

City & Guilds Level 3 Award in the Design and Installation of Domestic and Small Commercial Electric Vehicle Charging Installations (2921-31)

Version 1.7 (October 2023)

Qualification Handbook

Qualification at a glance

Subject area	Building Services Industry
City & Guilds number	2921
Age group approved	18+
Entry requirements	Please see the guidance on page 8
Assessment	Online multiple choice test using Evolve Assignment – short answer and scenario-based questions
Grading	Pass / Fail
Approvals	Automatic approval
Support materials	Qualification handbook Assessment pack
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	City & Guilds qualification number	Regulatory reference number	GLH	TQT
City & Guilds Level 3 Award in the Design and Installation of Domestic and Small Commercial Electric Vehicle Charging Installations	2921-31	610/0899/0	16	22

Version and date	Change detail	Section
1.0 May 2022	Initial version	All
1.1 June 2022	Learner entry requirements updated.	Centre requirements
1.2 October 2022	Introduction table amended to add clarification Assessor information clarification Learner entry requirements for Scotland added Test specification for 601 amended Test specification for 301 added Supporting information added	Section 1 Introduction Section 2 Centre requirements Section 4 Assessment Section 5 Unit
1.3 October 2022	Test specification for 301: Correction to the permitted materials	Section 4 Assessment
1.4 February 2023	Access arrangements and reasonable adjustments information amplified	2. Centre requirements
1.5 August 2023	Update to AC 1.2 within unit 301/601 Alterations to range of 1.1	5. Unit
1.6 September 2023	Updates in line with new Code of Practice 1.5	All
1.7 October 2023	Learner entry requirements clarification Assessor requirements clarification	2. Centre requirements

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1 Introduction

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

Area	Description
What is the purpose of this qualification	<p>This qualification is intended as a short course aimed at continual professional development supporting the development of knowledge/understanding of electric vehicle charging design and installations. The qualification is built to reflect the specific requirements in relation to:</p> <ul style="list-style-type: none">• The design and installation of domestic and small commercial electric vehicle charging installations <p>Learners undertaking this course may already be doing the associated roles from a practicing operative capacity, with proven and demonstrable skills in working as skilled and competent electricians and/or electrical installers. Validation of these skills and level of competence are reflected in the entry requirements for this qualification.</p>
Who is the qualification for?	<p>This qualification is aimed at practicing electricians interested in understanding how to design and install the range of electric vehicle charging equipment and systems available. It aims to provide expert guidance to learners wishing to gain further knowledge and understanding of electric vehicle charging equipment design and installation.</p>
What does the qualification cover?	<p>City & Guilds Level 3 Award in the Design and Installation of Domestic and Small Commercial Electric Vehicle Charging Installations (2921-31): The qualification covers additional methods of protecting against open PEN conductor faults and how to assess if an installation has an issue with diverted neutral current. It also covers smart functions in EVSE and relevant items within the installation as a whole. Integration into prosumer's electrical installations including the option of electric vehicles reverse feeding into the installation and/or supply grid.</p>
Who did we develop the qualification with?	<p>BP, Shell, Connected Kerb as well as the wider Electrotechnical sector institutions.</p>
Is it part of an apprenticeship framework or initiative?	<p>No.</p>

Structure

To achieve the **City & Guilds Level 3 Award in the Design and Installation of Domestic and Small Commercial Electric Vehicle Charging Installations (2921-31)**, learners must achieve:

City & Guilds unit number	Unit title	GLH
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Mandatory units:

Learners must achieve the following mandatory unit.

301	Design and installation of domestic and small commercial electric vehicle charging installations	16
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Total Qualification Time

Total Qualification Time (TQT) is the number of notional hours which represents an estimate of the total amount of time that could reasonably be expected for a learner to demonstrate the achievement of the level of attainment necessary for the award of a qualification.

TQT is comprised of the following two elements:

- 1) The number of hours that an awarding organisation has assigned to a qualification for Guided Learning, and
- 2) An estimate of the number of hours a learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by - but, unlike Guided Learning, not under the immediate guidance or supervision of - a lecturer, supervisor, tutor or other appropriate provider of education or training.

