T Level Technical Qualification in Engineering and Manufacturing – Maintenance, Installation and Repair

8712-315 Light & Electric Vehicle

Grade standard exemplification material

Distinction - summer 2024

Version 1-0

Version and date	Change detail	Section	Question
v1-0 Oct 2024			

Contents

Introduction

Summer 2024 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2024 assessment series to achieve a distinction grade for the 8712-315 Maintenance, Installation and Repair in Light & Electric Vehicle Engineering Occupational Specialism (OS).

The grade standard exemplification evidence (Grade SEM) provided for the distinction grade displays the holistic standard required across the tasks to achieve the distinction grade boundary in the summer 2024 series.

The aim of these materials is to provide examples of knowledge, skills and understanding that attested to **one mark above** distinction competence in summer 2024. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across tasks.

The Occupational Specialism is graded Distinction, Merit, Pass or Unclassified.

The distinction grade boundary is based on a synoptic mark across all tasks. The materials in this Grade SEM are separated into two sections as described below. Materials are presented against a number of tasks from the assignment.

Tasks

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/video evidence. Also referenced in this section are the assessment themes the candidates were marked against when completing the tasks within it. In addition, candidate evidence that has been included or not been included in this Grade SEM has been identified within this section.

In this Grade SEM there is candidate evidence from:

Task 1 Plan and prepare the service, maintenance and repair activities
Task 2A Perform a full service and maintenance on vehicle 1
Task 2B Perform the joining activity

Task 2C Perform maintenance and repair activities on vehicle 2
Task 3A Review and report the service, maintenance and repair activities
Task 3B Peer review
Task 4 Complete handover

Candidate evidence

This section includes exemplars of candidate work, photographs of the work in production (or completed) and practical observation records of the assessment completed by centre assessors. This was evidence that was captured as part of the assessment and then internally marked by the centre assessor.

The Occupational Specialism brief and tasks can be downloaded from here.

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (grading-arrangements-for-vtqsand-technical-qualifications-within-t-levels-in-the-academic-year-2023-to-2024), whilst also recognising the standards required for these qualifications.

- The evidence presented, as a whole, was **one mark** above the distinction grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than distinction grade).

Grade descriptors

To achieve a distinction, a candidate will be able to:

Competently and thoroughly interpret technical information, applying technical skills to plan, assess risk and follow safe working methods to practical tasks and procedures to an exemplary standard in response to the requirements of the brief, working systematically, logically, and efficiently, producing an excellent quality of work that meets regulations and standards.

Thoroughly prepare working areas, mitigating potential risks prior to commencing tasks and consistently apply exemplary housekeeping techniques during tasks that allow safe and efficient working.

Demonstrates comprehensive technical skills for diagnosing components, assemblies and sub-assemblies to complete maintenance, service, and repair activities, in line with the requirements of the brief, working systematically, logically, and efficiently.

Demonstrate exemplary technical skills using tools and equipment for light and electric vehicle maintenance, service, and repair, ensuring safe isolation, removal, and replacement of components, working systematically, logically, and efficiently.

Demonstrate comprehensive knowledge and understanding of the principles and processes required for disassembly, repair, configuration, and re-assembly of light and electric vehicle systems, ensuring that all tolerances, calibrations and tightening torques are in-line with specification.

Work safely and make well founded and informed decisions on the selection and appropriate use of tools, materials, and equipment within the working environments for maintenance, service, and repair activities.

Consistently and accurately use industry and technical terminology across different communication methods with full consideration of technical and non-technical audiences.

Task 1 Plan and prepare the service, maintenance and repair activities

Assessment number (eg 1234-033)	8712-315
Assessment title	Light and Electric Vehicle Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	A list of requirements and resources Completed risk assessment Job cards for each vehicle and welding activity
Date submitted by candidate	DD/MM/YY

Task 1

Assessment themes:

- Health and safety
- Planning and preparation
- Systems and components

You must analyse the brief and technical information about both vehicles provided and then:

- create a list of the requirements and resources needed to complete the activities on both vehicles, including the full service, maintenance and bonding/joining activities, justifying your selections. This should include:
    - all necessary technical information to confirm the type, scope and requirements of the activities
    - tools and equipment
    - materials, components and consumables
    - wastage and disposal requirements
    - time needed to carry out the activity
    - fault diagnosis methods to be used
    - any access requirements
- produce and complete a risk assessment to cover both vehicles, including the full service, maintenance working with high voltage systems and bonding/joining activity
- produce a job card template for each vehicle and bonding/joining activity.

Additional evidence of your performance that must be captured for marking:
none

Candidate evidence

Task 1 - A list of requirements and resources

Resource list

Tools	Quantity	Purpose
Screw drivers	Multiple varied sizes	To remove and refit screws which match the head of the screwdriver
Torque wrench	1	To torque fixtures
Spanner set	1	To remove and refit nuts/ bolts
Pliers	2	To help with removal
Socket set	4	To use on torque wrenches to help with refitting and removal
Driver set	1	Diverse types of drivers to help with fastening and removing
Picks	2	To make it easier to remove clips
Diagnostic code reader	1	To check the systems for diagnostic problems and help with servicing tasks
Sandpaper	Various grits	To smoothen down rough edges
Oil drain	1	To keep the old oil in one place to stop it from being messy and easily disposable
Service kit for vehicle		Brake fluid, powered steering fluid, coolant, gear box oil, pollen filter, oil filters, oil
Airline/ tool	1	To inflate the tyres and pressurise to the recommended psi, also air gun to remove tight bolts or nuts
Laptop	1	Control and diagnose the systems. Also used to check technical information on autodata
Exhaust extraction	2	To meet the health and safety standards of a running vehicle in a workshop and to extract the fumes safely
1000v Insulated tools	Whole toolbox	To prevent arcs and to safely work on high voltage areas of the car following health and safety acts
Wheel and tyre machines	As required	To remove and refit and balance wheels and tyres
Plastic repair kit	1	To repair the damaged bumper

Tyre tread depth gauge	1	To check the depth of the tyres
DTI gauge	1	To check the brakes
Brake pad gauge	1	To check the brake pad wear
vernier gauge	1	To check the vernier calliper
Micrometre	1	To check the disks
Multimeter	1	Conduct electrical tests
Spare parts	As required	May need screws, nuts, and bolts as well as cable ties during repair and replacement
Materials and consumables		
Rags	As required	To clean spillages and prevent any overspill
Cleaning fluids	As required	To clean brakes or small spillages
Lubricants	As required	For lubricating moving parts
Fuel	As required	To allow the vehicles to run
Protective equipment		
Safety boots	1	Basic PPE requirements meeting HASAWA. Prevents causing damage to feet.
Overalls	1	PPE requirement to meet HASAWA. Protects clothes and skin from contaminants and hot objects. Also protects clothes from dirt
Safety eye wear / goggles	1	Used when spraying lubricants to reduce risk of injury to eyes, used prevent ingress and eye damage.
Disposable gloves – heat proof	As required	Reduce injury, contamination and it also provides grip.
Class 00 gloves	A pair	To prevent electrocution
HEV warning signs		To prevent people from waling into an active hybrid vehicle area without the correct PPE.
Vehicle protective equipment		
Seat cover	One per vehicle	To prevent the seat from getting dirty, damage and contaminated
Steering wheel cover	One per vehicle	Protection from damage, dirt, and contaminants
Floor mats	One per vehicle	Protection from damage, dirt, and contaminants
Wing cover	Two per vehicle	Protects the wings from damage
Technical information		
Autodata		To access all correct information while working on the car, you can find specs and diagnoses to faults

Job cards		To help with understanding the processes of each task and making sure the requirements are meeting the brief. It also gives us history of the vehicle and gives some experiences of faults from the customer who are stating the problems they see, feel or hear.
Risk assessment		Completed before beginning the task. It ensures that hazards are identified and ways to mitigate the risks following correct procedures
Manuals		To check spec for wheels, tyres, and alignment

Key requirements

Waste disposal – We must follow the HSE requirements and safely dispose of every type of waste.

