QUALIFICATION HANDBOOK

Level 2 Diploma in Electrical Installations (Buildings and Structures) (2365-02)

February 2013 Version 1.5

City & Guilds

Qualification at a glance

Subject area	**Electrotechnical**
City & Guilds number	2365-02
Age group approved	16+
Entry requirements	None
Assessment	By online test/practical assignment
Fast track	Available
Support materials	Qualification handbook Assignment guides Text Book available June 2013 Smartscreen available February 2013
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	City & Guilds number	Accreditation number
Level 2 Diploma in Electrical Installation (Buildings and Structures)	2365-02	600/5498/0

Version and date	Change detail	Section
1.1 Aug 2012	Correction of Assessment information	**Assessment**
1.2 Sept 2012	Amended information on where to obtain assessments	**Assessment**
1.3 Sept 2012	Amended timing for duration of Unit 210 test to 40 minutes. Amended typing error in Unit Aim for Unit 201, from 'buisiness services engineering' to 'building services engineering'	**Assessment** **Unit**
1.4 Feb 2013	Added Appendix 3 – Normative references for use in open book examinations	**Appendix 3**
1.5 Feb 2013	Duration of test for unit 202 amended to 90 mins	**Assessment**

Contents

1 Introduction

This document tells you what you need to do to deliver the qualification:

Area	Description
Who is the qualification for?	For candidates who want to work as electricians in the building services engineering sector. This qualification does **not** make candidates fully qualified electricians (see Appendix 2).
What does the qualification cover?	It allows candidates to learn, develop and practise the skills required for employment and/or career progression in the electrotechnology sector. See Appendix 2 for further information.
What opportunities for progression are there?	It allows candidates to progress into employment, although **not** as a fully qualified electrician, or to the following City & Guilds qualifications: • Level 3 Diploma in Electrical Installation (Buildings and Structures) • Level 3 Diploma in Electrotechnology • Level 3 Award in the Initial Verification and Certification of Electrical Installations • Level 3 Award in the Periodic Inspection, Testing and Certification of Electrical Installations.

Structure

To achieve the **Level 2 Diploma in Electrical Installations (Buildings and Structures)**, learners must achieve **49** credits from the mandatory units.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Level	GLH
Mandatory					
T/503/9669	201/501	Health and safety in building services engineering	3	2	26
R/503/9937	202	Principles of electrical science	10	2	89
Y/503/9938	203	Electrical installations technology	12	2	115
R/503/9940	204	Installation of wiring systems and enclosures	21	2	196
J/606/2482	210	Understand how to communicate with others within building services engineering	3	2	28

2 Centre requirements

Approval

Centres already offering City & Guilds qualifications

If your Centre is approved to offer the **2330 Certificate in Electrotechnical Technology** you can apply for the new **Level 2 Diploma in Electrical Installations (Buildings and Structures) (2365-02)** approval using the **fast track approval form**, available from the City & Guilds website.

Centres should use the fast track form if:

- there have been no changes to the way the qualifications are delivered, and
- they meet all of the approval criteria in the fast track form guidance notes.

Fast track approval is available for 12 months from the launch of the qualification. After 12 months, the Centre will have to go through the standard Qualification Approval Process. The centre is responsible for checking that fast track approval is still current at the time of application.

Centres NOT already offering City & Guilds qualifications

To offer this qualification, new centres will need to gain both centre and qualification approval. Please refer to the *Centre Manual - Supporting Customer Excellence* for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Resource requirements

Physical resources and site agreements

Centres can use specially designated areas within a centre to develop practical skills and to assess the simulated practical assignments. The equipment, systems and machinery must meet industrial standards and be capable of being used under normal working conditions.

Human Resources

Staff delivering this qualification must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be technically competent in the area(s) for which they are delivering training and/or have experience of providing training
- hold appropriate qualifications detailed in this handbook
- have recent relevant experience in the specific area they are assessing
- be able to demonstrate occupational competence in the areas of the Building Services Engineering (BSE) for which they are delivering training and/or assessment. This competence must be at a level equal to, or above, the level of training being delivered and must include current knowledge and skills of each industry (for which the assessment is taking place), its techniques, settings, legislative and regulatory requirements, codes of practice and guidance
- have credible experience of providing training and/or assessment.

Centre staff may undertake more than one role, eg tutor and assessor or internal quality assurer, but must never verify their own assessments.

Assessors must;

- hold, or be working towards TAQA (A1/A2 – D32/33 updated) standards and continue to practice to these standards and possess CPD evidence of personally maintaining these standards, or
- have other suitable equivalent assessor qualifications endorsed by the Sector Skills Council and/or the Awarding Organisation.

