NATIONAL SKILL QUALIFICATION FRAMEWORK (NSQF)/ NATIONAL OCCUPATIONAL STANDARDS (NOS)

FOR

TRAINING & CERTIFICATION IN THE OPERATION AND MAINTENANCE OF ELECTRIC VEHICLES IN NIGERIA - (LEVEL I - IV)

NATIONAL AUTOMOTIVE DESIGN AND DEVELOPMENT COUNCIL
(NADDC)

PREFACE

Introduction

Globally, in the automotive industry there is revolutionary paradigm shift from the type of energy that power new generation of vehicles. A strategic transition from fossil fuels (i.e. petrol and diesel) to pure electric power that is safer, cleaner and environmentally friendly. We are in the era of vehicle electrification; many countries have embraced Electric Vehicles (EVs) as a means of private and public transportation systems.

Nowadays, with the advent of Electric Vehicles (EVs) in Nigeria and the launch of Nigeria's first assembled Electric Vehicle (EVs) the Hyundai Kona. There is a need for the Council to develop a standardised curriculum that will be used to train auto technicians on the repair and maintenance of Electric Vehicles (EVs) in Nigeria. It is evident that Nigerian auto technicians have limited knowledge and skill deficiencies, some of which are:

- Lack of understanding of the electrical and electronic systems in Electric Vehicles (EVs)
- Insufficient knowledge of mechatronics and occupational hazards especially working on Electric Vehicles (EVs)
- Lack of standardized method or curriculum for the training of repair and maintenance of Electric Vehicles (EVs)
- Lack of adequate tools and equipment to safely repair and maintain Electric Vehicles (EVs).

In view of the above, the National Automotive Design and Development Council (NADDC) have collaborated with National Board for Technical Education (NBTE) and other relevant stakeholders to develop the Electric Vehicles (EVs) NOS which will be used for the training and certification of Auto technicians in Nigeria. The Council in 2021 with the support of different industry experts developed National Occupational Standards (NOS) for Electric Vehicles in Lagos State. The developed NOS is in line with the National Skills Qualification Framework (NSQF) which aimed at institutionalising competence-based Technical Vocational Education and Training (TVET) for auto technicians in Nigeria. The NOS will ensure knowledge, skills, experience and competence to safely repair and maintain electric vehicles are standardised and available in Nigeria.

National Occupational Standards (NOS)

The National Occupational Standards (NOS) is a skill acquisition framework that will engage school dropouts, adults, apprentices and graduates with formal and informal backgrounds to acquire competent knowledge and training on the repair and maintenance of vehicles in Nigeria. The NOS is designed to develop, classify, and

recognise skills, knowledge, and competencies acquired irrespective of how or where the skill is acquired. Essentially, NOS are the minimum benchmark of workplace standards and practice that provides extensive knowledge and understanding of how vehicle components operate.

Over the years, the Council in partnership with the National Board for Technical Education (NBTE) and other stakeholders have developed the National Occupational Standards (NOS) for motorcycle, tricycle, light and heavy-duty vehicles. The developed NOS is being used for the training and certification of Auto technicians in Nigeria.

"With NADDC spearheading efforts in promoting CNG/Auto Gas-Powered and electric vehicles, Nigeria anticipates a reduction in reliance on traditional fuels like petrol and diesel, consequently addressing environmental concerns and rising energy prices. The development of the NOS, not only underscores NADDC's commitment to skills enhancement in the automotive sector but also signifies a pivotal step towards economic diversification, as well as job and wealth creation for Nigerians."

Oluwemimo Joseph Osanipin
DG NADDC

The Electric Vehicle (EV) NOS

The Electric Vehicle (EV) NOS was developed based on the concept of a curriculum modularisation with a total of **37 modules/units, a total credit value of 100 and 1,000 total guided learning hours**. For the developed NOS to be ideal and convenient for training, the developed Electric Vehicle (EV) NOS needed to be classified into Qualification Credit Framework (QCF) or levels. Therefore, the curriculums were structured for delivery at Four (4) levels:

i. **Level I (Basic):** 6 mandatory modules/units
ii. **Level II (Intermediate):** 7 mandatory modules/units and 3 optional, a total of 10 modules/units
iii. **Level III (Advanced):** 7 mandatory modules/units and 3 optional, a total of 10 modules/units
iv. **Level IV (Final):** 7 mandatory modules/units and 4 optional, a total of 11 modules/units

The National Skills Qualification Framework (NSQF) requires that all vocational training and learning must be quality checked by qualified assessors and verifiers. The Council in collaboration with NBTE has trained many master trainers as Quality Assurance Assessors (QAA) and Internal Assurance Managers (IQAM)/Verifiers for the automotive industry. The trained quality assurance and verifiers will support artisans and technicians to deliver qualitative and standard training in the auto sector. It is expected that the introduction of Electric Vehicle (EV) NOS and the

implementation of the National Skills Qualification Framework (NSQF) in the Nigerian Automotive Industry will lead to the following outcomes:

- Training will be industry-focused, through partnerships (links) between the training providers, the industries, and the enterprises they serve,
- Skills and competencies obtained in various settings: on the job at home or in a formal training institution, could be assessed and certified, thus expanding recognition and opportunities for progression
- The curriculum will be flexible and could be delivered in a range of settings, presented in modular form to provide close guidance to the trainee and facilitator,
- Training will be competency-based so that employers are clear about what people can do,
- There will be a consistent system of certification which guarantees quality, as well as transportability of skill.
- A wide range of skills could significantly increase employability.
- The assessment process, being practical and work-based, would effectively check certificate racketeering and examination malpractices.

Conclusion

The development of National Occupational Standards (NOS) for Electric Vehicles (EVs) is highly important because it lays the foundation for the development of such vehicles in Nigeria. This developed Electric Vehicles NOS which has been validated by industry experts and approved by the regulatory authority would be used to train auto technicians on the repair and maintenance of electric vehicles in Nigeria. The Council has a strong belief that skills promotion and competency-based training is germane to unleashing the full potential of the Nigerian Automotive Industry.

Oluwemimo Joseph Osanipin
Director General/CEO,
National Automotive Design and Development Council (NADDC).
March, 2024

FOREWORD

I find the development and publication of this book, National Occupational Standards (NOS) for the Operation and Maintenance of Electric Vehicles (EVs) in Nigeria timely considering the dearth of skills and competencies in our industries and the economy in general.

I am particularly excited about the publication because it goes to show that the project of institutionalizing national vocational qualifications and competency-based training is getting acceptance by the key stakeholders e.g. the industries, training providers, professional associations, regulatory agencies, etc. This clearly shows that we have collectively understood the challenges facing competency and skills development in Nigeria, especially in the ever dynamic automotive industry.

The skills development challenges started immediately after the third National Development Plan, when emphasis was shifted from competency to paper qualifications resulting into over subscription of our institutions. Our educational institutions were disconnected from the industries and tended to place less emphasis on the manpower need of the industry resulting in proliferation of mainly academic programmes. Assessment and evaluation processes in TVET institutions, remain largely 'academic', in spite of global trend towards industry based standard. The training being delivered at the non-formal settings which has positive contributions to the economy is not coordinated, standardized and regulated. Worse still, government at all levels paid lip service to TVET and skills development.

It is based on these and many other TVET and skills challenges that NADDC in partnership with relevant stakeholders and international development partners commenced this drive for the institutionalization of National Vocational Qualification Framework (NVQF) in the Nigerian automotive industry.

A qualification Framework provides descriptions of the knowledge and skills to be demonstrated as well as a common grid of skill levels for all qualifications included within the framework. It allows for "equivalences" to be established between elements of different qualifications. The Framework also facilitates establishment of progression routes between different fields of study, general and vocational education, learning in initial and further education and qualifications obtained through formal and non-formal education and training. The qualification framework is the structure where NVQs will operate.

This publication is a testament to the Council (NADDC)'s commitment towards sustainable and integrated development of the automotive industry in Nigeria. It will ensure that the Nigerian auto industry is in tandem with current trends globally. The NOS and NVQF is when fully implemented will achieve the following:

- Provide policy guidelines on organizing skills training to improve product quality, productivity and competitiveness in both formal and informal sector

- Provide a coherent structure for vocational qualifications, which are based on employment-led standards of competence
- Increase industry ownership of the traineeship system which enhance stakeholders input to major decisions
- Expand training opportunities so that they are more evenly spread across the workforce meeting the needs of all enterprises more equitably
- Facilitate access to, and mobility and progression within education training and career paths,
- Provide a policy framework for flexible curricula based on National Occupational Standards (NOS) dictated by the industry,
- Determine the levels of award, which enable clear roots of progression, and appropriate awards, which relate to employment,
- Determine convenient systems for recognition of prior achievement and,
- Expand access to education particularly lifelong learning through TVE.
- Provide system for up skilling, reskilling etc. of Nigerian youth and working adult.

I am not surprised that this feat has been achieved by NADDC because it has always exhibited its commitment and drive towards ensuring that the automotive industry develops to its full potentials. The automotive industry is one of the few sectors in Nigeria which has developed and documented NOS up to level five (5).

The Nigerian automotive industry and economy in general would no doubt be highly enriched by this publication as it opens up higher potentials for skills upgrade and competences development. These are potentials much desired in the ever dynamic automotive industry. To achieve the benefits inherent in this publication and leapfrog our industry to the desired level, its implementation requires the collaboration of relevant stakeholders both in the public and private sectors.

Prof. Idris M. Bugaje
Executive Secretary
National Board for Technical Education (NBTE)

ACKNOWLEDGEMENT

This publication of National Occupational Standards for Electric Vehicle would not have been accomplished without the recognition of the collaborative efforts, supports and commitment of relevant stakeholders, academia and industry experts who shared their profound knowledge and experience. This publication will certainly improve the technical knowledge and practical experience of Nigerian auto technicians, thereby positioning the Nigerian automotive industry to the desired level globally. The Council would like to appreciate the following regulatory agencies, organizations and stakeholders:

i. Federal Ministry of Industry, Trade and Investment (FMITI)
ii. National Board for Technical Education (NBTE)
iii. Industrial Training Fund (ITF)
iv. National Business and Technical Examination Board (NABTEB)
v. Sokoto Energy Research Center, Usman Danfodiyo University Sokoto
vi. Ahmadu Bello University (ABU), Zaria
vii. Abubakar Tafawa Balewa University, Bauchi
viii. University of Lagos
ix. University of Ibadan
x. University of Nigeria, Nsukka
xi. Federal Science & Technical College, Orozo, Abuja
xii. Bascon Multi-Skill Development Agency, Enugu
xiii. Automedics Nig Ltd Lagos
xiv. Jet Motors, Lagos
xv. Stallion Motor Ltd, Lagos
xvi. THLD Group
xvii. Omaa Motors Ltd; Anambra State
xviii. PAN Learning Centre, Kaduna
xix. Automotive and Locomotive Engineers Institute (AutoEI)
xx. Presidential Compressed Natural Gas Initiative (PCNGI)
xxi. Niger State Science and Technical Schools Board
xxii. Federal College of Education (Technical), Gombe
xxiii. Standards Organization of Nigeria (SON), Abuja
xxiv. Nigerian Institute of Transport Technology (NITT), Zaria
xxv. Filkmou Limited, Lagos

The Council is indeed grateful and appreciative of their contributions and zeal exhibited by all stakeholders either directly or indirectly towards the accomplishment of this national assignment.

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ABBREVIATIONS

AC	Alternation Current
AM	Auto Mechatronics
ASS	Assignment
BEAN	Body Electronic Area Network
CAN	Controller Area Network
CFC	Chlorofluorocarbon
DC	Direct Current
DO	Direct Observation
EQA	External Quality Assurance
EV	Electric Vehicle
GDE	Generic Diagnostic Equipment
HEV	Hybrid Electric Vehicle
HSE	Health, Safety and Environment
IQA	Internal Quality Assurance
IQAM	Internal Assurance Managers
KPI	King Pin Inclination
LIN	local Interconnect Network
LO	Learning Outcome
MET	Mechanical and Technical Trim
NADDC	National Automotive Design and Development Council
NOS	National Occupational Standard
NSQF	National Skill Qualification Framework
NVQ	National Vocational Qualification
OEM	Original Equipment Manufacturers
PD	Professional Discussion
PPE	Personal Protective Equipment
PS	Personal Statement
QA	Question and Answer
QAA	Quality Assurance Assessors
QCF	Qualification Credit Framework
RPL	Recognition of Prior Learning
SAI	Steering Angle Inclination
SSC	Sector Skills Council
TVET	Technical Vocational Education and Training
UDE	Universal Diagnostic Equipment
WP	Work Product
WT	Witness Testimony