Tyres – must be collected by a tyre disposal company.
General – placed in the right bin. (if its abled to be recycled then put in recycling bin)
Oils, fluids, and coolant – each fluid placed in the appropriate waste drum.
Metal – placed in the correct bins.

Time needed – Vehicle one:

Prepare work area – 10 mins.
Decommission and inspect – 20 minutes.
Fault finding and diagnosing – 15 minutes.
Repair – 50 minutes
Calibrate – 20 minutes.
Recommission – 20 minutes.
Recording – 15 minutes
Reinstate work area – 10 minutes.
Job card – 45 minutes

Vehicle two:
Prepare work area – 10 mins.
Decommission and inspect – 20 minutes.
Wait for battery to discharge – 15 minutes.
Fault finding and diagnosing – 15 minutes.
Repair – 50 minutes
Calibrate – 20 minutes.
Recommission – 20 minutes.
Recording – 15 minutes
Reinstate work area – 10 minutes.
Job card – 45 minutes

Plastic Bumper repair
Prepare work area – 10 minutes.
Repairing the plastic bumper - 30 minutes
Reinstate the work area – 15 minutes.
Job card – 30 minutes

Fault findings	
Interrogate vehicle	Attach a code reader into the OBD port using a diagnostic tool to read errors and compare to autodata
Using senses to check	This could be done using trying to listen out for the problem or feeling vibrations. Looking at anything that looks out of place, or a fault being displayed on the dash or any leaking pipes.
Test driving the car	You could start the car and let it run and check with the engine and the exhaust and use the sensory checks to double check. You should also drive it and see if there are any unusual noises or any recent problems that have appeared on the dash. You should also feel the brakes for any problems while in motion.

Task 1 – Risk Assessment

Preparation				
Hazard	Risk	Control	Severity	likelihood
Preparation of hand tools needed for maintenance	Abrasions and cuts	Carefully select and organize tools and make sure you are wearing PPE	1	3

		such as gloves. Also check the condition of the tools being used		
Preparation of pneumatic tools	Ingress and noise injuries	Must be trained to use the pneumatic tools before use. And give it a visual inspection as well as the airline to make sure it is safe to use	4	3
Working area when moving vehicles into work area or undertaking precaution checks	Moving vehicles, trips, slips and falls including personal injury	Make sure everything looks safe when safe before walking in. ensure no tools are on the floor and always keep the correct PPE on.	1	2
Manual handling of tools	Personal injury	Be aware of the maximum lifting weight when obtaining equipment and make sure correct training has been provided	2	2
Maintenance				
Hazard	Risk	Control	Severity	Likelihood
Use of pneumatic tools such pneumatic as air line	Ingress, noise	Correct training must be provided and check the pneumatic tool and connectors for any damage	4	3
Maintenance with live electricity	Electrocution	Make sure safe isolation Is conducted. Use a multimeter ensure that the system is dead by checking for voltage in the system. And follow the “Electricity at work” (1989) requirements	4	3

Silent running vehicles or HV batteries	Moving vehicles, fall, electrocution, or slip	Make sure everyone knows you are moving the car and use the correct signage and safely isolate vehicle when working on HVB system	3	3
Using hand or power tools	Abrasions and cuts	Pick the correct tool for problem and check the condition of the tools while wearing PPE while following PUWER regulations	3	2
Leaking liquid	Slipping	Check for leaks and pillages while undergoing on the work and make sure you follow correct procedures to clean it up to prevent any slips	1	2
Hot components on the car	Burns and scalding	As PPE you should already be wearing heat resistance gloves when managing hot components and let the components cool down before you start working on it.	3	3
Equipment malfunctioning or faulty components	Tool heating up while working with it	Remove and replace component after turning off the system	2	3

	Likelihood		Severity
1	Very unlikely to happen	1	Minor injury
2	Unlikely to happen	2	Major injury
3	Possible to happen	3	Loss of limbs
4	Likely to happen	4	Individual death
5	Highly likely to happen	5	Multiple deaths

Task 1 – Completed job cards

Prepared job card for vehicle 1:

	Vehicle make: Seat. Model: Altea XL Registration number: DX11ZHR	Details of work activity: 1. Full service 2. Maintenance

Job details:

Check PPE for damage and if there are no problems then inspect the vehicle for any exterior damage then fit the VPE to the vehicle.

Check the windscreen for any cracks and wiper blades making sure they are working correctly.

Make sure all the doors and boot open.

Check the all the lights (headlights, sidelights, brake lights, reverse lights, and hazard lights.

After that check, all the seatbelts by pulling them out till maximum length and checking for any tears. Then attack the seatbelt into its buckle and pull to add restriction and try unbuckling the seatbelt making sure that it releases.

Check engine management light on the dashboard by reading it with a diagnostic code reader to confirm location of the problem and the type of fault.

Take off the wheel by removing all of wheel nuts and store the wheel away from any trip hazards.

Raise the car above head height and remove the sump plug to drain the oil and catch the old oil in an oil drain trying not to spill any oil on the floor or surroundings. Remove the oil filter letting all the excess oil drip into the oil drainer too then replace the oil filter with a new one tightening back up hand tight. Refit the sump plug and check the transmission oil level.

Continue looking at the underside of the vehicle to try and spot any fault and damages.

Lower the vehicle to chest height and inspect the wheel tyres, brakes and suspension using DTI gauge to measure break disks and to make sure that they are still within manufacturer's specification.

If new pads are needed tell the workshop technician and replace when required and refit wheels to the vehicle. Torque the wheels to the company's specification and drop the car down.

Open the bonnet and check the fluid level. Read the autodata and find out what kind oil needs to go into the engine and how much, once you have found it, fill the car up with the correct oil and the right amount using a funnel so you do not make a mess.

Check all the other fluid levels (windscreen washer, engine coolant, brake fluid and power steering fluid. If any needs topping up, then top them up to the fill line.

Let the car run for around a minute to let the oil run through the engine and then shut it off and check the oil level using the dipstick.

Change the air filter by unclipping the box from the front and putting in the new filter and making sure you click the clips back onto place properly. Then go into the car and change the pollen filter the same way the air filter was changed.

Then use the diagnostic tool and check if the faults have been removed and no new faults have appeared while the service was being done and use it to double check on the faults with the vehicle.

Finally, safely dispose of all the waste products following health and safety disposal regulations.

Candidate signature: _____

Date:

Assessor's name:

Prepared job card for vehicle 2:

	Vehicle make: Toyota Model: Yaris Registration number: PJ15TCZ	Details of work activity:

Job details:

Check PPE for damage and if there are no problems then inspect the vehicle for any exterior damage then fit the VPE to the vehicle. Make sure you are wearing the class 00 gloves to be protected from the high voltage battery as a safety standard. Place the safety signs around and in the vehicle.

Start the ignition and make sure the cars ready light I working as the customers complaint was that the vehicle was nit powering up and there is a warning light.

Scan the car using a diagnostic test to find all the problems with the car and try figure out why it is not starting.

Go to the boot and disconnect the 12v battery and attaching a battery charger. Put the key in a RFID pouch and move that 15m away.

Then inspect the high voltage battery and discharge it by taking out the safety plug and wait 15 minutes to allow it to fully discharge. While you wait padlock the safety plug to make sure no one can plug it back into the car while you work. Put the safety plug in the same RFID pouch as the keep and keep it the same distance away.

Candidate signature: _____

Date:

Assessor's name:

Prepared job card for vehicle 1:

	Vehicle make: Model: Registration number:	Details of work activity:

Job details:

Wear appropriate PPE and check workstation for health and safety and make sure you are following the HASAWA regulations.

Drill two holes into both ends of the crack to stop it from cracking even more.

Then you scuff the crack using sandpaper to make the edges smoother to give it a smoother finish at the end.

Use resin to fill in the crack. Once that is hardened fill the crack up with filler and let that dry.

