

Level 3 in Electrotechnical Services Experienced Worker (2356-99)

July 2014 Version 3.1

Qualification Handbook

Qualification at a glance

Industry area	Building Services Industry
City & Guilds number	2356
Age group approved	19+
Entry requirements	Minimum of 5 years practicing industry experience
Assessment	Learner portfolio of evidence
Approvals	Restricted
Support materials	Centre handbook Assessment pack
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level

Level 3 in Electrotechnical Services - Experienced Worker

City & Guilds number

2356 -99

Version and date	Change detail	Section
3.1 March 2016	Introduction section updated	Introduction
	Phone numbers removed	Useful contacts
	City & Guilds group statement amended	Last page

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1 Introduction

This assessment route is designed solely for those experienced persons who are or have been working in the electrotechnical industry as a practicing electrician for a minimum of 5 years and who can demonstrate their technical knowledge, performance and competence to the industry standards at Level 3 in one of the occupations of this qualification and in line with the current edition of the IET wiring regulations (BS7671).

The objective is that those persons who successfully complete this Experienced Worker Assessment Route will be judged to have met the eligibility requirements sufficient to apply for an ECS Card from the JIB in the occupation that they have qualified.

This assessment route is not suitable for new entrants to the Electrotechnical industry, apprentices or other operatives who require any training or those who have completed an Electrotechnical technical certificate with less than last five years relevant industry experience (relevant industry experience gained whilst training can be acceptable and will need to be verified as meeting the qualification requirements). Such candidates are required to study and complete the training and assessment requirements of:

the Level 3 NVQ Diploma in Installing Electrotechnical Systems and Equipment (Buildings, structures and the environment) (2357) or

the Level 3 Electrotechnical qualification (installation) or (maintenance) (5357).

Where the candidate cannot provide documented evidence of previous technical qualifications, or has qualified outside the UK, the assessor must provide auditable evidence that the knowledge evidence of each unit has been satisfied.

As part of the programme of assessment to achieve this qualification it may be considered necessary for the candidate to take a CPD qualification such as the IET Wiring Regulations (BS7671) or Inspection & Testing.

Candidate eligibility

Ideally and in becoming a practicing electrician, the candidate should have completed one of the relevant electrotechnical theory courses listed below:

- C&G 'A' certificate
- C&G 'A' certificate plus 'B' certificate
- C&G 2360 Part 1
- C&G 2360 Part 1 plus 2360 Part 2
- C&G 2351 L3
- C&G 2330 L2
- C&G 2330 L2 plus C&G 2330 L3

- Other UK based qualifications (such as BTEC, NC/HNC etc.) may also be taken into consideration against the underpinning knowledge requirements of the award.

However, irrespective of the knowledge evidence presented, the assessment centre must be able to show through auditable evidence that the candidate has fully satisfied the knowledge requirements of each unit. The candidate will also be expected to demonstrate acceptable knowledge of the current industry requirements with respect to the IET Wiring Regulations and Inspection & Testing.

Candidates must also be able to provide sufficient valid and authentic evidence from site of their previous work to demonstrate that they can fully meet the performance requirements within each unit of this qualification.

It is therefore the responsibility of the centre to establish through robust initial assessment whether or not a candidate is suitable for registration on this assessment route. Documentation used to record this process may be subject to audit.

The assessment

This assessment route is designed to take into account the existing qualifications and experience of a candidate. Therefore, as part of the initial assessment and prior to enrolling on this assessment route, the candidate must provide written evidence and copies of certificates achieved that will help the centre ascertain the suitability of the candidate to be placed on the scheme.

As stated previously, irrespective of the knowledge evidence presented, the assessment centre must be able to show through auditable evidence that the candidate has fully satisfied the knowledge requirements of each unit. The candidate will also be expected to demonstrate acceptable knowledge of the current industry requirements with respect to the IET Wiring Regulations and Inspection & Testing.

The candidate must be able to provide auditable evidence from site that is no more than 24 months old to demonstrate full compliance with the performance criteria of the units in assessment route.

Additionally and once registered to the scheme, the centre will carry out no less than one site visit to observe the candidate working. Such a visit will apply holistic assessment across a range of units within the qualification.

Finally, the candidate must also attain (or have attained) the industry independent assessment of occupational competence, the AM2, as provided by industry assessment charity National Electrotechnical Training.

Learners with qualifications gained outside the UK

Candidates with qualifications gained outside the UK will need to meet the same requirements as any candidate following this assessment route.

This assessment route has been designed to take in to account the existing qualifications and experience of the candidate and therefore they must be able to demonstrate to an assessor their understanding of the industry theory and UK wiring regulations as set out in the performance and knowledge requirements of the units of this qualification.

All non UK qualifications must have been fully evaluated by UK Naric. However, under no circumstances can any UK Naric evaluation be used against the practical performance requirements of any unit.

Centre approval and registration

This is a restricted qualification and therefore special permission is required from the Joint Industry Board (JIB) before any centre can become registered to deliver it. Approval from the JIB must be gained prior to making an application to the Awarding Organisation and an annual approval will be required for a centre that wished to remain registered for the delivery qualification. The JIB will charge an administration fee for this approval.

Structure

To achieve the **Level 3 in Electrotechnical Services Experienced Worker - Electrical Installation (Building and Structures)**, learners must achieve a pass in all of the following units.

Level 3 in Electrotechnical Services Experienced Worker - Electrical Installation (Building and Structures)

City & Guilds unit number	Unit title	Level
301	Ensure Safe Site Working	3
302	Diagnose and Correct Faults in Electrotechnical Systems and Equipment	3
303	Provide Technical and Functional Information to People about Electrotechnical Systems and Equipment	3
304	Maintain a Safe and Healthy Working Environment	3
305	Prepare to Install Wiring Systems, Wiring Enclosures and Equipment	3
306	Install Electrical Wiring Systems, Wiring Enclosures and Equipment	3
307	Connect Wiring Systems and Equipment using Safe and Approved Methods	3
308	Inspect, Test and Commission an Electrical Installation	3
399	Electrotechnical occupational competence	3

To achieve the **Level 3 in Electrotechnical Services Experienced Worker - Electrical Maintenance**, learners must achieve a pass in all the following units.

Level 3 in Electrotechnical Services Experienced Worker - Electrical Maintenance

City & Guilds unit number	Unit title	Level
301	Ensure Safe Site Working	3
302	Diagnose and Correct Faults in Electrotechnical Systems and Equipment	3
303	Provide Technical and Functional Information to People about Electrotechnical Systems and Equipment	3
304	Maintain a Safe and Healthy Working Environment	3
309	Prepare to maintain electrical systems and equipment	3
310	Maintain electrical systems and equipment	3
311	Inspect, test and commission maintained electrical systems and equipment	3
399	Electrotechnical occupational competence	3

To achieve the **Level 3 in Electrotechnical Services Experienced Worker (Installing Instrumentation and Associated Equipment)**, learners must achieve a pass in all the following units.

Level 3 in Electrotechnical Services Experienced Worker (Installing Instrumentation and Associated Equipment)

City & Guilds unit number	Unit title	Level
301	Ensure Safe Site Working	3
302	Diagnose and Correct Faults in Electrotechnical Systems and Equipment	3
303	Provide Technical and Functional Information to People about Electrotechnical Systems and Equipment	3
304	Maintain a Safe and Healthy Working Environment	3
312	Prepare to install instrumentation and associated equipment	3
313	Install instrumentation and associated equipment	3
314	Connect, inspect and test instrumentation and associated equipment	3
399	Electrotechnical occupational competence	3

To achieve the **Level 3 in Electrotechnical Panel Building Experienced Worker**, learners must achieve a pass in all the following units.

Level 3 in Electrotechnical Panel Building Experienced Worker

City & Guilds unit number	Unit title	Level
319	Ensure safe working practices for panel building	3
320	Prepare to build panels	3
321	Build panels using safe and approved methods	3
322	Carry out inspection and testing of panels	3
323	Diagnose and correct faults in panels	3
324	Provide technical and functional information to relevant people	3
325	Maintain a healthy and safe working environment when building panels	3
399	Electrotechnical occupational competence	3

To achieve the **Level 3 in Electrotechnical Services Experienced Worker (Installing Public Lighting Systems and Associated Equipment)**, learners must achieve a pass in all the following units.

Level 3 in Electrotechnical Services Experienced Worker (Installing Public Lighting Systems and Associated Equipment)

City & Guilds unit number	Unit title	Level
301	Ensure safe site working	3
302	Diagnose and correct faults in electrotechnical systems and equipment	3
303	Provide technical and functional information to people about electrotechnical systems and equipment	3
304	Maintain a safe and healthy working environment	3
315	Prepare to work on public lighting systems and associated equipment	3
316	Install and connect public lighting systems, components and associated equipment	3
317	Inspect and test public lighting systems and associated equipment	3
318	Carry out emergency work on public lighting systems and associated equipment	3
399	Electrotechnical occupational competence	3

To achieve the **Level 3 in Electrical Machine Repair and Rewind Experienced Worker**, learners must achieve a pass in all the following units .

Level 3 in Electrical Machine Repair and Rewind Experienced Worker

City & Guilds unit number	Unit title	Level
326	Ensure safe working practices for electrical machine repair and rewind	3
327	Prepare electrical machines for repair	3
328	Rewind electrical machines	3
329	Repair electrical machines	3
330	Assemble, inspect and test repaired electrical machines	3
331	Provide technical and functional information to relevant people	3
332	Maintain a healthy and safe working environment when repairing or rewinding machines	3

2 Centre requirements

Approval

This is a restricted qualification and special permission is required from the Joint Industry board (JIB) for a centre to be registered to deliver it. Prospective centres must also be an established City and Guilds centre offering the 2357 or 2356.

Approval from the JIB must be gained prior to making an application to City and Guilds and an annual approval is also required for a centre that wished to continue to be registered for this qualification. The JIB will make an administration fee for this approval.

Centres wishing to register their interest in this qualification route, can email David Thomas **david.thomas@ecscard.org.uk**. On satisfactory approval from the (JIB), the centre can then complete and return the Fast Track Approval form

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. Centres will also have to go through the (JIB) centre approval process (as above).

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 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.

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

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.

Role requirements

All assessors and verifiers should be able to show that they possess formal recognition of achievement of the appropriate assessment and verification units of competence, the A and V units, or show that they are working towards achieving these units of competence. In addition, it is also required that assessors and verifiers have occupational experience, as explained below:

Assessors must:

- possess a qualification relevant to the occupation and level of competence being assessed
- have a suitable level of experience as a qualified operative/practitioner in the electrotechnical sector
- possess a current health and safety qualification; for example, IOSH Working Safely certificate or an approved equivalent.

Internal Quality Assurance

Internal quality assurance is essential to ensuring that the assessment of evidence for units is of a consistent and appropriate quality. Those performing the internal quality assurance role must be occupationally knowledgeable and possess the skills necessary to make quality assurance decisions. It is therefore recommended that it is best practice to hold a V1 qualification or a suitable alternative.

External Verifiers must:

- have had relevant experience of occupational assessment
- a thorough understanding of the national occupational standards for electrotechnical qualifications
- knowledge of current practice and emerging issues in the qualification area
- experience and a working knowledge of the operation and assessment processes specifically for Electrotechnical NVQs/SVQs.