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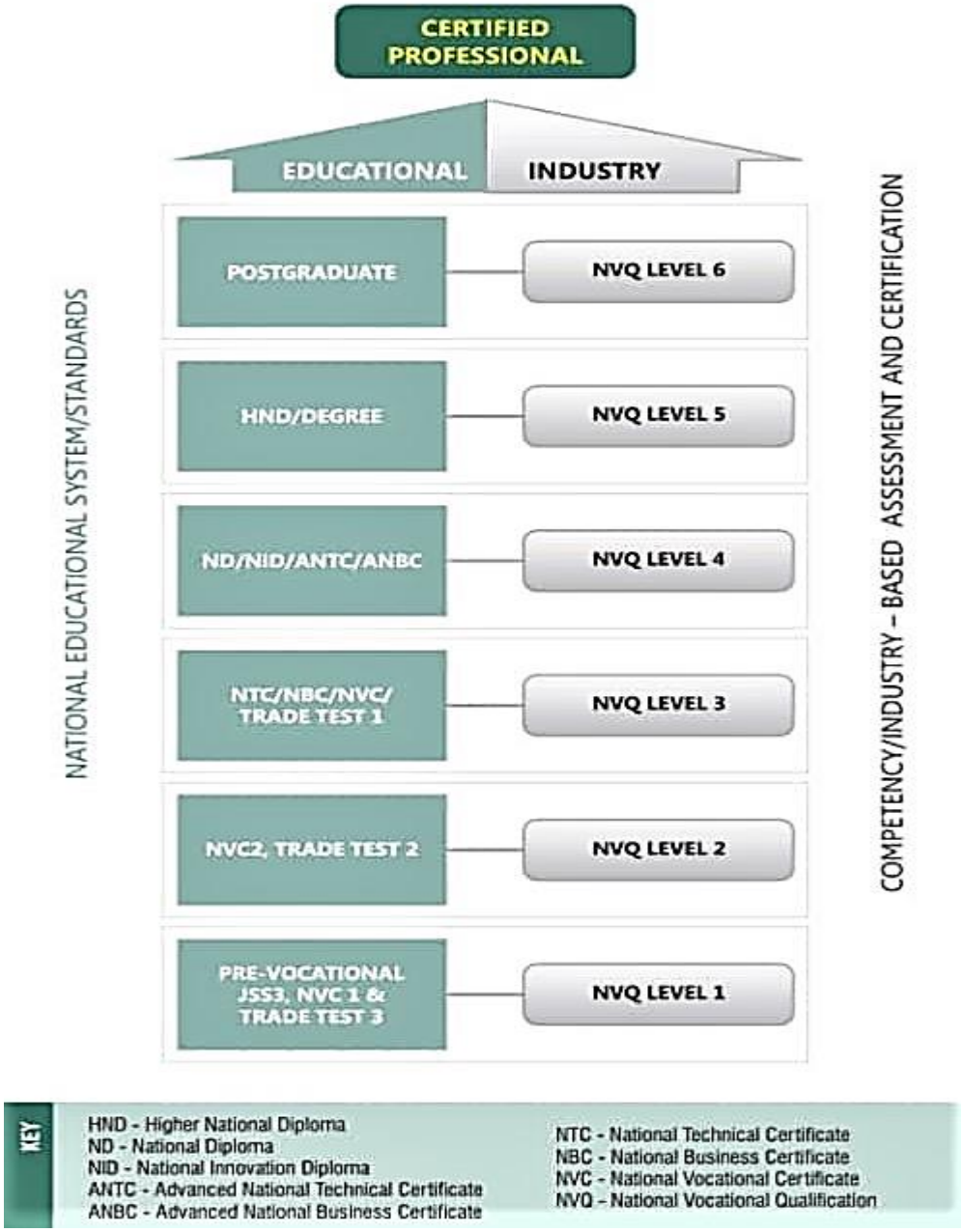
NATIONAL EDUCATIONAL SYSTEM/ STANDARDS



LEVEL I

SUMMARY OF LEVEL I

MANDATORY UNITS

S/NO/ UNIT	REFERENCE NO.	NOS TITLE	CREDIT VALUE	TOTAL LEARNING HOUR	REMARKS
1	NADDC/EV/L1/001	Introduction to Electric Vehicle	2	20	
2	NADDC/EV/L1/002	Occupational Health and Safety in Electric Vehicle Industry	2	20	
3	NADDC/EV/L1/003	Tools and Equipment for Servicing Electric Vehicles	3	30	
4	NADDC/EV/L1/004	Communication System in Electric Vehicle Working Environment	2	20	
5	NADDC/EV/L1/005	Teamwork in Electric Vehicle Service Environment	1	10	
6	NADDC/EV/L1/006	Electric Vehicle Tyres and Wheels	1	10	
TOTAL CREDIT VALUE/GUIDED LEARNING HOURS			**11**	**110**	

UNIT 001: INTRODUCTION TO ELECTRIC VEHICLE (EV)

Unit reference number:	**NADDC/EV/L1/001**
QCF level:	**1**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about identifying, understanding the basic features of an electric vehicle and differentiating between it and internal combustion engine-powered vehicle.

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where electric vehicle activities are carried out. Assessment will require the provision of functional vehicles, live engines, as well as assorted engine components.

Assessment method will include:

- Direct Observation / Oral Questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 001: INTRODUCTION TO ELECTRIC VEHICLE (EV)

LO (Learning outcome)	**Criteria:-**		Evidence Type					Evidence Ref Page number			
LO1: Understand the types of electric vehicles	1.1	Identify electric vehicle									
	1.2	Give examples of various types of electric vehicles									
	1.3	Differentiate between Internal combustion engine vehicle and electric vehicle									
	1.4	Differentiate between hybrid-electric vehicle, battery-electric vehicle and plug-in hybrid electric vehicle									
LO2: Understand basic components of electric vehicle											
	2.1	List basic components of electric vehicle									
	2.2	Describe electric vehicle battery, motors, generators and controls									
	2.3	Describe the electric regenerative braking system, electric vehicle transmission and transaxle									
	2.4	Differentiate between suspension of Internal Combustion engine vehicle and Electric vehicle (previously differentiate between Internal Engine vehicle and Electric vehicle)									
	2.5	Explain the basic working principles of electric vehicles									
LO3: Hazards surrounding electric vehicle											
	3.1	List examples of typical voltages used for a range electric vehicle									
	3.2	Follow manufacturer specifications in identifying high voltage electrical cables.									
	3.3	Describe the effect of alternating and direct current on human beings									
	3.4	Identify who may be at risk in the event of electric vehicle incidents									
	3.5	Describe the basic hazard associated with high voltage electrical energy									

LO4 Dashboard display of electric vehicle											
	4.1	Identify the basic features of a dashboard/instrument cluster of an electric vehicle									
	4.2	Distinguish between electric vehicle instrument cluster and the regular vehicle instrument cluster									
	4.3	Explain status of dashboard indicator lights as they relate to start and stop									
	4.4	Explain the state of charge percentage (SOC%) or power meter									
	4.5	Identify estimated drive range on the instrument cluster of the electric vehicle									
	4.6	Identify warning and indicator lights that are specific to the electric vehicles									
	4.7	Explain the components of the auxiliary equipment on the instrument cluster/dashboard.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 002: OCCUPATIONAL HEALTH AND SAFETY IN ELECTRIC VEHICLE INDUSTRY

Unit reference number:	**NADDC/EV/L1/002**
QCF level:	**1**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about the knowledge and skills needed to competently carryout daily activities in an electric vehicle working environment while observing relevant work ethics and safety. It includes housekeeping, basic first-aid and firefighting procedures**.**

Note: Adaptation of ISO performance criteria in personal health/hygiene as well as OSHA.

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real electric vehicle working environment where electric vehicle activities are carried out. Simulation is not allowed in this unit and level.

Assessment method will include

- Direct Observation / Oral Questions (DO)
- Question and Answer (QA)
- Practical Assessment
- Witness Testimony (WT)
- Personal Statement (PS)
- Project
- Work product (WP)

UNIT 002: OCCUPATIONAL HEALTH AND SAFETY IN ELECTRIC VEHICLE INDUSTRY

LO (Learning outcome)	**Criteria:-**		Evidence Type					Evidence Ref Page number			
LO 1 Personal health and hygiene	1.1	Use appropriate personal protective equipment (PPE).									
	1.2	Always work safely in line with occupational safety and health association standard (OSHA).									
	1.3	Ensure workplace injuries are treated by certified first aid technicians and or personnel									
	1.4	Report illness and infection promptly to the appropriate persons.									
	1.5	List contents of the first aid box and keep in an easily accessible place in the working environment.									
LO2 Maintain personal health and hygiene											
	2.1	State own responsibility health and safety act as it relates to electric vehicles work environment.									
	2.2	State general rules on hygiene that must be followed in an electric vehicle working environment									
	2.3	Explain the following Personal Protection Equipment such as hard hat/head protection, foot protection, hand and body protection and regulatory protection on electric vehicles.									
	2.4	State the importance of maintaining good personal hygiene: clothing and environment									
	2.5	Explain the types of electric fire extinguishers and how to use them									
	2.6	Describe how to treat electric vehicle shocks, cuts, grazes, and wounds.									
	2.7	Describe the importance of giving first aid treatment to									

		injured workers in an electric vehicle working environment.									
LO3 Housekeeping in an electric vehicle work environment.											
	3.1	Explain the importance of housekeeping									
	3.2	Identify tools and materials used for housekeeping.									
	3.3	Explain the consequences of not carrying out housekeeping in an electric vehicle working environment.									
	3.4	Remove and dispose components safely to meet legal workplace requirements									
	3.5	Carryout housekeeping in an electric vehicle work environment.									
	3.6	Store tyres and wheels, and other materials used on electric vehicle work environment in line with manufacturer's specifications									
LO 4 Preparation and preservation of workshop Surfaces.											
	4.1	Explain how to clean grease, oil, paints, thinners									
	4.2	Explain how to make workshop ready for work.									
	4.3	Detect vermin and carryout effective vermin control.									
LO 5 Cleaning toxic and hazardous substances											
	5.1	Explain how to remove hazardous substances									
	5.2	Dispose solid and liquid wastes in line with relevant environmental laws									
	5.3	State the dangers associated with hazardous materials.									
LO6 Clearing of gangways/aisles and damaged insulations											
	6.1	Identify and remove damaged electric vehicles components on walkway									
	6.2	Identify and rearrange fire extinguishers, tools, etc on the gangway									
	6.3	Explain dangers associated with blocked gangways/aisles.									
	6.4	Clear exit and access ways.									
LO7 Report											
	7.1	Report a housekeeping hazards									

Housekeeping hazards		to supervisor.									
	7.2	Report identified housekeeping lapses to the supervisor.									
	7.3	Notify authority of potential oil and chemical spill and exposure of electric vehicle battery to unsafe condition.									
	7.4	Report chemical spill clean-up.									
LO8 Maintenance of hygienic, safe, and secure workplace											
	8.1	State the importance of working in a healthy, safe, and hygienic workplace									
	8.2	Report any accidents or near accidents quickly and accurately to the right authority/personnel.									
	8.3	Explain safe and unsafe acts									
	8.4	Follow health, hygiene and safely procedure during work									
	8.5	Practice emergency rescue procedures during work. Emergency Drill, Muster Point.									
	8.6	Follow organizational security procedures. Engagement of a environmental Safety Officer.									
	8.7	Ensure the disposal of unused cables and other materials.									
	8.8	Carryout manual and mechanical lifting of the available component(s)									
LO 9 Prevention of hazards in the work place											
	9.1	Identify any hazards or potential hazards and report to the appropriate authority									
	9.2	Explain where information about health and safety in your workplace can be obtained.									
	9.3	Describe the types of hazards in workplace that may occur and how to deal with them									
	9.4	Explain the hazards of high voltage energy that can be dealt with personally and those that should be reported to someone else									
	9.5	Explain how to warn other people about hazards and why this is important									

9.6	Explain any accidents and near accidents should be reported and who they should be reported to									
9.7	Describe the types of emergencies that may happen in the workplace and how to deal with it.									
9.8	Explain where to find the first-aid equipment and who the registered first aider is in the workplace									
9.9	Explain safe lifting and handling techniques that should be followed.									
9.10	Explain the dangers of the DC rapid charge if not properly connected and too hot									
9.11	Explain the failure of the good connections of the connector, interface or protocol between the charger and the vehicle									
9.12	Explain other ways of working safely that are relevant to own position and why they are important.									
9.13	Describe organizational emergencies procedure, in particular fire, and how these should be followed.									
9.14	State the possible causes for fire in an electric vehicle workplace									
9.15	State the possible causes for electric shock in the workplace									
9.16	Explain how to resuscitate possible heart failure/electric shock victim									
9.17	Describe how to minimize the possibility of fire in the workplace. Application of fire extinguishers.									
9.18	State where to find the alarms and how to set them off									
9.19	State why a fire should never be approached unless it is safe to do so									
9.20	State the importance of following the fire safety laws									

	9.21	Describe the organizational security procedures and why these are important									
	9.22	Explain battery safe working temperature for electric vehicles									
	9.23	Explain the importance of reporting all usual or non-routine incidents to the appropriate personnel.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 003: TOOLS AND EQUIPMENTS FOR SERVICING ELECTRIC VEHICLES

Unit reference number:	**NADDC/EV/L1/003**
QCF level:	**1**
Credit value:	**3 CREDITS**
Guided learning hours:	**30 HOURS**

Unit Purpose: This qualification is about the basic use of electric vehicle tools, materials relevant to the Electric Vehicle automotive sector and for those working in technical support roles. It is also appropriate for workshop planners

This qualification is about:

1. Interpreting information
2. Adopting safe and healthy working practices
3. Selecting materials and equipment
4. Service and maintenance of electric vehicle tools and equipment
5. Storage of electric vehicle tools and equipment
6. Learning and Applying Workshop Tools and Equipment.

Unit assessment requirements/evidence requirements

Assessment must be carried out in real workplace environment in which electric vehicles service and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Project
- Work product

Unit 003: TOOLS AND EQUIPMENTS FOR SERVICING ELECTRIC VEHICLES

LO (Learning outcome)		**Criteria:-**	Evidence Type					Evidence Ref Page number			
LO1: Common Electric Vehicle service hand and power tools	1.1	Carry out operation using insulated hand and power tools in accordance with safe working practices to achieve the work outcome.									
	1.2	Identify, Use and maintain; Electric Vehicle Hand tools Electrical equipment Safety aids									
	1.3	Differentiate between insulated work tools and non-insulated work tools									
	1.4	Demonstrate work skills to use, measure, mark out, file, fit, tap, thread, cut, drill, finish, position, carry/lift and secure.									
	1.5	Differentiate between electrically operated hand and power tools, and others.									
LO2 : Use of Common Electric Vehicle workshop equipment											
	2.1	Carry out pre-start preparation inspections on Electric Vehicle tools and equipment in accordance with approved procedures									
	2.2	Store and secure Electric Vehicle tools and equipment									
	2.3	Conduct daily post-finish inspection before close of work									
LO3 : Maintenance and servicing of workplace tools and equipment											
	3.1	Identify damaged and worn out tools and equipment									
	3.2	Service, adjust and or maintain tools and equipment as specified by manufacturer's/ and or workshop within the scope of responsibility.									
	3.3	Carry out checks in accordance with manufacturers/operator's guidance, legislation and official guidance and organizational requirements.									
LO4: Electric vehicle tools and equipment storage.											
	4.1	Secure Electric Vehicle tools and equipment.									
	4.2	Dispose waste in accordance with legislation to maintain a clean work place.									

	4.3	Classify and store electric vehicle tools in the shelve									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 004: COMMUNICATION SYSTEM IN AN ELECTRIC VEHICLE WORK ENVIRONMENT

Unit reference number:	**NADDC/EV/L1/004**
QCF Level:	**1**
Credit Value:	**2**
Guided Learning Hours:	**20**

Unit Purpose: To establish an effective communication system that is responsive and subject to change in meeting workers, employers and customers need, in work environment

Unit assessment /evidence requirements
This assessment can only be carried out in a real electric vehicle workplace.