Then scuff that down to get rid off the excess and scuff it till it smooth.

Candidate signature: _____

Date:

Assessor's name:

Task 2A Perform a full service and maintenance on vehicle 1

Assessment number (eg 1234-033)	8712-315
Assessment title	Light and Electric Vehicle Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2A
Evidence title / description	Completed job card for vehicle 1 Completed manufacturers records Assessor observation Service sheet Photographic evidence
Date submitted by candidate	DD/MM/YY

Task 2A

Assessment themes:

- Health and safety
- Planning and preparation
- Systems and components
- Working with faults

You must:

- prepare the working area to complete the full service and maintenance on vehicle 1
- perform the full service and maintenance on vehicle 1 in accordance with the planning documents produced in Task 1. This should include:
    - decommissioning and inspection of the vehicle systems
    - diagnosing and recording faults within the vehicle systems, including carrying out appropriate tests and measurements
    - replacing components and consumables as required in the service schedule and any fault diagnosis
    - safely using the appropriate tools and equipment
    - recommissioning of the vehicle
    - re-instating the work area
- record the full service and maintenance, to include:
    - completed service schedule sheet
    - completed job card with description of all work carried out.

Additional evidence of your performance that must be captured for marking:
none

Candidate evidence

Task 2a – Completed job card for vehicle 1

	Vehicle make: Seat Model: Altea XL Registration number: PX11ZHR	Details of work activity : 1. Full service for every 40000 miles or 24 months 2. Maintenance

Job details:

Firstly I checked for any damage on my PPE and as there was no damage on them I put them on. I then examined the exterior of the car and I then put the VPE on. I started off opening the driver door and equipped the seat cover to make sure no dirt or grime got onto the seats. I then put on the floor mat for the same reason. Then I opened the bonnet and put on the wing covers to make sure I wasn't scuffing or scratching the car with tools or bits from the engine bay.

I then sat in the car and started with the checks. I first looked at the interior lighting and made sure there were no cracks and then I turned them on to make sure the bulbs were operating correctly. All of them were working in good condition and none of them were cracked. I then checked if the front screen wash worked and then tested the wiper blades. These were also in good condition. After that, I did the same for the rear screen wash, wiper blade and the headlight wash. Like the front ones there were all in good condition. I then moved on the make sure all the lights were working as intended to, starting off with the indicators and hazard lights. I walked around the car, and they were all working. I then tested the sidelights and headlights, and I noticed that the nearside headlight wasn't operating, however the sidelight was. I then moved onto both rear and front fog lights. The rear were working fine however the front nearside fog light wasn't working. I then asked my assessor to check if my brake and reverse lights were working as I couldn't press the brakes and observe at the same time. He told me they were in good condition. I then checked the headlight levelling system, and they moved up and down as intended to.

I then went outside and gave the car a thorough exterior inspection and noted that none of the panels were scratched, scuffed or dented. I then looked at the windscreen, rear screen and all the windows. None of them were chipped or scratched. Then I tested all the seatbelts

by pulling them out to the maximum length making sure none of them were torn or loose and then attached them back into the buckle. I then pulled on them to add restriction and tried unbuckling the seatbelt making sure the were able to release. After I did all the checks, I used a diagnostic tool and entered the details of the car into the tool and scanned it for the problems it could pick them up. The codes that appeared were ‘exhaust gas temperature sensor’ and ‘engine coolant temperature sensor’.

After finding the codes I decided to deal with them first. I located where the exhaust gas temperature was by finding where the exhaust leaves the internal engine from and following the wire until I found where the sensor sat. I used an 18mm spanner to loosen the bolt from the exhaust chamber and the heat shield which were buttoned on top of the wire. I then followed it to the sensor, and I unclipped the sensor from its plug. I used a multimeter to test the pins that sat inside the sensor. Before I put the nodes onto the pin, I tested them by using the beep setting on the multimeter by touching the nodes together. They made a beeping sound which let me know that the nodes and the multimeter were working. I then put the nodes onto the pin and set the multimeter to find resistance and it couldn’t find any letting me know that the sensor was faulty. I then attached the new sensor into its plug and attached the wire back to the clip and used the 18mm spanner to tighten the bolt back on after I placed the end of the sensor back into the exhaust chamber. I then buttoned the heat shield back onto the wires.

After this, it battled the engine coolant temperature sensor. I observed the coolant tank and found a pipe that lead to a sensor. I decided to tackle this problem by using a 10mm bolt to detach the fuel filter casing to make it easier to access the engine coolant sensor. I removed 2 bolts and a nut using the 10mm socket to move the fuel filter case out of the way. Then I proceeded to remove the clip from the sensor case. I then unclipped the sensor from its plug and inspected it. I identified that the pin inside of the sensor was bent which didn’t allow the sensor to work. Then I compared the old sensor to the new one and the part number. They were both the same, therefore I put the sensor back into the plug. However, it wasn’t fitting in all the way. I inspected the plug and noticed the rubber O ring also fell off of the old, damaged sensor which was blocking the new sensor to fit in. I used a flat screwdriver to pull the rubber ring out and then equipped the new sensor into the plug and attached the clip back on. I attached the fuel filter case back into place using the 18mm socket and a ratchet.

I then had to use a T30 to remove a bracket which blocked me from getting to the oil filter. After it was removed, I used a 32mm socket to crack the filter open, I then opened the cap

for the engine oil and lifted the dipstick up a bit to let more air flow through the system which allows the oil to leak more efficiently.

I then fully raised the car and inspected the underbody pipes and hoses after removing the undertray. There were no major problems with the underside of the car. I then looked for any engine leaks and there were none. I then rolled the oil drainer under the sump plug and used a 19mm socket and ratchet to break the nut and let the old oil drain out. After it was fully drained, I used a brake cleaner to get rid of all the oil on the underside of the car and used a rag to wipe it away. I then tightened the sump plug back up using a torque wrench and torqued it back up to 30Nm. I then looked at the manual transmission and looked for any leaks which there were none and did the same for the fuel tank.

I then lowered the car to chest height and measured the front brake pads which read 12mm distance to the disk. I then moved to the rear, and they read that they were 10mm away from the disc. I then used a micrometer to check the thickness of the disk and they were 25.7mm thick. I then checked the rear brake disks, and they were 11.5mm thick. I then checked the car all four tyres on the car, and they were all in good condition too, meaning there were no tears, bulges or degradation. I then checked the tread depths for all of the tyres, and they were all within the legal limit. I checked the tyre pressure of the all the wheels, and these were the results:

Front offside: 25psi, front nearside: 29psi, rear offside: 21psi, rear nearside: 27psi

I then lowered the car down all the way and refilled the engine with 4.3 litres of 5W-30 oil, following spec sheet. I then ran the engine for a bit and while it did I checked the brake fluid level, engine coolant level and made sure all the engine bay wiring and connections were correct.

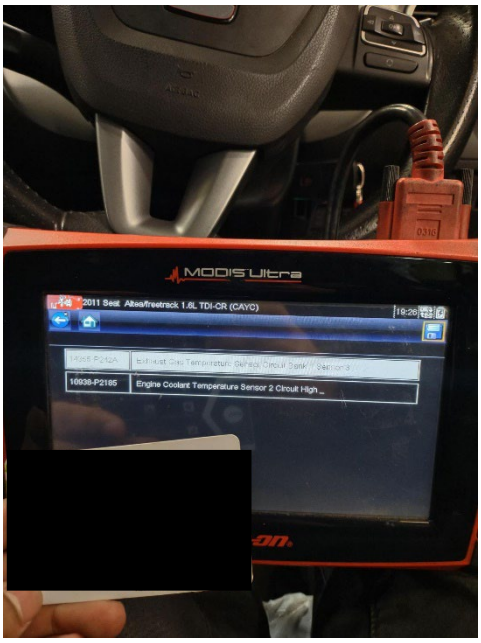
After the car has run for a while, I raised the dip stick and wiped it down and inserted that back into the engine and read the oil levels and it was at the max line, I was happy with that and knew that was the correct amount to let the car run optimally.

