QUALIFICATION HANDBOOK

Level 4 Award in the Design and Verification of Electrical Installations (2396-01)

November 2011 Version 1.0

City & Guilds

Qualification at a glance

Subject area	Building and Construction
City & Guilds number	2396
Age group approved	18+
Assessment	Assignment and dated entry exam
Fast track	Automatic approval available in some cases
Support materials	Centre handbook Assessment pack
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	City & Guilds number	Accreditation number
Level 4 Award in the Design and Verification of Electrical Installations	2396-01	600/3722/2

Contents

1 Introduction

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

Area	Description
Who is the qualification for?	It is intended for personnel in electrical contracting companies who have responsibility for the quality of the design, specification, installation and testing process. It addresses, in particular, the implications of the Wiring Regulations for Electrical Installations.
What does the qualification cover?	It allows candidates to learn, develop and practise the skills required designing and scoping electrical installations.
Who did we develop the qualification with?	The qualifications are endorsed by SummitSkills the Sector Skills Council for the building services engineering sector.
What opportunities for progression are there?	It allows candidates to progress into employment or to the following City & Guilds qualifications: • Level 4 Higher Professional Diploma in Building Services Engineering (4467-04) • ILM Management and Leadership qualifications

Structure

To achieve the **Level 4 Award in the Design and Verification of Electrical Installations**, learners must achieve **10** credits from the mandatory units.

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Mandatory			
J/503/5593	401	Design, construction management and initial verification of electrical installations (Assignment)	10
	402	Design, construction management and initial verification of electrical installations (written)	

2 Centre requirements

Approval

If your Centre is approved to offer the qualification Level 3 Certificate in the Certification of Electrical Installations (Design, Erection and Verification of Electrical Installations) (2391-20) you will receive automatic approval to offer the new Level 4 Award in the Design and Verification of Electrical Installations (2396-01).

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 must provide access to sufficient equipment in the centre or workplace to ensure candidates have the opportunity to cover all of the practical activities.

The Assignment guide gives details on the specifications of any practical rig which must be built.

Centre staffing

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 for which they are delivering training and/or have experience of providing training
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.

Centre staff may undertake more than one role, eg tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Assessors and internal verifiers

Assessor/Verifier (A/V) units are valued as qualifications for centre staff, but they are not currently a requirement for the qualification.

Continuing professional development (CPD)

Centres must support their staff to ensure that they have current knowledge of the occupational area, that delivery, mentoring, training,

assessment and verification is in line with best practice, and that it takes account of any national or legislative developments.

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.

Before undertaking this qualification candidates should seriously consider undertaking the Level 3 Award in Initial Verification and Certification of Electrical Installations (2394) and/or Level 3 Award in the Periodic Inspection, Testing and Certification of Electrical Installations (2395) as well as obtaining industry experience. It is also strongly recommended that candidates have achieved either the City & Guilds Certificate in the Requirements for Electrical Installations (BS7671) (2382) or similar qualifications where candidates have demonstrated knowledge and understanding of the 17th edition in order to ensure they have every opportunity of achieving this qualification.

Age restrictions

City & Guilds cannot accept any registrations for candidates under 18 as this qualification is not approved for under 18s.

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
- 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.

Support materials

The following resources are available for this qualification:

Description	How to access
Assignment guide for centres	**www.cityandguilds.com**
SmartScreen	**www.smartscreen.co.uk**

4 Assessment

Candidates must:

- successfully complete one assignment
- successfully complete dated entry written exam

Unit	Title	Assessment method
401	Design, construction management and initial verification of electrical installations (Assignment)	Assignment The assignment covers the skills and knowledge in the unit. It is set by City & Guilds, delivered and marked by the tutor/assessor, and will be externally verified by City & Guilds to make sure it is properly carried out.
402	Design, construction management and initial verification of electrical installations (Written)	City & Guilds written test It is set and marked by City & Guilds.

Test specifications

The way the knowledge is covered by each test is laid out in the table below:

Assignment: Unit 401
Duration: 40 hours

Unit	Outcome	Number of questions	%
401	1 Understand the relationship with statutory and non statutory requirements relating to electrical design, construction management and verification	1	8.3
	2 Understand the electrical installation design, construction and commissioning process	3	25
	4 Understand fundamental principles for the design and installation of associated protective systems relating to electrical installations	1	8.3
	5 Understand factors that affect choice of sources and environmental technologies used within electrical installation design	1	8.3
	6 Be able to apply design and verification procedures for single and poly phase electrical installations	6	50
	Total	**12**	**100**

Written Test Unit 402
Duration: 3 hours

Unit	Outcome	Number of questions	%
402	2 Understand the electrical installation design, construction and commissioning process	2	20
	3 Understand BS 7671 requirements relating to electrical installation design	8	80
	Total	**10**	**100**

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience or qualifications which have already been achieved to contribute to a new qualification.

RPL is not allowed for this qualification.

5 Units

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
- relationship to NOS, other qualifications and frameworks
- endorsement by a sector or other appropriate body
- information on assessment
- learning outcomes which are comprised of a number of assessment criteria

Unit 401/402 Design, construction management and initial verification of electrical installations

UAN:	J/503/5593
Level:	4
Credit value:	10
GLH:	30
Endorsement by a sector or regulatory body:	This unit is endorsed by SummitSkills.
Aim:	The aim of this unit is to enable the candidate to develop the necessary technical knowledge and skills for the design, erection and verification of electrical installations.

