate air conditioning components
- KU10.** how to check the functioning of various components of the AC system including: compressor evaporator condenser receiver/ dryer and expansion valve accumulator and orifice tube minor components like rubber hoses, metal pipes etc.any other component in the AC unit of the vehicle
- KU11.** how to evacuate air and moisture from the system and recharge refrigerant
- KU12.** how to use following tools and equipment : how to use following tools and equipment : hand tools refrigerant leak detecting equipment thermometers evacuation equipment refrigerant recovery and recycling equipment refrigerant re-gassing equipment refrigerant and refrigerant oils hand tools refrigerant leak detecting equipment thermometers evacuation equipment refrigerant recovery and recycling equipment refrigerant re-gassing equipment refrigerant and refrigerant oils
- KU13.** the methods for: adjustment refrigerant leak detection performance testing refrigerant re-gassing and de-gassing system evacuation system and component testing cleaning components fault finding with aural, visual and functional assessments (including damage, corrosion, wear, refrigeration leakage)

## Generic Skills (GS)

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

- GS1.** record and document the requirements of air conditioning for the OEM vehicle
- GS2.** record and document the basic details of service and routine maintenance performed
- GS3.** write in at least one language
- GS4.** read work orders, specifications etc. related to the job
- GS5.** interact with the customers
- GS6.** interact with superiors and other support staff function
- GS7.** analyse information and evaluate results to choose the best solution and solve problems
- GS8.** analyse all options available for servicing of cooling & air conditioning in the OEM vehicle
- GS9.** plan work according to the required schedule and location
- GS10.** organise the service and routine maintenance schedule to complete the work on the vehicle timely in case other aggregate repairs/ maintenance work is also required to be done



## Qualification Pack

- GS11.** ensure that customers requirements regarding the service and routine maintenance of cooling and air conditioning of the automotive vehicle are assessed and satisfactory service is provided
- GS12.** identify gaps in the service and routine maintenance in the AC unit of the vehicle and take necessary corrective action
- GS13.** analyse available information and evaluate results to identify the best solution to the service related issues
- GS14.** using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to any issue faced during installation

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Service &amp; routine maintainance of the AC system</i>				
<b>PC1..</b> understand the AC manufacturer specifications related to the various components/ aggregates in the air conditioning system	2	7	-	-
<b>PC2. .</b> follow standard operating proceduresfor using workshop tools and equipment especially in the AC system of the vehicle	1	6	-	-
<b>PC3..</b> ensure any malfunctions observed in tools and equipment used in the air conditioning systems are reported to the concerned persons	2	7	-	-
<b>PC4..</b> check operation of air conditioning system	1	7	-	-
<b>PC5. .</b> perform visual inspection and temperature and leak checks	2	7	-	-
<b>PC6..</b> test electrical circuits or components for continuity, using electrical test equipment	2	7	-	-
<b>PC7..</b> test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution	2	7	-	-
<b>PC8. .</b> perform routine maintenance ofany necessary service on the following : compressor evaporator condenser receiver/ dryer and expansion valve accumulator and orifice tube minor components like rubber hoses, metal pipes etc. any other component in the AC unit of the vehicle	2	9	-	-
<b>PC9. .</b> recharge refrigerant to recommended levels	2	7	-	-
<b>PC10. .</b> recover refrigerant, evacuate air and moisture from system	2	7	-	-
<b>PC11. .</b> perform any routine maintenance of other sensitive components in the vehicles controlled by microprocessors or small computers: ECU (Electron Control Unit) ATC (Automatic Temperature Control)	2	9	-	-

## Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>NOS Total</b>	<b>20</b>	<b>80</b>	-	-

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N1426
<b>NOS Name</b>	Service and routine maintenance of an air conditioning 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>	1.0
<b>Last Reviewed Date</b>	01/08/2013
<b>Next Review Date</b>	01/08/2015
<b>NSQC Clearance Date</b>	

## Qualification Pack

### ASC/N1427: Repair the automotive air conditioning system

#### Description

This NOS unit is about an individual repairing the air conditioning system and related components/ aggregates in a vehicle.