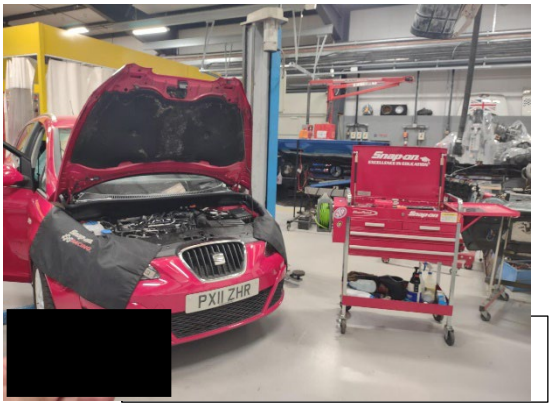
Lastly, I had to remove the cabin filter from under the glove box. I used a T25 to remove the 3 bolts from that were holding the panel. I then slid the cabin filter to the right to extract the cabin filter. I then put the new filter in and slid the casing back on and then fastened the 3 bolts back onto the panel. I then gave the exterior one final check and once I was happy with that I removed the wing covers and got back into the car and used the diagnostic tool to

make sure the faults have been removed and no new faults have appeared while I was doing the service.

Finally I removed the seat covers and the floor mat and threw all the waste from the service into the correctly allocated bins.

Task 2a – Photographic evidence





Task 2a – Assessor observation

Task 2a Practical observation form

8712-315 Maintenance Engineering Technologies: Light and Electric Vehicles - Summer 2024

Candidate Name	Candidate number
[Candidate name]	HKL2847
Provider name	**Date**
The Manchester College	18-04-2

Complete the table below referring to the relevant marking grid, found in the assessment pack.

Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Work area preparation	• The work area preparation.	• Health and Safety • Planning and Preparation • Systems and Components
Service and maintenance activities – vehicle 1	• decommissioning and inspection of the vehicle system • diagnosis and recording of faults within the vehicle system, including carrying out appropriate tests and measurements • replacing components and consumables as required in the service schedule and any faults diagnosis • use of tools and equipment • recommissioning of the system • re-instating the work area.	• Health and Safety • Planning and Preparation • Systems and Components

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*

Work area preparation:

Candidate ensured the work area was fully prepped will all appropriate equipment and the vehicle was fitted with correct vpe before work began.

During testing and diagnostics Candidate ensured the tools were adequate and of suitable capacity for the task. Candidate selected good testing methods during the assessment of components showing good knowledge and understanding, when comparing test data Candidate ensured this was reliable and compared with manufacturer standards.

During disassembly Candidate took great care and ensured that all re-fitted components were commissioned correctly as to not cause further issues.

Candidate ensured the area was clear when lifting and lowering the vehicle and ensured all equipment was returned to correct locations and work areas were left appropriately.

Service and maintenance activities – vehicle 1:

- decommissioning and inspection of the vehicle system
- diagnosis and recording of faults within the vehicle system, including carrying out appropriate tests and measurements
- replacing components and consumables as required in the service schedule and any faults diagnosis
- use of tools and equipment
- recommissioning of the system
- re-instating the work area.

Internal assessor signature	Date
✕	

Task 2a – Service sheet

Vehicle details:
Seat Altea/Altea XL (5P1/5P5/5P8)

Service schedule

Service schedule according to manufacturer's recommendation and specification.

Service type	MY 2011- (Longlife service)
Service interval	Service indicator on or every 24 months - interval service
Additional service	Every 40000 miles or 24 months

Total time - 1.00 hrs

VEHICLE ON FLOOR

Interior lamps	Good	Check/report ☑
Front wiper blades	good	Check/report ☑
Front screen wash	good	Check/adjust ☑
Rear wiper blade	Good	Check/report ☑
Rear screen wash	Good	Check/adjust ☑
Headlight wash/wipe	Good	Check/adjust ☑
Direction indicators/hazards	Good	Check/report ☑
Lighting system	Good	Check/report ☑
Headlight levelling system	good	Check ☑
Headlights	Nearside headlight doesn't work, everything else is fine	Check/report ☐
Windscreen/rear screen/windows	good	Check/report ☑

VEHICLE FULLY RAISED

Underbody pipes and hoses		Check/report ☑
Engine oil leaks		Check/report ☑
Engine oil		Drain/refill ☑

More information

Engine oil

Ambient temperature range	All temperatures
Engine oil grade	SAE 5W-30

Important

- Longlife oil.
- Models with or without diesel particulate filter (DPF).
- Low ash engine oil MUST be used to ensure long service life of diesel particulate filter (DPF).

Engine oil classification	OEM VW 507.00
Engine with filter(s)	litres 4,3
Sump drain bolt	30 Nm

Engine oil filter	Renew ☑

More information

Engine oil filter

Oil filter	25 Nm

Manual transmission oil leaks — no leaks — Check/report ☑

Fuel system leakage — no leaks — Check/report ☑

VEHICLE HALF RAISED

Front brake pads — 12 mm — Check/report ☑

More information

Front brake pads

Road wheels	120 Nm

Important

Bolts without conical washer

- Lightly grease thread and conical seat.

Bolts with conical washer

- Lightly coat thread and contact surfaces between bolt head and washer (use copper anti-seize grease).
- Do NOT grease conical seat.
- Lightly coat mating surfaces between wheel centre hole and hub (use spray wax).

Minimum pad thickness	Front 2 mm

Front brake discs — Check/report ☑

More information — ~~25 Nm~~

Front brake discs

Brake caliper to carrier	Front 30 Nm
Brake caliper/carrier to hub	Front ~~120 Nm~~ 25.7 mm

Important

- Brake caliper to hub:

  FS3 caliper (PR No. 1ZC/1ZF/1ZM) = 30 Nm
  P4-38/42 caliper (PR No. 1LT) = 110 Nm (Use new bolts.)

- Caliper carrier to hub:

  FN3 caliper (PR No. 1ZA/1ZE/1LJ) = 190 Nm
  FNR-G caliper (PR No. 1LU/1LB) = 200 Nm

Road wheels	120 Nm

Important

Bolts without conical washer

- Lightly grease thread and conical seat.

Bolts with conical washer

- Lightly coat thread and contact surfaces between bolt head and washer (use copper anti-seize grease).
- Do NOT grease conical seat.
- Lightly coat mating surfaces between wheel centre hole and hub (use spray wax).

Minimum disc thickness for replacement - ventilated	Front

Brake hydraulic system	Check/report ☐
Tyre condition — Good	Check/report ☑
Tyre pressures — Front offside = 25 psi, Front nearside = 29 psi, Rear offside = 21 psi, Rear nearside = 27 psi	Check/adjust ☑
Tyre pressure monitoring system	Reset ☐

ENGINE BAY OPERATIONS

Battery condition/specific gravity	Check/report ☑
Engine bay wiring/connections	Check ☑
Engine bay pipes and hoses	Check/report ☑
Washer bottle(s)	Check/top-up ☑
Brake fluid reservoir	Check/top-up ☑

More information

Brake fluid reservoir

Brake fluid classification	VW 501.14
Brake fluid	litres 1,2

Engine coolant/anti-freeze	Check/top-up ☐

More information

Engine coolant/anti-freeze

Coolant	Type G13
Coolant	Colour Purple
Cooling system - total capacity	litres 8,0

FINAL ITEMS CHECK

Cabin filter (if fitted)	Renew ☐

More information

Cabin filter • Cabin filter

Service interval indicator	Reset ☐
Headlamp alignment	Check/adjust ☐
Tyre repair canister expiry date (__/__/20__)	Check/report ☐

Total time - 1.00 hrs

Parts

Engine oil - Drain/refill

Important

- PR No. 1ZF/1ZC/1ZM (FS3 caliper) = 19 mm
- PR No. 1ZE/1LJ/1ZA (FN3 caliper) = 22 mm
- PR No. 1LU/1LB (FNR-G caliper) = 27 mm
- PR No. 1LT (P4-38/42 caliper) = 28 mm

Rear brake pads — Check/report ☐

More information

Rear brake pads

Road wheels — 120 Nm

Important

Bolts without conical washer

- Lightly grease thread and conical seat.