Learner entry requirements

City & Guilds does not set entry requirements for these qualifications. However, this qualification is for learners who are experienced workers and is not suitable for new entrants into the electrotechnical industry. Learners that cannot demonstrate sufficient industry experience should undertake 2357.

3 Delivering the qualification

Initial assessment / induction

This qualification is designed to take into account the existing qualifications and experience of the experienced worker.

However, irrespective of the knowledge evidence presented, the assessment centre must be able to show through auditable evidence that the candidate has fully satisfied the knowledge requirements of each unit. The candidate will also be expected to demonstrate acceptable knowledge of the current industry requirements with respect to the IET Wiring Regulations and Inspection & Testing.

Candidates must also be able to provide sufficient valid and authentic evidence from site of their previous work to demonstrate that they can fully meet the performance requirements within each unit of this qualification.

It is therefore the responsibility of the centre to establish through robust initial assessment whether or not a candidate is suitable for registration on this assessment route. Documentation used to record this process may be subject to audit.

The initial assessment of the candidate must be made before registration to the scheme and should identify:

- if the learner has any specific and permitted training needs (eg. BS 7671)
- the level of support and guidance required when working towards the qualification.

Centres must ensure that the candidate fully understands the requirements of this assessment route, their responsibilities and the responsibilities of the centre. This information should be recorded on a learning contract.

4 Assessment

Summary of assessment methods

In order to successfully complete this assessment route, the candidate must satisfy the component parts of the scheme, namely:

- 1) Attainment of the industry's independent assessment of occupational competence, the AM2, as provided by industry assessment charity National Electrotechnical Training.
- 2) The assessment of job knowledge as specified within each unit of the qualification.
- 3) Evidence from the workplace that demonstrates competence against the performance criteria within each unit of the qualification.

Evidence against the performance criteria of each unit must be provided on three separate occasions with any evidence requirements (range statements) covered across the three occasions.

However, for units 301, 302, 304 and 308 successful attainment of the AM2 provides one such occasion and therefore evidence from the workplace will only be required on two separate occasions.

Assessment of performance should be carried out holistically using a range of approved assessment methods (e.g. reflective account, witness testimony, professional discussion, authenticated and verified photographs) and additionally the centre assessor shall observe the candidate on at least one occasion as part of the evidence gathering process.

5 Units

Structure of units

These units each have the following:

- City & Guilds reference number
- title
- level
- unit overview
- key words and phrases
- performance objectives
- knowledge/learning requirements.

This unit is for:

you if you work on electrotechnical systems and equipment as you will need to ensure that where you work on site is continually safe for electrotechnical working.

This unit is about:

assessing the site for hazards prior to, during and on completion of work on electrotechnical systems and equipment.

This is what you need to show:

that you possess the skills and knowledge to:

- assess the working environment at the site for health and safety purposes
- plan and agree a safe system of work
- carry out safe working practices including the correct use of access equipment
- monitor that the site remains continually safe during working and is left in a safe and secure condition on completion.

What you need to do next:

look at the 'Key Words and Phrases' section. This explains some words and phrases, which have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Access equipment:	In this unit these include: stepladders, trestles, mobile scaffolding, and powered platform systems.
Electrotechnical systems and equipment:	In this unit, this includes: ELV and LV single and multiphase, power, lighting, switchgear and controls.
Relevant person (s):	In this unit these include: customers, clients, client representatives, team-leaders, charge-hands, supervisors, other contractors, non-electrotechnical operatives, colleagues or those working on machine which will be affected by our work.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Site:	In this unit, this refers to the immediate work area or work place.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the electrotechnical work activities are due to take place. The working conditions could vary. It could be, for example, that the work takes place outside, in which case you may need to take account of the weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may cause the site to become hazardous.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks on the site to comply with health and safety regulations and other relevant legislation
2. you plan a safe system of work and agree it with the relevant person(s)
3. you use suitable warning notices and barriers to prevent unauthorised entry to the work site as identified by your assessment of risks
4. you monitor regularly that the working conditions remain safe for work to continue
5. you minimise the risks associated with using tools, plant and access equipment by following health and safety requirements and suppliers' instructions
6. you check that all tools, plant and access equipment available on site are stored safely and securely during work activities and are moved on completion
7. you check that the work site is cleared after the work ends and left in a safe and satisfactory condition in accordance with health and safety regulations and good housekeeping practice.

KNOWLEDGE REQUIREMENTS

In order to be able to ensure safe site practices when working on electrotechnical systems and equipment, you should know and understand the following aspects relating to:

	Performance objective number
Health and Safety:	
1. how to carry out an assessment of risks and plan a safe system of work with regard to: a. the site and the hazards it presents b. access to the immediate work site, c. others working at the site, d. systems and equipment integrity, e. the working conditions	1,2,3,4
2. the regulatory and your organisation's requirements for correctly handling, using and storing tools, equipment, materials and access equipment	5,6
3. when a site is safe a. for work to proceed b. for work to continue c. to leave when work finishes	7
4. the legal responsibilities for health and safety in accordance with current Health and Safety legislation, regulations and codes of practice	All POs
5. the need for safety, welfare and access arrangements to be in force at the site	3
Safe working on site:	
6. assessing the suitability of the electrotechnical systems and equipment for the working environment	1
7. the importance of 'good housekeeping' procedures in relation to site working	7

Unit 302

Diagnose and correct faults in electrotechnical systems and equipment (NET Unit 54)

This unit is for:

you if you diagnose and correct faults in electrotechnical systems and equipment, and need to take appropriate action.

This unit is about:

ensuring the safe identification of faults, and correcting the faults by using safe and approved methods.

This is what you need to show:

that you possess the skills and knowledge to:

- follow correct procedures in identifying the location of the fault
- carry out safe and secure isolation procedures
- diagnose the faults in the electrotechnical systems and equipment
- correct faults using safe and approved methods
- use test equipment and tools correctly.

What you need to do next:

turn to the section on 'Key Words and Phrases'. This explains how some words and phrases have been used in this standard, and will help you understand it more easily.

KEYWORDS AND PHRASES

Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Faults:	In this unit, faults on electrotechnical systems and equipment may include: overload, earth leakage faults, open circuits, short circuits, high resistance joints, incomplete circuits and oversensitive/ non-performing protective devices.
Connections:	In this unit, this includes: the termination and connection of wiring systems to electrotechnical systems and equipment, ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Electrotechnical systems and equipment:	In this unit this includes: ELV and LV single and multiphase power, lighting, switchgear and controls.
Electrotechnical equipment:	In this unit this includes electrical plant, components, and accessories, motors and starters, switchgear and distribution panels, control systems and components, luminaries.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you obtain clear and detailed information about the faults including the system specification relating to the electrotechnical systems and equipment
2. you advise the relevant people clearly and accurately about the potential disruption and consequences of carrying out a diagnosis and correction of faults
3. you agree the appropriate repairs and their implications with the relevant people in accordance with organisational procedures
4. you conduct an assessment of safe working practices and perform suitable tests on the installed electrotechnical systems and equipment, safely, to identify the fault
5. you follow the correct procedures for carrying out a safe and secure isolation, where required, before diagnosing and correcting the fault
6. you follow the correct procedures when rectifying the fault, including using the appropriate tools, equipment and materials
7. where the fault can not be corrected immediately, you leave the electrotechnical systems and equipment safe in accordance with industry regulations
8. you inspect and test that the repaired electrotechnical systems and equipment are functioning in accordance with the relevant Industry Standards and specifications
9. you inform the relevant people about the test results and complete the documentation clearly and accurately.

KNOWLEDGE REQUIREMENTS

In order to diagnose and correct faults in electrotechnical systems and equipment you should know and understand the following aspects relating to:

	Performance objective number
Diagnosing and correcting faults:	
1. the necessary information for carrying out a successful fault diagnosis	1
2. the implications for relevant parties of carrying out diagnosis and rectification faults	2,3
3. how to carry out an assessment of risks and plan a safe system of work with regard to: a. access to the workplace, b. preventing unauthorised access, c. others working at the workplace, d. systems and equipment integrity, e. the working conditions and the working environment	4
4. the correct sequence of tests for locating faults	4
5. the advantages and limitations of fault diagnosis techniques	4
6. the main types, advantages and limitations of test instruments	4
7. the correct procedures for a safe and secure isolation with regard to: a. an assessment of safe working practice, b. correct identification of circuits to be isolated, c. correct test and proving instruments selected, d. use of correct testing methods, and e. correct selection of devices for securing isolation	5,7
8. the correct methods for checking that test instruments are functional and in calibration	6
9. the methods and the correct procedures to follow for correcting faults	6
10. the main requirements and procedures for inspecting and testing rectified electrotechnical systems and equipment installed equipment	8
11. organisational requirements with regard to informing relevant people about the test results and completing all relevant documentation	9

Health and Safety

- | | |
|--|---------|
| 12. importance of using personal safety equipment and appropriate tools for specific jobs | All POs |
| 13. the legal responsibilities for health and safety in accordance with current health and safety legislation, regulations and codes of practice | All POs |

Principles and theory

- | | |
|---|---------|
| 14. the latest, relevant Industry Standards applicable to diagnosing and correcting faults in electrical systems and equipment | All POs |
| 15. where to find out about principles of electrical theory and installation techniques for diagnosing and correcting faults in electrical systems and equipment. | All POs |

Unit 303

Provide technical and functional information to relevant people about electrotechnical systems and equipment (NET Unit 70)

This unit is for:

you if you pass on technical or functional information relating to electrotechnical systems and equipment on which you have been working.

This unit is about:

supplying technical and functional information accurately on appropriate occasions or at handover with the right amount of detail bearing in mind the level of awareness of the recipient of the information.

This is what you need to show:

that you possess the skills and knowledge to:

- identify who should receive such information and at what level of detail
- supply the information that is within your job capabilities and responsibilities
- pass on the necessary safety considerations in the correct manner.

What you need to do next:

turn to the section on 'Key Words and Phrases'. This explains how some words and phrases have been used in this standard, and will help you understand it more easily.

KEYWORDS AND PHRASES

Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Technical Information:	In this unit, this will include information covering installation and equipment specifications, manufacturers' data and instructions.
Functional Information:	In this unit, this will include information covering user instructions, including the circumstances when professional expertise should be called upon.
Relevant people:	In this unit these will include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, and those working on machinery affected by our work.
Electrotechnical systems and equipment:	In this unit this includes: ELV and LV single and multiphase power, lighting, switchgear and controls.
Electrotechnical equipment:	In this unit this includes electrical plant, components, and accessories, motors and starters, switchgear and distribution panels, control systems and components, luminaries.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you identify the relevant people that need to be supplied with technical and functional information
2. you discuss, with the relevant people, their technical and functional information requirements
3. you obtain current and relevant information from appropriate sources
4. you assess the nature and extent of information required by the relevant people in order for the installation, or equipment, to be operated safely and effectively
5. you pass on the information in a timely, courteous and professional manner and in accordance with organisational procedures
6. you provide written technical and functional information to the relevant people in accordance with organisational procedures
7. you confirm that the relevant people receive the necessary health and safety information and advice in the approved manner.