Assessor Occupational Competence

For the purposes of this qualification, occupational competence will be deemed to have been demonstrated by the verifiable evidence of **one, preferably more,** of the following:

- **a relevant sector** qualification equal to or at a level above the training and/or assessment being delivered. Where earlier forerunner qualifications are held eg City and Guilds Craft or Advanced Craft Certificated, the assessor must demonstrate through CPD evidence a thorough knowledge of the qualification standards that they meet the required criteria
- **an up-to-date CPD record including relevant CPD qualifications**. Assessors must either be able to demonstrate that they are registered and up-to-date with their registration with an appropriate approved industry registration body or have one or more relevant occupational qualifications to demonstrate that they can be regarded as occupationally competent in terms of assessing or verifying the qualification and the unit contained
- **a verifiable CV** of industry experience and current knowledge of industry practice and techniques relevant to the occupational area in which they assess. This verifiable evidence must be **at or above the level being assessed**
- a thorough **knowledge and understanding** of the qualification standards and requirements

Assessor continuing professional development (CPD)

The occupational competence of assessors must be updated on a regular basis and be periodically reconfirmed via CPD evidence and quality assured by City and Guilds.

It is the responsibility of the assessor to make use of opportunities for CPD such as industry conferences and events, access to trade publications and journals, SSC and professional/Trade Association events, at least on an annual basis to enhance and upgrade their professional development and technical knowledge.

It is imperative that evidence records of these CPD opportunities/occasions are maintained and retained in a verifiable CPD record.

Guidance note

Where questions arise about the occupational competence/qualification of an individual/trainer/assessor, these should be referred to the centre's Qualifications Adviser for a decision. The Qualification Advisor may decide to refer the decision to the Portfolio/Group Portfolio Consultant for further consideration.

Candidate entry requirements

City & Guilds does not set entry requirements for this qualification. However, centres must ensure that candidates have the potential and opportunity to gain the qualification successfully.

Age restrictions

This qualification is approved for learners 16+.

Accreditation of prior learning (APL)

Guidance on APL between this qualification and the 2357 qualification will be available on the website by the start of November 2012.

3 Delivering the qualification

Initial assessment and induction

An initial assessment of each candidate should be made before the start of their programme to identify:

- if the candidate has any specific training needs
- support and guidance they may need when working towards their qualification
- any units they have already completed, or credit they have accumulated which is relevant to the qualification
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the candidate fully understands the requirements of the qualification, their responsibilities as a candidate, and the responsibilities of the centre. This information can be recorded on a learning contract.

Induction should also be used to ensure that candidates are aware that this qualification does **not** make them qualified electricians. **All candidates must complete a declaration confirming their understanding. This declaration can be found in Appendix 2.**

Support materials

The following resources are available for this qualification:

Description	How to access
Assignment guides	City & Guilds website
Text Book	Available from May 2013
Smartscreen	Available from January 2013

4 Assessment

Assessment of the qualification

Unit Number	Unit Title	Assessment method	Where to obtain assessment materials
201/501	Health and safety in building services engineering	Practical Assignment (201) City and Guilds on-line multiple choice test (501) The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 2365 webpage. Password available on the Walled Garden.
202	Principles of Electrical Science	City and Guilds on-line multiple choice test The assessment covers the knowledge requirements of the unit and assesses all learning outcomes to verify coverage of the unit.	Test available for booking on the Walled Garden.
203	Electrical Installations Technology	City and Guilds on-line multiple choice test The assessment covers the knowledge requirements of the unit and assesses all learning outcomes to verify coverage of the unit.	Test available for booking on the Walled Garden.
204	Installation of wiring systems and enclosures	Practical Assignment The assessment covers the knowledge and practical requirements of the unit and assesses all learning outcomes to verify coverage of the unit. Externally set assignment, locally marked and externally verified.	Go to **www.cityandguilds.com** and navigate to the 2365 webpage. Password available on the Walled Garden

210	Understand how to communicate with others within building services engineering	City and Guilds on-line multiple choice test The assessment covers the knowledge requirements of the unit and assesses all learning outcomes to verify coverage of the unit.	Test available for booking on the Walled Garden.

Test Specifications

Test: Unit 501 Health and safety in building services engineering
Duration: 1 hour 15 mins

Unit	Outcome	Number of questions	%
501	01 Know health and safety legislation	**4**	**10**
	02 Know how to handle hazardous situations	**14**	**33**
	03 Know electrical safety requirements when working in the building services industry	**7**	**17**
	04 Know the safety requirements for working with gases and heat producing equipment	**8**	**19**
	05 Know the safety requirements for using access equipment in the building services industry	**4**	**9**
	06 Know the safety requirements for working safely in excavations and confined spaces in the building services industry	**5**	**12**
	Total	**42**	**100**

Test: Unit 202 Principles of electrical science
Duration: 90 mins

Unit	Outcome	Number of questions	%
202	01 Know the principles of electricity	**8**	**20**
	02 Know the principles of basic electrical circuits	**6**	**15**
	03 Know the principles of electro-magnetism	**6**	**15**
	04 Know the principles of basic mechanics	**5**	**12.5**
	05 Know electrical quantities in Star Delta configurations	**7**	**17.5**
	06 Know the operating principle of a range of electrical equipment	**4**	**10**
	07 Know the principles of A.C theory	**4**	**10**
	Total	**40**	**100**

