

NATIONAL OCCUPATIONAL STANDARDS FOR CONSTRUCTION/ BUILDING TRADES IN NIGERIA

ELECTRICAL INSTALLATION AND MAINTENANCE

VOLUME 1



COUNCIL OF REGISTERED BUILDERS OF NIGERIA

CORBON

Established in 1989

COUNCIL OF REGISTERED BUILDERS OF NIGERIA
(ESTABLISHED BY Builders Registration Act CAPB13 LFN 2004)



**NATIONAL BOARD FOR
TECHNICAL EDUCATION**

PREFACE

The Construction industry occupies a very critical position in the Nigerian economic landscape. It is a major contributor to the nation's GDP and one of the biggest employer of labour particularly in the artisanal level. However, there is the prevalence of skills gap in the sector which has impacted on the quality of our buildings. The need to improve the quality of works produced by Nigerian artisans and craftsmen is the primary reason for the development of the National Occupational Standards (NOS) for Building Trades in Nigeria.

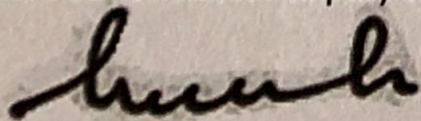
This NOS is a product of relentless efforts that started in 2014 when CORBON was assigned the role of a Sector Skills Council (SSC) under the National Vocational Qualification Framework (NVQF) programme being spearheaded by the National Board for Technical Education. Its primary objective is the promotion of skills development in the Building/ Construction Sector. The Council has since then continued to deliver on its mandates by working and collaborating with NBTE and other stakeholders in ensuring;

- " The Training of Assessors under the NVQF programme
- " Organising the conduct of training of master trainers
- " Development of Sector skills plan and maintaining skills inventory
- " Development of competency standards and Qualifications
- " Development of NOS for the appropriate skills, amongst others.

This maiden edition covers Seven (7) different trades in the industry, namely; Masonry, Carpentry, Electrical Installation, Painting and Decoration, Welding and Fabrication, Tiling, and Plumbing. This document will serve as a uniform standard training tool for up-skilling our Artisans and Craftsmen under the NVQF programme, as they are critical and indispensable in Building Production delivery. Moreover, these set of quality personnel are very scarce in the Nigerian market today.

It is my pleasure to state that we appreciate the effort and substantial contributions of all individuals and stakeholders who have made valuable contributions in the development of this NOS.

I am happy with the current efforts made so far because it is a measure of our readiness and preparedness to grapple with the task ahead of us to reposition the building / construction sector to play the key role in industrialising Nigeria.



Mr. Babatunde Raji Fashola, SAN
Minister for Power, Works and Housing
Federal Republic of Nigeria

FOREWORD

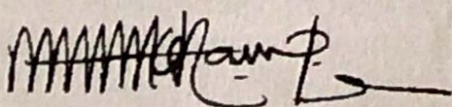
It is evident that young people out of employment, under employed, having left education too early or completed with inadequate skills, are everywhere in Nigeria. These are at high risk of economic marginalization and social exclusion. Upgrading their skills is essential in helping them to enter, or return to the labour market or become entrepreneurs. So the challenge is hugely depended on how Nigeria can transform this youthful population into highly skilled and competent citizens. A major part of the responsibility for preparing such a workforce rests on our Nation's education and training systems. It is for this reason that National Board for Technical Education (NBTE) has been spearheading skills development programmes in Nigeria through the National Vocational Qualifications Framework (NVQF) in line with the practice adopted by many countries.

NVQF is a system for the development, classification and recognition of skills, knowledge and competencies acquired by individuals, irrespective of where and how the training or skill was acquired. The system gives a clear statement of what the learner must know or be able to do whether the learning took place in a classroom, on-the-job, or less formally. The framework is the instrument through which National Vocational Qualifications (NVQs) are delivered. The NVQs are based on National Occupational Standards (NOS) dictated by industry bodies or employers. At the moment in Nigeria, different industries, organisations and companies have their standards which do not attract national certification and recognition. However, with the coming of CORBON as the sector skills council for the building industry, it has harmonised and standardised learning outcomes and competencies to be attained irrespective of how and where the learning took place. The outcome is what we have in this document as the classified NOS.

National Occupational Standards (NOS) specify the standard of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Essentially NOS are benchmarks of good practice. Each NOS defines one key function in a job role and describes functions, standards of performance and knowledge/understanding.

The preparation and maintenance of the NOS are tasks which cannot be completed once and for all in our expanding economy, changes in techniques and scientific developments are continually introducing new job opportunities requiring new occupational skills in the new industrial processes the preparation and the maintenance work will, therefore, be a continuous process. I therefore appeal to all stakeholders to partner and support CORBON achieve this laudable objectives. It is an essential requirement for the production of competent, flexible and competitive workforce in Nigeria.

I call on other regulatory agencies and the organised Private Sector to partner with NBTE, as they actually have the leading role, and stand to derive the greatest benefit from a successful NVQF in Nigeria.