KNOWLEDGE REQUIREMENTS

In order to provide technical and functional information to relevant people you should know and understand the following aspects relating to:

	Performance objective number
Providing technical and functional information:	
1. which situations warrant written technical and functional information	4,6
2. methods of checking the relevant person's understanding of the technical and non-technical information provided	1,2
3. sources of technical and functional information including the manufacturer, supplier or own organization	3
4. ways of checking the relevant people understand those aspects of the information which have a bearing on health and safety	7
5. responsibilities and limitations in your job role with respect to supplying technical and functional information	All POs
6. organisational practice on the amount of information and detail that individual members of the relevant person's organisation are entitled to receive	5
7. the importance of providing information clearly, courteously and professionally	7
8. the safety implications and functional consequences of supplying inaccurate or incomplete information to the relevant person	All POs
Health and Safety	
9. the need for up-to-date, reliable technical and functional information	All POs
10. the legal responsibilities for health and safety according to current health and safety legislation, regulations and codes of practice.	All POs

Unit 304

Maintain a healthy and safe working environment (NET Unit 81)

This unit is for:

you whilst at work. The Health and Safety at Work Act, 1974, seeks to secure the health, safety and welfare of people whilst they work and protect other people against risks to health or safety arising from the activity of people at work.

Read 'important note' under key words and phrases.

This unit is about:

maintaining a healthy and safe working environment.

This is what you need to show:

that you possess the skills and knowledge to:

- ensure that your own actions do not create any health and safety risks
- not ignore hazards with significant risk in your workplace
- take sensible action to put things right.

What you need to do next:

turn to the section on 'Key Words and Phrases'. This explains how some words and phrases have been used in this standard, and will help you understand it more easily.

KEYWORDS AND PHRASES

The Health and Safety Executive (HSE) is the body appointed to support and enforce health and safety law. They have defined two important concepts as follows:

Hazard:	`A hazard is something with potential to cause harm'.
Risk:	`A risk is the likelihood of the hazard's potential being realised'.
Emergencies:	This includes: fire, explosions, toxic atmosphere, electrical shocks.
Working conditions:	This refers to the working conditions which exist at that point in time when the work is due to take place, but which could vary. It could be, for example, that the work is to take place outside, in which case you may need to take account of the weather conditions. Or, perhaps other (non-electrical) contractors come onto the site to start their work - their subsequent activities may cause the site to become hazardous.
Working environment:	This refers to different types of the worksite where the installation is to take place. These include: agricultural, industrial, commercial sites, or confined spaces or working near other machinery. The working environment is something you would not be able to change.
Relevant people:	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Working practices:	This includes: activities, procedures, use of materials or equipment and working techniques used in carrying out your job.

Important Note:

According to the Health and Safety at Work Act:

Employers must safeguard so far as is reasonably practicable, the health, safety and welfare at work of all the people who work for them and 'other persons'. This applies in particular to the provision and maintenance of safe plant and systems of work, and covers all machinery, equipment and substances used.

Employees also have a duty under the Act to take reasonable care to avoid harm to themselves or to others by their working practices, and to co-operate with employers and others in meeting statutory requirements. The Act also requires employees not to interfere with or misuse anything provided to protect their health, safety or welfare in compliance with the Act.

There is an array of health and safety regulations and codes of practice which affect people at work. There are regulations for those who, for example, work with electricity, or work on construction projects, as well as regulations covering noise at work, manual handling, working with VDUs, or dealing with substances hazardous to health, etc. The specific requirements for all or any of these can be obtained from HSE local offices.

The phrase 'the legal responsibilities for health and safety as defined by any specific legislation covering your job role' is intended to relate to those specific pieces of legislation important to your workplace and/or activities which you should be able to find out about.

The Health and Safety at Work Act 1974 is the main piece of legislation under which nearly all the other regulations are made. It is for this reason that only this piece of legislation is specifically referred to in this Unit.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you identify which workplace health and safety procedures are relevant to your working environment
2. you identify evacuation procedures and emergency exits before work commences
3. you review your working practices and your working environment for hazards which could cause serious harm
4. you control those health and safety hazards within your capability and job responsibility limits
5. you report those hazards which may present a high risk to the relevant persons responsible for health and safety in the workplace
6. your personal conduct around the workplace does not endanger the health and safety of yourself or other persons
7. you follow the workplace policies and suppliers' or manufacturers' instructions for the safe use of tools, plant and equipment
8. you follow agreed procedures in the event of an emergency
9. you follow correct procedures in the event of injuries to self and others.

KNOWLEDGE REQUIREMENTS

In order to provide technical and functional information to relevant people you should know and understand the following aspects relating to:

	Performance objective number
Providing technical and functional information:	
1. your legal duties for health and safety in the workplace as defined by the Health and Safety at Work Act 1974	1
2. your duties for health and safety as defined by any specific legislation covering your job role	1,2
3. what hazards may exist in your workplace	3
4. the particular health and safety risks which may be present in your own job role	3
5. the importance of remaining alert to the presence of hazards in the whole work place	All POs
6. agreed workplace health and safety procedures <ul style="list-style-type: none">• including site evacuation procedures• and procedures for dealing with injured persons• emergency procedures	6,7,8,9
7. responsibilities for health and safety in your job description	4
8. the responsible persons to whom to report health and safety matters.	5

Unit 305

Prepare to install electrical wiring systems, wiring enclosures and equipment (NET Unit 20)

This unit is for:

a person required to ensure that the necessary wiring systems, wiring enclosures and equipment are appropriate for the installation, prior to the electrical installation work taking place.

This unit is about:

ensuring that the wiring systems, wiring enclosures and equipment are suitable for the installation.

This is what you need to show:

that you understand the application and the meaning of 'fitness for purpose' of wiring systems, wiring enclosures and equipment. You will need to also demonstrate that you understand the importance of making sure that the intended installation matches the expectations of the relevant person. Also, you will need to prove that you have confirmed that the wiring systems, wiring enclosures and equipment you are going to install are suitable for the working environment where the installation will take place.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Wiring Systems:	This includes: multi-core and single core cables with PVC, XLPE or LSF insulation and sheathing, M I cables with or without PVC/LSF sheathing and SWA cables with PVC, XLPE or LSF insulation and sheathing.
Wiring Enclosures:	This includes: PVC and Steel Conduit, PVC and Steel trunking, Cable tray and ladder systems, ducting systems.
Electrical Equipment:	This includes: electrical plant, components and accessories, motors and starters, switch gear and distribution panels, control systems and components, luminaires.
Site Services:	This includes: maintenance vehicles, water, gas services, oil and air lines, air conditioning, alarms.
Working conditions:	This refers, to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the weather conditions. Or, perhaps other (non-electrical) contractors come onto the site to start their work - their subsequent activities may cause the site to become hazardous.
Working environment:	This refers to different types of the worksite where the installation is to take place. These include: domestic, agricultural, industrial, commercial, or leisure sites. The working environment is something you would not be able to change. The type of worksite will determine whether the working environment is hazardous which could affect the type of equipment installed.
Relevant people:	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm at the outset with the relevant person that your plans for the installation meet their expectations,
2. you review the working environment and working conditions for any changes which might impact on the installation due to take place,
3. you have wiring systems, wiring enclosures and equipment of the right type, amount and size available to undertake the installation,
4. you confirm that the selected wiring systems, wiring enclosures and equipment are compatible with all other available site services,
5. you confirm that:
 - the wiring systems
 - the wiring enclosures, and
 - the equipmentare fit for purpose and meet the needs of the installation
6. you seek confirmation that there are no hazards which could harm yourself or other people within the building fabric prior to commencement of the installation

7. you use fixings which are fit for purpose and appropriate for the site structure and building fabric
8. you follow all appropriate manufacturers' instructions for wiring systems, wiring enclosures and equipment.

KNOWLEDGE REQUIREMENTS

In order to prepare to install electrical wiring systems, wiring enclosures and equipment you should know and understand the following aspects relating to:

	Performance objective number
Providing technical and functional information	
1. contract responsibilities with respect to: <ul style="list-style-type: none"> • agreeing variations to the installation outside the contract • start and finish dates • legal procedures 	1
2. the common types, their advantages and limitations of wiring systems, wiring enclosures and equipment	3
3. the materials which are recommended for use as electrical conductors and insulators	2,3,5
4. how to calculate sizes and types of wiring systems, wiring enclosures and equipment and the importance of making calculations for this purpose	3
5. how to prepare a schedule of quantities of all materials required for an electrical installation from customer information, drawings or site visits	3
6. how to determine whether a wiring system, wiring enclosure and equipment for installation in a particular environment is	2,3,5
7. how to interpret diagrams and drawings to find site services and the planned location of the wiring systems, wiring enclosures and equipment	4
8. how to determine the suitability of fixing methods to building fabric in the environment of the installation	6,7
Health and Safety	
9. the effects of installing into unknown building fabric	6,7
10. your legal responsibilities for health and safety as required by the Health and Safety at Work Act 1974 and the Electricity At Work Regulations of 1989 appropriate to site working	all POs but in particular 2
11. handling wiring systems, wiring enclosures and equipment in the correct manner	8
Principles and theory	
12. IEE wiring regulations as specified in the latest British Standard for Electrical Installations relevant to types and uses of wiring systems, wiring enclosures and equipment.	all POs

Unit 306

Install electrical wiring systems, wiring enclosures and equipment (NET Unit 23)

This unit is for:

a person required to carry out the installing of wiring systems, wiring enclosures and equipment.

This unit is about:

following the correct procedures for the installation of wiring systems, wiring enclosures and equipment as specified.

This is what you need to show:

an understanding of:

- installing of wiring systems, wiring enclosures and equipment
- the methods for identifying and isolating electrical supply
- positioning and fixing components correctly
- those areas which have the potential to be hazardous.

What you need to do next:

look through the 'Key Words and Phrases', as they explain how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Wiring Systems:	This includes: multi-core and single core cables with PVC, XLPE or LSF insulation and sheathing, M I cables with or without PVC/LSF sheathing and SWA cables with PVC, XLPE or LSF insulation and sheathing.
Wiring Enclosures:	This includes: PVC and Steel Conduit, PVC and Steel trunking, Cable tray, basket and ladder systems, ducting systems.
Electrical Equipment:	This includes: electrical plant, components and accessories, motors and starters, switch gear and distribution panels, control systems and components, luminaires.
Site Services:	This includes: maintenance vehicles, water, gas services, oil and air lines, air conditioning, alarms.
Relevant people:	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Means of isolation:	This involves: ensuring the item or component is located accessibly and is appropriate for the application whilst having regard to the nature of the equipment and the circumstances under which isolation may be required.
Electrical systems:	This includes: ELV and LV single and multiphase, power, lighting and controls.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm the existing electrical supply is compatible with the planned installation in accordance with laid down procedures
2. you follow agreed procedures to ensure the co-ordination of site services and the activities of other trades
3. you identify accurately the means of electrical isolation prior to commencing installation
4. when required, you carry out isolation procedures to ensure a safe installation in accordance with electrical regulations and approved procedures
5. you measure and mark out all locations for wiring systems, wiring enclosures and equipment in accordance with electrical regulations and to meet an agreed specification
6. you check that the planned locations are sensible, visually acceptable and are in accordance with other site services
7. you fix the wiring systems, wiring enclosures and equipment safely and in accordance with relevant regulations and manufacturers' instructions
8. you report to relevant people those necessary variations to the planned programme of work that may have:
 - the potential to be dangerous
 - have a cost implication
9. you seek the appropriate action from the relevant people.