Bolts with conical washer

- Lightly coat thread and contact surfaces between bolt head and washer (use copper anti-seize grease).
- Do NOT grease conical seat.
- Lightly coat mating surfaces between wheel centre hole and hub (use spray wax).

Minimum pad thickness — Rear 2 mm

Rear brake discs — 10 mm — Check/report ☑

More information

Rear brake discs

11.5 mm

Brake caliper to carrier — Rear 35 Nm

Important

- Use new bolts.

Brake caliper/carrier to hub — Rear 90 Nm+90°

10 mm 11.5 mm

Important

- Use new bolts.

Road wheels — 120 Nm

Important

Bolts without conical washer

- Lightly grease thread and conical seat.

Bolts with conical washer

- Lightly coat thread and contact surfaces between bolt head and washer (use copper anti-seize grease).
- Do NOT grease conical seat.
- Lightly coat mating surfaces between wheel centre hole and hub (use spray wax).

Minimum disc thickness for replacement — Rear

Important

- PR No. 1KD/1KS/1KQ (C138, ZOH 38 caliper) = 8 mm
- PR No. 1KZ/1KF/1KJ/1KY (C11 38, C11 41 caliper) = 10 mm

Task 2a - Maintenance Schedule and Records

Equipment/System type	Identification No.
Vehicle 1 (Petrol/Diesel)	8712-315
Brand/Model	**Location**
City & Guilds	Workshop

Equipment/System specification
• Please refer to manufacturer's vehicle specification documentation (supplied by provider).

Maintenance records					
Service No	Maintenance date	Maintenance type (fault/repair, scheduled/routine, requested)	Checked by	Repair details (where relevant)	Technician signature
01	20/4/2022	Scheduled	JS	• Carried out an annual service to manufacturer specifications. • Vehicle functioning as per vehicle specification following annual maintenance activity.	J Smith

02	28/5/2023	Repair	AB	• Diagnosed fault to N/S/R ABS sensor, replaced sensor and checked vehicle working to manufacturer specifications. • Noted rear brake pads at 2 mm.	A Bloggs
03	3/5/2024			• Engine coolant temperature sensor • Lambda sensor service	
04					
05					
06					

Maintenance Schedule – annual unless specified otherwise					
Service No	Year	Detail inspection	Recommended planned maintenance	Service advisor signature	Technician signature
01	2022	Annual	Annual- routine/scheduled	D Jones	J Smith
02	2023	Annual	Annual- routine/scheduled	D Jones	A Bloggs

03	2024	Annual	Annual- routine/scheduled	D Jones	
04					
05					
06					

Commentary	
Service No	Recommendations for future maintenance activity

Task 2B Perform the joining activity

Assessment number (eg 1234-033)	8712-315
Assessment title	Light and Electric Vehicle Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2B
Evidence title / description	Completed job card of the welding activity with description of the work carried out Assessor observation Photographic evidence
Date submitted by candidate	DD/MM/YY

Task 2B

Assessment themes:

- Health and safety
- Planning and preparation
- Systems and components
- Working with faults
- Reviewing and reporting

You must:

- prepare the working area to complete bonding/joining activity
- perform the activity in accordance with the planning documents produced in Task 1, which should include:
    - preparing the bumper for bonding/joining activity
    - complete the bonding/joining activity
    - safely using the appropriate tools and equipment
    - re-instating the work area
    - completing the job card for the bonding/joining activity with a description of work carried out.

Additional evidence of your performance that must be captured for marking:
none

Candidate evidence

Task 2b - Completed job card

	Task: Repair the crack in the plastic bumper	

Job details:

Firstly, I started off by checking my PPE and made sure there was no damage to them. I then put it on my PPE and then prepared my workstation making sure everything is following the HASAWA regulations.

I then drilled a hole at the end of the crack to ensure the plastic bumper would no be able to crack any further while I was working on it.

Then I taped the backside of the bumper to make sure nothing would seep through the crack

After that I used a belt sander to create a ‘v’ groove which would help the glue and resin mixture to stick better to the bumper crack.

I then got the resin and glue mixture ready by putting the mixing nozzle on the gun.

After I had that prepared, I tested if the nozzle was working properly by testing it on onion paper and waited around a minute and a half to make sure it hardened properly.

I then applied a generous amount onto the crack and let it harden.

I waited around 5 minutes to ensure that the resin has fully dried which would allow to move onto the next step.

I then used a p80 grit sandpaper to scuff and smoothen the surface down to make it flat for the filler to sit properly. I also used a disk sand with p80 grit to speed up the process.

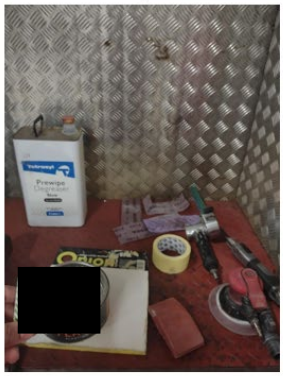
Once it was fully smooth, I wiped it down using a degreaser to prevent any contamination and to give it a more detailed finish.

After cleaned, I added filler onto a sheet of onion paper and added a small dose of hardener to it, so it didn’t take too long to harden but didn’t harden too fast either.

I then applied that onto my crack and waited for that to completely solidify for around half an hour.

I then used a p240 grit sandpaper to make it completely smooth and ready to be painted.

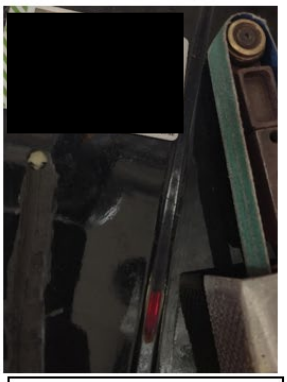
Task 2b – Photographic evidence



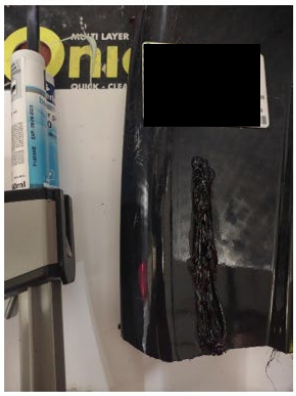
Prepared work area.

Hole drilled into end of crack.

Taped backside of crack



Belt sanded to create v groove.



Glue and resin mixture placed into v groove.

Sanded and filled with filler and hardener mixer.

Final product after sanded down with p240 grit

Completed work area

Task 2b – Assessor observation

Task 2b - Practical observation form

8712-315 Maintenance Engineering Technologies: Light and Electric Vehicles - Summer 2024

Candidate Name	Candidate number
Provider name	**Date**

Complete the table below referring to the relevant marking grid, found in the assessment pack.

Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Work area preparation for bonding/joining	• The work area preparation for bonding/joining.	• Health and Safety • Planning and Preparation • Systems and Components
The bonding/welding activity	• preparing the bumper for bonding/joining activity • complete the bonding/joining activity • safely using the appropriate tools and equipment • re-instating the work area	• Health and Safety • Planning and Preparation • Systems and Components

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Work area preparation for bonding/joining: Candidate appropriately selected appropriate tools and equipment for the joining activity he wa completing and ensured the work area was suitable with correct safety equipment in place and in proximity. Candidate ensured the chosen method of repair was suitable for the repair and this was completed to manufacturer standard to ensure a lasting repair. The surface was thoroughly prepared and ready for paint once finished. Candidate ensured to not mix excess products to minimise waste and ensure ease of repair. Once complete the work area was reinstated correctly and all tools retuned to correct locations, waste materials were disposed of correctly and excess returned to storage. The work area was cleaned and left in good condition. **The bonding/welding activity:** • preparing the bumper for bonding/joining activity • complete the bonding/joining activity • safely using the appropriate tools and equipment • re-instating the work area.