Assessment methods will include:

- Direct Observation /Oral questions (DO)
- Question and Answer (QA)
- Witness Testimony (WT)
- Personal Statement (PS)

UNIT 004: COMMUNICATION PROCESS IN ELECTRIC VEHICLE WORK ENVIRONMENT

LO (Learning outcome)		Performance Criteria	Evidence Type					Evidence Ref Page number			
LO1: Use a non-complex communication system in a work environment	1.1	Use a simple verbal means to pass on necessary information									
	1.2	Use non- verbal means to pass on necessary information e.g. body language									
	1.3	Explain symbols and signs appropriately.									
	1.4	Use a simple verbal means to pass on necessary information									
	1.5	Interpret written communication: memos, newsletter, etc.									
LO2 Demonstrate the ability to source information in a work environment											
	2.1	Identify the source of information in an organisation and work environment									
	2.2	Explain appropriately the sources of information the work environment									
	2.3	Use the various information flow systems in a work environment									
	2.4	Use information to avoid challenges in a work situation									
	2.5	Communicate findings in accordance to procedure in the work environment.									
LO3: Use of communicating means in a work environment											
	3.1	Identify the various communication equipment in the work environment									
	3.2	Use effectively, the various communication equipment in the work environment									
	3.3	Communicate information effectively to the right personnel									

	3.4	Observe information effectively using symbols, signs and codes.									
	3.5	Obey instruction in line with ethics of the work environment.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 005: TEAMWORK IN ELECTRIC VEHICLE WORK ENVIRONMENT

Unit reference number:	**NADDC/EV/L1/005**
QCF level:	**1**
Credit value:	**1**
Guided learning hours:	**10**

Unit Purpose: The purpose of this unit is to impart to the learners, skills, knowledge and the understanding required to develop team spirit and positive working relationship.

Unit Assessment/evidence requirement

Assessment must be carried out in a real workplace environment in which electric vehicle services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment methods will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)/P
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 005: TEAM WORK

LO (Learning outcome)		Performance Criteria	Evidence Type					Evidence Ref Page number			
LO1: Positive working relationship with colleagues	1.1	Identify the need for developing positive relationship with colleagues.									
	1.2	Recognize the importance of relating with other people in a way that makes them feel valued and respected.									
	1.3	Assist team members when required.									
	1.4	Report to the appropriate personnel when request/requesting for assistance fall outside area of responsibility.									
	1.5	Communicate information to colleagues about own work that might affect others.									
LO2: Take Responsibilities within the team											
	2.1	Recognize own role and responsibilities within the team.									
	2.2	Perform individual tasks in line with the team rules and regulations.									
	2.3	Participate effectively in teamwork.									
LO3: Compliance with organisational policies											
	3.1	Work In line with organizational standard and structure.									
	3.2	Use organizational code of practice.									
	3.3	Explain organizational code of conduct.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 006: ELECTRIC VEHICLE TYRES AND WHEELS

Unit reference number:	**NADDC/EV/L1/006**
QCF level:	**1**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose:
This qualification is about inspecting electric vehicles tyres and wheels to assess their conditions and suitability for repair and carrying out necessary repair, replacement or refitting activities. It includes replacement and repair procedures for wheels, tyres and tubes.

Unit assessment requirements/evidence requirements;
This assessment can only be carried out in a real electric vehicle work in which replacement and repair procedures for wheels, tyres, and tubes are carried out.

Assessment method will includes:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Project
- Work product

UNIT 006: ELECTRIC VEHICLE TYRES AND WHEELS

LO (Learning outcome)	**Criteria:-**		Evidence Type					Evidence Ref Page number			
LO1 Wheels/tyres classification and characteristics	1.1	Carry out tyre replacement in accordance with vehicle manufacturer's specification									
	1.2	Explain and use wheel data according to manufacturer's specifications									
	1.3	Explain various tyre classifications									
	1.4	Explain various tyres characteristics									
	1.5	Check and ensure correct tyre pressure is used (Previously Deflate and pressure tyres accordingly)**.**									
LO2 Tools/equipment for wheels/tyre repairs and replacement											
	2.1	Recognise that all the tools and equipment required are safe and well calibrated prior to use									
	2.2	Identify and select tools and equipment used in wheels/tyre repairs									
	2.3	Carry out all inspection, repair and replacement activities on electric vehicles using the relevant for tools and equipment									
	2.4	Select appropriate tools and equipment for wheels and tyres repairs									
LO3 Inspect, repair and replace vehicle tyres and wheels											
	3.1	Use suitable Personal Protective Equipment (PPE) and vehicle coverings throughout all tyres and wheels inspection, repair and replacement activities									
	3.2	Use suitable sources of technical information to support your inspection, repair and replacement of tyres and wheels									
	3.3	Operate in a way which minimises the risk of damage									

	to the vehicle and its systems									
3.4	Perform all inspections (pre check and post check) repairs and replacement activities following tyre manufacturer instructions, vehicle manufacturer instructions and organizational work place procedure, health and safety requirements etc.									
3.5	Carry out all inspection, repair and replacement activities using: ▪ The correct inspection technique ▪ The correct type and size of component ▪ Relevant tools and equipment									
3.6	Ensure that replaced and refitted tyres and valves are correctly fitted									
3.7	Complete all activities within the agreed timescale									
3.8	Report any anticipated delays in completion and any additional faults identified to the relevant personnel promptly									
3.9	Carry out appropriate repairs according to manufacturers' specification on wheels with tyre pressure sensor)									
3.10	Select replacement tyres in accordance manufacturer's specifications									
3.11	Interpret and use wheel data according to manufacturer's specifications									

Learners Signature:	**Date:**
Assessors Signature:	Date:

IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

LEVEL II

SUMMARY OF LEVEL II

MANDATORY UNITS

S/NO/ UNIT	REFERENCE NO	NOS TITLE	CREDIT VALUE	TOTAL LEARNING HOUR	REMARKS
1	**NADDC/EV/L2/001**	Introduction to electric vehicle	2	20	
2	**NADDC/EV/L2/002**	Occupational health and safety in electric vehicle industry	2	20	
3	**NADDC/EV/L2/003**	Communication process in an electric vehicle working environment	2	20	
4	**NADDC/EV/L2/004**	Mechanical fastening techniques used in electric vehicle services and repairs operation	2	20	
5	**NADDC/EV/L2/005**	Electric Vehicle supply equipment specifications and operations (Charging system)	2	20	
	NADDC/EV/L2/006	Removal/fitting of trim, mechanical and electrical components of an electric vehicle	2	20	
6	**NADDC/EV/L2/007**	Teamwork in electric vehicle service environment	1	10	
7	**NADDC/EV/L2/008**	Basic computers skills in electric vehicle industry	2	20	
TOTAL CREDIT VALUE/GUIDED LEARNING HOURS			**15**	**150**	

OPTIONAL UNITS

S/NO/ UNIT	REFERENCE NO	NOS TITLE	CREDIT VALUE	TOTAL LEARNING HOUR	REMARKS
1	**NADDC/EV/L2/008**	Wheels and tyres	2	20	
2	**NADDC/EV/L2/009**	Electric vehicle maintenance services	2	20	
3	**NADDC/EV/L2/010**	Light electric motor vehicle maintenance	2	20	
TOTAL CREDIT VALUE/LEARNING HOURS			**6**	**60**	

UNIT 001: INTRODUCTION TO ELECTRIC VEHICLE (EV)

Unit reference number:	**NADDC/EV/L2/001**
QCF level:	**2**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about identifying, understanding the basic features of an electric vehicle and differentiating between it and internal combustion engine-powered vehicle.

Unit assessment requirements/evidence requirements

This assessment can only be carried out in a real automotive workplace environment where electric vehicle activities are carried out. Assessment will require the provision of functional vehicles, live engines, as well as assorted engine components.

Assessment method will include:

- Direct Observation / Oral Questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 001: INTRODUCTION TO ELECTRIC VEHICLE (EV)

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1: Understand the types of electric vehicles	1.1	Identify electric vehicle									
	1.2	Give examples of various types of electric vehicles									
	1.3	Differentiate between Internal combustion engine vehicle and electric vehicle									
	1.4	Differentiate between hybrid-electric vehicle, battery-electric vehicle and plug-in hybrid electric vehicle									
LO2: Understand basic components of electric vehicle											
	2.1	List basic components of electric vehicle									
	2.2	Describe electric vehicle battery, motors, generators and controls									
	2.3	Describe the electric regenerative braking system, electric vehicle transmission and transaxle									
	2.4	Compare the electric vehicle suspension with the internal engine combustion vehicle suspension system.									
	2.5	Explain the basic working principles of electric vehicles									
LO3: Hazards surrounding electric vehicle											
	3.1	Give examples of typical voltages used for a range electric vehicle									
	3.2	Follow manufacturers' specification(s) to identify locations of high voltage electrical cables.									
	3.3	Describe the effect of alternating and direct current on human beings									
	3.4	Identify who may be at risk in the event of electric vehicle incidents									
	3.5	Describe the basic hazard associated with high voltage electrical energy									

LO4 Dashboard display of electric vehicle	4.1	Identify the basic features of a dashboard/instrument cluster of an electric vehicle									
	4.2	Distinguish between electric vehicle instrument cluster and the regular vehicle instrument cluster									
	4.3	Explain status of instrument cluster/dashboard indicator lights as they relate to start and stop									
	4.4	Explain the state of charge percentage (SOC%) or power meter									
	4.5	Identify estimated drive range on the instrument cluster of the electric vehicle									
	4.6	Identify warning and indicator lights that are specific to the electric vehicles									
	4.7	Explain the components of the auxiliary equipment on the instrument cluster/dashboard.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 002: OCCUPATIONAL HEALTH AND SAFETY IN ELECTRIC VEHICLE INDUSTRY

Unit reference number:	**NADDC/EV/L2/002**
QCF level:	**2**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about the knowledge and skills needed to competently carryout daily activities in an electric vehicle working environment while observing relevant work ethics and safety. It includes basic first-aid and firefighting procedures**.**

Unit assessment requirements/evidence requirements

This assessment can only be carried out in a real electric vehicle working environment where electric vehicle activities are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Project
- Work product

UNIT 002: OCCUPATIONAL HEALTH AND SAFETY IN ELECTRIC VEHICLE INDUSTRY

LO (Learning outcome)		**Criteria:-**	Evidence Type					Evidence Ref Page number			
LO 1 Personal Health and Hygiene	1.1	Use appropriate personal protective equipment (PPE)									
	1.2	Always work safely in line with Occupational Safety and Health Association (OSHA) Standards.									
	1.3	Ensure workplace injuries are treated by certified First Aid Technicians and or personnel.									
	1.4	Report illness and infection promptly to the appropriate persons.									
	1.5	List the contents of the first aid box and keep in an easily accessible place in the work environment									
LO2 Maintain personal health and hygiene											
	2.1	State own responsibility health and safety act as it relates to electric vehicles work environment.									
	2.2	State general rules on hygiene that must be followed in an electric vehicle work environment									
	2.3	Explain the use of the following Personal Protection Equipment: ▪ hard hat/head protection, ▪ foot protection, ▪ hand and body protection ▪ regulatory protection									
	2.4	State the importance of maintaining good personal hygiene: clothing and environment									
	2.5	Explain the types of electric fire and how to use them									
	2.6	Describe how to treat electric									

		vehicle shocks, cuts, grazes, and wounds.									
	2.7	Describe the importance of giving first aid treatment to injured workers in an electric vehicle working environment.									
LO3 Maintenance of hygienic, safe, and secure workplace											
	3.1	State the importance of working in a healthy, safe, and hygienic workplace									
	3.2	Report incidents and accidents promptly and accurately									
	3.3	Follow HSE procedures during work									
	3.4	Practice emergency rescue procedures during work. Emergency Drill, Muster Point.									
	3.5	Follow organizational security procedures. Engagement of a environmental Safety Officer.									
	3.6	Ensure the disposal of unused cables and other materials.									
LO4 Prevention of hazards in the work place											
	4.1	Identify any hazards or potential hazards and deal with these correctly:									
	4.2	Explain where information about health and safety in your workplace can be obtained.									
	4.3	Describe the types of hazards in workplace that may occur and how to deal with them									
	4.4	Explain the hazards of high voltage energy that can be dealt with personally and those that should be reported to someone else									
	4.5	Explain how to warn other people about hazards and why this is important									
	4.6	Explain while accidents and incidents should be reported and to whom									
	4.7	Describe the types of emergencies that may happen in the workplace and how to deal with it.									

4.8	Explain where to find the first-aid equipment and who the registered first aider is in the workplace									
4.9	Explain safe lifting and handling techniques that should be followed.									
4.10	Explain the dangers of the DC rapid charge if not properly connected and too hot									
4.11	Explain the failure of the good connections of the connector, interface or protocol between the charger and the vehicle									
4.12	Explain other ways of working safely that are relevant to own position and why they are important.									
4.13	Describe organizational emergencies procedure, in particular fire, and how these should be followed.									
4.14	State the possible causes for fire in an electric vehicle workplace									
4.15	State the possible causes for electric shock in the workplace									
4.16	Explain how to resuscitate possible heart failure/electric shock victim									
4.17	Describe how to minimize the possibility of fire in the workplace. Application of fire extinguishers.									
4.18	State where to find the alarms and how to set them off									
4.19	State why a fire should never be approached unless it is safe to do so									
4.20	State the importance of following the fire safety laws									
4.21	Describe the organizational security procedures and why these are important									
4.22	Explain battery safe working temperature for electric vehicles									

	4.23	Explain the importance of reporting all usual or non-routine incidents to the appropriate personnel.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 003: COMMUNICATION SYSTEM IN AN ELECTRIC VEHICLE WORK ENVIRONMENT

Unit reference number:	**NADDC/EV/L2/003**
QCF Level:	**2**
Credit Value:	**2**
Guided Learning Hours:	**20**

Unit Purpose: To establish an effective communication system that is responsive and subject to change in meeting workers, employers and customers need, in work environment

Unit assessment /evidence requirements

This assessment can only be carried out in a real electric vehicle workplace.