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2 Centre requirements

Approval

Automatic approval

If your centre is approved to offer the 2919-01-02 you will be automatically approved to offer the new 2921-31. Please refer to the document **Quality Assurance Standards: Centre Approval Process** 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

Centre staffing

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

- be occupationally competent or technically knowledgeable in the area(s) for which they are delivering training and/or have experience of providing training. This knowledge must be to the same level as the training being delivered
- 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 quality assurer, but cannot internally verify their own assessments.

Tutors must:

- be occupationally competent or technically knowledgeable in the area(s) for which they are delivering training and/or have experience of providing training. This knowledge must be to at least the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.
- have relevant Continuing professional development (CPD)

Assessors must:

- hold an up-to-date qualification* in EVC
- be occupationally competent or technically knowledgeable in the area for which they are assessing. This knowledge must be to at least the same level as the assessment
- ideally have an assessing qualification although not mandatory
- demonstrate CPD to remain current.

** Up to date qualifications are any UK regulated qualification with the purpose to supporting the development of knowledge/understanding of electric vehicle charging installation and maintenance.*

NB For assessors and delivery staff looking to update their qualifications for the purposes of CPD please contact EQA to discuss entry requirements.

Continuing professional development (CPD)

Centres are expected to support their staff in ensuring that their knowledge remains current of the occupational area and of best practice in delivery, mentoring, training, assessment and quality assurance, and that it takes account of any national or legislative developments.

Quality assurance

Approved centres must have effective quality assurance systems to ensure optimum delivery and assessment of qualifications. Quality assurance includes initial centre approval, qualification approval and the centre's own internal procedures for monitoring quality. Centres are responsible for internal quality assurance and City & Guilds is responsible for external quality assurance. For more detail on this visit the [Quality Assurance Standards](#) documents on the City & Guilds website.

Standards and rigorous quality assurance are maintained by the use of:

- Internal quality assurance
- City & Guilds external quality assurance.

In order to carry out the quality assurance role, Internal Quality Assurers must

- have appropriate teaching and vocational knowledge and expertise
- have experience in quality management/internal quality assurance
- hold or be working towards an appropriate teaching/training/assessing qualification
- be familiar with the occupation and technical content covered within the qualification.

External quality assurance for the qualification will be provided by City & Guilds EQA process. EQAs are appointed by City & Guilds to approve centres, and to monitor the assessment and internal quality assurance carried out by centres. External quality assurance is carried out to ensure that assessment is valid and reliable, and that there is good assessment practice in centres.

The role of the EQA is to:

- provide advice and support to centre staff
- ensure the quality and consistency of assessments within and between centres by the use of systematic sampling
- provide feedback to centres and to City & Guilds.

Learner entry requirements

This course is intended for practicing electricians as part of the assessment for this qualification. Learners **must** hold one of the following:

- City & Guilds Level 3 NVQ Diploma in Installing Electrotechnical Systems and Equipment (Buildings, Structures and the Environment) (2357)
- City & Guilds Level 3 NVQ Diploma in Electrotechnical Services (Electrical Maintenance) (2357)
- City & Guilds Level 3 Electrotechnical qualification (5357)
- City & Guilds Level 3 NVQ in Electrotechnical Services Experienced Worker (2356)
- City & Guilds Level 3 Electrotechnical Experienced Worker Qualification (2346)
- Placeholder for City & Guilds Level 3 Electrotechnical in Dwellings Experienced Worker Qualification (2347)
- Other Awarding Organisations equivalences will also be acceptable
- Equivalent historical qualifications (see EAS Table 4B/4C) [EAS Qualifications guide August 2023 \(theiet.org\)](#)
or
- ECS Gold Card (for domestic electrician), JIB Electrician or Approved Electrician Card

For learners in Scotland:

- Any of the above or
- SVQ in Electrical Installation at SCQF level 7 + Up to date BS 7671 Requirements for Electrical Installations

The qualifications above must have been achieved no more than 5 years prior to starting this qualification or there must be evidence the candidate has remained current by holding the latest version of the Wiring regulations qualification.

Age restrictions

This qualification is approved for learners aged 18 or above.

Access arrangements and reasonable adjustments

Access arrangements are adjustments that allow candidates with disabilities, special educational needs and temporary injuries to access the assessment and demonstrate their skills and knowledge without changing the demands of the assessment. These arrangements must be made before assessment takes place.