KNOWLEDGE REQUIREMENTS

In order to install electrical wiring systems, wiring enclosures and equipment you should know and understand the following aspects relating to:

	Performance objective number
Installing electrical wiring systems, wiring enclosures and equipment	
1. the most effective methods of measuring, cutting to length and installing wiring systems and wiring enclosures	5
2. the most effective methods of fabricating wiring enclosures	7
3. the authority issuing procedures for co-ordinating data on site services	1,2,6
4. how to interpret diagrams and drawings to find site services and the planned location of the wiring systems, wiring enclosures and equipment	2,6
5. organisational procedures for reporting variations to work schedules	8,9
Health and Safety	
6. the correct procedures for a safe isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation.	3,4
7. the implications for relevant parties of carrying out an isolation	4
8. the importance of using personal protective equipment and safe appropriate tools for specific jobs	3,4
9. the hazards associated with using electrical equipment and plant including their lifting, handling and fixing	7
Principles and theory	
10. IEE wiring regulations as specified in the latest British Standard for Electrical Installations relevant to types and uses of wiring systems, wiring enclosures and equipment	all POs
11. where to find out about the principles of electrical theory which allow for the safe installation of electrical wiring systems, wiring enclosures and equipment	all POs

Unit 307

Connect wiring systems and equipment using safe and approved methods (NET Unit 41)

This unit is for:

a person required to connect wiring systems, wiring enclosures and equipment.

This unit is about:

implementing the correct procedures for connecting wiring systems, wiring enclosures and equipment appropriate to the electrical system.

This is what you need to show:

an understanding of:

- connecting wiring systems, wiring enclosures and equipment
- how to check the connection afterwards using safe methods.

What you need to do next:

turn to the section on 'Key Words and Phrases'. This explains how some words and phrases have been used in this standard, and will help you understand it more easily.

KEYWORDS AND PHRASES

An assessment of safe working practices:	This includes the use of permits to work (PTW) which form an essential part of safe systems of work for many activities. A PTW covers work which can only be carried out when normal practices are no longer available or when new hazards are introduced as a result of the work.
Connections:	This includes: the connection of any item of electrical equipment ensuring that every joint and connection be mechanically and electrically suitable for use and prevent danger.
Means of isolation:	This involves: ensuring the item or component is located accessibly and is appropriate for the application whilst having regard to the nature of the equipment and the circumstances under which isolation may be required.
Wiring Systems:	This includes: multi-core and single core cables with PVC, XLPE or LSF insulation and sheathing, M I cables with or without PVC/LSF sheathing and SWA cables with PVC, XLPE or LSF insulation and sheathing.
Electrical Equipment:	This includes: electrical plant, components and accessories, motors and starters, switch gear and distribution panels, control systems and components, luminaires.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you are working within a safe system of work and that you identify any foreseeable hazards relating to the connection of wiring systems, wiring enclosures and equipment
2. you identify accurately the means of electrical isolation prior to connection
3. when required, you carry out isolation procedures to ensure a safe connection in accordance with electrical regulations and approved procedures
4. you make connections in accordance with specifications and comply with IEE wiring regulations as specified in the most recent British Standard for Electrical Installations
5. you check the connections are electrically and mechanically sound, and ensure that they are identified correctly and clearly
6. where appropriate, you take safe and sensible action to remedy any identified defects after connection has taken place
7. you complete any necessary documentation about the work legibly, accurately and timely in accordance with organisational requirements.

KNOWLEDGE REQUIREMENTS

In order to connect wiring systems and equipment using safe and approved methods you should know and understand the following aspects relating to:

	Performance objective number
Connecting wiring systems and equipment	
1. the main types, their advantages and limitations of different electrical connections	4
2. the correct procedures for a safe isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation	2,3
3. the implications for relevant parties of carrying out an isolation	2,3
4. the procedures for the connection of single and multi-phase circuits	4
5. how to interpret diagrams and drawings to facilitate the connection of wiring systems, wiring enclosures and equipment	1
6. the procedures for proving a connection is electrically and mechanically sound	5
7. how to establish which connections in circuits and protective conductors including connections to terminals are suitable for the purpose for which they are being used	4
8. the implications on the choice of connections with regard to permanent or temporary purposes	6
9. the requirements of joints and connections to be of strength and conductance to allow for the passage of fault currents and to prevent corrosion	5
10. organisational procedures for completion of necessary documentation	8
Health and Safety	
11. the importance of using personal protective equipment and safe appropriate tools for specific jobs	all POs
12. procedures for carrying out an assessment of safe systems of work including permits to work	1
13. the procedures for reporting any potentially dangerous situations or incidents	1,7
Principles and theory	
14. IEE wiring regulations as specified in the latest British Standard for Electrical Installations relevant to types and uses of wiring systems, wiring enclosures and equipment	all POs
15. where to find out about the principles of electrical theory which allow for the safe connection of electrical wiring systems and equipment	all POs

Unit 308

Inspect, test and commission an electrical installation (NET Unit 45)

This unit is for:

anyone required to inspect, test and commission an electrical installation.

This unit is about:

carrying out the process of inspecting, testing and commissioning electrical installations in a safe manner and in the correct sequence as prescribed by the IEE wiring regulations as specified in the British Standard for Electrical Installations.

This is what you need to show:

an understanding of:

- how to commission an electrical installation bearing in mind the constraints imposed by legislation and regulations
- how to select and use the appropriate testing equipment
- the importance of keeping good records of the procedures and results.

What you need to do next:

turn to the section on 'Key Words and Phrases'. This explains how some words and phrases have been used in this standard, and will help you understand it more easily.

KEYWORDS AND PHRASES

Relevant people:	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
An assessment of safe working practices:	This includes the use of permits to work (PTW) which form an essential part of safe systems of work for many activities. A PTW covers work which can only be carried out when normal practices are no longer available or when new hazards are introduced as a result of the work.
Means of isolation:	This involves: ensuring the item or component is located accessibly and is appropriate for the application whilst having regard to the nature of the equipment and the circumstances under which isolation may be required.
Tests:	this includes: tests appropriate to conductors, insulation resistance, polarity, operation of RCDs and earth fault loop impedance.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you plan and agree the inspecting, testing and commissioning procedures with relevant people on site
2. you undertake an assessment of safe working practices in accordance with general and industry specific health and safety regulations
3. you follow the correct procedures for identifying and carrying out a safe isolation before inspecting, testing and commissioning the electrical installation
4. you confirm that your test instruments are
 - appropriate to the job in hand
 - fit for purpose
 - in calibration
5. you conduct an inspection in accordance with the IEE wiring regulations as specified in the British Standard for Electrical Installations
6. you conduct the required tests in accordance with IEE wiring regulations as specified in the British Standard for Electrical Installations and in accordance with manufacturers' instructions
7. you confirm the installation is in accordance with IEE wiring regulations as specified in the British Standard for Electrical Installations and in accordance with manufacturers' instructions and the specification
8. you prepare a formal record of testing which confirms the safety and integrity of the installation, in accordance with organisational procedures and IEE wiring regulations as specified in the British Standard for Electrical Installations
9. you handover the installation to relevant people and ensure that they have sufficient information and documentation for continued safe and effective use of the installation.

KNOWLEDGE REQUIREMENTS

In order to inspect, test and commission an electrical installation you should know and understand the following aspects relating to:

	Performance objective number
Inspecting, testing and commissioning	
1. the purpose and requirements of the system to be commissioned	1
2. procedures for an assessment of safe systems of work including permits to work	2
3. the correct procedures for a safe isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation.	3
4. the requirements of an inspection with regard to: <ul style="list-style-type: none">• selection, identification and connection of conductors• protection against contact and fire• labelling, access to switchgear and equipment• availability of danger, warning notices, diagrams and instructions	5
5. the importance of choosing the right instruments for the test	4
6. the main methods for checking test instruments are functional and in calibration	4
7. best practice with regard to methods of testing, their inter-relationship and sequence	6
8. the importance of accurate labelling and recording of the test	8
9. the characteristics of different types of cabling and components and how they impact on the test	2
10. the approved procedures and requirements for commissioning the installation	7
11. approved reporting procedures	8
Health and Safety	
12. carrying out the tests and the effect on equipment not part of the fixed installation	6
13. testing that takes place under live conditions	
Principles and theory	
14. IEE wiring regulations as specified in the latest British Standard for Electrical Installations relevant to types and uses of wiring systems, wiring enclosures and equipment	all POs
15. where to find out about the principles of electrical theory for the inspection, testing and commissioning of electrical wiring systems and equipment	all POs

Unit 309

Prepare to maintain electrical systems and equipment (NET Unit 24)

This unit is for:

you if you prepare to maintain electrical systems and equipment.

This unit is about:

confirming that your work, tools, plant and materials meet requirements and that the working conditions are safe for work to commence.

This is what you need to show:

that you possess the skills and knowledge to:

- carry out an assessment of risk and plan a safe system of work
- identify any changes in the working conditions which might impact on the maintenance work
- co-ordinate the maintenance work with the work of other people who might be affected by your own work
- ensure that the tools, instruments and equipment are safe and fit for purpose.

What you need to do next:

turn to the section on 'Key Words and Phrases'. This explains how some words and phrases have been used in this standard, and will help you understand it more easily.

KEYWORDS AND PHRASES

Electrical Systems:	In this unit, this refers to an assembly of conductor systems and electrical equipment providing operation and control, for example: heating, lighting, ventilation, security, communications and process control.
Electrical Equipment:	In this unit, this includes: electrical plant, components and accessories, motors and starters, switchgear and distribution panels, control systems and components, luminaries.
Maintenance activities:	In this unit, these are adjustments, replacements, repairs and refurbishment of electrical equipment undertaken as part of planned maintenance work, or as part of non-routine preventative work.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment, and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Working environment:	In this unit, this refers to the different types of site where the maintenance activities take place. It could be, for example, an agricultural, industrial or commercial site. It could be that the site involves confined spaces or is in close proximity to other machines. The working environment is something you would not be able to change. The type of site will determine whether the working environment is hazardous.
Working conditions:	In this unit, this refers to the working conditions, which exist at that point in time when the maintenance activities are due to take place. It could be, for example, that the maintenance activities take place outside in which case you would need to take account of weather conditions. Or, it could be that other (non-electrical) operatives come onto the site to start their work - in which case their subsequent activities may cause the site to become hazardous.
Relevant person(s):	In this unit, these include: customers, clients, client representatives, team-leaders, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Authorisation:	In this unit, this refers to permission to start work via verbal or written instructions.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks and plan, correctly, a safe system of work for use throughout the maintenance activities
2. you confirm that your maintenance activities meets with the expectations of the relevant person(s)
3. you report, promptly, any changes to the working conditions of the work site which might impact on the maintenance activities due to take place
4. you inform the relevant person(s) immediately when changes are necessary before work can commence
5. you confirm with the relevant person(s) that your maintenance work co-ordinates with the work of other people on site
6. prior to commencing work, you seek authorisation from the relevant person(s) that it is safe to undertake the maintenance work as specified
7. your information and documentation is current and relevant and your
 - plant
 - instruments
 - equipment
 - materials
 - tools

are correct and fit for purpose for the specified maintenance.