Assessment methods will include:

- Direct Observation /Oral questions (DO)
- Question and Answer (QA)
- Witness Testimony (WT)
- Personal Statement (PS)

UNIT 003: COMMUNICATION PROCESS IN ELECTRIC VEHICLE WORK ENVIRONMENT

LO (Learning outcome)		Performance Criteria	Evidence Type					Evidence Ref Page number			
LO1: Use a non-complex communication system in a work environment	1.1	Use a simple verbal means to pass on necessary information									
	1.2	Use non- verbal means to pass on necessary information e.g. body language									
	1.3	Explain symbols and signs appropriately.									
	1.4	Use a simple verbal means to pass on necessary information									
	1.5	Written communication: memos, newsletter, etc									
LO2 Demonstrate the ability to source information in a work environment											
	2.1	Identify the source of information in an organisation and work environment									
	2.2	Relate appropriately with source of information									
	2.3	Use the various information flow systems in a work environment									
	2.4	Use information to avoid challenges in a work situation									
	2.5	Communicate findings in accordance to procedure in a work environment.									
LO3: Use of communicating means in a work environment											
	3.1	Identify the various communication equipment in the work environment									
	3.2	Use effectively, the various communication equipment in a work environment									
	3.3	Communicate information effectively to the right personnel									
	3.4	Observe information effectively using symbols, signs and codes.									

	3.5	Obey instruction in line with ethics of the work environment.										

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 004: MECHANICAL FASTENING TECHNIQUES USED IN ELECTRIC VEHICLE SERVICES AND REPAIR

Unit reference number:	**NADDC/EV/L2/004**
QCF level:	**2**
Credit value:	**2**
Guided learning hours:	**20 HOURS**

Unit Purpose:
This qualification is about joining materials effectively using mechanical joining techniques.

Unit assessment requirements/evidence requirements:
This assessment can only be carried in a real workplace environment in which automotive service, repair, and mechanical joining/fastening operations are carried out.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product
- Recognition of Prior Learning

UNIT 004: MECHANICAL FASTENING TECHNIQUES USED IN ELECTRIC VEHICLE SERVICES AND REPAIR OPERATION.

LO (Learning outcome)		**Criteria:-**	Evidence Type					Evidence Ref Page number			
LO 1: Safety precautions required in metal joining/fastening and repair operations	1.1	Use the appropriate personal protective equipment when carrying out mechanical joining operations. Meaning and types of PPE									
	1.2	Protect the vehicle and its contents effectively when carrying out mechanical joining operations. Caution with high voltage, moving, loose and vibrating parts									
	1.3	Ensure that the tools, equipment and PPE you require are right tools, in a safe working condition									
	1.4	Avoid damaging other components, units and panels on the vehicle									
	1.5	Protect the repaired area to inhibit corrosion where applicable									
	1.6	Clean and store PPE and equipment in appropriate manner. Restrict movement and personnel in work area									
	1.7	Carry out mechanical joining operations in line with health safety and legal requirements.									
LO2: Tools and equipment for carrying out mechanical joining operations and repair operations											
	2.1	Select and use the correct tools and equipment for carrying out mechanical joining operations, electric testing and fault code detection									
	2.2	Ensure that the tools, equipment and PPE you require are in a safe working condition									
	2.3	Identify types of tools to be use in mechanical joining operations and repairs									
LO3:											

Types of metal joining/fastening materials, their applications, and techniques	3.1	Assemble materials and align to enable suitable joint to be achieved									
	3.2	Treat meeting flanges before joining.									
	3.3	Set up your equipment to carry out mechanical joining operations ▪ check suitability of joining technique ▪ check suitability of tooling ▪ check consumables are correct									
	3.4	Recognise when your joint is not forming correctly and what action needs to be taken									
	3.5	Check integrity of the joint.									
	3.6	Carry out mechanical joining operations within the agreed time scale									
	3.7	Identify common fastener failures. Familiarise with fastening constituent materials and properties. Educate on size-torque values									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 005: ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)

Unit reference number: NADDC/EV/L2/005
QCF level: 2
Credit value: 2
Guided learning hours: 20 HOURS

Unit Purpose: This qualification is about competency in the different levels of charging system/electric vehicle supply equipment (EVSE), voltage specification, and operations.

Unit assessment requirements/evidence requirements:
This assessment can only be carried in a real workplace environment in which the electric vehicle charging operations are carried out.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product
- Recognition of Prior Learning

UNIT 005: ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) – SPECIFICATIONS AND OPERATIONS (CHARGING STATION)

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Safety Requirements in electric vehicle Charging.	1.1	Use the appropriate personal protective equipment when Carrying out charging operations. Meaning and types of PPE used during charging operations.									
	1.2	Ensure protection against short-circuit and overloads.									
	1.3	Ensure proper connection of charging gun to the charging port.									
	1.4	State the environmental conditions that will be observed in the use of charging station									
	1.5	Use appropriate insulated tools while working around the charging station area.									
	1.6	Ensure charging gun is not loose at any time both during and after a charging operation.									
	1.7	Ensure input voltage, frequency, circuit breaker or fuse of the devices meets specifications.									
LO2: Charging system/Electric vehicle supply equipment (EVSE) basics											
	2.1	Distinguish the different types of charging connectors									
	2.2	Recognise Level 1, Level 2 and Direct Current (DC) fast charger, with their different specifications									
	2.3	Distinguish the voltage requirements for Level 1, Level 2 and Direct Current charger.									
	2.4	Identify the merits and demerits of different levels of charging system/electric vehicle supply equipment (EVSE)									

LO3: Electric vehicle charging operation											
	3.1	Explain Electric vehicle charging stations functionality									
	3.2	Describe the electric vehicle charging station interface and also the Electric vehicle instrument cluster state of charge percentage (SOC%)									
	3.3	Explain how to identify when the electrical charging gun is properly plugged into the charging station.									
	3.4	Explain basic fault signals on the electric vehicle charging station.									
	3.5	Identify emergency stop on the charging station.									
	3.6	Explain the step-by-step procedure in carrying out the charging operations									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 006: REMOVAL/REFITTING OF MECHANICAL AND ELECTRICAL TRIM COMPONENTS IN A VEHICLE

Unit reference number:	**NADDC/EV/L2/006**
QCF level:	**2**
Credit value:	**2**
Guided learning hours:	**20 hours**

Unit Purpose: This qualification is about the appropriate removal and fitting of basic mechanical, electrical and trim (MET) Components to vehicles. It is also about checking the operation (s) of the components fitted

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment in which the removal and fitting of basic mechanical, electrical and trimming of components are carried out.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product
- Recognition of Prior Learning

UNIT 006: REMOVAL/REFITTING OF MECHANICAL AND ELECTRICAL TRIM COMPONENTS IN A VEHICLE

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO1 Description and selection of MET components	1.1	Select the appropriate basic MET components to be fitted, Refer to OEM part number or reputable Aftermarket equivalent. Ensure proper assessment test (electric and diagnostic) for component before change. Refer to vehicle component schematics									
	1.2	Remove and fit basic MET components within the agreed timescale									
	1.3	Check that the components you have fitted operate correctly following the manufacturer's specification.									
	1.4	Store all removed components safely in the correct location									
	1.5	Acquire live data parameter of vehicle									
LO2 Tools and equipment for dismantling and fitting MET components											
	2.1	Select the correct tools and equipment for the components you are going to remove or fit.									
	2.2	Follow safety procedures on the use of tools and equipment you required for the operation.									
	2.3	Use the correct tools and equipment for the components you are going to remove or fit									
	2.4	Select the correct tools and equipment for the components for fitting MET components.									
LO3 Dismantling and fitting of MET components											
	3.1	Use the appropriate personal protective equipment when removing and fitting basic MET components									
	3.2	Remove and fit basic MET components following; removal and fitting procedures manufacturers' instructions your workplace procedures health, safety and legal									

		requirements									
	3.3	Avoid damaging other components and units on the vehicle									
	3.4	Check that the components you have fitted operate correctly following manufacturer's specification. (Do not distort Manufacturer circuitry)									
	3.5	Report any additional faults you find during the course of your work to the relevant personnel(s) promptly									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 007: TEAMWORK IN ELECTRIC VEHICLE WORK ENVIRONMENT

Unit reference number:	**NADDC/EV/L2/007**
QCF level:	**2**
Credit value:	**1**
Guided learning hours:	**10hours**

Unit Purpose: The purpose of this unit is to impart to the learners, skills, knowledge and the understanding required to develop team spirit and positive working relationship.

Unit Assessment/evidence requirement

Assessment must be carried out in a real workplace environment in which electric vehicle services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment methods will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)/P
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 007: TEAM WORK

LO (Learning outcome)		Performance Criteria	Evidence Type					Evidence Ref Page number			
LO1: Positive working relationship with colleagues	1.1	Identify the need for developing positive relationship with colleagues.									
	1.2	Recognize the importance of relating with other people in a way that makes them feel valued and respected.									
	1.3	Assist team members when required.									
	1.4	Report to the appropriate personnel when request/requesting for assistance fall outside area of responsibility.									
	1.5	Communicate information to colleagues about own work that might affect others.									
LO2: Take Responsibilities within the team											
	2.1	Recognize own role and responsibilities within the team.									
	2.2	Perform individual tasks in line with the team rules and regulations.									
	2.3	Participate effectively in teamwork.									
LO3: Compliance with organisational policies											
	3.1	Work In line with organizational standard and structure.									
	3.2	Use organizational code of practice.									
	3.3	Explain organizational code of conduct.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 008: BASIC COMPUTER SKILLS IN ELECTRICAL VEHILCE INDUSTRY

Unit reference number:	**NADDC/EV/L2/008**
QCF level:	**2**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This Qualification is to provide the necessary skills and competency required for computer usage in an automotive industry.

Unit assessment requirements/evidence requirements

Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

Unit 008: BASIC COMPUTER SKILLS IN ELECTRICAL VEHILCE INDUSTRY

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Computer classification	1.1	List different classification of computers.									
	1.2	Differentiate between laptops and desktop computers.									
	1.3	Explain the various functional key on the keyboards.									
	1.4	Identify the various parts of the computer									
	1.5	Operate the computer keyboard									
LO2 Role of computers in modern motor vehicles.											
	2.1	Describe the use of computers in modern motor vehicle workshops									
	2.2	Explain the various application of computers in electric vehicle repairs.									
	2.3	Identify the characteristics and benefit of computers in electric vehicle.									
	2.4	Identify the applications of the computer									
LO 3 Computer Hardware and Software Elements											
	3.1	Identify and explain the functions of various hardware and software components of the computer									
	3.2	Differentiate between system and application software.									
	3.3	Connect internet to computer and phone									
	3.4	Select system software for a particular operation									
LO 4 Principles of operation, capability, and system requirement of a	4.1	Explain the principles of operation, capability and system requirement of Auto-CAD									
	4.2	Effectively install basic software.									

computer	4,3	Explain different types of software used on the computer.									
	4.4	Describe the computerized diagnostics tool used in the electric vehicle industry.									
LO5 Basic computer Operation											
	5.1	Operate the keyboard using function keys, alphanumeric keys, numeric keys and control keys									
	5.2	Carryout typing exercise on the computer									
	5.3	Link an android to a scanner /printer									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 009: ELECTRIC VEHICLE TYRES AND WHEELS

Unit reference number:	**NADDC/EV/L2/009**
QCF level:	**2**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about inspecting electric vehicles tyres and wheels to assess their conditions and suitability for repair and carrying out necessary repair, replacement or refitting activities. It includes replacement and repair procedures for wheels, tyres and tubes.

Unit assessment requirements/evidence requirements;
This assessment can only be carried out in a real electric vehicle work in which replacement and repair procedures for wheels, tyres, and tubes are carried out.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Project
- Work product

UNIT 009: ELECTRIC VEHICLE TYRES AND WHEELS

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Wheels/tyres classification and characteristics	1.1	Carry out tyre replacement in accordance with vehicle manufacturer's specification									
	1.2	Explain and use wheel data according to manufacturer's specifications									
	1.3	Explain various tyre classifications									
	1.4	Explain various tyres characteristics									
	1.5	Deflate and pressure tyres accordingly									
LO2 Tools/ equipment for wheels/tyre repairs and replacement											
	2.1	Recognise that all the tools and equipment required are safe and well calibrated prior to use									
	2.2	Carry out all inspection, repair and replacement activities on electric vehicles using the relevant for tools and equipment									
	2.3	Identify and select tools and equipment used in wheels/tyre repairs									
	2.4	Select appropriate tools and equipment for wheels and tyres.									
	2.5	Identify various wheel sensors									
LO3 Inspect, repair and replace vehicle tyres and wheels											
	3.1	Use suitable Personal Protective Equipment (PPE) and vehicle coverings throughout all tyres and wheels inspection, repair and replacement activities									
	3.2	Use suitable sources of technical information to support your inspection, repair and replacement of tyres and wheels									
	3.3	Operate in a way which minimises the risk of damage to the vehicle and its systems									

	3.4	Perform all inspection (pre-check and post check), repair and replacement activities following: ▪ tyre manufacturer's instructions ▪ vehicle manufacturer's instructions ▪ workplace procedure ▪ health and safety requirements, etc									
	3.5	Ensure that replaced and refitted tyres and valves are correctly fitted									
	3.6	Complete all activities within the agreed timescale									
	3.9	Report any anticipated delays in completion and any additional faults identified to the relevant personnel promptly									
	3.10	Remedy wheels unbalance									
	3.11	Carry out appropriate repairs according to manufacturers' specification on wheels with tyre pressure sensor									
	3.12	Select replacement tyres in accordance manufacturer's specifications									
	3.13	Interpret and use wheel data according to manufacturer's specifications									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 010: ELECTRIC VEHICLE MAINTENANCE

Unit reference number:	**NADDC/EV/L2/010**
QCF level:	**2**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about conducting routine examination, adjustment and replacement activities as part of the periodic servicing of electric vehicles.