The Equality Act 2010 requires City & Guilds to make reasonable adjustments where a disabled person would be at a substantial disadvantage in undertaking an assessment.

It is the responsibility of the centre to ensure at the start of a programme of learning that candidates will be able to access the requirements of the qualification.

Please refer to the *JCQ access arrangements and reasonable adjustments and Access arrangements - when and how applications need to be made to City & Guilds* for more information. Both are available on the City & Guilds website:

<http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/access-arrangements-reasonable-adjustments>

3 Delivering the qualification

Initial assessment and induction

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

- if the learner has any specific training needs
- support and guidance they may need when working towards their qualification(s)
- 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 learner fully understands the requirements of the qualification, their responsibilities as a learner, and the responsibilities of the centre. This information can be recorded on a learning contract.

4 Assessment

Assessment of the qualification

Candidates must:

- successfully complete x1 assignment
- successfully complete x1 online multiple choice test

Assessment Types			
Unit	Title	Assessment method	Where to obtain assessment materials
301	Design and Installation of Domestic and Small Commercial Electric Vehicle Charging Installations	Assignment; Short-answer and scenario-based questions	Go to www.cityandguilds.com and navigate to the 2921 webpage. Password available on the Walled Garden.
601	Design and Installation of Domestic and Small Commercial Electric Vehicle Charging Installations	Online multiple choice test	City & Guilds Evolve test system

Assessment strategy

City & Guilds has written the following assessments to use with this qualification:

- Assignment – Short answer and scenario-based questions
- Online multiple choice test.

The knowledge requirements will be tested through the online multiple choice test and the practical requirements will be assessed through the assignment.

Please note that for 2921-301, the examination should be supervised by centre staff. The same assessor who supervises the assessment session may be used for the marking of the assessment.

Time constraints

Qualification registration is valid for three years.

Test specifications

The way the content of the qualification is covered by each assessment is laid out in the tables below,

2921-601: Evolve test

Permitted Materials: IET Code of Practice for Electric Vehicle Charging Equipment Installation (5th edition)

Graded: Pass/Fail

Pass Mark: The pass mark for this examination is set at approx. 75%

Test:	Duration: 45 minutes		
Unit	Outcome	Number of questions	Percentage %
601	01 Know the key requirements relating to electric vehicle charging equipment	4	15%
	02 know different types and features of electric vehicle charging equipment	6	20%
	04 Understand requirements for inspection, testing, commissioning and handover of electric vehicle charging equipment and circuits	14	50%
	05 Understand the use of vehicles as electrical energy storage systems as part of prosumer's installations	4	15%
	Total	28	100%

2921-301: Assignment; Short-answer and scenario-based questions

Assessment conditions: Supervised assignment. Learners must sit the assessment independently.

Permitted Materials:

- BS 7671 Requirements for Electrical Installations, IET Wiring Regulations
- IET On-Site Guide.

Graded: Pass/Fail

Pass Mark: The pass mark for this assignment is set at approx. 75%

Test:	Duration: 90 minutes		
Unit	Outcome	Number of questions	Percentage %
301	03 Be able to design an installation for electric vehicle charging equipment	20	100%

5 Unit

Structure of the unit

The unit has the following:

- City & Guilds reference number
- Title
- Level
- Guided learning hours (GLH)
- Assessment type
- Learning outcomes, which are comprised of a number of assessment criteria
- Range statements
- Supporting information

Guidance for delivery of the units

This qualification is comprised of one **unit**. A unit describes what is expected of a competent person in particular aspects of his/her job.

Each **unit** is divided into **learning outcomes** which describe in further detail the skills and knowledge that a candidate should possess.

Each **learning outcome** has a set of **assessment criteria** (performance, and knowledge and understanding) which specify the desired criteria that must be satisfied before an individual can be said to have performed to the agreed standard.

Range statements define the breadth or scope of a learning outcome and its assessment criteria by setting out the various circumstances in which they are to be applied.

Supporting information provides additional resources that would be useful for learners.