Internal assessor signature	**Date**
X	

Task 2C Perform maintenance and repair activities on vehicle 2

Assessment number (eg 1234-033)	8712-315
Assessment title	Light and Electric Vehicle Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2C
Evidence title / description	Completed job card for vehicle 2 Maintenance schedule and records Assessor observation Photographic evidence
Date submitted by candidate	DD/MM/YY

Task 2C

Assessment themes:

- Health and safety
- Planning and preparation
- Systems and components
- Working with faults
- Reviewing and reporting

You must:

- prepare the work area for the maintenance and repair activities on vehicle 2
- perform the maintenance and repair activities on vehicle 2 in accordance with the planning documents produced in Task 1. This should include:
    - decommissioning and inspection of the vehicle systems
    - disassemble and reassemble the relevant system(s)
    - diagnosing and recording faults within the systems, including carrying out appropriate tests and measurements
    - safe isolation of the high voltage system
    - repairing faults and replacing components as required
    - safely using the appropriate tools and equipment
    - re-energising the high voltage system and recommissioning the vehicle
    - re-instating the work area
- record the maintenance and repair activities, to include:
    - completed job card and control documents
    - record of measurements and test results completed.

Additional evidence of your performance that must be captured for marking:
none

Candidate Evidence

Task 2c – Completed job card

	Vehicle make: Toyota Model: Auris Registration number: PK64OEM	Details of work activity : 1- Ready light is not illuminating on dash 2- Customer complaint of AC not working

Job details:

Firstly I checked for any damage on my PPE and as there was no damage on them I put them on. I then examined the exterior of the car and I then put the VPE on. I cornered the car off using the plastic links to make sure no one came into the area of the car. I then put the seat cover, floor mats and steering wheel cover onto the car. After that I put the 'High Voltage' warning signs around the car.

I then sat in the car and turned in the ignition to check if the 'ready' light was working. The 'ready' light didn't turn on. After I checked for that I used a diagnostic tool and entered the details of the car into the scanner, the faults that came up was that there was a problem with a high voltage fuse (P0A95). This told me that I should check the fuses that lead to the high voltage (HV) battery.

After that I put the key in a RFID pouch and moved it 15m away to make sure the car wouldn't stay charged.

I went to the boot of the car, as this is where the 12V battery is, and disconnected the negative terminal and moved it to the side to ensure that it wouldn't arc. I did this to disconnect the HV battery from getting any power and to follow regulations.

Then I tested the high and low voltage rubber gloves by pumping air in them to make sure there were no holes in the glove. After I made sure they were safe to use, I layered all the gloves that I needed to work on the hybrid car. First the sweatproof gloves, then the low voltage rubber gloves and after that the class 00 high voltage gloves and finally the leather glove to ensure safety.

I then went to the rear seats of the car and unlatched the seat to make the HV safety plug more accessible. I removed the safety plug and attached a padlock to it and put it in the safe RFID pouch as the keys 15m away. After this I waited 15 minutes for the car to fully discharge.

While I waited, I researched the fault code, and it came up with suggestions on what could be the problem with the system. One of them were that the HV service plug might not be connected properly. I then unlocked the padlock and tested the pins on the service plug for resistance using a multimeter and the fuse within the service plug was blown leaving it in an open circuit. That's what caused the problem with 'ready' light. I then locked the service plug back up and put it back in the RFID pouch to ensure no one would touch it.

After the 15 minutes were over, I opened the bonnet of the car and used a 1000v rated 10mm socket and ratchet to remove the 9 bolts that held down the inverter cover. Once it was off, I used a multimeter to test the inverter for DC voltage and it read '0V', therefore I knew that there was no power within the vehicle and that it was safe to work on.

I used an 8mm socket and ratchet to remove the 2 bolts that held down the glass fuse in the inverter, I also tested that for resistance as this fuse could also be blown, not allowing the ready light to illuminate. However, the fuse had no resistance within it, therefore it wasn't broken.

I unclipped the air filter and removed the casing to make it easier to access the wire that lead from the inverter to the AC compressor, so I could test the wire for any resistance. After I had removed that, using 10mm socket to detach the 5 bolts I was able to access the AC compressor wire. I unclipped the wire and unbolted that 10mm bolts that held in the end that lead to the inverter. I then tested the wire for resistance to check if there was a good continuity and as there was no resistance it told me that there wasn't a problem with AC wire but the ac compressor itself.

I then removed the gas pipe to allow me to detach the ac compressor from the car. I detached the 10mm bolt that held in the AC compressor from on top. I then lifted the car above head height and removed the undertray. I used a 12mm spanner to detach the second gas pipe and then a 10mm spanner detach the other 2 bolts that hold it in and lowered it out of the engine bay. I replaced the AC compressor with the new one and attached the pipe back on and screw in all the bolts.

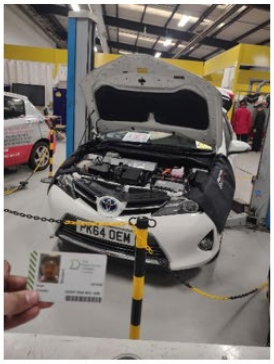
after that I attached the undertray back and lowered the car and attach the gas pipe from up top. I then screw in the final 10mm bolt for the top of the compressor. I then put the air filter casing back on top of the compressor and put the air filter back into place. I attached the clip back on and put the inverter panel case back onto the car, slowly making sure the pin didn't break. I put the engine cover back on. I then went back to the RFID pouch after I replaced the safety plug with a new one.

I then attached the negative terminal back onto the 12V battery and started the car to make sure the ready light and the AC was working.

After I knew everything was working correctly, I removed all of the VPE and set my work station back to its original form.

Task 2c – Photographic evidence

Fault finding and the tools used.

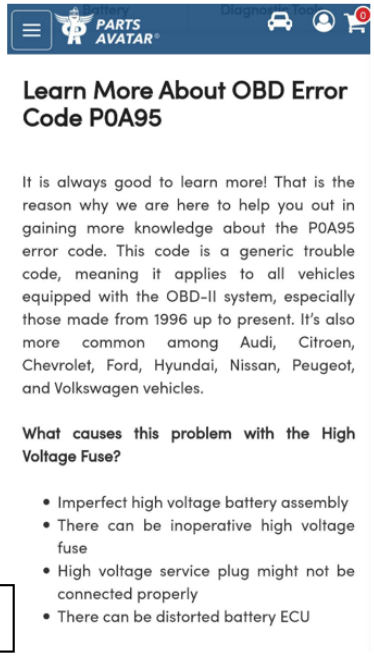


Prepared work area with VPE.

Interior VPE

Testing inverter for voltage

Re-instated work area



PARTS AVATAR

Learn More About OBD Error Code P0A95

It is always good to learn more! That is the reason why we are here to help you out in gaining more knowledge about the P0A95 error code. This code is a generic trouble code, meaning it applies to all vehicles equipped with the OBD-II system, especially those made from 1996 up to present. It's also more common among Audi, Citroen, Chevrolet, Ford, Hyundai, Nissan, Peugeot, and Volkswagen vehicles.

What causes this problem with the High Voltage Fuse?

- Imperfect high voltage battery assembly
- There can be inoperative high voltage fuse
- High voltage service plug might not be connected properly
- There can be distorted battery ECU

Examples of problems

Task 2c – Maintenance Schedule and Records

Equipment/System type	Identification No.
Vehicle 2 (Electric/Hybrid)	8712-315
Brand/Model	**Location**
City and Guilds	Workshop

Equipment/System specification
• Please refer to manufacturer's vehicle specification documentation (supplied by provider).