Dr. M.A. Kazaure, mni
Executive Secretary, NBTE



ELECTRICAL INSTALLATION AND MAINTENANCE

Level 1

The Nigerian electrical industry demands trained, certified and experienced technicians, artisans and active personnel in the field of electrical installation and management. The National Board for Technical Education programme (NBTE) offers Electrical Installation and Maintenance as one of the technical education training programmes. It is aimed at training and certifying self-reliant electricians that will work by the provisions of the National Occupational Standards in Electrical Installation and Maintenance.

For the electrical installation and management trade, three qualification levels are offered. The Level 1 Qualifications and Credit Framework (QCF Level 1) for the electrical installation and management trade is made up of seven (7) units, with a credit value of twelve (12) and Guided Learning Hours of One Hundred and Twenty (120). Being a 12-credit qualification, the Candidate for the Level 1 electrical installation and management is expected to undertake and achieve 7 credits from the mandatory units, and 5 credits from the optional units, to have the Level 1 qualification.

Evidence requirements for this level are: Questions and Answers (QA), Direct Observation (DO), Recognition of Prior Learning and Experience (RPLE), Planning (P), Authentic Statement (AS) / Witness Testimony (WT) and Personal Statement / Reflective Account. A summary of the Level 1 Qualifications and Credits Framework (QCF) details are presented in the table below.

LEVEL 1: ELECTRICAL INSTALLATION AND MAINTENANCE					
UNIT	REF NO.	Credit Value	GLH	UNIT TITLE	REMARK
1	CON/EI/001/L1	3	30	Occupational Health and Safety Requirement	Mandatory
2	CON/EI/002/L1	1	10	Communication system in a Work Environment	Mandatory
3	CON/EI/003/L1	1	10	Teamwork	Mandatory
4	CON/EI/004/L1	2	20	Identification of Symbols, Drawings and Layout	Mandatory
5	CON/EI/005/L1	2	20	Identification of Tools and Demonstration of Handling Tools	Optional
6	CON/EI/006/L1	1	10	Management of Personal Development	Optional
7	CON/EI/007/L1	2	20	Electrical Protective Devices	Optional



There are three compulsory units (units 1, 2 and 3) and any other three (3) units out of the other four (4) units in this level, to enable the Learner to qualify for QCF Level 1 in electrical installation and maintenance.

At the end of the Units within, the Learner should be able to:

1. Understand the importance of Communication and Team-work at the workplace;
2. Know basic safety and health requirements in a workplace;
3. Know the skills, knowledge and understanding required to develop team spirit among colleagues;
4. Identify and draw basic electrical symbols;
5. Use the right tools for the right jobs and how to identify them;
6. Recognise his/her potentials and areas for development using techniques and processes;
7. Understand the purpose and use of protective devices in electrical installations;



ELECTRICAL INSTALLATION AND MAINTENANCE

Level 2

Reading and interpretation of electrical designs and codes, installation of new electrical gears and maintenance of existing electrical apparatuses, require an excellent understanding of electromagnetism, electronics and electricity. Electrical installation and maintenance demand an apt ability to promptly troubleshoot electrical problems and continuous upgrading with new/emerging technologies and trends, including electronically-controlled systems.

The Level 2 Qualifications and Credit Framework (QCF Level 2) for the electrical installation and management trade is made up of eleven (11) units, with a credit value of twenty-six (26) and Guided Learning Hours (GLH) of Two Hundred and Sixty (260). This is a 13-credit qualification.

Evidence requirements for this level are Questioning, Direct Observation of Learner's performance, Recognition of prior learning and experience, Planning, Authentic statement / Witness testimony, Personal statement / Reflective account and Product of the Learner's work. A summary of the Level 2 Qualifications and Credits Framework (QCF) details are presented in the table below.

LEVEL 2: ELECTRICAL INSTALLATION AND MAINTENANCE					
UNIT	REF NO.	Credit Value	GLH	UNIT TITLE	REMARK
1	CON/EI/001/L2	4	40	Occupational Health and Safety Requirements.	Mandatory
2	CON/EI/002/L2	1	10	Communication system in a Work Environment.	Mandatory
3	CON/EI/003/L2	1	10	Teamwork	Mandatory
4	CON/EI/004/L2	2	20	Domestic Installations.	Mandatory
5	CON/EI/005/L2	5	50	Types of Wiring in Electrical Installation.	Mandatory
6	CON/EI/006/L2	2	20	Installation of Fire Alarm System in Building.	Optional
7	CON/EI/007/L2	2	20	Installation of Electrical Systems and Components.	Optional
8	CON/EI/008/L2	2	20	Testing Electrical Systems, Equipment and Components.	Optional
9	CON/EI/009/L2	4	40	Cabling	Optional
10	CON/EI/010/L2	1	10	Lighting System and Installation	Optional
11	CON/EI/010/L2	2	20	Protective Devices, Installation and Operation	Optional



There are five (5) compulsory units (i.e. units 1,2,3,4 and 5) and any other five (5) units out of the other six (6) units in this level, to enable the learner qualify for QCF Level 2 in electrical installation and maintenance.