Unit 301/601

Design and installation of domestic and small commercial electric vehicle charging installations

Level:	3
GLH:	16
Assessment type:	2921-301 Assignment 2921-601 Evolve Multiple Choice Test

Learning outcome

The learner will:

01 know the key requirements relating to electric vehicle charging equipment

Assessment criteria

The learner can:

1.1 identify **statutory** and **non-statutory** documents relating to the selection, installation and commissioning of electric vehicle charging equipment

1.2 identify situations that require Traffic Regulation Orders (TRO)

Range

1.1 Statutory

- Electricity at Work Regulations (EAWR)
- Health and Safety at Work etc. Act (HASAWA)
- Electricity Safety, Quality and Continuity Regulations (ESQCR)
- Traffic Regulation order (TRO)
- Building Regulations
- Planning permission

1.1 Non-statutory

- Building regulation approved documents
- IET code of practice for Electric Vehicle Charging Equipment Installation
- BS 7671 Requirements for Electrical Installations
- IET Guidance Notes
 - GN1 Selection & Erection
 - GN2 Isolation & Switching
 - GN3 Inspection & Testing
 - GN4 Protection Against Fire
 - GN5 Protection Against Electric Shock
 - GN6 Protection Against Overcurrent
 - GN7 Special Locations
 - GN8 Earthing & Bonding
- IET On-Site Guide

Learning outcome

The learner will:

02 know different types and features of electric vehicle charging equipment

Assessment criteria

The learner can:

2.1 identify the different **Modes** of charging equipment including suitability for intended location

2.2 state the advantages and disadvantages of different charging modes

2.3 identify the range of plugs and socket-outlets used and the type of **charging connection**

2.4 identify variations in electric vehicle **charging equipment** features

Range

2.1 Modes

- Mode 1
- Mode 2
- Mode 3
- Mode 4

2.3 Charging connections

- Case A
- Case B
- Case C

2.4 Charging equipment

- Power supplies
 - Multiple socket-outlets
 - Feeder pillars
 - Protective devices
 - Timers
 - Built-in energy meters
 - Security features
 - Communication features
 - Wireless integration
-

Learning outcome

The learner will:

03 be able to design an installation for electric vehicle charging equipment

Assessment criteria

The learner can:

3.1 determine what needs to be **assessed prior to installing** electric vehicle charging equipment

3.2 state what needs to be **assessed with regards to the location** of electric vehicle charging equipment

3.3 apply the design and installation requirements in relation to the system earthing and supply arrangements

3.4 use **methods** for selecting **suitable cable** and cable cross-sectional area (csa) to supply charging equipment

- 3.5 explain suitable **methods of protecting against** the risk associated with PEN/CNE conductor faults including the implications of each method
 - 3.6 select suitable methods used for protection against electric **shock protection** which apply to electric vehicle charging systems as detailed in BS 7671
 - 3.7 select suitable types of Residual Current Device (RCD) in relation to the type of charging equipment being protected
 - 3.8 select suitable equipment for isolation, switching, **control** and protection of charging equipment supply circuits
 - 3.9 identify the correct labelling required on circuits and equipment intended for electric vehicle charging
 - 3.10 identify methods of fixing, protecting, and supporting electrical equipment used to supply electric vehicle charging equipment
-

Range

3.1 Assessed prior to installing

- Supply metering
- Adequacy of supply
- Earthing arrangements
- Simultaneous contact assessment
- GPRS coverage
- Manufacturer's requirements
- Planning consent
- Traffic management
- DNO notification
- Client's requirements

3.2 Assessed with regards to the location

- Potentially explosive atmospheres
- Parking spaces
- Single vehicle charging
- Multiple vehicle charging
- Vehicle impact protection
- Control device location
- Socket-outlet location
- Ventilation and cooling
- IP protection

3.3 Installation requirements

- TT
- TN-S
- TN-C-S
- Single-phase
- Three-phase

3.4 Methods

- Using manufacturer's recommendations
- Calculation using BS 7671
- Selecting from IET guidance eg On-Site Guide

3.4 Suitable cable csa

- Current carrying capacity
 - Voltage drop
-

- Circuit resistance to achieve maximum earth fault disconnection times
- Thermal constraints under earth fault conditions

3.5 Methods of protecting against

- Use of earth electrodes
- Voltage measuring devices (Open PEN conductor detection devices)
- Electrical separation