#### Scope

This unit/task covers the following: repair the air conditioning system and related components/ aggregates

#### Elements and Performance Criteria

##### *Repair AC and related systems*

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

- PC1.** . understand the AC manufacturer specifications related to the various components/ aggregates in the air conditioning system
- PC2..** follow standard operating procedures for using workshop tools and equipment especially in the AC system of the vehicle
- PC3..** ensure any malfunctions observed in tools and equipment used in the air conditioning systems are reported to the concerned persons
- PC4.** . identify and replace worn, damaged, deteriorated or faulty components/ aggregates in the AC system of a vehicle
- PC5.** . dismantle, reassemble and test air conditioning system components
- PC6.** . test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution
- PC7..** test electrical circuits or components for continuity, using electrical test equipments
- PC8.** . select appropriate fittings and materials as required
- PC9.** . de-gas and re-gas air conditioning system using recovery unit
- PC10..** re-gas and conduct performance test on the system
- PC11.** . fill the unit with refrigerant and test it for leaks and malfunctions
- PC12..** carry out repair work on existing units, including testing, fault finding, dismantling, repair or replacement of faulty parts, re-assembly and final testing.
- PC13.** . overhaul air conditioning system without causing damage to any component or system
- PC14.** . repair or retrofit air conditioning system without causing damage to any component or system test the installation prior to placing in service and record the results
- PC15..** test the system performance using approved methods and equipment
- PC16..** carry out final inspection to ensure that: protective guards, safety features and cowlings are in place the system is functional, without leaks
- PC17.** . clean and maintain the work place area

#### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

## Qualification Pack

- KU1.** standard operating procedures to be followed related to air conditioning system repair and replacements as per manufacturer guidelines
- KU2.** standard operating procedures recommended by the dealership/ AC suppliers/OEM for using tools and equipment for repair & replacement of various components/ aggregates of the specific variants of AC unit
- KU3.** safety requirements for various equipment and auto components/ aggregates
- KU4.** documentation requirements for each procedure carried out as part of roles and responsibilities as specified by the OEM in the manual or manufacturer
- KU5.** organisational and professional code of ethics and standards of practice
- KU6.** safety and health policies and regulations for the workplaces as well as for automotive trade in general (e.g. safe practices while working in pits/ under vehicles)
- KU7.** the overall functioning of an air conditioning system
- KU8.** how to test, inspect and evaluate air conditioning units and its various components including: compressor evaporator condenser receiver/ dryer and expansion accumulator and orifice tube minor components like rubber hoses, metal pipes etc. any other component in the AC unit of the vehicle
- KU9.** how to identify faults in the various air conditioning components
- KU10.** how to dismantle and reassemble air conditioning components
- KU11.** how to repair or replace components as required which are faulty and effecting the overall cooling performance of the OEM vehicle compressor evaporator condenser receiver/ dryer and expansion accumulator and orifice tube minor components like rubber hoses, metal pipes etc. any other component in the AC unit of the vehicle
- KU12.** how to use following tools and equipment : hand tools refrigerant leak detecting equipment thermometers evacuation equipment refrigerant recovery and recycling equipment refrigerant re-gassing equipment refrigerant and refrigerant oils
- KU13.** the methods for: adjustment refrigerant leak detection performance testing refrigerant re-gassing and de-gassing system evacuation mechanical removal and replacement of components system and component testing dismantling and reassemble cleaning components fault finding with aural, visual and functional assessments (including damage, corrosion, wear, refrigeration leakage)

## Generic Skills (GS)

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

- GS1.** record and document the basic details of repairs and replacement of various components/ aggregates performed
- GS2.** document the job card for repair performed on AC unit of the vehicle
- GS3.** write in at least one language
- GS4.** read work orders, specifications etc. related to the job
- GS5.** interact with the customersto understand the issues faced in the ac unit the vehicle
- GS6.** interact with superiors and other support staff function
- GS7.** analyse information and evaluate results to choose the best solution and solve problems
- GS8.** analyse whether to repair or replace various components responsible for improper cooling due to fault in the AC unit