KNOWLEDGE REQUIREMENTS

In order to be able to prepare maintain electrical systems and equipment, you should know and understand the following aspects relating to:

	Performance objective number
Preparing to maintain	
1. how to carry out an assessment of risks and plan a safe system of work with regard to the maintenance activity	1
2. contract responsibilities with respect to : <ul style="list-style-type: none">• planned maintenance• non-routine maintenance• start, finish dates and timings	2
3. the working conditions at the work site which can affect the maintenance activity	3
4. the implications of different working conditions on the electrical systems and equipment to be maintained	3
5. the authority and organisational procedures at the site relevant to work plans and changes to the work plans	3,4,5,6
6. regulations and working practices that will affect the maintenance activity	6,7,8
7. whether the tools and instruments you use are fit for purpose and that they have a current calibration certificate	7
8. the advantages and limitations of plant, tools, materials, equipment and instruments used for maintenance activities	7
Health and Safety	
9. the legal responsibilities for health and safety according to current health and safety legislation, regulations and codes of practice	all POs
10. gaining access to the electrical systems and equipment being maintained	8
11. handling equipment, plant, instruments and tools used in the maintenance activity	8
Principles and theory	
12. the latest Industry Standards relevant to electrical systems and equipment, and for preparing to maintain electrical systems and equipment	all POs
13. where to find out about the principles of electrical theory and techniques for preparing to maintain electrical systems and equipment.	all POs

Unit 310

Maintain electrical systems and equipment (NET Unit 40)

This unit is for:

you if you maintain electrical systems and equipment.

This unit is about:

correctly following agreed procedures when carrying out maintenance activities on electrical systems and equipment.

This is what you need to show:

that you possess the skills and knowledge to:

- maintain electrical systems and equipment in accordance with a safe system of work
- identify faults correctly and safely
- carry out repair activities within the scope of your job responsibilities
- record your findings in accordance with organisational requirements.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Electrical Systems:	In this unit, this refers to an assembly of conductor systems and electrical equipment providing operation and control, for example: heating, lighting, ventilation, security, communications and process control.
Electrical Equipment:	In this unit, this includes: electrical plant, components and accessories, motors and starters, switchgear and distribution panels, control systems and components, luminaries.
Maintenance activities:	In this unit, these are adjustments, replacements, repairs and refurbishment of electrical equipment undertaken as part of planned maintenance work, or as part of non-routine, preventative work.
Maintenance schedule:	In this unit, this refers to a timetable or specification which shows what maintenance activity will be required and when.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment, and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Relevant person(s):	In this unit, these include: customers, clients, client representatives, team leaders, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Authorisation:	In this unit, this refers to permission to start work via verbal or written instructions.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks and implement the agreed safe system of work during all your maintenance activities
2. when necessary, you use relevant sources of technical information to support your maintenance activities
3. you follow agreed maintenance procedures to ensure the effective co-ordination of activities by the relevant person(s)
4. you use, safely and correctly, the tools, equipment and materials following:
 - your workplace procedures
 - the suppliers' instructions
 - health and safety requirements
5. you locate the correct wiring systems and equipment as specified in your maintenance instructions
6. you carry out safe and secure isolation procedures to comply with electrical regulations and the agreed safe system of work
7. you identify and locate, accurately, the electrical systems and equipment to be maintained in accordance with the relevant maintenance schedule
8. your maintenance activities comply with:
 - manufacturers' instructions
 - industry approved practices
 - the maintenance schedule
9. you advise the relevant person(s) clearly and accurately about the potential consequences of carrying out effective repairs
10. where maintenance activities vary from the schedule, you notify the relevant person(s) promptly
11. you use suitable testing methods to accurately evaluate the performance of all replaced and adjusted equipment and systems during and on completion of the maintenance activity
12. your maintenance records are accurate, complete and given to the relevant person(s) in the required format promptly
13. you complete all maintenance activities within the agreed timescale
14. when necessary, you report any expected delays in completing the maintenance activity to the relevant persons(s) promptly.

KNOWLEDGE REQUIREMENTS

In order to be able to maintain electrical systems and equipment, you should know and understand the following aspects relating to:

	Performance objective number
Preparing to maintain	
1. carrying out an assessment of risks and procedures for implementing safe systems of work	1
2. contract responsibilities with respect to : <ul style="list-style-type: none"> • planned maintenance • non-routine maintenance • agreeing variations to the maintenance specification or schedule • start, finish dates and timings 	3,7,8, 12,13
3. the differences between carrying out routine and non-routine maintenance activities	3
4. the implications of inappropriate work practices	all POs
5. which information sources are relevant and appropriate to the location of your maintenance activities	2,3
6. the correct handling and usage of tools, materials and equipment	4
7. the correct procedures for a safe and secure isolation with regard to: <ul style="list-style-type: none"> • safe working practices • correct identification of circuits to be isolated • correct selection of test and proving instruments selected • correct selection of devices for securing the means of isolation 	5
8. how to interpret specifications, diagrams and drawings to: <ul style="list-style-type: none"> • find the planned location of the wiring systems, wiring enclosures and equipment • facilitate the connection of the wiring systems, wiring enclosures and equipment 	6
9. what corrective action is appropriate and when to carry it out	7,8
10. the advantages and limitations of repair versus replacement	7,8
11. your responsibilities with regard to making decisions for repair	7,8,9
12. approved procedures and likely implications for relevant parties of carrying out effective repairs	7,8
13. the reasons for regular inspection, adjustment and replacement of, or to, electrical systems and equipment	all POs
14. your workplace requirements for, and the importance of, documenting information, reporting findings and variations from the maintenance schedule	9,10,11,12

15. organisational procedures for the completion of necessary documentation which might include organisational or external QA systems 12

Health and Safety

16. the legal responsibilities for health and safety in accordance with current health and safety legislation all POs
17. the importance of using personal protective equipment and appropriate tools for specific jobs all POs

Principles and theory

18. the latest Industry Standards and regulations relevant to electrical systems and equipment, and the environments within which they operate all POs
19. where to find out about the principles of electrical theory and installation techniques for maintaining electrical systems and equipment. all POs

Unit 311

Inspect, test and commission maintained electrotechnical systems and equipment (NET Unit 50)

This unit is for:

you if you inspect, test and commission maintained electrotechnical systems and equipment.

This unit is about:

carrying out the process of inspecting, testing and commissioning in a safe manner and in the correct sequence to comply with the latest Industry Standards and regulations.

This is what you need to show:

that you possess the skills and knowledge to:

- inspect, test and commission the maintained electrotechnical systems and equipment in accordance with approved procedures,
- select and use the appropriate testing equipment
- carry out an accurate handover of the maintained electrotechnical systems and equipment
- keep good records of the procedures and results.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Electrical Systems:	In this unit, this refers to an assembly of conductor systems and electrotechnical equipment providing operation and control, for example: heating, lighting, ventilation, security, communications and process control.
Electrical Equipment:	In this unit, this includes: electrical plant, components and accessories, motors and starters, switch gear and distribution panels, control systems and components, luminaries.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment, and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Tests:	In this unit, these include tests appropriate to conductors, insulation resistance, pressure tests, polarity and phase sequencing, the operation of protective equipment, functional operation of control circuits, components and equipment.
Maintenance activities:	In this unit, these are adjustments, replacements, repairs and refurbishment of electrical equipment undertaken as part of planned maintenance work, or as part of non-routine, preventative work.
Maintenance schedule:	In this unit, this refers to a timetable or specification which shows what maintenance activity will be required and when.
Relevant person(s):	In this unit, these include: customers, clients, client representatives, team leaders, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Authorisation:	In this unit, this can be permission to start work via verbal or written instructions.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks to comply with health and safety regulations prior to carrying out the inspection and testing
2. you obtain all relevant data, instructions and information prior to inspecting, testing and commissioning maintained electrotechnical systems and equipment
3. you plan and agree the inspecting, testing and commissioning procedures with the relevant person(s)
4. you follow the correct procedures for carrying out a safe and secure isolation before inspecting, testing and commissioning the maintained electrotechnical systems and equipment
5. you confirm that your test instruments
 - are appropriate to the job in hand
 - are fit for purpose
 - have a current calibration certificate
6. you conduct an inspection in accordance with the latest Industry Standards and, where applicable, equipment manufacturers' instructions
7. you conduct the required tests in accordance with the latest Industry Standards, equipment manufacturers' instructions and industry approved procedures
8. you commission by confirming that the maintained electrotechnical systems and equipment are in accordance with:
 - health and safety requirements
 - the latest Industry Standards
 - manufacturers' instructions
 - industry approved procedures
 - the maintenance schedule
9. you confirm that the maintained electrotechnical systems and equipment are safe and function correctly
10. your handover of the maintained electrotechnical systems and equipment to the relevant person(s) includes accurate and complete information and documentation about the inspection, tests and commissioning.

KNOWLEDGE REQUIREMENTS

In order to inspect, test and commission maintained electrotechnical systems and equipment you should know and understand the following aspects relating to:

	Performance objective number
Preparing to maintain	
1. procedures for an assessment of risks and how to plan a safe system of work	1
2. what data, instructions and information are necessary to carry out an effective inspection, testing and commissioning of maintained electrotechnical systems and equipment	2
3. how to prepare an effective plan which will meet the purpose and requirements of an inspection, test and commission	3
4. the purpose and requirements of the maintained electrotechnical systems and equipment being inspected, tested and commissioned	3
5. the correct procedures for a safe and secure isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation	4
6. the importance of choosing the correct instruments for the <ul style="list-style-type: none">• inspection• testing• commissioning	5
7. the main methods for checking test instruments are functional and in calibration	5
8. the importance of inspection, testing and commissioning in accordance with health and safety requirements <ul style="list-style-type: none">• manufacturers' instructions• approved industry procedures• the maintenance schedule	6,7,8
9. correct methods of testing and the testing sequence	7
10. the approved procedures and requirements for confirming that the maintained electrotechnical systems and equipment are functional and safe	9
11. the importance of accurate recording of the inspection, test and commissioning in accordance with organizational procedures	10
Health and Safety	
12. the legal responsibilities for health and safety in accordance with current health and safety legislation	all POs
13. the importance of using personal protective equipment and appropriate tools for specific jobs	all POs

Principles and theory

- | | |
|---|---------|
| 14. the latest, relevant Industry Standards relevant to types and uses of electrotechnical systems and equipment | all POs |
| 15. where to find out about the principles of electrotechnical theory and installation techniques and which allow for the inspection, testing and commissioning of maintained electrotechnical systems and equipment. | all POs |

Unit 312

Prepare to install instrumentation and associated equipment (NET Unit 14)

This unit is for:

you if you prepare to install appropriate instrumentation and associated equipment.

This unit is about:

confirming that the instrumentation and associated equipment are identified for the installation.