Test: Unit 203 Electrical installations technology
Duration: 1 hour 15 mins

Unit	Outcome	Number of questions	%
203	01 Know implications of electrical industry regulations	**3**	**8**
	02 Know how to obtain technical information	**5**	**12**
	03 Know wiring systems of electrical installations	**15**	**38**
	04 Know requirements earthing systems	**9**	**22**
	05 Know how electricity is supplied	**5**	**12**
	06 Know requirements for different types of micro-renewable energies	**3**	**8**
	Total	**40**	**100**

Test: Unit 210 Understand how to communicate with others within building services engineering

Duration: 40 mins

Unit	Outcome	Number of questions	%
210	01 Know the members of the construction team and their role within the building services industry	**5**	**25**
	02 Know how to apply information sources in the building services industry	**9**	**45**
	03 Know how to communicate with others in the building services industry	**6**	**30**
	Total	**20**	**100**

5 Availability of units

The following units can also be obtained from The Register of Regulated Qualifications: **http://register.ofqual.gov.uk/Unit**

Structure of units

These units each have the following:

- City & Guilds reference number
- unit accreditation number (UAN)
- title
- level
- credit value
- guided learning hours
- unit aim
- health and safety requirements
- learning outcomes which are comprised of a number of assessment criteria
- notes for guidance, where applicable.

Unit 201/501 Health and safety in building services engineering

UAN:	**T/503/9669**
Level:	Level 2
Credit value:	3
GLH:	26
Aim:	This combination unit provides learners with the essential health and safety knowledge and skills to demonstrate best practice in a building services engineering environment or sector. The unit provides learners with an awareness of relevant legislation and should underpin all building services engineering activities learners take part in.
Health and safety:	Health and safety behaviour learned in this mandatory unit should be displayed in all arenas.

Learning outcome
The learner will: 1. Know health and safety legislation
Assessment criteria
The learner can: 1.1 State the aims of health and safety legislation 1.2 Identify the responsibilities of **individuals** under health and safety legislation 1.3 Identify statutory and non-statutory **health and safety materials** 1.4 Identify the different **roles** of Health and Safety Executive in enforcing health and safety legislation.

Range
Health and safety legislation The Health & Safety at Work Act, The Electricity at Work Regulations, Control of Substances Hazardous to Health (COSHH) Regulations, Working at Heights Regulations, Personal Protective Equipment at Work Regulations (PPE), Lifting and Manual Handling Operations Regulations, Provision and Use of Work Equipment Regulations, Control of Asbestos at Work Regulations, Health, Safety and Welfare Regulations, Health and Safety (First Aid) Regulations, Confined Spaces Regulations. **Individuals** Employers, employees and contractors, visitors to site. **Health and safety materials** Acts of Parliament, regulations, approved codes of practice, HSE Guidance notes. **Roles** Improvement notice, prohibition notice, powers of prosecution, providing advice and guidance.

Learning outcome
The learner will: 2. Know how to handle hazardous situations
Assessment criteria
The learner can: 2.1 Identify common **hazardous situations** found on site 2.2 Describe safe systems at work 2.3 Identify the **categories** of safety signs 2.4 Identify **symbols** for hazardous substances 2.5 List common **hazardous substances** used in the building services industry 2.6 List **precautions** to be taken when working with hazardous substances 2.7 Identify the **types of asbestos** that may be encountered in the workplace 2.8 Identify the **actions** to be taken if the presence of asbestos is suspected 2.9 Describe the **implications** of being exposed to asbestos 2.10 State the application of different types of **personal protective equipment** 2.11 Identify the **procedures for manually handling** heavy and bulky items 2.12 Identify the **actions** that should be taken when an accident or emergency is discovered 2.13 State procedures for handling injuries sustained on-site 2.14 State the **procedures for recording accidents** and near misses at work.

Range
Hazardous situations Trailing leads, slippery or uneven surfaces, presence of dust and fumes, handling and transporting equipment or materials, contaminants and irritants, fire, working at heights, malfunctioning equipment, improper use and storage of tools and equipment, potential presence of asbestos. **Safe systems at work** Method statements, permit to work systems, risk assessments, safety signs and notices. **Categories** Mandatory, prohibition, information, warning. **Symbols** Toxic, harmful, corrosive, irritant, oxidising, extremely flammable. **Hazardous substances** Lead - solid and fume, solvents and lubricants, fluxes, jointing compounds, sealants, gases – LPG, oxy-acetylene and carbon dioxide, cleaning agents. **Precautions** PPE, ventilation, risk assessment, method statements, safe systems of work. **Types of asbestos** White asbestos (Chrysotile), brown or grey asbestos (Amosite), blue asbestos (Crocidolite), asbestos cement materials. **Actions** Stop working immediately, report to supervisor. **Implications** Long-term health implications (mesothelioma, asbestosis). **Personal protective equipment** Clothing protection including high visibility, Eye protection, Hand protection, Head protection, Foot protection, Hearing protection, Respiratory protection. **Procedures for manually handling** Single, two-person lift, mechanical lift. **Actions** Raising the alarm, contact emergency services, follow typical emergency evacuation procedures, inform supervisor. **Procedures for handling injuries** Make self safe, make area safe, administer first aid where appropriate, contact emergency services, contact nominated first aid person, contact supervisor. **Procedures for recording accidents** RIDDOR, the use of company accident books, details to be recorded.