## Qualification Pack

- GS9.** plan work according to the required schedule and location
- GS10.** complete the repair of AC unit on the vehicle timely in case other aggregate repairs/ maintenance work is also required to be done
- GS11.** ensure that customer complaints are assessed and satisfactory repair or replacement is provided
- GS12.** identify faults & problems concerning the specific component/ aggregate of the AC system and suggest the most cost and time effective repair/ replacement solution for the AC unit of the OEM vehicle
- GS13.** analyse available information and evaluate results to identify faults and other problems and work-around taking help from concerned persons wherever required
- GS14.** use logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to any issue faced during repair or replacement of any component/ aggregate of the AC unit of the vehicle

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Repair AC and related systems</i>				
<b>PC1.</b> . understand the AC manufacturer specifications related to the various components/ aggregates in the air conditioning system	2	4	-	-
<b>PC2.</b> .. follow standard operating procedures for using workshop tools and equipment especially in the AC system of the vehicle	2	4	-	-
<b>PC3.</b> .. ensure any malfunctions observed in tools and equipment used in the air conditioning systems are reported to the concerned persons	2	4	-	-
<b>PC4.</b> . identify and replace worn, damaged, deteriorated or faulty components/ aggregates in the AC system of a vehicle	2	5	-	-
<b>PC5.</b> . dismantle, reassemble and test air conditioning system components	2	5	-	-
<b>PC6.</b> . test pipe or tubing joints or connections for leaks, using pressure gauge or soap-and-water solution	2	4	-	-
<b>PC7.</b> .. test electrical circuits or components for continuity, using electrical test equipments	2	4	-	-
<b>PC8.</b> . select appropriate fittings and materials as required	2	4	-	-
<b>PC9.</b> . de-gas and re-gas air conditioning system using recovery unit	1	4	-	-
<b>PC10.</b> .. re-gas and conduct performance test on the system	1	4	-	-
<b>PC11.</b> . fill the unit with refrigerant and test it for leaks and malfunctions	2	4	-	-
<b>PC12.</b> .. carry out repair work on existing units, including testing, fault finding, dismantling, repair or replacement of faulty parts, re-assembly and final testing.	2	5	-	-



### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC13.</b> . overhaul air conditioning system without causing damage to any component or system	2	4	-	-
<b>PC14.</b> . repair or retrofit air conditioning system without causing damage to any component or system test the installation prior to placing in service and record the results	2	4	-	-
<b>PC15..</b> test the system performance using approved methods and equipment	2	4	-	-
<b>PC16..</b> carry out final inspection to ensure that: protective guards, safety features and cowlings are in place the system is functional, without leaks	1	4	-	-
<b>PC17.</b> . clean and maintain the work place area	1	3	-	-
<b>NOS Total</b>	<b>30</b>	<b>70</b>	-	-

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N1427
<b>NOS Name</b>	Repair the automotive air conditioning 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>	1.0
<b>Last Reviewed Date</b>	01/08/2013
<b>Next Review Date</b>	01/08/2015
<b>NSQC Clearance Date</b>	

## Qualification Pack

### 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.

**Recommended Pass % aggregate for QP : 70**

#### Assessment Weightage

##### Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N0001.Plan and organise work to meet expected outcomes	25	75	-	-	100	10
ASC/N0002.Work effectively in a team	25	75	-	-	100	10
ASC/N0003.Maintain a healthy,safe and secure working environment	25	75	-	-	100	15

### Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N1425.Install an automotive air conditioning system	25	75	-	-	100	15
ASC/N1426.Service and routine maintenance of an air conditioning system	20	80	-	-	100	20
ASC/N1427.Repair the automotive air conditioning system	30	70	-	-	100	30
<b>Total</b>	<b>150</b>	<b>450</b>	<b>-</b>	<b>-</b>	<b>600</b>	<b>100</b>

## Qualification Pack

### 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

## Qualification Pack

### 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.

## Qualification Pack

<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.