Unit assessment requirements/evidence requirements:
This assessment can only be carried in a real workplace environment in which electric vehicle service and repair operation are carried out in a workshop environment effectively. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 010: ELECTRIC VEHICLE MAINTENANCE

LO (Learning Outcomes)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO 1: Electric motor vehicle system components and operation	1.1	Identify the components that make up the high energy electrical drive train system									
	1.2	Identify the mechanical components of the electric vehicles									
	1.3	Identify the traction battery pack and the auxiliary battery.									
	1.4	Explain the types of electric vehicles (Plug-in electric) etc.									
	1.5	State the functions and principle of operation of major components of electric vehicles									
	1.6	List merits and demerits of electric vehicles									
	1.7	Sketch the line diagram of battery modules									
	1.7	Explain the function of battery modules									
	1.8	Explain the construction and function of electric motors									
	1.9	Explain the function of associated high energy electrical components including circuit protection and cables									
	1.10	Identify high energy electrical cabling and associated components									
LO2: Understand the hazards surrounding electrically propelled vehicles											
	2.1	Explain the basic hazards associated with high energy electricity in electric vehicles									
	2.2	State the levels of current and voltage that a hazard for both alternating and direct current systems									
	2.3	Demonstrate and work in a way which minimizes the risk of damage to the electric vehicle and its systems, other people and the environment									
	2.4	Describe the potential hazards that may be present when an electrically propelled vehicle									

		has been damaged by fire, impact or overcharging									
	2.5	Describe the effects of alternating and direct current on humans									
LO 3: Occupational Health, Safety and Environment in electric vehicle maintenance											
	3.1	Use suitable Personal Protective Equipment (PPE) and vehicle coverings throughout all electric vehicle maintenance activities									
	3.2	Use suitable sources of technical information to support all your vehicle maintenance activities									
	3.3	State safety precautions to be taken before and after carrying out routine maintenance									
	3.4	State safety precautions to be observed before carrying out any repair procedures on electric motor vehicles.									
	3.5	Explain the precautions required when working with electric components (awareness of high voltage components, etc)									
	3.6	Explain the safety procedures for towing electric motor vehicles (adherence to manufacturer's specifications.									
	3.7	Store tools and equipment in accordance with manufacturers specifications									
LO4: Carryout maintenance and repair activities on electric vehicles											
	4.1	Explain the correct procedure required when removing and replacing electric vehicle components									
	4.2	Explain how to disconnect high voltage supplies correctly e.g. batteries									
	4.3	Identify the possibility of hazard in the electrical system before carrying out repair activities.									
	4.4	Explain the precautions taken prior to removing and replacing high voltage components									
	4.5	Explain the correct procedure									

		of recharging electric vehicle									
	4.6	Explain the correct procedures to disconnect a high voltage battery pack.									
	4.7	Use the correct procedures to connect an alternative power source to an electrically propelled vehicle									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

LEVEL III

SUMMARY OF LEVEL III

MANDATORY NOS

S/NO/ UNIT NO	REFERENCE NO.	NOS TITLE	CREDIT VALUE	TOTAL LEARNING HOUR	REMARKS
1	NADDC/EV/L3/001	Health and safety in automotive industry	2	20	
2	NADDC/EV/L3/002	Communication process in an automotive work environment	1	10	
3	NADDC/EV/L3/003	Teamwork in an automobile workshop	1	10	
4	NADDC/EV/L3/004	Customer relations in an automotive workshop	4	40	
5	NADDC/EV/L3/005	Motor vehicle electrical system enhancement installation	4	40	
6	NADDC/EV/L3/006	Motor vehicle transmission and chassis related electrical faults rectification	5	50	
7	NADDC/EV/L3/007	Service and repair of non-live electric vehicle systems and components	6	60	
TOTAL CREDIT VALUE/ GUIDED LEARNING HOURS			**23**	**230**	

OPTIONAL NOS

S/NO/ UNIT NO	REFERENCE NO.	NOS TITLE	CREDIT VALUE	TOTAL LEARNING HOUR	REMARKS
8	NADDC/EV/L3/008	Vehicle electrical and electronics systems faults rectification	6	60	
9	NADDC/EV/L3/009	Motor vehicle engine and components fault rectification	5	50	
10	NADDC/EV/L3/010	Assessing damage to vehicle by stripping	4	40	
TOTAL CREDIT VALUE/ GUIDED LEARNING HOURS			**15**	**150**	

UNIT 001: HEALTH AND SAFETY IN AUTOMOTIVE INDUSTRY

Unit reference number:	**NADDC/EV/L3/001**
(QCF) level:	**3**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about the knowledge and skills needed to competently carryout daily activities in an automotive workshop while observing relevant work ethics and safety. It includes basic first-aid and firefighting procedures**.**

Unit assessment requirements/evidence requirements

This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 001: HEALTH AND SAFETY IN AUTOMOTIVE INDUSTRY

LO (Learning Outcome)		**Criteria:-**	Evidence Type					Evidence Ref Page number			
LO1 Recognise how to maintain personal health and hygiene	1.1	Carry out the responsibility in health and safety Act as it relates to own occupation									
	1.2	State general rules on hygiene that must be followed									
	1.3	Adapt correct personal protection equipment (PPE) such as head protection, foot protection, hand and body protection and respiratory protection.									
	1.4	State the importance of maintaining good personal hygiene									
	1.5	Describe how to deal with cuts, grazes, and wounds and why it is important to do so									
LO2 Carry out Personal Health and Hygiene Regulations and Guidelines											
	2.1	Use appropriate personal protective equipment (PPE)									
	2.2	Work safely at all times, complying with health and safety regulations and guidelines									
	2.3	Ensure workplace injuries are treated by certified first technicians and or personnel.									
	2.4	Report illness and infection promptly to the appropriate persons.									
LO3 Assist to maintain a hygienic, safe and secure workplace											
	3.1	State the importance of working in a healthy, safe and hygienic workplace									
	3.2	Report any accident or near accident (s) quickly and accurately to the proper person									
	3.3	Report any unsafe acts and or conditions (s) quickly and accurately to the proper person									
	3.4	Assist other workers to observe health, hygiene and									

		safety procedure during work									
	3.5	Practice emergency procedures during work									
	3.6	Follow organizational security procedures									
	3.7	Ensure the disposal of waste and pollution control with organic and inorganic waste disposal methods.									
	3.8	Assist others to observe sound and noise control and protection methods.									
LO4 Carry out preventive measures against hazards in the work place											
	4.1	Identify any hazard or potential hazards and deals with these correctly									
	4.2	Explain where information about health and safety in own workplace can be obtained.									
	4.3	Describe the types of hazards in workplace that may occur and how to deal with them									
	4.4	Explain hazards that can be dealt with personally and those that should be reported to someone else									
	4.5	Explain how to warn other people about hazards and why this is important									
	4.6	Explain why any accident and near accident should be reported and the personnel to report to									
	4.7	Describe the types of emergencies that may happen in the workplace and how to deal with each of them									
	4.8	Locate where to find the first-aid equipment and who the registered first aider is in the work place									
	4.9	Demonstrate safe lifting and handling techniques that should be followed.									
	4.10	Demonstrate other ways of working safely that are relevant to own position and why they are important.									

	4.11	Describe organizational emergency procedure, in particular, fire, and how these should be observed									
	4.12	Describe periodic chart for emergency for safety and needs for muster point.									
	4.13	State the possible causes for fire in the workplace									
	4.14	Describe how to minimize the possibility of fire in the workplace									
	4.15	State where to find the alarms and how to set them off									
	4.16	State why a fire should never be approached unless it is safe to do so									
	4.17	State the importance of observing the fire safety laws									
	4.18	Describe the organizational security procedures to access by unauthorized person.									
	4.19	Explain the importance of reporting all usual or non-routine incidents to the appropriate personnel.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 002: COMMUNICATION PROCESS IN A WORK ENVIRONMENT

Unit reference number:	**NADDC/EV/L3/002**
QCF level:	**3**
Credit value:	**1**

Guided learning hours: 10

Unit Purpose: To establish a quality communication system that is responsive and reflective in meeting workers and employers need, in work environment.

Unit assessment requirements/evidence requirements

This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 002: COMMUNICATION PROCESS IN A WORK ENVIRONMENT

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1: Use a non-complex communication system in a work environment	1.1	Use audio, electronic, Electro-magnetic means to pass on necessary information									
	1.2	Describe simple non-verbal means of communication									
	1.3	Read and interprets concept of symbols and signs appropriately									
LO2 Locate the source of information in Work environment.											
	2.1	Use the source of information in an organization and work environment while performing tasks									
	2.2	Make accessible the source of information in an organization or work environment									
	2.3	Relate appropriately with the source of information									
	2.4	Use the various information flow systems in an organization or work environment									
	2.5	Ensure proper documentation retrieval of information in accordance with procedure in the work environment.									
LO3: Use various communication means in a work environment.											
	3.1	Ensure accessibility of the communication equipment in the work environment									
	3.2	Describe the effective use of various communication means in a work environment.									
	3.3	Pass information effectively to the right personnel using various communication means.									
	3.4	Ensure effective information flow to the right personnel									
	3.5	Ensure that instructions are obeyed and disseminated in line with ethics of the work environment.									
LO4: Maintain and deploy communication equipment											
	4.1	Ensure the accessibility of the communication equipment in the work environment.									
	4.2	Liaise with the maintenance unit to ensure that communication									

		equipment in event of loss or damage are fixed or replaced.									
	4.3	Liaise with appropriate authority to replace communication equipment in the event of loss or damage									
	4.4	Ensure that communication equipment are stored appropriately in a work environment.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 003: TEAM WORK IN AN AUTOMOBILE WORKSHOP

Unit reference number:	**NADDC/EV/L3/003**
QCF level:	**3**
Credit value:	**1**
Guided learning hours:	**10**

Unit Purpose:
The purpose for this unit is to impact unto the learner, skills knowledge and understanding required to develop team spirit and positive working relationship

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 003: TEAM WORK IN AN ELECTRIC VEHICLE AUTOMOBILE WORKSHOP

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Demonstrate positive working relationship with colleagues	1.1	Identify the need for developing positive relationship with colleagues									
	1.2	Recognize the importance of relating with other people in a way that makes them feel valued and respected.									
	1.3	Assist team members when required.									
	1.4	Report to the appropriate personnel when request for assistance fall outside area of responsibility									
	1.5	Communicate information to colleagues about own work that might affect others									
LO2 Take responsibilities within the team											
	2.1	Recognize own role and responsibilities within the team									
	2.2	Perform individual tasks in line with the team rules and regulations.									
	2.3	Participate effectively in teamwork									
LO3 Comply with organizational policy											
	3.1	Work in line with organizational standards									
	3.2	Use organizational codes of practice									
	3.3	Explain organizational codes of conduct									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 004: CUSTOMER RELATIONS IN ELECTRIC VEHICLE IN AN AUTOMOTIVE SERVICE AND REPAIR WORK ENVIRONMENT

Unit reference number:	**NADDC/EV/L3/004**
QCF level:	**3**
Credit value:	**4**
Guided learning hours:	**40**

Unit Purpose: This qualification is about gaining information from customers on their perceived needs; ascertain the scope of work; giving advice and information and agreeing a course of action; contracting for the agreed work and completing all necessary records and instructions

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 004: CUSTOMER RELATIONS IN AN AUTOMOTIVE SERVICE AND REPAIR WORK ENVIRONMENT

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO1: Contact with Customers	1.1	Gather relevant information from the customer to make an assessment of their own and perceived vehicle needs									
	1.2	Recognise questions and clarifications from customers during conversation									
	1.3	Communicate customers' understanding of the agreement reached									
	1.4	Document customers' needs assessment as necessary									
	1.5	Accommodate customer in safe, non-active and comfortable place									
LO2: Discuss and determine customers' needs											
	2.1	Carry out accurate identification and clarification of customer and vehicle needs, by referring to: Vehicle data Operating procedure									
	2.2	Certify that recording system are complete, accurate, in the required format and signed by the customer when necessary									
	2.3	Test drive vehicle as necessary and listen to customer's complaint.									
LO3: Deliver customer service											
	3.1	Discuss and record the following with the customer before accepting the vehicle: ❖ The physical inventory of the car ❖ The extent and nature of the work undertaken ❖ The terms and conditions of acceptance ❖ The timeframe									
	3.2	Discuss with customers on the accurate, current and relevant advice and information on:									

		❖ Suitable vehicle inspection, repair/parts replacement ❖ Potential course of action ❖ The consequences of the action ❖ The estimated cost									
LO4: Carry out customers' follow up service											
	4.1	Seek further customer approval where the contracted agreement is likely to be exceeded									
	4.2	Describe how to get feedback from customers									
	4.3	Carry out customer necessary satisfaction survey									
	4.4	Obtain customer feedback on completed jobs									
	4.5	Analyze customer feedback.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 005: MOTOR VEHICLE ELECTRICAL SYSTEM ENHANCEMENTS INSTALLATION

Unit reference number: NADDC/EV/L3/005

QCF level:	**3**
Credit value:	**4**
Guided learning hours:	**40**

Unit Purpose: This qualification is about fitting electrical features and components to enhance (add more electrical accessories/components different from those provided by manufacturers) the original vehicle features and specification to meet customer requirements.

Unit assessment requirements/evidence requirements

This qualification identifies the competences needed to enhance the original vehicle features and specification to meet customer requirements.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 005: MOTOR VEHICLE ELECTRICAL SYSTEM ENHANCEMENTS INSTALLATION

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO1 Recognize vehicle electrical system enhancement and their operations	1.1	Explain the purpose of electrical enhancements. (Note: that EV does not work with OBDI protocol)									
	1.2	Indicate the already installed electrical enhancements in a vehicle									
	1.3	Identify electrical system enhancement in EVs									
	1.4	Discuss the advantage(s) and disadvantage(s) of fitting electrical enhancements in a vehicle									
	1.5	Interpret the manufacturers' requirement for properly fitting electrical enhancements in the particular vehicle. Understanding electrical diagrams.									
	1.6	Describe the legal requirement for fitting electrical enhancements									
	1.7	Explain the working principle of various electrical enhancements									
LO2 Use tools and equipment for vehicle electrical system enhancement											
	2.1	Describe the enhancement tools and equipment									
	2.2	Carry out the preparation and testing of all the tools and equipment required, following manufacturers' instructions									
	2.3	Observe safety in appropriate storage and equipment.									
	2.4	Use tools and equipment in line with manufacturer's specification.									
	2.5	Calibrate basic tools used for electrical enhancement									
LO3 Discuss and determine											
	3.1	Discuss with the customer on his requirements concerning									

customer needs and requirements for electrical system enhancement		electrical system enhancement.									
	3.2	Assemble components which are compatible with the vehicle specification and customers' requirements.									
	3.3	Monitor all enhancements functions with respect to specification prior to release to the customer									
	3.3	Implement all enhancement activities within the agreed timeframe									
	3.4	Communicate any anticipated delays in completion to the appropriate authority promptly									
LO4 Install vehicle electrical system Enhancements.											
	4.1	Observe safety and work ethics with suitable personal protective equipment (PPE) and the use of vehicle coverings throughout all enhancement activities									
	4.2	Carry out all electrical enhancement activities following: ❖ manufacturers' instructions ❖ workplace procedures ❖ health and safety requirements ❖ legal requirements									
	4.3	Adapt workshop rules and regulations to minimise the risk of: ❖ damage to other vehicle systems ❖ damage to other components and units ❖ contact with leakages ❖ contact with hazardous substances ❖ damage to the environment									
	4.4	Use manufacturer's specifications to adjust the components fitted and vehicle systems correctly for effective operations.									
	4.5	Inspect to ensure all enhancements function with to specifications prior to release									

		to the customer									
	4.6	Carry out all enhancement activities within the agreed timeframe									
	4.7	Communicate any anticipated delays in completion to the relevant authority promptly									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 006: MOTOR VEHICLE TRANSMISSION AND CHASSIS RELATED ELECTRICAL FAULTS RECTIFICATION