Learning outcome
The learner will: 3. Know electrical safety requirements when working in the building services industry
Assessment criteria
The learner can: 3.1 Identify the common **electrical dangers** to be aware of on site 3.2 List different **sources** of electrical supply for tools and equipment 3.3 Describe **reasons** for using reduced low voltage electrical supplies for tool and equipment on site 3.4 Identify how to conduct a **visual inspection** of portable electrical equipment for safe condition before use 3.5 State **actions** to take when portable electrical equipment fails visual inspection 3.6 Outline the Safe Isolation Procedure 3.7 State the **procedures** for dealing with electric shocks.

Range
Electrical dangers Faulty electrical equipment, damaged electrical equipment, exposed conductors, damaged insulation, worn electrical cables and cords, trailing cables, proximity of cables, buried/hidden cables. **Sources** Battery powered supplies, 110 volt supplies, 230 volt supplies, generating sets. **Reasons** Increased likelihood for damage to equipment, operative in better contact with earth, protect from electric shock, reduces trailing leads. **Visual inspection** Checking for a valid PAT test, Inspection for general condition. **Actions** Remove from use, report to supervisor. **Procedures** Removal from supply, CPR method, contact emergency services, report to supervisors, treatment of minor burns.

Learning outcome
The learner will: 4. Know the safety requirements for working with gases and heat producing equipment
Assessment criteria
The learner can: 4.1 Identify different **types of gases** used on site 4.2 Describe how bottled gases and equipment should be safely transported and stored 4.3 Describe how to conduct a **visual inspection** on heat producing equipment for safe condition 4.4 Describe how **combustion** takes place 4.5 State the **dangers** of working with heat producing equipment 4.6 State the **procedures** to follow on discovery of fires on site 4.7 Identify different classifications of fires 4.8 Identify types of fire **extinguisher** for different classifications of fires.

Range
Types of gases Propane, butane, oxy-acetylene, nitrogen. **Visual inspection** Inspection for general condition. **Combustion** Three elements of the fire triangle. **Dangers** Fires, burns, fumes, equipment damage, explosions. **Procedures** Raise the alarm, follow safety evacuation procedures, fight fire if trained to do so. **Classifications of fires** Class A, B, C, D, electrical fires. **Fire extinguisher** Carbon dioxide, water, powder, foam.

Learning outcome
The learner will: 5. Know the safety requirements for using access equipment in the building services industry
Assessment criteria
The learner can: 5.1 Identify different types of access equipment 5.2 Select suitable equipment for carrying out work at heights based on the **work being carried out** 5.3 Describe the **safety checks** to be carried out on access equipment 5.4 Describe safe erection methods for **access equipment**.

Range
Types of access equipment Step ladders, ladders, roof ladders and crawling boards, mobile tower scaffolds, podiums fixed scaffolds and edge protection, mobile elevated work platforms including scissor lifts and cherry pickers, telescopic ladders. **Work being carried out** Duration at work, action points for heights. **Safety checks** Visual, tagging, fit for purpose, secure level ground. **Access equipment** Step ladders, ladders, roof ladders, mobile tower scaffolds, podiums, telescopic ladders.

Learning outcome
The learner will: 6. Know the safety requirements for working safely in excavations and confined spaces in the building services industry
Assessment criteria
The learner can: 6.1 Identify the situations in which it may be necessary to work in excavations 6.2 Describe how excavations should be **prepared** for safe working 6.3 State **precautions** to be taken to make excavations safe 6.4 Identify areas where working in **confined space** may be a consideration 6.5 State **safety considerations** when working in confined spaces.

Range
Prepared Safe access into the excavation, trench support systems. **Precautions** Use of warning signs, use of barriers, vehicle proximity to excavation edges. **Confined space** Drainage systems, Plant rooms, Main service duct-rooms, In tanks, cylinders, boilers or cisterns, Under suspended timber floors, In roof spaces. **Safety considerations** Ventilation, lighting, PPE, evacuation procedures, medical conditions, lone working.

Learning outcome
The learner will: 7. Be able to apply safe working practice
Assessment criteria
The learner can: 7.1 Perform **manual handling** techniques 7.2 Manually handle loads using mechanical lifting aids 7.3 Demonstrate the safe method of assembly of **access equipment** 7.4 Use access equipment safely.

Range
Manual handling Single, two-person lift. **Access equipment** Step ladders, ladders, mobile tower scaffolds.

Unit 201/501 Health and safety in building services engineering

Supporting information

Guidance

Electrical equipment

Includes power tools, lights etc

Safe Isolation Procedure

Recommend referring to JIB Safe Isolation Procedure

On Site

Where reference to 'on site' is made in this unit, the intention is that this covers building sites and domestic sites.