Maintenance records					
Service No	Maintenance date	Maintenance type (fault/repair, scheduled/routine, requested)	Checked by	Repair details (where relevant)	Technician signature
01	20/4/2022	Scheduled	JS	• Carried out an annual service to manufacturer specifications.	J Smith

				Vehicle functioning as per vehicle specification following annual maintenance activity.	
02	28/5/2023	Repair	AB	• Replaced front brake discs and pads to manufacturer specifications. • Noted both front tyres are close to the legal limit.	A Bloggs
03	10/05/2024	Fault repair		Replaced AC compressor Replaced safety plug	

Maintenance Schedule – annual unless specified otherwise					
Service No	Year	Detail inspection	Recommended planned maintenance	Service Advisor signature	Technician signature
01	2022	Annual	Annual- routine/scheduled	D Jones	J Smith
02	2023	Annual	Annual- routine/scheduled	D Jones	A Bloggs
03	2024	Annual	Annual- routine/scheduled	D Jones	

Commentary	
Service No	Recommendations for future maintenance activity

Task 2c – Assessor observation

Practical Observation Form

8712-315 Maintenance Engineering Technologies: Light and Electric Vehicles - Summer 2024

Candidate Name	Candidate number
Provider name	**Date**

Complete the table below referring to the relevant marking grid, found in the assessment pack.

Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Work area preparation	• The work area preparation.	• Health and Safety • Planning and Preparation • Systems and Components
Maintenance and repair activities – vehicle 2	• decommissioning and inspection of the vehicle systems • disassemble and reassemble the relevant system(s) • diagnosing and recording faults within the systems, including carrying out appropriate tests and measurements • safe isolation of the high voltage system • repairing faults and replacing components as required • safely using the appropriate tools and equipment • re-energising the high voltage system and recommissioning the vehicle • re-instating the work area.	• Health and Safety • Planning and Preparation • Systems and Components

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Work area preparation: Before working on the vehicle he enured the area was adequaltly barriered off ensuring no access wa possible for anyone. Correct sinages were made visible and all appropriate VPE and PPE were fitted. All safety equipment was noted and kept in proximity incase of emergencies. Candidate correctly followed manufacturer specifications ensuring the vehicle voltages had discharged and ensured all testing equipment was suitable for the task at hand and also correctly working and calibrated. Readings and data were compared with manufacturer standards and interpreted correctly. He followed correct procedures for disassembly and reassembly ensuring care was taken and repairs were conducted to a high standard. Once complete the work area was returned to original condition with all tools stored correctly he ensured that all safety equipment was returned and stored in the correct manner as to not cause damage. Waste parts were disposed of correctly. **Maintenance and repair activities – vehicle 2:** • decommissioning and inspection of the vehicle systems • disassemble and reassemble the relevant system(s) • diagnosing and recording faults within the systems, including carrying out appropriate tests and measurements • safe isolation of the high voltage system • repairing faults and replacing components as required • safely using the appropriate tools and equipment • re-energising the high voltage system and recommissioning the vehicle • re-instating the work area.

Internal assessor signature	**Date**
×	

Task 3A Review and report the service, maintenance and repair activities

Assessment number (eg 1234-033)	8712-315
Assessment title	Light and Electric Vehicle Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3A
Evidence title / description	A technical report
Date submitted by candidate	DD/MM/YY

Task 3A

Assessment themes:

- Health and safety
- Systems and components
- Reviewing and reporting

You must:

- produce a technical report for your manager, covering both vehicles and includes the service, maintenance and bonding/joining activities. This should typically be 850 words and must include:
    - a review of the service, maintenance and bonding/joining activities, including fault diagnosis/detection techniques used and suggestions for future improvements
    - the faults found and how they were rectified
    - any outstanding faults, including recommendations that may require attention before the next planned maintenance activity according to the current maintenance schedule
    - reporting of stock levels and waste disposal
- produce a revised maintenance schedule for vehicle 1 from your activities and findings, this should include:
    - recommendations for future planned maintenance including justifications
    - due date of next service and maintenance activity.

Additional evidence of your performance that must be captured for marking:
None

Candidate evidence
Task 3a – Technical report

Two vehicles entered with different faults and a bumper crack that needed to be repaired

Vehicle one – Diesel powered Seat Altea XL

- Full service for every 40,000 miles for 24 months
- Maintenance
- Engine management light illuminated

Vehicle two – Hybrid vehicle Toyota Auris

- No ready light
- AC not working

Plastic Bumper – crack

- 12cm crack within plastic bumper

One of the vehicles were diesel powered and the other vehicle was a hybrid and PPE is crucial for working on both vehicles, however even more important on hybrid vehicle as it is silent running and can cause accidents or damage to the combustion engine. Also, the PPE must be able to withstand 1000v as electrocution is a significant health and safety concern. In normal operation, diesel-powered engines require adequate ventilation in a workshop. Hybrid vehicles use a high voltage battery to run when traveling below 20mph and regenerate battery charge when braking or slowing down. Health and safety regulations, including the Health and Safety at Work Act and PPE regulations, must be followed when working on electric/hybrid vehicles and plastic welding.

I then gave both vehicles a visual test to check for any obvious damages. I recorded some dents and scratches on the back bumper on the service sheet. This is done to prevent customers from voicing concerns about potential damage that may have occurred during their activities. The maintenance encompassed the examination, evaluation, and resolution of any malfunctions detected in the vehicles. The inspection methods employed involved sensory assessments encompassing visual and olfactory checks, diagnostic tests for faults, measurement of crucial parameters, and ultimately, operational assessments of every system present in the vehicles. I adhered to the job cards that were generated and utilized autodata service schedules/technical information as a reference for tightening torques and other necessary details.

Subsequently, I proceeded to inspect the rear screen wash, wiper blade, and headlight wash. Similar to the front components, they were all found to be in satisfactory condition. Following this, I conducted a thorough check to ensure that all the lights were functioning properly, beginning with the indicators and hazard lights. Upon circling the vehicle, I confirmed that they were all operational. I then proceeded to test the sidelights and headlights, and it was evident that the nearside headlight was not functioning, although the sidelight was operational. Subsequently, I examined both the rear and front fog lights. While the rear fog lights were working correctly, the front nearside fog light was not operational. I then sought assistance from my assessor to verify the functionality of my brake and reverse lights, as I was unable to press the brakes and monitor the lights simultaneously. He confirmed that they were in proper working order.

Finally, I inspected the headlight levelling system, and it was observed that they were moving up and down as intended. Upon completing all necessary inspections, I proceeded to utilize a diagnostic tool to input the car's information and conduct a scan for potential issues. The diagnostic tool identified fault codes related to the 'exhaust gas temperature sensor' and 'engine coolant temperature sensor'. This is to make it easier to find the faults within the engine. Once I found the codes, I made the decision to tackle them right away. I pinpointed the exhaust gas temperature by tracing the path of the exhaust as it exited the internal engine, following the wire until I reached the sensor. This is so after I use the diagnostic tool after the service, I would know if it has caused more faults. After disconnecting the sensor from its plug, I decided to check the pins inside the sensor using a multimeter. Before attaching the probes to the pins, I tested them by using the beep function on the multimeter and touching the probes together. They produced a beeping sound, indicating that both the probes and the multimeter were functioning properly. Next, I attached the probes to the pins and switched the multimeter to resistance mode. However, it failed to detect any resistance, indicating that the sensor was indeed faulty.

To ensure it doesn’t happen again, I suggest the car isn’t driven in short distances frequently as the engine doesn’t have a chance to heat up to temperature. Next, I battled against the engine coolant temperature sensor. I checked out the coolant tank and noticed a pipe that connected to a sensor. To address this issue, I used a 10mm bolt to remove the fuel filter casing for better access to the engine coolant sensor. I unscrewed two bolts and a nut to shift the fuel filter case aside. After that, I detached the clip from the sensor case. Next, I unclipped the sensor from its plug and gave it a thorough examination. I noticed that the pin

inside the sensor was bent, which was causing the sensor to malfunction. To confirm, I compared the old sensor with the new one and checked their part numbers. They matched perfectly, so I reinserted the sensor into the plug. This fault is most likely due to wear and tear.