Unit reference number:	**NADDC/EV/L3/006**
QCF level:	**3**
Credit value:	**5**
Guided learning hours:	**50**

Unit Purpose: This qualification is about identifying and rectifying electrical faults occurring within a variety of electrical systems within the vehicle and chassis areas. It includes the procedures of inspecting and assessing the conditions and overhauling of the transmission system in line with manufacturers' specifications

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 006: MOTOR VEHICLE TRANSMISSION AND CHASSIS RELATED ELECTRICAL FAULTS RECTIFICATION

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Recognise vehicle transmission and chassis system operations and principles	1.1	Describe the purpose of transmission systems									
	1.2	Explain the purpose of chassis system									
	1.3	Identify the components of the transmission system									
	1.4	Identify the components of the chassis system									
	1.5	Differentiate between transmission and chassis system									
LO2 Identify and use appropriate chassis and transmission tools and equipment											
	2.1	Identify chassis and transmission systems tools and equipment									
	2.2	Differentiate between special purpose tools from other tools									
	2.3	Use the tools and equipment required correctly and safely throughout all rectification activities									
	2.4	Observe manufacturer's specification in storing and securing tools and equipment									
LO3 Carry out transmission/ chassis electrical faults diagnoses And rectification.											
	3.1	Use suitable personal protective equipment and vehicle coverings when applying electrical testing techniques in carrying out rectification									
	3.2	Assist the identification of complex electrical faults, by reviewing vehicle: technical data diagnostic test procedures									
	3.3	Use manufacturer's instructions to prepare, connect and test all the required electrical and electronic testing equipment									
	3.4	Carry out all rectification activities following: ❖ manufacturers' instructions									

	❖ recognized researched repair methods ❖ health and safety requirements									
3.5	Use tools and equipment required, correctly and safely throughout all rectification activities									
3.6	Ensure all repaired and replaced electrical components and units conform to: ❖ the vehicle operating specification, ❖ any legal requirements									
3.7	Adjust when necessary components and units correctly to ensure that they operate to that meet system requirements									
3.8	Ensure the electrical system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer									
3.9	Ensure the records are accurate, complete and passed to the relevant person(s) promptly in the format required									
3.10	Complete all system diagnostic activities within the agreed timeframe									
3.11	Assess and apply correct information, tools and equipment for inspecting and assessing the transmission system and its associated components in line with manufacturers' specifications									
3.12	Demonstrate procedures for dismantling a gear box/chassis system units and its associated components									
3.13	Demonstrate procedures for assembling a dismantled gear box/chassis system unit and its associated components									
3.14	Demonstrate procedures for repairing and/or replacing component parts of a gear box/ chassis system unit and its associated components									

	3.15	Apply procedures for measuring and evaluating wear on component parts of gear box/chassis system unit and its associated components									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 007: SERVICE AND REPAIR OF NON-LIVE ELECTRIC VEHICLE SYSTEMS AND COMPONENTS

Unit reference number:	**NADDC/EV/L3/007**
QCF level:	**3**
Credit value:	**6**
Guided learning hours:	**60 hours**

Unit Purpose:
The purpose of this unit is to expose trainees to knowledge and competencies required by technicians to carry out servicing and general repairs on non-live high energy electrical systems and components on electric vehicles safely. The unit will also train the technicians to be aware of the effect that high energy electrical component technology has on other vehicles systems. This unit does not cover the competence and knowledge required to work on live high energy electrical components and associated systems, like battery packs.

NOTE: An equipment, system or component could be described as live or non-live when it is connected to a source of electricity; however, the voltage involved determines whether it is live or non-live. For DC system, it is high energy when the voltage is greater than 60V and 1500V root mean square, but it becomes live when the voltage is 120V and above. For AC system, it is high energy when the voltage is 30V and 1000V root mean square, but it becomes live when the voltage is 50V and above. All in dry conditions. Generally, trainees for this unit are expected to work only on components and systems of electric vehicles with low voltages (non-live) that cannot pose any form of danger when in contact with human body.

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

LO (Learning outcome)	Criteria:-	Evidence Type		Evidence Ref Page

								number			
LO1 Identify and explain electrical vehicle components and construction	1.1	State the differences between electric and non-electric vehicle									
	1.2	Recognize and identify electric vehicle components: ▪ batteries/stack, ▪ pod, ▪ module; ▪ motors; cabling; ▪ relays/control units; ▪ charger and charging points; isolators; ▪ inverters; ▪ battery management interface; ignition/key on control switch; driver display panel; ▪ multi-battery server unit; ▪ drive trains; ▪ power sources; ▪ ancillary systems and components									
	1.3	Explains how high energy electrical components functions									
	1.4	Explain the construction of the following electrical components: ❖ Battery modules, ❖ Electric motors and ❖ Associated electrical components									
	1.5	Read and interpret drawings and schematics of electrical vehicle components									
	1.6	Describe the charging system associated with EV									
	1.7	Explain how to charge EV safely									
	1.8	List the precautions necessary when using plug-in charging equipment									
LO2 Identify and describe electrical vehicles components											
	2.1	Identify high energy electrical systems and components in EVs									
	2.2	Identify the typical location of high energy electrical									

removal and replacement		components in an EV									
	2.3	Explain how to locate high energy electrical components and cabling e.g. using wiring labelling and colour codes for EVs.									
	2.4	Describe the different types of energy storage systems and voltages associated with electric vehicles.									
	2.5	Describe how to remove and replace high energy electrical components in EVs in line with manufacturer's procedures									
	2.6	Describe how to store, dispose or recycle removed components in line with legislation and organisational procedures for EVs.									
LO3 Describe electrical and electronic principles for electric vehicles											
	3.1	List basic electrical and electronic principles, like: ❖ Ohms law ❖ Voltage ❖ Power ❖ Current (AC/DC) ❖ Resistance ❖ Magnetism ❖ Electromagnetism ❖ Electromagnetic induction									
	3.2	Describe the basic electrical and electronic principles, including: • Ohms law • Voltage • Power • Current (AC/DC) • Resistance • Magnetism • Electromagnetism • Electromagnetic induction									
	3.3	Describe the principles, operations and applications associated with ancillary systems e.g. sensors, actuators, microprocessor, embedded systems for EVs									
	3.4	Explain the interaction between electrical, electronic									

		and mechanical components in EVs									
	3.5	Describe vehicle earthing principles and earthing methods as appropriate to electric vehicles									
	3.6	Identify specific high energy circuit protection types and why they are important									
LO4 Use electrical testing equipment and apply electrical testing techniques											
	4.1	Identify various electrical testing equipment, e.g. code readers, manufacturer specific software, onboard diagnostic tools (OBD)									
	4.2	Use all required electrical test and diagnostic equipment following manufacturer's instruction (testing methods will include: visual, oral, functional and measurements)									
	4.3	Prepare, test and use all required test and diagnostic equipment for repair and replacement									
	4.4	Describe how to interpret readings of test results and use them for recommendations									
	4.5	Justify the importance of recommendations based on test results									
	4.6	Observe manufacturers specification to store and secure all testing equipment									
	4.7	Determine if components in a high energy electrical system are serviceable									
	4.8	Perform safety and operational checks on the tools and equipment required to remove and replace electrical components in EVs									
LO5 Identify and fix electrical faults in electric vehicles											
	5.1	Identify and explain the common causes of faults and damages in high energy electrical components of EVs									

5.2	Describe how to identify faults and damages in EV high energy electrical systems										
5.3	Fix faults and replace damaged electrical and electronic components in EVs										
5.4	Record and report any additional faults noticed during the cause of work										
5.5	Use suitable testing methods to evaluate the performance of replacement components and the reassembled systems accurately										
5.6	Ensure that the replaced components and reassembled systems perform to vehicle operating specifications and legal requirements										
5.7	Present accurate records to relevant personnel in an EV work place										
5.8	Explain why it is important to ensure that replaced and reassembled electrical components of EVs are functioning correctly before release to the customer										

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 008: VEHICLE ELECTRICAL AND ELECTRONICS SYSTEM FAULTS RECTIFICATION

Unit reference number: **NADDC/EV/L3/008**
QCF level: **3**

Credit value:	**6**
Guided learning hours:	**60**

Unit Purpose: This qualification identifies the competences needed to carryout fault diagnosis of vehicle electrical and electronic components, in accordance with approved procedures. It involves the application of the following six points diagnostic procedures:

- Fault verification
- Fault data compilation
- Data evaluation
- Testing
- Fault amendment
- Final testing/amendment confirmation/certification

Unit assessment requirements/evidence requirements

This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 008: VEHICLE ELECTRICAL AND ELECTRONICS SYSTEM FAULTS RECTIFICATION

LO (Learning outcome)		**Criteria:-**	Evidence Type					Evidence Ref Page number			
LO1 Describes vehicle electrical/ electronics systems operations	1.1	Identify vehicle electrical/electronic systems									
	1.2	Differentiate between electrical and electronics components									
	1.3	Analyze the operations of each of the electrical and electronic systems and components									
		Sketch electrical/electronic schematics									
LO2 Use diagnostic tools and equipment											
	2.1	Identify types and capacities of diagnostic tools d aids to locate faults;									
	2.2	Select, use and apply appropriate diagnostic techniques, tools and aids to locate faults									
	2.3	Operate vehicle diagnostic tools and equipment									
	2.4	Store diagnostic tools and equipment safely and in line with manufacturer's specifications									
	2.5	Update diagnostic tools/equipment as at when due and in line with manufacturer's specifications									
LO3 Demonstrate safe working practices in vehicle electrical /electronics diagnosis											
	3.1	Comply with health, safety and other relevant regulations and guidelines									
	3.2	Demonstrate safe handling and storage of the diagnostic tools and equipment.									
	3.3	Work to minimize the risk of damage to other vehicle system, components, units, and the environment; ensures no short circuits to damage diagnostic tool									
LO4 Carry out vehicle											
	4.1	Interpret electrical wiring									

electrical / electronics systems faults rectification		diagrams									
	4.2	Troubleshoot and establishes the most likely cause (s) of the faults									
	4.3	Select, use and apply appropriate diagnostic techniques, tools and aids to locate faults									
	4.4	Rectify the identified faults using appropriate tools, methods and techniques									
	4.5	Demonstrate procedures for retrieving, interpreting and erasing fault codes in an electronic system									
	4.6	Demonstrate the procedures for printing a selection of information from a data base; introduction to vehicle repair software application									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 009: MOTOR VEHICLE ENGINE AND COMPONENTS FAULTS RECTIFICATION

Unit reference number:	**NADDC/EV/L3/009**
QCF level:	**3**
Credit value:	**5**
Guided learning hours:	**50**

Unit Purpose: This qualification is about diagnosing and rectifying faults occurring in the mechanical, electrical, hydraulic and fluid systems.

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out. Assessment will require the provision of functional vehicles, stationary live engines, as well as assorted engine components.

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 009: MOTOR VEHICLE ENGINE AND COMPONENTS FAULTS RECTIFICATION

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Recognise and explain working principle of an engine	1.1	Identify 4 stroke and 2 stroke cycles of engine operations									
	1.2	Differentiate between 4 stroke cycle and 2 stroke cycle operations									
	1.3	Differentiate spark ignition engine from compression ignition engine									
	1.4	Identify mechanical components of an engine									
	1.5	Identify electrical components of an engine such as sensors, actuators and harnesses									
	1.6	Identify hydraulic and fluid engine components									
	1.7	Differentiate between hybrid and alternative fuel engines									
LO2: Use appropriate tools and equipment used in engine diagnosis and rectification											
	2.1	Identify various diagnostic tools and equipment									
	2.2	Differentiate between original equipment manufacturers (OEM) tool from universal diagnostic equipment (UDE)/ general scan tool (GST)									
	2.3	Use manufacturer's instructions to prepare, connect and test all the required equipment prior to use									
	2.4	Use the equipment required, correctly and safely throughout all diagnostic and rectification activities									
	2.5	Observe manufacturer's specifications to store and secure all tools and equipment.									
LO3 Apply various techniques to identify, analyse and rectify engine											
	3.1	Wear suitable personal protective equipment and use vehicle coverings when using diagnostic methods and carrying out rectification									

faults		activities									
	3.2	Support the identification of faults, by reviewing vehicle: ❖ technical data ❖ diagnostic test procedures									
	3.3	Collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of engine system faults; live data and freeze frame application									
	3.4	Identify and record any system deviation from acceptable limits accurately									
	3.5	Ensure that the dismantled sub-assemblies, components/ units are intact; identifies their condition and suitability for repair or replacement accurately									
	3.6	Carry out all diagnostic and rectification activities following: manufacturers' instructions recognized researched repair methods (see guidance document) workplace procedures									
	3.7	Measure when necessary to adjust components and units correctly to ensure that they operate to meet system requirements									
	3.8	Use testing methods which are suitable for assessing the performance of the system rectified									
	3.7	Ensure the engine system rectified performs to the vehicle operating specification and any legal requirements prior to return to the customer									
	3.8	Interpret electrical wiring diagrams									
	3.9	Describe procedures for interpreting readings related to direct, indirect and intermittent faults									
	3.10	Carry out procedures for retrieving and erasing fault									

		codes in an electronic system									
	3.12	Carry out procedures for repairing and replacing electrical and electronically controlled system components									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 010: ASSESSING DAMAGE TO VEHICLE BY STRIPPING

Unit reference number:	**NADDC/EV/L3/010**
QCF level:	**3**
Credit value:	**5**
Guided learning hours:	**50**

Unit Purpose:
This qualification is about performing what is commonly known as an 'estimate strip' done to support the work of Vehicle Damage Assessors in order to gain detailed and exact information on the extent and type of damage present within all vehicle systems, units and components and trim fitments. The qualification also covers the ability to describe and document damage with reference to manufacturer's guidance and make recommendations in order to maintain the integrity of the repair

Unit assessment requirements/evidence requirements
This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out.