This is what you need to show:

that you possess the skills and knowledge to:

- identify any changes in the working conditions which might impact on the installation of instrumentation and associated equipment
- co-ordinate the installation work with the work of other people who might be affected by your own work
- be sure that the tools, instruments and equipment are safe and fit for purpose
- implement a safe system of work.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Associated Equipment:	In this unit equipment is associated with and determined by the function of the instrumentation to be installed and includes any associated wiring systems.
Authorisation:	In this unit, this is formal permission to start work.
Hazardous Areas:	In this unit, this refers to an area where flammable or explosive substances are, or may be expected to be, present in quantities which require special precautions to be taken against the risk of ignition.
Industry Standards:	These standards can include relevant British, European and International Standards.
Instrumentation and associated equipment:	In this unit instrumentation and associated equipment are a collection of instruments which measure and interpret electrical and associated non-electrical parameters, for example: - pressure, levels, temperature, speed, flow rate, current, voltage, etc.
Instruments:	In this unit instruments are designed to monitor and/or control process variables by: <ul style="list-style-type: none"> • Indication - display instantaneous or totalised values. • Recording - to record and store information for later viewing. • Control - to collect information and transmit for controlling purposes.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment, as appropriate, identified as being necessary during an assessment of risks. The system of work may take the form of a method statement.
Scope of work:	In this unit, this may take the form of verbal and written specifications.
Site services:	In this unit, these are services associated with the instruments and associated equipment, these could include, for example, water, gas services, oil, electricity, hydraulics and pneumatics.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may change the working conditions.
Working environment:	In this unit, this refers to the different types of site, including hazardous areas, where the installation is due to take place. The working environment is something you would not be able to change. The type of site will determine whether the working environment affects the type of instrumentation and associated equipment to be installed.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm with the relevant person(s) the scope of the work to be carried out
2. you review the working environment and working conditions for any changes in terms of the impact they will have on the installation to take place
3. you inform the relevant person(s) immediately when changes are necessary and of any expected delays
4. you confirm that the installation work co-ordinates with site services and the work of other relevant person(s) at the site who may be affected by the installation activity
5. you confirm from the relevant person(s) that you are authorised to start the installation work
6. you implement, correctly, a safe system of work for use throughout the installation
7. your information and documentation is current and relevant, and your
 - plant
 - instruments
 - equipment
 - tools
 - dataare correct and fit for purpose
8. you follow accurately all appropriate manufacturers' instructions and industry approved practice when carrying out the installation of instrumentation and associated equipment.

KNOWLEDGE REQUIREMENTS

In order to prepare to install instrumentation and associated equipment you should know and understand the following aspects relating to:

	Performance objective number
Preparing to install	
1. the scope of the work to be carried out	1
2. contract and legal implications with respect to : <ul style="list-style-type: none">• agreeing variations to the scope of work and/or specification• start and finish dates	3
3. the principles underlying the purpose of each of the three different functions of instruments (see key words and phrases)	1
4. the application, advantages and limitations of instruments appropriate to each of the three functions (see key words and phrases)	1
5. the materials which are recommended for use as electrical conductors and insulators	2,5
6. how to prepare a schedule of quantities of all materials required for the installation of instrumentation and associated equipment from customer information, drawings, specifications or site visits	1,7
7. the basic principles for selecting the correct instruments and associated equipment for a particular application	1,2,7
8. how to interpret diagrams and drawings to find site systems and the planned location of the instruments and associated equipment	4
9. how to determine the type of fixing methods required to suit the environment of the installation	6
10. organisational requirements with regard to reporting changes and/ or delays	3
Health and Safety	
11. the legal responsibilities for health and safety in accordance with current Health and Safety legislation, regulations and codes of practice	all POs
12. handling instruments and associated equipment in the correct manner	6
Principles and theory	
13. the latest, relevant Industry standards appropriate to instrumentation and associated equipment	all POs
14. where to find out about the principles of electrical theory and installation techniques for the installation of instrumentation and associated equipment.	all POs

Unit 313

Install instrumentation and associated equipment (NET Unit 15)

This unit is for:

you, if you install instrumentation and associated equipment.

This unit is about:

following the correct procedures for the installation of instrumentation and associated equipment as specified.

This is what you need to show:

that you possess the skills and knowledge to:

- install instrumentation and associated equipment
- apply the correct methods for identifying and isolating electrical supply
- locate and fix instrumentation and associated equipment correctly
- identify those areas which have the potential to be hazardous
- apply the correct methods for identifying process isolation.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Associated Equipment:	In this unit equipment is associated with and determined by the function of the instrumentation to be installed and includes any associated wiring systems.
Authorisation:	In this unit, this is formal permission to start work.
Hazardous Areas:	In this unit, this refers to an area where flammable or explosive substances are, or may be expected to be, present in quantities which require special precautions to be taken against the risk of ignition.
Industry Standards:	These standards can include relevant British, European and International Standards.
Instrumentation and associated equipment:	In this unit instrumentation and associated equipment are a collection of instruments which measure and interpret electrical and associated non-electrical parameters, for example: pressure, levels, temperature, speed, flow rate, current, voltage, etc.
Instruments:	In this unit instruments are designed to monitor and/or control process variables by: <ul style="list-style-type: none"> • Indication - display instantaneous or totalised values. • Recording - to record and store information for later viewing. • Control - to collect information and transmit for controlling purposes.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment, as appropriate, identified as being necessary during an assessment of risks. The system of work may take the form of a method statement.
Scope of work:	In this unit, this may take the form of verbal and written specifications.
Site services:	In this unit, these are services associated with the instruments and associated equipment, these could include, for example, water, gas services, oil, electricity, hydraulics and pneumatics.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may change the working conditions.
Working environment:	In this unit, this refers to the different types of site, including hazardous areas, where the installation is due to take place. The working environment is something you would not be able to change. The type of site will determine whether the working

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks and follow the agreed safe system of work during your installation activities
2. you follow accurately all appropriate manufacturers' instructions and industry approved practice when carrying out the installation of instrumentation and associated equipment
3. you confirm the existing electrical supply is compatible with the instrumentation and associated equipment to be installed
4. you carry out a safe and secure electrical and process isolation prior to commencing installation in accordance with relevant industry regulations and approved procedures
5. you measure and mark out all locations for the instruments and any associated equipment in accordance with the drawings and instructions and to comply with electrical regulations
6. you install the instruments and associated equipment correctly and in accordance with manufacturers' instructions and relevant industry regulations
7. you report to relevant people those variations to the planned programme of work that may have:
 - the potential to be dangerous
 - a cost implication
8. you confirm the appropriate action in relation to the variations with the relevant people.

KNOWLEDGE REQUIREMENTS

In order to install Instrumentation and associated equipment you should know and understand the following aspects relating to:

	Performance objective number
1. how to carry out an assessment of risks and plan a safe system of work with regard to: <ul style="list-style-type: none"> • access to the immediate workplace • preventing unauthorised access • others working at the workplace • safe system of work and equipment integrity • the working environment 	1
2. the appropriate manufacturers' instructions to follow	2
3. the storage, transportation and handling of instruments and equipment	2
4. how to confirm the existing electrical supply is compatible with the planned installation	3
5. the correct procedures for a safe and secure electrical and process isolation with regard to: <ul style="list-style-type: none"> • an assessment of safe working practice • correct identification of circuits to be isolated • correct test and proving instruments selected • use of correct testing methods • correct selection of devices for securing isolation 	4,5
6. the application, advantages and limitations of installation methods when installing instruments and associated equipment	6
7. those environmental factors which affect the location of instruments and associated equipment	5,6,7
8. how to interpret diagrams and drawings to find site services and the planned location for the instrumentation and associated equipment	6,7
9. the organisational procedures for reporting variations to work schedules	8
10. which equipment is associated with and determined by the function of the instruments to be installed	5,6
Health and Safety	
11. the implications for relevant parties of carrying out an isolation	4
12. the importance of using personal protective equipment and safe appropriate tools for specific jobs	3,4
13. the hazards associated with using electrical equipment including their lifting, handling and fixing	6
14. the legal implications of health and safety in accordance with current health and safety legislation, regulations and codes of practice	all POs

Principles and theory

- | | |
|---|---------|
| 15. the latest, relevant Industry Standards relevant to instrumentation and associated equipment | all POs |
| 16. where to find out about the principles of electrical theory and installation techniques for the installation of instrumentation and associated equipment. | all POs |

Unit 314

Connect, inspect and test instrumentation and associated equipment (NET Unit 42)

This unit is for:

you if you test, connect and inspect instrumentation and associated equipment prior to commissioning.

This unit is about:

implementing the correct procedures for testing, connecting and inspecting instruments and associated equipment in accordance with manufacturers' instructions, specifications and codes of practice.

This is what you need to show:

that you possess the skills and knowledge to:

- carry out an assessment of risks to implement a safe system of work
- connect instrumentation and associated equipment
- follow safe and secure isolation procedures
- confirm the safety and integrity of the instrumentation and associated equipment by inspection and testing
- prepare a report of your inspection and test results.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Associated Equipment:	In this unit equipment is associated with and determined by the function of the instrumentation to be installed and includes any associated wiring systems.
Authorisation:	In this unit, this is formal permission to start work.
Connections:	In this unit, this includes: the termination and connection of wiring systems to instrumentation and associated equipment ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Hazardous Areas:	In this unit, this refers to an area where flammable or explosive substances are, or may be expected to be, present in quantities which require special precautions to be taken against the risk of ignition.
Industry Standards:	These standards can include relevant British, European and International Standards.
Inspection and Testing:	In this unit, this relates to tests and inspections of instruments and associated equipment.
Instrumentation and associated equipment:	In this unit instrumentation and associated equipment are a collection of instruments which measure and interpret electrical and associated non-electrical parameters, for example: - flow rate, current, voltage, etc.
Instruments:	In this unit instruments are designed to monitor and/or control process variables by: <ul style="list-style-type: none"> • Indication - display instantaneous or totalised values. • Recording - to record and store information for later viewing. • Control - to collect information and transmit for controlling purposes.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment, as appropriate, identified as being necessary during an assessment of risks. The system of work may take the form of a method statement.
Scope of work:	In this unit, this may take the form of verbal and written specifications.
Site services:	In this unit, these are services associated with the instruments and associated equipment, these could include, for example, water, gas services, oil, electricity, hydraulics and pneumatics.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the

	weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may change the working conditions.
Working environment:	In this unit, this refers to the different types of site, including hazardous areas, where the installation is due to take place. The working environment is something you would not be able to change. The type of site will determine whether the working environment affects the type of instrumentation and associated equipment to be installed.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm with the relevant person the scope of the work to be carried out
2. you carry out an assessment of risks and implement a safe system of work to comply with health and safety legislation, regulations and codes of practice
3. you confirm with the relevant person that your safe system of work is appropriate to the scope of work
4. when required, you carry out a safe and secure isolation
5. you make connections correctly and in accordance with
 - manufacturers' instructions
 - drawings
 - the latest, relevant Industry Standards
6. you take safe and suitable action to remedy any identified defects with the instrumentation and associated equipment after connection has taken place and report to the relevant person
7. you confirm that your test instruments:
 - are appropriate to the job in hand
 - are fit for purpose
 - have a current calibration certificate
8. you conduct an inspection in accordance with industry approved practice and the latest, relevant Industry Standards
9. you conduct the required tests in accordance with
 - the latest, relevant Industry Standards
 - industry approved practice
 - with manufacturers' instructions
10. you prepare a formal record of the inspection and testing which confirms the safety and integrity of the installation in accordance with organisational procedures
11. your handover of the instrumentation and associated equipment to the relevant person(s) includes accurate and complete information and documentation about the inspection and tests.