It is recommended that assessors cover employee rights in relation to Health & Safety.

This First Aid element of this unit is not intended to replicate a full First Aid course but to give learners the underpinning knowledge to understand the types of injuries they may come across in a work place.

Unit 202 Principles of electrical science

UAN:	**R/503/9937**
Level:	Level 2
Credit value:	10
GLH:	89
Aim	The aim of this unit is to enable the candidate to know the basic principles of electrical science. This knowledge provides the foundation for electrical installations which can be applied when designing wiring systems for clients and when inspection and testing electrical installations.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome
The learner will: 1. Know the principles of electricity
Assessment criteria
The learner can: 1.1 Describe the reaction of electrons when charged to form an electric current 1.2 Identify **sources** of an electromotive force 1.3 Describe the **effects** of an electric current 1.4 Identify SI Units for various **electrical quantities** 1.5 Transpose basic formulae.

Range
Sources Chemical, magnetic, thermal. **Effects** Chemical, magnetic, thermal. **SI Units** Quantity symbol, unit symbol, multiples, sub-multiples. **Electrical quantities** Current, potential, resistance, resistivity, temperature, mass, force, magnetic flux, magnetic flux density, period, frequency, power, energy, time, length, area, mass, weight. **Basic formulae** Ohm's law, transformer formulas, Magnetism formulas, Pythagoras formulas, trigonometry (for power factor and a.c. theory).

Learning outcome
The learner will: 2. Know the principles of basic electrical circuits
Assessment criteria
The learner can: 2.1 Calculate resistance of a **conductor** in a basic electrical circuit 2.2 Apply Ohm's law to **electrical circuits** 2.3 Calculate power in a basic electrical circuits 2.4 State how **instruments** are connected into circuits in order to measure electrical quantities.

Range
Conductors (all @ 20˚celsius) Copper conductor, aluminium conductor, silver conductor, gold conductor, brass conductor. **Electrical circuits** Series, parallel. **Instruments** Voltmeter, ammeter, wattmeter, ohmmeter.

Learning outcome
The learner will: 3. Know the principles of electro-magnetism
Assessment criteria
The learner can: 3.1 Describe the magnetic flux patterns of **electromagnets** 3.2 Apply Flemings right hand rule to the operating principles of a simple alternator 3.3 Calculate magnitudes of a generated EMF 3.4 State how an alternator produces a sinusoidal waveform output 3.5 Calculate sinusoidal quantities 3.6 State the reason for **a.c. distribution**.

Range
Electromagnets Current carrying conductor, solenoid, inductor, magnetic poles, relays. **Sinusoidal quantities** R.M.S voltage, average voltage, instantaneous voltage, peak voltage, peak to peak voltage, periodic time, frequency. **a.c. distribution** Step up transformers, step down transformers.

Learning outcome
The learner will: 4. Know the principles of basic mechanics
Assessment criteria
The learner can: 4.1 Calculate **quantities** of mechanical loads 4.2 Calculate the efficiency of a machine expressed as a percentage 4.3 Calculate mechanical advantage gained by use of **levers.**

Range
Quantities Force, mass, gravity, acceleration, work done, power, time. **Levers** 1st order levers, 2nd order levers.

Learning outcome
The learner will: 5. Know electrical quantities in Star Delta configurations
Assessment criteria
The learner can: 5.1 Differentiate between **voltages** and **currents** in Star configured loads 5.2 Differentiate between **voltages** and **currents** in Delta configured loads 5.3 Describe why single phase loads should be **balanced** across a three line supply.

Range
Voltages Line voltage, phase voltage. **Currents** Line current, phase current. **Balanced** No neutral current, neutral current values (simple methods).

Learning outcome
The learner will: 6. Know the operating principle of a range of electrical equipment
Assessment criteria
The learner can: 6.1 Describe the operating principle of **electrical equipment** 6.2 Apply Flemings left hand rule to determine the direction of rotation of a motor 6.3 Describe the operating principle of **transformers.**

Range
Electrical equipment Basic a.c. motors, basic d.c machines, fluorescent luminaires, relays. **Transformers** Self inductance, mutual inductance, turns ratio, potential transformer, current transformer, isolating transformer.

Learning outcome
The learner will: 7. Know the principles of A.C theory
Assessment criteria
The learner can: 7.1 State the **effects** of components in a.c circuits 7.2 State characteristics of **power quantities** for an a.c. circuit 7.3 Describe why power factor **correction** is required 7.4 Describe how power factor **correction** may be achieved.

Range
Effects Resistance, inductance, capacitance, impedance, reactance. **Power quantities** Apparent power (KVA), Reactive power (KVAr), True Power (KW), power triangles. **Correction** Use of capacitors, load correction, bulk correction, synchronous motor.