Assessment methods will include:

- Direct Observation / Oral Questions (DO/OQ)
- Question and Answer (QA)
- Practical Assessment (PA)
- Witness Testimony (WT)
- Personal Statement (PS)
- Work Product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 010: ASSESSING DAMAGE TO VEHICLE BY STRIPPING

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Identify and explain vehicle structure, components and accessories	1.1	Identify types of vehicle structure									
	1.2	Locate various component and accessories of vehicle structure; using vehicle manual where necessary.									
	1.3	Explain the functions of various vehicle components and accessories									
	1.4	Enumerate the merits and de-merits of various vehicle structures									
LO2 Use tools and equipment for vehicle stripping and damage assessment											
	2.1	Select and uses the correct tools and equipment for the vehicle stripping and examination activities									
	2.2	Inspect that the tools and equipment required are in safe and proper working condition									
	2.3	Use the manufacturer's specifications as a guide to store diagnostic tools and equipment safely									
LO3 Carry out technical documentations for vehicle stripping and damage assessments											
	3.1	Support vehicle stripping, examination and testing activities by referring to: ❖ Vehicle technical data ❖ Manufacturer's guidance ❖ Initial vehicle damage assessor report ❖ Removal and replacement procedures ❖ Legal requirements									
	3.2	Use suitable examination and testing methods to evaluate the type and extent of damage accurately									
	3.3	Review and ensures that examination and testing of the vehicle follows specifications identified: ❖ The type and extent of									

		damage to systems, units and components ❖ Differences from the vehicle specification ❖ Vehicle appearances and fault condition ❖ Accident related and any non-accident related damage or fault ❖ Safety critical items									
	3.4	Ensure documentations describe damage with reference to manufacturers specification for system, unit and component condition									
	3.5	Carry out pre strip inventory and customer notification as necessary.									
LO4 Perform vehicle stripping for damage assessment.											
	4.1	Use appropriate personal protective equipment when carrying out vehicle stripping, examination and testing									
	4.2	Supports and protects the vehicle and its contents effectively when carrying out vehicle stripping, examination and testing									
	4.3	Carry out all vehicle stripping, examination and testing activities following: ❖ Recognized research ❖ Manufacturer's instructions ❖ Workplace procedures ❖ Health and safety requirements ❖ Environmental requirements									
	4.4	Work in a way which minimizes the risk of: ▪ Damage to other vehicle systems ▪ Damage to other component and units ▪ Leakage ▪ Contact with hazardous substances ▪ Damage to the environment									

	4.5	Investigate and carries out works commensurate to the level and limit of the damage to the vehicle									
	4.6	Interact and ensures that the extent of vehicle stripping is suitable to determine the level and extent of damage									
	4.7	Comply with recommendations for further work that will maintain the integrity of the repair and meet manufacturers' requirements.									
	4.8	Implement all vehicle stripping, examination and testing activities within the agreed timeframe									
	4.9	Communicate any expected delays in completing the work to relevant personnel promptly									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

LEVEL IV

SUMMARY OF LEVEL IV

MANDATORY NOS

S/NO/ UNIT NO	REFERENCE NO.	NOS TITLE	CREDIT VALUE	TOTAL LEARNING HOUR	REMARKS
1	NADDC/EV/L4/001	Communication Process in an Automotive Work Environment	2	20	
2	NADDC/EV/L4/002	Health and Safety in Automotive Industry	2	20	
3	NADDC/EV/L4/003	Team Work	2	20	
4	NADDC/EV/L4/004	Computer Skills in Automotive Industry	2	20	
5	NADDC/EV/L4/005	Workshop Organization and Supervisory Management/ Supervisory Skills	2	20	
6	NADDC/EV/L4/006	Diagnose, test and repair electric vehicle system	4	40	
7	NADDC/EV/L4/007	Isolate and reinstate an electric vehicle	4	40	
TOTAL CREDIT VALUE/GUIDED LEARNING HOURS			**18**	**180**	

OPTIONAL NOS

S/NO/ UNIT NO	REFERENCE NO.	NOS TITLE	CREDIT VALUE	TOTAL LEARNING HOUR	REMARKS
8	NADDC/EV/L4/008	Electric Vehicle Air-Conditioning / Heating Systems	3	30	
9	NADDC/EV/L4/009	Electric vehicle body painting	3	30	
10	NADDC/EV/L4/010	Electric vehicle upholstery	3	30	
11	NADDC/EV/L4/011	Panel beating works	3	30	
TOTAL CREDIT VALUE/GUIDED LEARNING HOURS			**12**	**120**	

UNIT 001: COMMUNICATION PROCESS IN AN AUTOMOTIVE WORK ENVIRONMENT

Unit reference number:	**NADDC/EV/ L4/001**
QCF level:	**4**
Credit value:	**1**
Guided learning hours:	**10**

Unit Purpose: This qualification is about a quality communication system that is responsive to and reflects workers and employers' need in work environment.

Unit assessment requirements/evidence requirements
Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment (PA)
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 001: COMMUNICATION PROCESS IN AN AUTOMOTIVE WORK ENVIRONMENT

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO1: Application of a complex communication system in a work environment	1.1	Supervise the use of audio, electronic, Electro-magnetic means to pass on necessary information									
	1.2	Describe simple non-verbal means of communication. Understanding Flow Chart diagrams and Posters.									
	1.3	Read and interpret concept of symbols and signs appropriately									
	1.4	Placement of Notice/ Information Boards									
LO2 Location of source of information in work environment.											
	2.1	Involve the creating and making functional the source of information in an organization and work environment									
	2.2	Make accessible the source of information in an organization or work environment									
	2.3	Relate appropriately with the source of information									
	2.4	Use the various information flow systems in an organization or work environment									
	2.5	Ensure proper documentation retrieval of information in accordance to procedure in a work environment.									
LO3: Application of various communication means in a work environment.											
	3.1	Ensure the accessibility of the communication equipment in the work environment									
	3.2	Describe the effective use of various communication means in a work environment.									
	3.3	Pass information effectively to the right personnel									

	3.4	Ensure effective information flow to the right personnel									
	3.5	Ensure that instructions are obeyed and disseminated in line with ethics of the work environment.									
LO4: Maintenance and deployment of communication equipment											
	4.1	Ensure the accessibility of the communication equipment in the work environment.									
	4.2	Liaise with the maintenance unit in the event of loss or damage of communication equipment.									
	4.3	Liaise with appropriate authority to replace communication equipment in the event of loss or damage									
	4.4	Ensure that communication equipments are stored appropriately in a work environment.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 002: HEALTH AND SAFETY IN AUTOMOTIVE INDUSTRY

Unit reference number:	**NADDC/EV/L4/002**
QCF level:	**4**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This qualification is about the knowledge and skills needed to competently carryout daily activities in an automotive workshop while observing relevant work ethics and safety. It includes basic first-aid and firefighting procedures**.**

Unit assessment requirements/evidence requirements
Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 002: HEALTH AND SAFETY IN AUTOMOTIVE INDUSTRY

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO 1 Personal health and hygiene	1.1	Use appropriate personal protective equipment									
	1.2	Work safely at all times, complying with health and safety regulations and guidelines									
	1.3	Report any accident or near accident (s) quickly and accurately to the proper person									
	1.4	Report illness and infection promptly to the appropriate persons.									
	1.5	Apply hygienic processes while working									
LO2 How to maintain personal health and hygiene											
	2.1	State own responsibility health and safety Act as it relates to own occupation									
	2.2	State general rules on hygiene that must be followed. Periodic enlightenment talks and program									
	2.3	State correct personal protection equipment such as Head Protection, Foot Protection, Hand and body protection and regulatory protection.									
	2.4	State the importance of maintaining good personal hygiene									
	2.5	Describe how to deal with cuts, grazes and wounds and why it is important to do so									
LO3 Assisting to maintain a hygienic, safe and secure workplace											
	3.1	State the importance of working in a healthy, safe and hygienic workplace									
	3.2	Report any accidents or near accidents quickly and accurately to the proper person									
	3.3	Follow health, hygiene and									

		safely procedure during work									
	3.4	Practice emergency procedures during work and periodic safety audit.									
	3.5	Follow organizational security procedures									
	3.6	Ensure the disposal of waste and pollution control with organic and inorganic waste disposal methods.									
	3.7	Follow sounds and noise control and protection methods.									
LO4 Prevention of hazards in the work place											
	4.1	Identify any hazards or potential hazards and deal with these correctly									
	4.2	Identify where information about health and safety in your workplace can be obtained.									
	4.3	Describe the types of hazard in workplace that may occur and how to deal with them									
	4.4	Explain hazards that can be dealt with personally and those that should be reported to someone else									
	4.5	Explain how to warn other people about hazards and why this is important									
	4.6	Explain procedures for reporting accidents and near accident.									
	4.7	Describe the types of emergencies that may happen in the workplace and how to deal with it									
	4.8	Explain where to find the first-aid equipment and who the registered first aider is in the work place									
	4.9	Explain safe lifting and handling techniques that should be followed.									
	4.10	Explain other ways of working safely that are relevant to own position and why they are important.									

	4.11	Describe organizational emergencies procedure, in particular fire, and how these should be followed.									
	4.12	State the possible causes for fire in the workplace. Engage or train a Safety Officer.									
	4.13	Describe how to minimize the possibility of fire in the workplace									
	4.14	State where to find the alarms and how to set them off									
	4.15	State why a fire should never be approached unless it is safe to do so									
	4.16	State the importance of following the fire safety laws									
	4.17	Describe the organizational security procedures and why these are important									
	4.18	Explain the importance of reporting all usual or non-routine incidents to the appropriate personnel.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 003: TEAM WORK

Unit reference number:	**NADDC/EV/L4/003**
QCF level:	**4**
Credit value:	**2**

Guided learning hours: 20

Unit Purpose:
The purpose for this qualification is to impact onto the learner, skills knowledge and understanding required to develop team spirit and positive working relationship

Unit assessment requirements/evidence requirements
Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 003: TEAM WORK

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Positive working relationship with colleagues	1.1	Identify the need for developing positive relationship with colleagues									
	1.2	Recognizing the importance of relating with other people in a way that makes them feel valued and respected.									
	1.3	Assist team members when required. Conduct pre-work meetings before execution									
	1.4	Report to the appropriate personnel when request for assistance fall outside area of responsibility									
	1.5	Communicate information to colleagues about own work that might affect others									
LO2 Take Responsibilities within the team											
	2.1	Recognize own role and responsibilities within the team									
	2.2	Perform individual tasks in line with the team rules and regulations.									
	2.3	Participate effectively in teamwork									
LO 3 Compliance with policy of organization											
	3.1	Work In line with organizational standard									
	3.2	Use organizational code of practice									
	3.3	Explain organizational code of conduct									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
EQA Signature (if sampled)	**Date:**

UNIT 004: BASIC COMPUTER SKILLS IN AUTOMOTIVE INDUSTRY

Unit reference number:	**NADDC/EV/L4/004**
QCF level:	**4**
Credit value:	**2**
Guided learning hours:	**20**

Unit Purpose: This Qualification is to provide the necessary skills and competency required for computer usage in an automotive industry.

Unit assessment requirements/evidence requirements
Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 004: BASIC COMPUTER SKILLS IN AUTOMOTIVE INDUSTRY

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO 1 Computer classification	1.1	Use computers according to usage and size.									
	1.2	Differentiate between analogue, digital and hybrid computers.									
	1.3	Describe the various types of microcomputers.									
	1.4	Identify various types of microcomputers									
	1.5	Operate the computer keyboard									
LO2 Role of computers in modern motor vehicles.											
	2.1	Describe the use of computers in modern motor vehicle workshops									
	2.2	Demonstrate the various application of computers in auto shop									
	2.3	Discuss the characteristics and benefits of computers in auto shop									
LO 3 Computer Hardware and Software Elements											
	3.1	Explain the functions of various hardware and software components of the computer									
	3.2	Differentiate between system and application software.									
	3.3	Select system software for a particular operation									
LO 4 Principles of operation, capability, and system requirement of a computer	4.1	Explain the principles of operation computer system									
	4.2	Explain the configuration of computer									
	4,3	List software and explain various computer components and systems									
LO5 Basic computer Operation											
	5.1	Operate the keyboard using function keys, alphanumeric keys, numeric keys and control keys									
	5.2	Carryout typing exercise on the computer									

	5.3	Carryout a given assignment in the vehicle using a computer										

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
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UNIT 005: ORGANISATION PLANNING AND MANAGEMENT/ SUPERVISORY SKILLS

Unit reference number:	**NADDC/EV/L4/005**
QCF level:	**4**
Credit value:	**6**
Guided learning hours:	**20**

Unit Purpose: This unit is to provide participants with the knowledge and skills to competently carry out effective work planning and administration in an automotive workshop

Unit assessment requirements/evidence requirements
Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and answer (QA)
- Practical assessment
- Witness testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of prior learning (RPL)
- Professional discussion (PD)

UNIT 005: ORGANISATION PLANNING AND MANAGEMENT/ SUPERVISORY SKILLS

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Organisational planning and management	1.1	Maintain regular briefing on day to day activities.									
	1.2	Determine how the work will be undertaken within given specified time.									
	1.3	Justify the required skill and work load.									
	1.4	Locate and understand the importance of manufactures manual and specifications for efficient performance appraisal.									
	1.5	Review and update plans of work and clearly communicating any changes as work progresses									
	1.6	Carry out regular sensitization and meetings to update personnel on policies and organizational rules									
LO2 Financial records											
	2.1	Critically analyze reasons for keeping financial records									
	2.2	Describe various records used in the workshop: ▪ Receipt invoice ▪ Invoice ▪ Work bills									
	2.3	Describe procedures for financial records used in the workshop									
LO 3 Related records											
	3.1	Describe and differentiates between various jobs related record used in the workshop									
	3.2	Demonstrate through application of best practices in attaining organizational roles and regulations									
	3.3	Evaluate work in line with organizational standard and structure									
	3.4	Carry out risk assessment of									

		tools, equipment and environmental conditions before commencement of work.									
	3.5	Evaluate regularly various storage techniques used in workshop management									
LO4 Monitoring performances											
	4.1	Demonstrate leadership role in assignment of responsibilities and rewards of excellence guide as work progress.									
	4.2	Review and update plans of work to the team.									
	4.3	Monitor collective and individual progress on regular and fair basis against standard.									
	4.4	Provide the work team accurate and sufficient information support to meet the work needs.									
	4.5	Initiates ideas for an efficient team work.									