Learning outcome
The learner will: 1. understand the relationship with statutory and non-statutory requirements relating to electrical installation design, construction management and verification
Assessment criteria
The learner can: 1.1 explain the relationship between electrical installation design and **statutory/non-statutory regulations**

Learning outcome
The learner will: 2. understand the electrical installation design, construction and commissioning process
Assessment criteria
The learner can: 2.1 identify the information required to form a design specification 2.2 describe the process for designing **final circuits** 2.3 explain the process for designing distribution circuits 2.4 explain methods of determining maximum demand including diversity 2.5 explain why specifications may alter during installation work 2.6 describe the commissioning and handover process of electrical installation work: • Verification documentation and certification

- As fitted drawings
- Operation and maintenance manuals

2.7 identify **techniques** for providing information relating to electrical installation design, construction and verification

Learning outcome
The learner will: 3. understand BS 7671 requirements relating to electrical installation design
Assessment criteria
The learner can: 3.1 interpret fundamental **principles** relating to electrical installation design 3.2 explain the **requirements** for the assessment of general characteristics of an electrical installation 3.3 identify the requirements for **Protective measures** for safety used in electrical installations 3.4 describe the methods used for **Protective measures** for safety used in electrical installations 3.5 explain the **requirements for selection and erection of equipment** in electrical installations 3.6 identify the **requirements for initial verification** of electrical installations 3.7 identify the requirements for special installations or locations as given in BS 7671 3.8 interpret information given in appendices within BS 7671

Learning outcome
The learner will: 4. be able to apply design and verification procedures for single and poly phase electrical installations
Assessment criteria
The learner can: 4.1 apply design calculations relevant to electrical installation design 4.2 select suitable electrical installation **components** 4.3 provide **information** relating to electrical installation design in a suitable format 4.4 critically compare design criteria for electrical installations with results gained from initial verification

Learning outcome
The learner will: 5. understand fundamental principles for the design and installation of associated protective systems relating to electrical installations
Assessment criteria
The learner can: 5.1 state how the design of **associated protective systems** in electrical installations affects the design of an installation

5.2	state fundamental design principles relating to **associated protective systems**

Learning outcome
The learner will: 6. understand factors that affect choice of alternative energy sources and environmental technologies used within electrical installation design
Assessment criteria
The learner can: 6.1 state factors that determine the suitability of **alternative energy sources** 6.2 state **components used in environmental technologies** which form part of the electrical installation 6.3 state **factors that contribute to reduced energy consumption** in a building

Range

statutory/non-statutory regulations
• BS 7671
• IET Guidance Notes
• Electricity at Work Regulations
• Electricity Safety Quality and Continuity Regulations
• The Building Regulations (England & Wales) (Scotland)
• Construction (Design Management) Regulations
 	
final circuits
• Ring final
• Radial
• Power track and buzz bar trunking
• Circuit loading
 	
techniques
• Drawings
• Operation and maintenance manuals
• Manufacturer's documentation
• Certification
• Specifications
• Clients requirements
• Recommendations
 	
principles
• Protection for safety:
  • Protection against electric shock
  • Protection against thermal effects
  • Protection against overcurrent
  • Protection against fault current

- Protection against voltage disturbances and measures against electromagnetic disturbances
- Protection against power supply interruptions
- Additions and alterations
- Design principles:
  - Characteristics of available supply or supplies
  - Nature of demand
  - Electrical supply systems for safety services and standby supplies
  - Environmental conditions
  - Cross sectional area of conductors
  - Type of wiring and method of installation
  - Protective equipment
  - Isolation and switching
  - Protective devices and switching
  - Accessibility of electrical equipment
  - Prevention of mutual detrimental influences
- Erection and initial verification of electrical installations

requirements

- Purpose of supplies and structure
  - Maximum demand and diversity
  - Arrangements of live conductors and earthing arrangements
  - Supplies
  - Division of installation
- Compatibility
- Maintainability
- Continuity of service

Protective measures

- Protection against electric shock
- Protection against thermal effects
- Protection against overcurrent
- Protection against voltage disturbances and electromagnetic disturbances

requirements for selection and erection of equipment

- Compliance with product standards
- Identification and notices
- Wiring systems
- Isolation switching, control and monitoring
- Earthing arrangements and protective conductors
- Current using equipment
  - Rotating machines
  - Accessories
  - Transformers
  - Luminaires and lighting installations

requirements for initial verification

- Inspection
- Testing

components

- Consumer's control equipment
- Earthing arrangements
- External influences
- Wiring and containment systems
- Cables and conductors
- Conductor cross-sectional area
- Protective devices
- Earth fault protection
- Earthing and bonding
- Isolation and switching
- Accessories
- Luminaires and lighting
- Transformers
- Final circuits
- Distribution circuits
- Search protection devices

information

- Drawings
- Operation and maintenance manuals
- Manufacturer's documentation
- Certification
- Specifications
- Clients requirements
- Recommendations

associated protective systems

- Lightning protection systems using zones of protection
- Lightning protection systems component parts
- Methods of protection against corrosion and erosion
- Manual Fire detection systems
- Automatic fire detection systems
- Standby lighting systems
- Self-contained emergency lighting systems
- Centrally supplied emergency lighting systems
- Generator systems for alternative supplies
- UPS systems for alternative supplies

alternative energy sources

- Photovoltaic systems
- Wind turbines

- CHP
- Ground and air source pumps
- Micro-hydro systems

components used in environmental technologies

- Photo voltaic module
- Inverters
- Control and protective devices
- Generators
- Heat pumps

factors that contribute to reduced energy consumption

- Building Management Systems
- Energy control systems

Appendix 1 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 e-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).

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