Unit 203 Electrical installations technology

UAN:	**Y/503/9938**
Level:	Level 2
Credit value:	12
GLH:	115
Aim:	The purpose of this knowledge unit is for the candidate to gain knowledge of the underpinning principles and industry standards and requirements of electrical installation technology. They will know about sources of information and the types of information they provide about wiring systems. They will also know about earthing systems and the installation of wiring systems.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome
The learner will: 1. Know implications of electrical industry regulations
Assessment criteria
The learner can: 1.1 Identify **statutory regulations** 1.2 Identify **non statutory regulations** 1.3 State **implications** of statutory regulations 1.4 State **implications** of non-statutory regulations.

Range
Statutory regulations HASAWA, EAWR, ESQCR, PUWER, COSHH, CDM, Manual Handling, PPE, Noise at Work, Environmental Act, DDA, Equal Opportunities. **Non statutory regulations** BS7671, On-Site Guide, Unite Union Book, Guidance Notes, Codes of Practice. **Implications** Prosecution, fine, imprisonment, prohibition notices, improvement notices, dismissal, injury, death, loss of earnings, lost clients, loss of reputation.

Learning outcome
The learner will: 2. Know how to obtain technical information
Assessment criteria
The learner can: 2.1 State purpose of different **sources** of technical information 2.2 Recognise different **drawing types** 2.3 Recognise **symbols** used in drawings 2.4 Convert scale from drawings to actual dimensions.

Range
Sources Specifications (to select correct materials), drawings (provide technical information on wiring systems), BS7671 On-Site Guide, Unite Union Book, manufacturers data, Guidance Notes (install in accordance with regulations), client's needs. **Drawing types** As fitted drawings, circuit diagrams, block diagrams, schematics, wiring diagrams, bar charts. **Symbols** Switching (one way, two way, intermediate, pull, switched socket outlets, unswitched socket outlets, fused connection units, switched fused connection units) lighting points (fluorescent, incandescent, wall), cooker control unit, consumer control unit, integrated meter, fuse, circuit breaker.

Learning outcome
The learner will: 3. Know wiring systems of electrical installations
Assessment criteria
The learner can: 3.1 Describe principles of operation of different **circuit types** 3.2 Identify **wiring systems** for different **environments** 3.3 Determine minimum current carrying capacity of live conductors for given **installation conditions** 3.4 State **applications** of different types of **protective devices** 3.5 Identify purpose of **specialised** equipment for installing **wiring systems** 3.6 Calculate spacing factor of **wiring enclosures.**

Range
Circuit types Lighting, power and heating, alarm and emergency systems, data communications, control circuits, ring final, radial. **Wiring systems** Cable tray, cable trunking, cable conduit, ladder racking, thermoplastic multi-core, flat profile, SWA, MICC, FP200, thermoplastic single-core, support methods and requirements, component parts. **Environments** Domestic, commercial, hazardous, industrial installation, agricultural. **Installation conditions** Ib In Iz It, Ca, Cc, Cf, Cg, Ci, voltage drop. **Applications** Domestic, commercial, hazardous, industrial installation, agricultural, load characteristic. **Protective devices** Fuses (BS88 (gM, gG), BS3036, BS1362), circuit breaker BSEN60898 types b, c and d, RCD BSEN 61008, RCBO BSEN 61009 types b, c and d. **Specialised** Conduit and tray benders, stocks, dies, formers. **Wiring enclosures** Conduit, trunking.

Learning outcome
The learner will: 4. Know requirements earthing systems
Assessment criteria
The learner can: 4.1 Identify different types of **earthing systems** 4.2 Identify **component parts** of Automatic Disconnection of Supply (ADS) 4.3 Identify exposed conductive parts 4.4 Identify extraneous conductive parts 4.5 Identify **component parts** of an earth loop impedance path.

Range
Earthing systems TT, TN-S, TN-C-S. **Component parts** CPC, main protective bonding conductor, supplementary equipotential bonding conductor, earthing conductor, protective devices, earth electrode. **Exposed conductive parts** Steel conduit, steel trunking, steel tray, steel enclosures of wiring systems, metal accessories, metallic equipment. **Extraneous conductive parts** Metallic service pipes (gas, oil, water), steel duct work, structural steel. **Component parts** Zs, Ze, R1, R2, main earthing terminal (MET), supplier's earth return path.

Learning outcome
The learner will: 5. Know how electricity is supplied
Assessment criteria
The learner can: 5.1 Identify **methods** of generating electricity for distribution 5.2 Identify transmission voltages 5.3 Identify distribution voltages 5.4 State the **component parts** of the electrical distribution network.

Range
Methods Coal, oil, biomass, wind, wave, hydro, nuclear, photo-voltaic, gas, micro-generation. **Transmission voltages** 400KV, 275KV, 132KV. **Distribution voltages** 33KV, 11KV, 400/230V. **Component parts** Sub-stations, pylons, power stations, cables, insulators, transformers.