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UNIT 006: DIAGNOSE, TEST AND REPAIR ELECTRIC VEHICLE SYSTEMS

Unit reference number:	**NADDC/EV/L4/006**
QCF level:	**4**
Credit value:	**2**
Guided learning hours:	**50**

Unit Purpose:
This qualification is about how to effectively diagnose and carryout repair works on Electric vehicles in a recommended EV Vehicle repair centres.

Unit assessment requirements/evidence requirements
Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 006: DIAGNOSE, TEST AND REPAIR ELECTRIC VEHICLE SYSTEMS

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Health and Safety procedures	1.1	Observe safety information prior to commencing work on the high voltage vehicle									
	1.2	Carry out a risk assessment of the vehicle and the work done.									
	1.3	Use correct and appropriate personal protective clothing and equipment.									
	1.4	Perform the periodical checks for spills/leakages around the work area and take corrective actions.									
LO2 Diagnostic and testing tools											
	2.1	Identify and isolate the types of EV available: ❖ Hybrid EV ❖ Plug in EV ❖ All Electric EV ❖ Converted EV									
	2.2	List and explain diagnosis and testing equipment's eg multi-meter, OEMs Scan tool etc									
	2.3	Carry out necessary virtually checks (where possible)									
	2.4	Diagnose using recommended diagnostic tools.									
	2.6	Adhere to SOP by the manufacturer while dismantling and remounting the rectified component.									
LO 3 Repairing damaged part(s) and installation of systems components											
	3.1	Ensure the use of appropriate use of PPE at all times									
	3.2	List and explain possible faulty components in an electric vehicle: ❖ Abnormal connecting of starter windings ❖ Open circuit or short circuit of starter windings ❖ Bearing failure ❖ Broken rotor Bar ❖ Eccentricity related faults ❖ Short circuit of rotor									

	windings etc									
3.3	Diagnose using the appropriate test tools (OEM) etc to identify possible fault area									
3.4	Replace/fix according to manufacturer's specification									
3.5	Test drive to compliance									

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UNIT 007: ISOLATE AND REINSTATE ELECTRIC VEHICLE

Unit reference number:	**NADDC/EV/L4/007**
QCF level:	**4**
Credit value:	**3**
Guided learning hours:	**50**

Unit Purpose: This qualification provides the needed knowledge and skills to competently identify high-risk areas in EVs, isolate, dismantle and re-mount EVs vehicle.

Unit assessment requirements/evidence requirements
Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

Unit 007: ISOLATE AND REINSTATE ELECTRIC VEHICLE

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Identification of high voltage areas	1.1	Put on the appropriate PPE according to manufacturer's specifics and apply all mandatory protective devices during isolation									
	1.2	Identify and perform a visual inspection of the dangerous areas in reconciliation with the vehicle's manufacturer's electrical diagram									
	1.3	Sketch and label the high voltage components / cables with tapes, colors, ribbons, etc.									
	1.4	Identify and suggest any potential cause of the vehicle failures.									
	1.5	Critically analyze using diagnostic and /or digital tools to establish potential high voltage areas in the vehicle.									
	1.6	Proffer solutions to 1.5 above in line with manufacturers specifications									
LO2 Lockout, Tag-out and Try-out (LOTOTO)											
	2.1	Identify any power source and lock out all power switches.									
	2.2	Indicate high voltage areas with tags; safety labels and codes to distract co-workers from contact									
	2.3	Adhere to the codes and standards of isolating high voltage system									
	2.4	Maintaining Zero Energy State (Tryout) and ensure no voltage flow									
LO 3 Dismantling procedure											
	3.1	Use appropriate PPE before, during and after the dismantling exercise									
	3.2	Use appropriate diagnostic tools/equipment to identify potential faults.									
	3.3	Carryout dismantling activities									

		following the standard operating procedure (SOP) by the manufacturer.									
	3.4	Critically analyze using appropriate testing method to determine performance parameters of the dismantled components/systems									
	3.5	Couple the repaired components and verify before reinstatement									
LO4 Reinstatement procedure											
	4.1	Carryout the re-instatement of the components from most simple to the most complex									
	4.2	Follow the procedures of first-out and last-in operation during the reinstatement of the components									
	4.3	Maintain proper connections between the terminals (positive and negative)									
	4.4	Carryout visual inspection to ensure safety, performance and reliability									
	4.5	Examine the vehicle using diagnostic tools to identify potential errors									
	4.6	Correct any identified erroneous connections									
	4.7	Ensure that proper records of all activities carried out are kept									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
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UNIT 008: ELECTRIC VEHICLE AIR- CONDITIONING / HEATING SYSTEM

Unit reference number: NADDC/EV/L4/008

QCF level:	**4**
Credit value:	**6**
Guided learning hours:	**60**

Unit Purpose: This qualification provides the needed knowledge and skills to competently test and service motor vehicle air conditioning system. These include procedures for inspecting, evacuating and recharging the air conditioning & Heating system of a EVs vehicle.

Unit assessment requirements/evidence requirements

Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)
- Assignment (ASS)

UNIT 008: ELECTRIC VEHICLE AIR- CONDITIONING / HEATING SYSTEM

LO (Learning outcome)		**Criteria:-**	Evidence Type					Evidence Ref Page number			
LO 1 Principle of operations of an Air-conditioning / Heating Systems	1.1	Analyze the Air-conditioning systems and components functions									
	1.2	Explain the environmental impacts of Chlorofluorocarbon (CFC) and the general work habits of EVs AC & Heating Technicians.									
	1.3	Locate and explain how the EVs power-source interfaces with AC & Heating systems components (IE, Compressor. etc)									
	1.4	Demonstrate competence in AC & Heating fault-finding or diagnosis.									
	15	Critically analyze effectively analyze the behavior of refrigerants and types.									
	1.6	Justify the preventive and Reactive troubleshooting and / or maintenance of AC & system.									
	1.7	Competence in EVs electrical circuit testing and the software App. Around or supporting the AC & Heating system.									
LO2 Inspecting and testing Air-conditioning /Heating Systems Components											
	2.1	Inspect and test Air-conditioning / Heating System Components									
	2.2	Assess and apply correct information, tools and equipment for inspecting and testing Air-conditioning /Heating System components using dyes, and sound methods etc.									
	2.3	Manage hazard associated with handling and storage of refrigerants									
LO 3											

Servicing Air-conditioning / Heating System and its Components	3.1	Monitor the use of personnel protective equipment in the servicing of Air-conditioning System and Components									
	3.2	Assess and apply correct information, tools and equipment for servicing Air-conditioning /Heating System and Components									
	3.3	Guide the procedure for discharging Air-conditioning /Heating System									
	3.4	Supervise the evacuation of an Air-conditioning System. Modern ways and equipment to recirculate, service AC /Heating									
	3.5	Supervise the procedure for charging an Air-conditioning / Heating System									
	3.6	Demonstrate the procedure for servicing Air-conditioning / Heating System component in line with the manufacturer's specifications									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
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UNIT 009: MOTOR VEHICLE SPRAY PAINTING

Unit reference number:	**NADDC/EV/L4/009**
QCF level:	**4**
Credit value:	**6**
Guided learning hours:	**60 HOURS**

Unit Purpose:

This unit provides necessary knowledge, skills and attitudes (competency) required in carrying out spray painting using relevant tools, materials and operational sequence in the Automotive Sector.

This unit is about:

1. Adopting safe and healthy work practices
2. Selecting tools, materials and equipment
3. Following the Right sequence for the task
4. Applying the appropriate methodology

Unit assessment requirements/evidence requirements

Assessment must be carried out in real workplace environment in which automotive services and repair operations are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Project
- Work product

UNIT 009: MOTOR VEHICLE SPRAY PAINTING

LO (Learning outcome)	**Performance Criteria:-**		Evidence Type					Evidence Ref Page number			
LO1: Personal/environmental Safety	1.1	Identify and use required Personal Protective Equipment (PPE): Nose mask, Hand glove (latex), Safety Boot, Goggle, Overall, Helmet etc.									
	1.2	Prepare: Environment for the task, Check hose line for leakage, Check tools for defect.									
	1.3	Ensure the following are secured from paints: ❖ Wiring, ❖ Light bulbs, ❖ Part of fixtures that get excessively hot, ❖ Windscreen, ❖ Tyre, etc.									
	1.4	Ensure proper storage of tools, relevant to vehicle components and equipment used.									
LO2: Customer Relation and Job Evaluation											
	2.1	Identify customer needs and requirements.									
	2.2	Assess the scope of work									
	2.3	Evaluate quantity and cost of materials required									
	2.4	Estimate Time Required to accomplish the job									
LO3: Spray tools, equipment and materials											
	3.1	Identify the appropriate tools to be used: ❖ Spray gun ❖ Tag cloth ❖ Air Compressor ❖ Dolly block ❖ Sanders, etc.									
	3.2	Verify Paint specification by: ❖ Color matching, ❖ Color number, ❖ Color correction, ❖ Color separation.									
LO4 : Motor											
	4.1	Carry out Filling according to									

vehicle Body spray preparation		specifications.									
	4.2	Carry out smoothening according to specifications.									
	4.3	Carry out washing according to specifications.									
	4.4	Carry out protective masking of windscreen, glass, locks, etc.									
LO5: Application of paint on the Motor vehicle Body.											
	5.1	Carry out Priming (first coat); ❖ Cleaning, ❖ Washing, ❖ Drying based on specification.									
	5.2	Mix paint according to specifications.									
	5.3	Apply paint (second coat) based on; ❖ Manufacturer specification ❖ Work place procedure.									
	5.4	Apply vanish (final coat).									
	5.5	Bake to the required temperature and duration.									
	5.6	Carryout detailing, buffing/waxing.									
	5.7	Complete all activities within the agreed time frame.									
	5.8	Carryout assessment of the finished job.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
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UNIT 010: MOTOR VEHICLE UPHOLSTERY WORK

Unit reference number:	**NADDC/EV/L4/010**
QCF level:	**4**
Credit value:	**6**
Guided learning hours:	**60**

Unit Purpose:

This unit is to acquire the knowledge, skills and attitude (competency) needed to carryout motor vehicle upholstery work competently in an automotive workshop.

Unit assessment requirements/evidence requirements

This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment
- Witness Testimony (WT)
- Personal statement (PS)
- Project
- Work product (WP)

UNIT 010: MOTOR VEHICLE UPHOLSTERY WORK

LO (Learning outcomes) Criteria	**Performance**		Evidence Type					Evidence Ref Page number			
LO 1: Basic components in motor vehicle interior works	1.1	Adhere to safety precautions necessary in carrying out upholstery work.									
	1.2	Identify basic motor vehicle interior components e.g. doors, dash-boards, sun visor etc.									
	1.3	Identify location of basic interior components in motor vehicle.									
	1.4	Determine problems associated with motor vehicle interior.									
LO2: Upholstery tools and equipment											
	2.1	Identify different types of upholstery tools/equipment and their applications.									
	2.2	Demonstrate the ability to use sewing machines and other tools appropriately.									
	2.3	Demonstrate the ability to maintain sewing machines and other tools appropriately.									
	2.4	Demonstrate step-by-step procedures for maintaining sewing machines and other tools.									
LO3: Motor vehicle interior upholstery estimation											
	3.1	Determine the quality of materials required.									
	3.2	Determine the quantity of materials required.									
	3.3	Estimate the cost implication									
	3.4	Determine duration of work to be carried out and inform the customer accordingly									
LO4: Sewing layout and designs											
	4.1	Explain procedures in developing layouts.									
	4.2	Demonstrate ability to sketch layout of interior									
	4.3	Demonstrate ability to sew without the original seat cover, head-rest, arm-rest, door-mats, etc.									

	4.4	Select appropriate material/ leather or wool claddings and threads suitable for motor vehicle interior components.									
	4.5	Observe safety precautions in developing layout for sewing									
LO 5: Cushions and frames repairs											
	5.1	Demonstrate ability to use the required tools for carrying out repairs on cushions.									
	5.2	Select the tools required in carrying out repairs on frames e.g. spanners, screwdrivers.									
	5.3	Demonstrate the ability to adjust Mechanism which allows free movement of the seats.									
	5.4	Demonstrate the skill required for fixing damaged cushions.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
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UNIT 011: PANEL BEATING

Unit reference number:	**NADDC/EV/L4/011**
QCF level:	**4**
Credit value:	**5**
Guided learning hours:	**50**

Unit Purpose:

This unit is about acquiring knowledge, skills and attitudes (competency) required for correcting dents and mis-alignment on motor vehicle body.

Unit assessment requirements/evidence requirements

This assessment can only be carried out in a real automotive workplace environment where automotive activities are carried out. Simulation is not allowed in this unit and level.

Assessment method will include:

- Direct Observation / oral questions (DO)
- Question and Answer (QA)
- Practical assessment (PA)
- Witness Testimony (WT)
- Personal statement (PS)
- Work product (WP)
- Recognition of Prior Learning (RPL)
- Professional Discussion (PD)

UNIT 011: PANEL BEATING

LO (Learning outcome)		Performance Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1: Body surface assessment	1.1	Differentiate between smooth and rough body surfaces.									
	1.2	Describe tools for correcting rough surfaces.									
	1.3	Use appropriate tools for body surface assessment.									
	1.4	Remove, repair and replace body sub-assembly.									
	1.5	Demonstrate removal and replacement of body trims.									
LO 2: Body frame alignment equipment											
	2.1	❖ Identify various types of equipment used in body-frame: alignment ❖ Anchor pot ❖ Frame clamps ❖ Frame racks ❖ Frame puller, etc.									
	2.2	Demonstrate the use of the equipment listed in 2.1 above.									
	2.3	Store tools and equipment correctly after use.									
	2.4	Observe safety precautions while using tools and equipment listed in 2.1 above.									
LO 3: Motor vehicle body repair materials											
	3.1	Differentiate between ferrous and non-ferrous metals.									
	3.2	Identify various types of body fillers, hardness, adhesives, sealants and their uses.									
	3.3	Demonstrate the use of the materials stated in 3.2 above.									
LO 4: Joining methods in body repairs											
	4.1	Differentiate between temporary and permanent methods of joining									
	4.2	Demonstrate the use of mechanical fasteners in body work.									
	4.3	Demonstrate the use of oxy-acetylene welding.									
	4.4	Demonstrate the use of flux in oxy-acetylene welding.									
	4.5	Set and demonstrate the use of									

		different types of flames in welding and cutting.									
	4.6	Observe safety precautions in the use of oxy-acetylene welding.									

Learners Signature: Assessors Signature: IQA Signature (if sampled)	**Date:** Date: Date:
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