KNOWLEDGE REQUIREMENTS

In order to test, connect and inspect instrumentation and associated equipment you should know and understand the following aspects relating to:

	Performance objective number
Testing, connecting and inspecting instrumentation and associated equipment	
1. the scope, purpose and requirements of the inspection and testing of instruments and associated equipment	1
2. procedures for an assessment of risk and how to plan a safe system of work	2,3
3. the correct procedures for a safe and secure electrical and process isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation	4
4. the implications for relevant parties of carrying out an isolation	4
5. the main applications, their advantages and limitations of different electrical connections and non-electrical connections and methods for remedying defects	5,6
6. the procedures for ensuring a connection is electrically and mechanically sound and identified clearly and correctly	5
7. the methods and procedures for electrical and non-electrical connections	6
8. how to interpret manufacturers' instructions and specifications to facilitate the termination and connection of instruments and associated equipment	7
9. the importance of choosing the correct instruments for the particular test	8
10. the main methods for checking test instruments are functioning and in calibration	8
11. the requirements of an inspection with regard to: <ul style="list-style-type: none">• selection, identification and connection of conductors• protection against contact and fire• labelling, access to instruments and associated equipment• application of danger, warning notices, diagrams and instructions	9
12. how tests could impact on the instrumentation and associated equipment	10
13. the importance of accurate recording of the inspection and test results	11

14. organizational procedures for reporting and completion of documentation which might include organisational or external QA systems 12

Health and Safety

15. the importance of using personal protective equipment and safe appropriate tools for specific jobs all POs
16. the procedures for reporting any potentially dangerous situations or incidents all POs
17. the legal responsibilities for health and safety in accordance with current health and safety legislation, regulations and codes of practice all POs

Principles and theory

18. the latest, relevant Industry Standards relevant to types and uses of instruments and associated equipment all POs
19. where to find out about the principles of electrical theory and installation techniques and which allow for the safe connection of instrumentation and associated equipment. all POs

Unit 315

Prepare to work on public lighting systems and associated equipment (NET Unit 60)

This unit is for:

you if you are preparing to carry out works on public lighting systems and associated equipment.

This unit is about:

ensuring that the public lighting systems and associated equipment are appropriate for the work site and working conditions.

This is what you need to show:

that you possess the skills and knowledge to:

- determine the site boundaries and the type of equipment present
- assess the site and working conditions for any changes which might impact on the work you will do
- check that you have the right public lighting components for the work
- carry out the correct procedures with regard to identifying the means of supply and site service cables.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Public lighting and associated equipment:	In this unit, this covers street lighting units, illuminated traffic signs, traffic signals, motorway communications, lighting for public areas, buildings, tunnels or subways, CCTV, motorway communications.
Public lighting components:	In this unit, these are lamps, control gear, photoelectric cell units, time switches and luminaires, cutouts, columns, signs, brackets, bollards, cables and joints.
Public lighting systems:	In this unit, these are a network of public lighting equipment and wiring.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may change the working conditions.
Working environment:	In this unit, this refers to the different types of site, including hazardous areas, where the installation is due to take place. The working environment is something you would not be able to change. The type of site will determine whether the working environment affects the type of instrumentation and associated equipment to be installed.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Current approved Codes of Practice:	In this unit, these are, for example, the Traffic Signs Manual on (Chapter 8) Temporary Signing and Guarding, codes of practice from HSE, NJUG, ILE, HAUC and publications from relevant organisations.
Faults:	In this unit, these include electrical or structural faults.
Site services:	In this unit, these are: electricity, water, gas, drainage, telecommunications, data transmission either underground or overhead.
Personal protective equipment:	In this unit, these include safety helmet, highly visibility clothing, rubber gloves, safety shoes and safety harness (for example for working on mobile elevated work platforms).
Types of supply:	In this unit, these are either Regional Electricity Companies (REC) or private.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you assess the work site to determine
 - the boundary and
 - the nature of the equipment present
2. you confirm with the relevant person the scope of the work to be carried out
3. you review the work site and working conditions for any changes which might impact on the work due to take place
4. you have available public lighting components
 - of the appropriate type, quantity and size
 - and which are fit for purpose
5. you identify accurately the means and point(s) of electrical isolation prior to commencing work
6. when appropriate, you determine the position of site services using suitable equipment
7. you wear suitable personal protective equipment throughout all preparation activities.

KNOWLEDGE REQUIREMENTS

In order to prepare to carry out works on public lighting systems and associated equipment you should know and understand the following aspects relating to:

	Performance objective number
Preparation work	
1. how to assess sites and understand boundary definitions, different types of equipment under, on and over the highway	1
2. the scope of the work to be carried out	2
3. the application, advantages and limitations of common types of public lighting systems and associated equipment	2,3,4
4. the materials which are recommended for use as electrical conductors and insulators	3
5. how to determine the suitability of fixing methods for public lighting systems in the environment of the installation including the threat from vandalism and unauthorised access	3,4
6. hazards present at the work site or from a change in working conditions which need to be controlled	3
7. how to determine quantities, size and types of components for public lighting systems	4
8. the correct procedures for a safe isolation with regard to the identification of <ul style="list-style-type: none">• the types of supply• electrical circuits to be isolated• isolation points	5
9. how to identify the position of site services using equipment	6
10. why and how to avoid site services at the work site	6
11. the importance of wearing appropriate personal protective equipment	9
12. the legal implications of health and safety in accordance with current health and safety legislation, regulations and codes of practice	all POs
13. handling public lighting electrical systems and equipment in the correct manner for health and safety reasons	all POs
Principles and theory	
14. the latest, relevant Industry Standards relevant to public lighting systems and associated equipment	all POs
15. ILE Code of Practice for Public Lighting.	all POs

Unit 316

Install and connect public lighting systems, components and associated equipment (NET Unit 61)

This unit is for:

you if you are required to install and connect public lighting systems, components and associated equipment.

This unit is about:

following the correct procedures for the installation and connection of public lighting systems, components and associated equipment.

This is what you need to show:

that you possess the skills and knowledge to:

- install public lighting systems and associated equipment
- apply the correct methods of isolating electricity supply on site
- position and fix public lighting systems and associated equipment correctly
- connect public lighting systems and associated equipment and check the connections using safe methods.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Connections:	In this unit, this includes: the termination and connection of wiring systems to public lighting systems and associated equipment ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Tests:	In this unit these include electrical tests such as insulation resistance, polarity and earth loop impedance or functional tests which confirm that the systems and equipment are working.
Public lighting and associated equipment:	In this unit, this covers street lighting units, illuminated traffic signs, traffic signals, motorway communications, lighting for public areas, buildings, tunnels or subways, CCTV, motorway communications.
Public lighting components:	In this unit, these are lamps, control gear, photoelectric cell units, time switches and luminaires, cutouts, columns, signs, brackets, bollards, cables and joints.
Public lighting systems:	In this unit, these are a network of public lighting equipment and wiring.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may change the working conditions.
Working environment:	In this unit, this refers to the different types of site, including hazardous areas, where the installation is due to take place. The working environment is something you would not be able to change. The type of site will determine whether the working environment affects the type of instrumentation and associated equipment to be installed.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Current approved Codes of Practice:	In this unit, these are, for example, the Traffic Signs Manual on (Chapter 8) Temporary Signing and Guarding, codes of practice from HSE, NJUG, ILE, HAUC and publications from relevant organisations.
Personal protective equipment:	In this unit, these include safety helmet, highly visibility clothing, rubber gloves, safety shoes and safety harness (for example for working on mobile elevated work platforms).
Types of supply:	In this unit, these are either Regional Electricity Companies (REC) or private.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you implement a safe system of work during your installation and connection activities
2. you follow agreed procedures to ensure the co-ordination of the activities of other trades
3. you use all tools and equipment safely following the manufacturer's instructions and your organisation's procedures
4. you carry out safe and secure isolation procedures
5. you follow the correct procedures for installing appropriate to the type of supply and cut outs
6. you fix all public lighting components and associated equipment
 - in an appropriate position to enable ease of access and facilitate future maintenance
 - to comply with relevant regulations and manufacturers' instructions
7. the connections you make:
 - comply with relevant regulations
 - are electrically and mechanically sound
 - are identified correctly and clearly
8. you test the connections by following safe and industry approved procedures
9. when appropriate, you take safe and suitable action to remedy any identified defects
10. where you are unable to complete specified work, you report the matter to the relevant person(s) clearly and accurately.
11. your work records are accurate, complete, up to date and passed to the relevant person(s) promptly.

KNOWLEDGE REQUIREMENTS

In order to install and connect public lighting systems and associated equipment you should know and understand the following aspects relating to:

	Performance objective number
1. procedures for an assessment of risk and how to implement a safe system of work	1
2. site procedures for ensuring the co-ordination with other trades	2
3. organisational procedures and manufacturers' instructions for using tools and equipment	3
4. the correct procedures for a safe and secure isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation	4
5. the implications for relevant parties for carrying out an isolation	4
6. the correct procedures for dealing with electricity company supplies and private supplies	5
7. the existence and application of relevant regulations and manufacturers' instructions for fixing equipment	6
8. how to interpret diagrams and drawings to enable the correct positioning and fixing of equipment	6
9. how lighting circuits work for various lamp types and wattages (e.g.SOX,SON etc.)	7
10. the function of control gear items and switching equipment	7
11. the procedures for the connection of single and multi-phase circuits	7
12. the main types, advantages and limitations of different electrical connections, including <ul style="list-style-type: none">• temporary or permanent purposes• joints and connections which are of strength and conductance to allow for the passage of fault currents and to prevent corrosion	7
13. how to interpret diagrams and drawings to facilitate the connection of public lighting systems and associated equipment	7
14. the procedures for ensuring a connection is electrically and mechanically sound and identified clearly and correctly	7
15. the appropriate tests to be carried out on completion.	8
16. safe action to take to remedy defects	9
17. organisational reporting and recording procedures which might include organisational or external Quality Assurance systems	10,11

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| 18. the importance of using personal protective equipment and safe appropriate tools for specific jobs | all POs |
| 19. the legal responsibilities in accordance with current health and safety regulations, legislation and codes of practice. | all POs |

Principles and Theory

- | | |
|---|---------|
| 20. the hazards associated with using electrical equipment and plant including their lifting, handling and fixing. | all POs |
| 21. the latest Industry Standards for public lighting systems and associated equipment. | all POs |
| 22. the current edition of the Electrical Association Engineering Memorandum (G39). | all POs |
| 23. the ILE Code of Practice. | all POs |
| 24. where to find out about the principles of electrical theory and installation techniques which allow for the safe installation and connection of public lighting systems and associated equipment. | all POs |

Unit 317

Inspect and test a public lighting system and associated equipment (NET Unit 63)

This unit is for:

you if you are required to inspect and test public lighting systems and associated equipment.

This unit is about:

carrying out the process of inspecting and testing public lighting systems and associated equipment in a safe manner and in the correct sequence to ensure that the installation complies with the client's requirements and the industry codes of practice.