Learning outcome
The learner will: 6. Know requirements for different types of micro-renewable energies
Assessment criteria
The learner can: 6.1 Describe types of micro-renewable energies 6.2 Identify requirements for installation of micro-renewable energies 6.3 Identify advantages and disadvantages of **micro-renewable energies.**

Range
Micro-renewable energies Solar thermal (hot water), ground source heat pump, air source heat pump, biomass, solar photovoltaic, micro-wind, micro-hydro, micro-combined heat and power (heat led), rainwater harvesting, greywater re-use. **Requirements** Legal, regulatory, building location, building fabric.

Unit 204 Installation of wiring systems and enclosures

UAN:	**R/503/9940**
Level:	Level 2
Credit value:	21
GLH:	196
Aim:	This practical unit will develop in learners the skills required to install wiring systems to recognised standards. Learners will learn to use tools and materials effectively in completing well defined tasks for electrical installations. In addition to learning to install systems, learners will also develop skills to inspect and test wiring systems.
Health and safety:	Health and safety behaviour learned in mandatory unit 201/501 should be displayed in all arenas.

Learning outcome
The learner will: 1. Know tools used to install wiring systems
Assessment criteria
The learner can: 1.1 Identify **hand tools** for different tasks 1.2 Identify **power tools** for different tasks 1.3 Describe **safety checks** used for tools.

Range
Hand tools Rules, levels, gauges, plumb lines, cable cutters, screwdrivers, wire strippers, knife, files, reamers, wrenches, hammer, saws. **Power tools** Drill, hammer drill, pillar drill, electric screwdriver. **Safety checks** Check safe to use, correct speed setting, correct attachments, attached correctly, guards in place, correct PPE, best performance (sharp).

Learning outcome
The learner will: 2. Know how to prepare for installing wiring systems
Assessment criteria
The learner can: 2.1 Identify possible **hazards** in the workspace 2.2 Identify **PPE** for different tasks 2.3 Select access equipment.

Range
Hazards Circuit isolation, safe working practices, risk assessment/method statement. **PPE** Hard hat, safety glasses, safety shoes, gloves, ear defenders, protective work wear. **Access Equipment** Ladders, hop up.

Learning outcome
The learner will: 3. Be able to install wiring systems
Assessment criteria
The learner can: 3.1 Select materials from drawings 3.2 Mark out dimensions on work areas from drawings 3.3 Fix accessories to dimensions from drawings 3.4 Install wiring systems 3.5 Terminate **wiring systems** 3.6 Maintain safe working practices 3.7 Use JIB safe isolation procedures.

Range
Wiring Systems Single and multicore thermoplastic cable, multicore armoured cable, cable tray, cable conduit (steel and PVC), cable trunking.

Learning outcome
The learner will: 4. Be able to bond mains services to main earthing terminal
Assessment criteria
The learner can: 4.1 Identify cable sizes 4.2 Terminate cables 4.3 Connect bonding clamps 4.4 Test continuity.

Learning outcome
The learner will: 5. Be able to inspect a 'dead electrical installation.
Assessment criteria
The learner can: 5.1 Verify that wiring systems conform to IET standards.

Learning outcome
The learner will: 6. Be able to test a dead electrical installation
Assessment criteria
The learner can: 6.1 Test continuity of protective conductor 6.2 Test ring final circuit 6.3 Test insulation resistance 6.4 Test polarity 6.5 Test **functionality** 6.6 Record test results.

Range
Functionality Of switches and devices by movement, by continuity test Live under supervision.

Unit 210 Understand how to communicate with others within building services engineering

UAN:	**J/602/2482**
Level:	Level 2
Credit value:	3
GLH:	28
Aim:	This knowledge unit provides learning in the development and continued maintenance of effective working relationships in the building services industry associated with work in dwellings, industrial and commercial premises and for private and contract type clients.

Learning outcome
The learner will: 1. Know the members of the construction team and their role within the building services industry
Assessment criteria
The learner can: 1.1 Identify the key roles of the site management team: • architect • project manager/clerk of works • structural engineer • surveyor • building services engineer • quantity surveyor • buyer • estimator • contracts manager • construction manager. 1.2 Identify the key roles of the individuals that report to the site management team: • sub contractors • site supervisor • trade supervisor • trades: o bricklayer o joiner o plasterer o tiler o electrician o H&V fitter o gas fitter o decorator o ground workers 1.3 Identify the key roles of site visitors: • building control inspector • water inspector • HSE inspector • electrical services inspector.

Learning outcome
The learner will: 2. Know how to apply information sources in the building services industry
Assessment criteria
The learner can: 2.1 Identify the types of statutory legislation and guidance information that applies to working in the industry: • legislation o data protection o equal opportunities o health & safety o employment • regulations • british standards • codes of practice • manufacturer guidance: o installation instructions o service & maintenance instructions o user instructions 2.2 Identify the purpose of information that is used in the workplace: • job specifications • plans/drawings o work programmes • delivery notes • time sheets • policy documentation – health & safety, environmental, customer service 2.3 Identify the purpose of information given to customers: • quotations • estimates • invoices/statements • statutory cancelation rights • handover information 2.4 State the importance of company policies and procedures that affect working relationships: • company working policies/procedures: o behaviour o timekeeping o dress code o contract of employment • limits to personal authority: o apprentices o level 2 qualified staff o level 3 qualified staff • supervisor and management responsibilities.