At the end of the Units within, the Learner should be able to:

1. Know basic safety and health requirements in the workplace.
2. Understand the importance of Communication and Team-work at the workplace.
3. Know and Install a fire alarm system in a building as well as the safety regulations guiding such installations.
4. Carry out trunking, surface and conduit wiring in electrical installations, and taking cognisance of safe working practices by the IEE regulations regarding electrical wiring.
5. Carry out basic domestic electrical installations, testing of such installations using an appropriate testing instrument.
6. Know, select, and carry out the installation of electrical systems and components, standard safety precaution and testing to confirm the soundness of the systems and components.
7. Carry out various tests like continuity, polarity etc. on electrical systems and know safety regulations in handling testing instruments.
8. Know the different types of cables and conductors, its jointing and termination as well as IEE regulations regarding jointing and termination.
9. Explain terms on illumination, e.g. luminous intensity, lux, etc., and also carry out the installation of simple lighting systems.
10. Understand the purpose and use of protective devices in electrical installation.



ELECTRICAL INSTALLATION AND MAINTENANCE

Level 3

Electricity, which is key to national development, requires expert deployment and management. A trained and certified electrician shall always observe safety practices in the installation of electrical apparatuses and appliances, and strict adherence to existing laws guiding the practices of Electrical Installation and Maintenance in Nigeria.

Level 3 Qualifications and Credit Framework (QCF Level 3) for electrical installation and management trade is made up of twelve (12) units, with a credit value of Forty (40) and Guided Learning Hours (GLH) of Four hundred (400). A minimum of 40 credits is required for a certificate at this level. The breakdown consists of 28 mandatory credit units and 12 optional credit units.

Evidence requirements for this level are Questioning, Direct Observation of Learner's performance, Recognition of Prior Learning and Experience, Planning, Authentic statement / Witness testimony, Personal statement / Reflective account and Product of the Learner's work. A summary of the Level 3 Qualifications and Credits Framework (QCF) details are presented in the table below.

LEVEL 3: ELECTRICAL INSTALLATION AND MAINTENANCE					
UNIT	REF NO.	Credit Value	GLH	UNIT TITLE	REMARK
1	CON/EI/001/L3	6	60	Occupational Health and Safety Requirements.	Mandatory
2	CON/EI/002/L3	3	30	Communication systems in a Work Environment.	Mandatory
3	CON/EI/003/L3	3	30	Team Work in Plumbing	Mandatory
4	CON/EI/004/L3	3	30	Domestic Installations.	Mandatory
5	CON/EI/005/L3	7	70	Types of Wiring in Electrical Installation.	Mandatory
6	CON/EI/006/L3	3	30	Protective Devices, Installation and Operation	Mandatory
7	CON/EI/007/L3	3	30	Installation of Electrical Earthing Systems	Optional
8	CON/EI/008/L3	2	20	Fault Finding, Repairs and Maintenance in Electrical Systems, Equipment and Components.	Optional
9	CON/EI/009/L3	2	20	Installation of Audio-Visual System and CCTV Equipment.	Optional



10	CON/EI/010/L3	4	40	Underground Cables and Overhead Wire Installation.	Optional
11	CON/EI/011/L3	3	30	Alternating Current (AC) and Direct Current (DC) Machines	Optional
12	CON/EI/012/L3	3	30	Construction of Electrical Panel	Optional

There are six (6) compulsory units (i.e. unit 1, 2,3,4,5 and 6) and any other four (4) units out of the other five (5) units in this level, to enable the Learner to qualify for QCF Level 3 in electrical installation and maintenance.

At the end of the twelve (12) Units of the Level 3 Qualifications and Credit Framework (QCF Level 2), the Learner should be able to:

1. Know basic safety and health requirements in the workplace.
2. Understand the importance of Communication and Team-work at the workplace.
3. Be able to work as a team with other artisans and professionals.
4. Carry out basic domestic electrical installations, testing of such installations using the appropriate testing instrument.
5. Carry out trunking, surface and conduit wiring in electrical installations as well as safe working practices and the Institute of Electrical Engineers (IEE) regulations regarding electrical wiring.
6. Carry out basic domestic electrical installations, testing of such installations using the appropriate testing instrument.
7. Know, Select and carry out the installation of electrical systems and components, standard safety precaution and testing to confirm the soundness of the systems and components.
8. Carry out various tests like continuity, polarity etc. on electrical systems and know safety regulations in handling testing instruments.
9. Know the different types of cables and conductors, its jointing and termination as well as IEE regulations regarding jointing and termination.
10. Explain terms on illumination, e.g. luminous intensity, lux etc. and also carry out the installation of simple lighting systems.
11. Describe the principles of operation of Alternating Current (AC) and Direct current (DC) machines and Carry out maintenance and repairs in electric motors.
12. Construct an electric panel.