However, on the HV battery, upon starting the vehicle, I proceeded to verify the functionality of the 'ready' light by engaging the ignition. Unfortunately, the 'ready' light failed to illuminate. Consequently, I resorted to employing a diagnostic tool to input the car's specifications into the scanner. The diagnostic results indicated the presence of a fault pertaining to a high voltage fuse (P0A95). This revelation prompted me to inspect the fuses responsible for supplying power to the high voltage (HV) battery. This made it more efficient to find the cause of the problem. Afterwards, I secured the key in a RFID pouch and relocated it 15m away to ensure the car wouldn't remain powered. Then, I headed towards the boot of the car, where the 12V battery is located, and detached the negative terminal. I carefully moved it aside to prevent any electrical arc. This was necessary to cut off power supply to the HV battery and comply with regulations. Then, I headed towards the back seats of the car and released the seat to make it easier to reach the HV safety plug. I detached the safety plug and secured it with a padlock before placing it inside the secure RFID pouch, which happened to be 15 meters away from the car keys. After completing this task, I patiently waited for 15 minutes to allow the car to completely discharge.

During the waiting period, I took the opportunity to look up the fault code and found some suggestions regarding the potential issue with the system. One of the suggestions pointed out that the HV service plug might not be properly connected. With this in mind, I unlocked the padlock and used a multimeter to test the pins on the service plug for resistance. However, the fuse within the service plug had blown, resulting in an open circuit. This was the root cause of the problem with the 'ready' light. To prevent any unwanted interference, I securely locked the service plug again and returned it to the RFID pouch, ensuring that nobody would tamper with it. After the 15 minutes had passed, I opened the car's bonnet and a 1000v rated 10mm socket and ratchet to unscrew the 9 bolts securing the inverter cover. With the cover removed, I employed a multimeter to check the inverter's DC voltage, which displayed a reading of '0V'. This confirmed that there was no power running through the vehicle, ensuring it was safe for me to proceed with my work. I grabbed my 8mm socket and ratchet to unscrew the 2 bolts securing the glass fuse in the inverter. I made sure to check the resistance, just in case the fuse was blown and causing the ready light not to turn on.

Luckily, the fuse had no resistance, so it was still intact. To check the why the AC wasn't working I suggested it was a faulty wire. Therefore, I detached the wire and unscrewed the 10mm bolts that secured the end connected to the inverter. Afterward, I examined the wire for resistance to ensure a smooth flow, and since there was no resistance, it indicated that the issue did not lie with the AC wire but rather with the AC compressor itself.

I then removed the AC compressor and realised that the compressor itself was faulty as it had shorted out. I speculate this is also the reason the safety plug fuse has blown and the current from the shortage has all travelled to the safety plug.

As for the bumper repair, as it was a 12cm crack I thought it would be easier and more efficient to use the cold method as this will give the bumper a stronger foundation and a better-looking finish. This is because of the filler and hardener.

After I made sure that the problems were fixed, I decided to test the cars whenever it was possible. I also made sure to check if the vehicles were clean and if there were any leaks. Additionally, I cleaned and put back all the tools and equipment.

Task 3B Peer Review

Assessment number (eg 1234-033)	8712-315
Assessment title	Light and Electric Vehicle Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3B
Evidence title / description	Completed peer review forms
Date submitted by candidate	DD/MM/YY

Task 3B

Assessment themes:

- Health and safety
- Systems and components
- Reviewing and reporting

You must:

- produce a technical report for your manager, covering both vehicles and includes the service, maintenance and bonding/joining activities. This should typically be 850 words and must include:
    - a review of the service, maintenance and bonding/joining activities, including fault diagnosis/detection techniques used and suggestions for future improvements
    - the faults found and how they were rectified
    - any outstanding faults, including recommendations that may require attention before the next planned maintenance activity according to the current maintenance schedule
    - reporting of stock levels and waste disposal
- produce a revised maintenance schedule for vehicle 1 from your activities and findings, this should include:
    - recommendations for future planned maintenance including justifications
    - due date of next service and maintenance activity.

Additional evidence of your performance that must be captured for marking:
none

Candidate Evidence

Task 3b – Peer Review Forms

Assessment ID	Qualification number
Candidate name	**Candidate number**
Provider name	**Provider number**
Date	**Series**
14/05/2024	Summer 2024

Question	Feedback
How well does the job card for vehicle 1 record the service work completed and align to the planned maintenance activity?	The work done on this car was very well organised. This candidate worked on the maintenance activity first because he did a diagnostic scan first and found the relevant codes needed to fix the car. After finishing the planned maintenance activity, he then moved on to the service work, making sure to do everything in a logical order.
How appropriate are the recommended service works to complete and why?	The service work was very well structured. The candidate gave the actual measurements and the minimum required measurements to prove some future recommendations. He talked about the condition of the car and most of the parts.
What are the implications to the business of the proposed job card for vehicle 1?	I believe that this candidate's work would be beneficial to the business purely because of the amount of effort and detail that went into handling the customer's request. This person talked about future requirements and backed it with measurements. He made sure to double check his work to ensure that it was up to his standards.

How could the job card be optimised/ improved?	• Adding more pictures • Adding more annotations • Adding minor details • Add more future recommendations

Assessment ID	Qualification number
Candidate name	**Candidate number**
Provider name	**Provider number**
Date	**Series**
14/05/2024	Summer 2024

Question	Feedback
How well does the job card for vehicle 1 record the service work completed and align to the planned maintenance activity?	Very well, the job card includes a lot of description and explanation to how he completed the service and repaired the activities. There is also a lot of examination to the vehicle to identify condition and operating components. The job card is well organised, and he explains how he completed each activity and notes down all different sizes and measurements of tools and fastenings.
How appropriate are the recommended service works to complete and why?	The job card includes a 40,000 mile service schedule for full service which should only be for this specific service type that could be misled. Besides that, there is no further recommendation. He does include tyre and brake condition so customer is aware on condition.
What are the implications to the business of the proposed job card for vehicle 1?	The job card shows a lot of information and diagnosis to prove all the work done and all measurements. He does include a pre-inspection which is good. This he in case a customer falsely reports damage, so he is covered and protects the business. The job card is very professional, there is also prove of the faults found.
How could the job card be optimised/ improved?	Photographic evidence of the un operating headlight and other condition components. More photographs of the vehicles condition showing evidence of damaged components and examination. Include vehicle mileage. Annotate photographic evidence.

Task 4 Complete Handover

Assessment number (eg 1234-033)	8712-315
Assessment title	Light and Electric Vehicle Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	4
Evidence title / description	Assessor observation
Date submitted by candidate	DD/MM/YY

Task 4

Assessment themes:

- Reviewing and reporting

You must now hold a meeting with the manager to return to service and complete handover procedures, including:

- demonstration of vehicles' functionality
- welded/joined bumper repair
- confirmation of work completed
- amended job card for vehicle 1 and how they addressed peer review feedback, including any suggested changes that were not made and why
- appropriate handover documentation.

Additional evidence of your performance that must be captured for marking:
none

Candidate evidence

Task 4 – Assessor observation

Task 4 Practical observation form

8712-315 Maintenance Engineering Technologies: Light and Electric Vehicles - Summer 2024

Candidate Name	Candidate number

Complete the table below referring to the relevant marking grid, found in the assessment pack.

Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Handover	• the handover of the work completed.	• Health and Safety • Reviewing and Reporting

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Handover: During the handover [candidate] spoke in a suitable manner using language of professional standard with mostly correct terminology. Relevant documentation was shared with effective communication skills ensuring that a good explanation of work carried out was given. **He showed the vehicle functioning correctly with not faults showing on the vehicle dashboard and a clear verbal explanation of this.** **Overall he presented himself well with good confidence.**

Internal assessor signature	**Date**
X	

If completing electronically, double-click next to the 'X' to add an electronic signature once the record is **finalised**.

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

T: 0300 303 53 52

E: **technicals.quality@cityandguilds.com**

W: **http://www.cityandguilds.com/tlevels**

Web chat available **here**.

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