Learning outcome
The learner will: 3. Know how to communicate with others in the building services industry
Assessment criteria
The learner can: 3.1 Identify suitable communication methods for use in work situations: • oral communication • written communication: o e-mail o fax o letter 3.2 Define methods of effective communication for people with: • physical disabilities • learning difficulties • language differences: o dialects o accents o foreign and second language issues 3.3 State the actions to take to deal with conflicts between: • customers and operatives • co-workers • supervisors and operatives 3.4 State the effects that poor communication may have on an organisation: • between operatives • between operatives and management • company to customer.

Appendix 1 Relationships to other qualifications

Links to other qualifications

This qualification has connections to the:

- Level 3 Diploma in Electrical Installations (Buildings and Structures) (2365)
- Level 2 NVQ in Plumbing and Heating (6189)
- Level 3 NVQ in Plumbing and Heating (6189)
- Level 3 NVQ in Electrotechnical Services (2357)
- Level 2 NVQ in Heating and Ventilating (6188)
- Level 3 NVQ in Heating and Ventilating (6188)
- Level 2 NVQ in Refrigeration and Air Conditioning (6087)
- Level 3 NVQ in Refrigeration and Air Conditioning (6087)
- Level 2 Diploma in Plumbing Studies (6035)
- Level 3 Diploma in Plumbing Studies (6035)
- Level 2 Diploma in Heating and Ventilating (7188)
- Level 3 Diploma in Heating and Ventilating (7188)
- Level 2 Diploma in Refrigeration, Air Conditioning and Heat Pump Systems (7189)
- Level 3 Diploma in Refrigeration, Air Conditioning and Heat Pump Systems (7189)

Literacy, language, numeracy and ICT skills development

This qualification can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see **www.cityandguilds.com/functionalskills**
- Essential Skills (Northern Ireland) – see **www.cityandguilds.com/essentialskillsni**
- Essential Skills Wales – see **www.cityandguilds.com/esw**

Appendix 2 Disclaimer

This document must be completed by the candidate and the tutor as part of the qualification induction.

You have been enrolled on the **Level 2 Diploma in Electrical Installations (Buildings and Structures) (2365-02).** This is a qualification that tests both practical and knowledge based skills in a realistic working environment. When you have successfully completed this qualification you will be at an **Improver/Electrician's Mate** level.

In order to fully qualify as an Electrician you will need to fully meet the performance criteria as laid down in the National Occupational Standards put together by Summit Skills, the Sector Skills Council. This is covered in the City and Guilds 2357 Level 3 NVQ Diploma in Electrotechnical Technology.

Your tutor/assessor will be able to explain how you may progress onto the City and Guilds 2357 Level 3 NVQ Diploma in Electrotechnical Technology. **However, you should be aware that the relevant performance units will need to be carried out in industry.** Completion of the 2357 will enable you to apply to join an industry graded or competent person's scheme.

I can confirm that as part of my induction the above statement has been explained and I understand that completing the City and Guilds Level 2 Diploma in Electrical Installations (Buildings and Structures) (2365-02) qualification <u>will not make me a fully qualified Electrician.</u>

Candidate _____ Date _____

Tutor _____ Date-_____

Appendix 3 Normative references for use in open book examinations

203 Electrical installations technology

- IET On-Site Guide (BS 7671:2008 Wiring Regulations)

Appendix 4 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on **www.cityandguilds.com**.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- Regulatory Arrangements for the Qualifications and Credit Framework (2008)
- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information such on such things as:

- **Walled Garden**: how to register and certificate candidates on line
- **Qualifications and Credit Framework (QCF)**: general guidance about the QCF and how qualifications will change, as well as information on the IT systems needed and FAQs
- **Events**: dates and information on the latest Centre events
- **Online assessment**: how to register for GOLA/e-volve assessments.

Useful contacts

UK learners **General qualification information**	**T: +44 (0)844 543 0033** **E: learnersupport@cityandguilds.com**
International learners General qualification information	T: +44 (0)844 543 0033 F: +44 (0)20 7294 2413 E: **intcg@cityandguilds.com**
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **centresupport@cityandguilds.com**
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: **singlesubjects@cityandguilds.com**
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **intops@cityandguilds.com**
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: **walledgarden@cityandguilds.com**
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: **business@cityandguilds.com**
Publications Logbooks, Centre documents, Forms, Free literature	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413

If you have a complaint, or any suggestions for improvement about any of the services that we provide, email:
feedbackandcomplaints@cityandguilds.com

About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Land Based Services (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

Published by City & Guilds, a registered charity established to promote education and training

City & Guilds
1 Giltspur Street
London EC1A 9DD
T +44 (0)844 543 0000
F +44 (0)20 7294 2413
www.cityandguilds.com

HB-01-2365