3.7 Shock protection

- Basic Protection
- ADS
- Electrical Separation
- Additional Protection

3.8 Control

- Time charging control
- Demand limiting or load curtailment
- Smart meter integration
- Optimisation for use

Learning outcome

The learner will:

- 04 understand requirements for inspection, testing, commissioning and handover of electric vehicle charging equipment and circuits

Assessment criteria

The learner can:

- 4.1 identify information required to complete an Electrical Installation Certificate
- 4.2 state requirements for a visual inspection during initial verification
- 4.3 explain **methods** used to test circuits installed associated with vehicle charging equipment
- 4.4 state **information and documentation** which is handed to the client on completion and handover
- 4.5 explain the handover procedure including methods used to successfully demonstrate to the client how to operate and maintain equipment
- 4.6 explain the need for firmware and software, including Apps, to be kept up to date.
- 4.7 identify requirements for a Distribution Network Operator/Distribution System Operator (DNO/DSO) notification

Range

4.3 Methods

- Continuity of protective conductors
- Insulation resistance
- Separation of circuits
- Polarity
- Verification of automatic disconnection of supply
- Earth electrode resistance
- Earth fault loop impedance
- Prospective fault current
- Additional protection
- Phase sequence
- Functional testing

4.4 Information and documentation

- Manufacturer's documentation
 - Certification and associated schedules
 - Warranties
 - Instructions
 - Maintenance requirements
 - Firmware updates
 - Software and app updates
-

Learning outcome

The learner will:

- 05 understand the use of vehicles as electrical energy storage systems as part of prosumer's installations

Assessment criteria

The learner can:

- 5.1 identify how electric vehicle charging installations and vehicles can be utilised as energy storage systems
- 5.2 identify special requirements for vehicle to grid services
- 5.3 identify the requirements for island mode operation
- 5.4 explain how other electrical energy storage facilities are arranged
- 5.5 explain how **smart charging** can be integrated into electrical installations
-

Range

5.5 Smart charging

- Unidirectional charging features
- Bi-directional charging features

Supporting information

Suggested learning resources

IET Code of Practice for Electric Vehicle Charging Equipment Installation (5th edition)

IET On-Site Guide to BS 7671

IET Guidance Note 3 Inspection and Testing

BS 7430 Code of practice for protective earthing of electrical installations

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 **Centre Document Library** on **www.cityandguilds.com** or click on the links below:

Quality Assurance Standards: Centre Handbook

This document is for all approved centres and provides guidance to support their delivery of our qualifications. It includes information on

- Centre quality assurance criteria and monitoring activities
- Administration and assessment systems
- Centre-facing support teams at City & Guilds / ILM
- Centre quality assurance roles and responsibilities.

The Centre Handbook should be used to ensure compliance with the terms and conditions of the Centre Contract.

Quality Assurance Standards: Centre Assessment

This document sets out the minimum common quality assurance requirements for our regulated and non-regulated qualifications that feature centre assessed components. Specific guidance will also be included in relevant qualification handbooks and/or assessment documentation.

It incorporates our expectations for centre internal quality assurance and the external quality assurance methods we use to ensure that assessment standards are met and upheld. It also details the range of sanctions that may be put in place when centres do not comply with our requirements, or actions that will be taken to align centre marking/assessment to required standards. Additionally, it provides detailed guidance on the secure and valid administration of centre-assessments.

Access arrangements - When and how applications need to be made to City & Guilds

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 Document Library** also contains useful information on such things as:

- Conducting examinations
- Registering learners
- Appeals and malpractice

Useful contacts

Please visit the Contact Us section of the City & Guilds website, [**Contact us**](#)

City & Guilds

For over 140 years we have worked with people, organisations and economies to help them identify and develop the skills they need to thrive. We understand the life changing link between skills development, social mobility, prosperity and success. Everything we do is focused on developing and delivering high-quality training, qualifications, assessments and credentials that lead to jobs and meet the changing needs of industry.

We partner with our customers to deliver work-based learning programmes that build competency to support better prospects for people, organisations and wider society. We create flexible learning pathways that support lifelong employability, because we believe that people deserve the opportunity to (re)train and (re)learn again and again – gaining new skills at every stage of life, regardless of where they start.

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