This is what you need to show:

that you possess the skills and knowledge to:

- carry out an assessment of risks to implement a safe system of work under test conditions
- follow safe and secure isolation procedures when appropriate
- confirm the safety and integrity of the public lighting systems and associated equipment by inspection and testing
- prepare a report of your inspection and test results.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Public lighting and associated equipment:	In this unit, this covers street lighting units, illuminated traffic signs, traffic signals, motorway communications, lighting for public areas, buildings, tunnels or subways, CCTV, motorway communications.
Public lighting components:	In this unit, these are lamps, control gear, photoelectric cell units, time switches and luminaires, cutouts, columns, signs, brackets, bollards, cables and joints.
Public lighting systems:	In this unit, these are a network of public lighting equipment and wiring.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may change the working conditions.
Working environment:	In this unit, this refers to the different types of site, including hazardous areas, where the installation is due to take place. The working environment is something you would not be able to change. The type of site will determine whether the working environment affects the type of instrumentation and associated equipment to be installed.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Current approved Codes of Practice:	In this unit, these are, for example, the Traffic Signs Manual on (Chapter 8) Temporary Signing and Guarding, codes of practice from HSE, NJUG, ILE, HAUC and publications from relevant organisations.
Faults:	In this unit, these include electrical or structural faults.
Site services:	In this unit, these are: electricity, water, gas, drainage, telecommunications, data transmission either underground or overhead.
Personal protective equipment:	In this unit, these include safety helmet, highly visibility clothing, rubber gloves, safety shoes and safety harness (for example for working on mobile elevated work platforms).
Types of supply:	In this unit, these are either Regional Electricity Companies (REC) or private.
Connections:	In this unit, this includes: the termination and connection of wiring systems to public lighting systems and associated equipment ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Tests:	In this unit these include electrical tests such as insulation resistance, polarity and earth loop impedance or functional tests which confirm that the systems and equipment are working.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm with the relevant person the scope of the work to be carried out
2. you carry out an assessment of risks and produce a safe system of work to comply with health and safety legislation, regulations and codes of practice
3. you confirm that your safe system of work is appropriate to the scope of work
4. you confirm that your test instruments are
 - appropriate to the job in hand
 - fit for purpose
 - have a current calibration certificate
5. you conduct a structural inspection in accordance with the requirements of the client and the industry codes of practice
6. you conduct the required tests to ensure that the installation complies with
 - the latest Industry Standards relevant to public lighting systems and associated equipment
 - manufacturers' instructions
 - the client's requirements
7. where the test results reveal problems, you report the problems to the relevant person(s)
8. you carry out the correct functional tests to determine whether the completed installation operates prior to leaving the site
9. you prepare a formal record of the inspection and testing in accordance with the client's requirements and the industry codes of practice.

KNOWLEDGE REQUIREMENTS

In order to inspect, test and commission an electrical installation you should know and understand the following aspects relating to:

	Performance objective number
Inspecting, Testing And Commissioning	
1. the scope, type and requirements of the inspection and testing of public lighting systems and associated equipment	1
2. procedures for an assessment of risk and how to implement a safe system of work	2,3
3. the specific procedures and requirements for: <ul style="list-style-type: none">• initial and periodic inspection and testing• pre-commissioning and commissioning	3
4. the correct procedures for a safe isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation	2,3
5. the importance of choosing the correct instruments for the particular test	4
6. the main methods for checking test instruments are functioning and in calibration	4
7. best practice with regard to methods of testing and the correct sequence of testing	6
8. the characteristics of different types of cabling and components and how they impact on the test	6,7
9. the approved procedures and requirements for commissioning the installation	8
10. the importance of accurate recording of the test	9
11. approved recording and reporting procedures for inspection and test results	9
12. the legal responsibilities in accordance with current health and safety regulations and legislation and codes of practice	all POs
13. precautions necessary for testing energised equipment.	6,8
Principles and Theory	
14. the latest Industry Standard for public lighting systems.	all POs
15. the current edition of the Electrical Association Engineering Memorandum (G39).	all POs
16. ILE Code of Practice.	all POs

17. where to find out about the principles of electrical theory and installation techniques for the inspection and testing of public lighting systems and associated equipment.

all POs

Unit 318

Carry out emergency work on public lighting systems and associated equipment (NET Unit 65)

This unit is for:

you if you are required to carry out emergency work on public lighting systems and associated equipment.

This unit is about:

ensuring that safe and approved methods are used to carry out emergency work on public lighting and associated electrical equipment.

This is what you need to show:

that you possess the skills and knowledge to:

- assess the likely hazards and risks to yourself and others resulting from the emergency situation
- assess the site for damaged equipment
- ensure the site is safe and secure for site personnel and the general public
- repair equipment where appropriate
- report work that cannot be repaired
- record the results of your work.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Public lighting and associated equipment:	In this unit, this covers street lighting units, illuminated traffic signs, traffic signals, motorway communications, lighting for public areas, buildings, tunnels or subways, CCTV, motorway communications.
Public lighting components:	In this unit, these are lamps, control gear, photoelectric cell units, time switches and luminaires, cutouts, columns, signs, brackets, bollards, cables and joints.
Public lighting systems:	In this unit, these are a network of public lighting equipment and wiring.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the installation is due to take place, but they could vary. It could be, for example, that the installation is to take place outside, in which case you may need to take account of the weather conditions. Or, they could include other (non-electrical) operatives who come onto the site to start their work - their subsequent activities may change the working conditions.
Working environment:	In this unit, this refers to the different types of site, including hazardous areas, where the installation is due to take place. The working environment is something you would not be able to change. The type of site will determine whether the working environment affects the type of instrumentation and associated equipment to be installed.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Current approved Codes of Practice:	In this unit, these are, for example, the Traffic Signs Manual on (Chapter 8) Temporary Signing and Guarding, codes of practice from HSE, NJUG, ILE, HAUC and publications from relevant organisations.
Faults:	In this unit, these include electrical or structural faults.
Site services:	In this unit, these are: electricity, water, gas, drainage, telecommunications, data transmission either underground or overhead.
Personal protective equipment:	In this unit, these include safety helmet, highly visibility clothing, rubber gloves, safety shoes and safety harness (for example for working on mobile elevated work platforms).
Types of supply:	In this unit, these are either Regional Electricity Companies (REC) or private.
Connections:	In this unit, this includes: the termination and connection of wiring systems to public lighting systems and associated equipment ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Tests:	In this unit these include electrical tests such as insulation resistance, polarity and earth loop impedance or functional tests which confirm that the systems and equipment are working.

Industry Standards:

These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you prepare for the emergency work by confirming its nature and location of the checking you have appropriate equipment
2. you follow agreed procedures to ensure co-ordination as appropriate with
 - with the Emergency Services
 - with relevant the person(s)
3. you carry out an accurate assessment of the site to determine the:
 - structural damage
 - electrical damage
 - type of electrical supply present at the site
4. you carry out safe and secure isolation procedures
5. you make safe the public lighting and associated equipment, where appropriate, cables to prevent immediate danger to the public, yourself and other site personnel
6. you identify equipment which:
 - can be removed from the site
 - can be left safely on site
7. you monitor that the site is safe and secure and protects the public, vehicular traffic and livestock from harm
8. you keep the relevant person(s) and emergency services aware of your actions regularly
9. you follow agreed organisational procedures to obtain technical back-up and additional resources where necessary
10. your records about the work are accurate and complete and passed to the relevant person(s) promptly.

KNOWLEDGE REQUIREMENTS

In order to carry out emergency work on public lighting systems and associated equipment you should know and understand the following aspects relating to:

	Performance objective number
Carrying out emergency work	
1. the correct procedures for preparations for attending to emergency work	1
2. the correct site procedures for co-ordination with emergency service work and other relevant people	2
3. how to carry out a safe assessment of the site and plan site working	3
4. the procedures for identifying structural damage and electrical damage	3
5. how to identify the different types of supply	3
6. what the correct procedures are to effect a safe isolation	4
7. the correct procedures for making Electricity Company and private supplies safe	5
8. how to identify which equipment must be removed and which can be safely left	6
9. how to light, sign and guard the site to protect the public, livestock and vehicular traffic	7
10. when to request technical backup and when it is safe to repair and is within your job responsibility to do so	9
11. organisational reporting and recording procedures and those relating to involving technical advice and additional resources	10
12. the importance of using personal protective equipment and safe appropriate tools for specific jobs	all POs
13. the legal responsibilities in accordance with current health and safety regulations, legislation and codes of practice	all POs
14. the hazards associated with underground and overhead cables and other services	all POs
Principles and Theory	
15. the latest Industry Standards for public lighting systems and associated equipment	all POs
16. your responsibilities under the New Roads and Streets Works Act	all POs
17. ILE Code of Practice	all POs
18. where to find out about the principles of electrical theory and all installation techniques which allow for the safe emergency working on public lighting systems and associated equipment.	all POs

Unit 319

Ensure safe electrical working when building panels (NET Unit 18a)

This unit is for:

you if you build panels as you will need to ensure the workplace is continually safe for electrical work.

This unit is about:

assessing the workplace for hazards prior to, during and on completion of work on panel building.

This is what you need to show:

that you possess the skills and knowledge to:

- assess the working conditions for health and safety purposes
- plan a safe programme of work
- carry out safe working practices including use of access equipment
- monitor that the workplace remains continually safe during working
- ensure it is left in a safe and secure condition on completion.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Workplace:	In this unit, this refers to the immediate area where the panel is being built.
Working environment:	In this unit, this refers to the workplace's environment which may be affected by other associated or allied trades, such as paint spraying work, sheet metal work.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the panel building is due to take place. The physical dimensions of the panel being built may affect the working conditions.
Access equipment:	In this unit, these include: stepladders, trestles, mobile scaffolding, platform systems.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Panel Types:	In this unit, these include: switchboards, mccs, control panels, etc. A control panel is a multi-functional enclosure which contains an electrical system of control components and whose uses are explained by a circuit diagram.
Equipment:	In this unit, this includes switchgear, distribution boards, motor starters, controllers, instrumentation and their control systems, components and accessories.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks of the workplace and the working environment to comply with health and safety regulations and other legislation applicable to the panel being built
2. you agree a safe programme of work with the relevant person(s)
3. you use suitable warning notices and barriers to prevent unauthorised entry to the workplace as identified by the assessment of risks
4. you minimise the risks associated with the tools, plant, equipment, materials and access equipment applicable to the panel being built
5. you monitor regularly that the working conditions remain safe for work to continue
6. you operate the tools, equipment, plant and, when necessary, access equipment following suppliers' instructions and health and safety requirements
7. you check that your tools, equipment, plant and materials at the workplace are stored safely and securely during work activities and removed on completion
8. on completion of your work the immediate workplace is left in a safe and satisfactory condition in accordance with health and safety regulations and good housekeeping practice.

KNOWLEDGE REQUIREMENTS

In order to carry out emergency work on public lighting systems and associated equipment you should know and understand the following aspects relating to:

	Performance objective number
Health and Safety	
1. how to carry out an assessment of risks with regard to: <ul style="list-style-type: none">• access to the immediate workplace• preventing unauthorised access• others working at the workplace• systems and equipment integrity• the working environment	1,2,3
2. the regulatory and your organisation's requirements for correctly handling and storing tools, equipment, materials and access equipment	6,7,8
3. when it is safe for work to proceed, continue or to leave when work finishes	5,8
4. the need for safety, welfare and access arrangements to be in force at the workplace	3
5. use, care and storage of substances covered by COSHH	6,7,8
6. the legal responsibilities for health and safety in accordance with current health and safety legislation, regulations and codes of practice	all POs
Working practices	
7. the importance of 'good housekeeping' procedures in maintaining a safe working environment	8
8. the potential consequences of failure to follow specified working practices and suppliers' instructions for the use of tools, equipment, plant and materials	6
9. your organisation's procedures for safe working practices and the monitoring of working conditions.	all POs

This unit is for:

you if you are preparing to build a custom-built panel in the workplace.

This unit is about:

ensuring that the conductor systems and equipment are suitable for the panel type and its specification, and planning a safe system of work.

This is what you need to show:

that you possess the skills and knowledge to:

- confirm that the work you are going to do meets the relevant person'(s) expectations,
- ensure you have the right materials for that panel type, and that the working conditions are safe for work to start,
- be sure that the conductor systems and equipment are safe and fit for purpose
- correctly plan a safe system of work.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Equipment:	In this unit, this includes switchgear, distribution boards, motor starters, controllers, instrumentation and their control systems, components and accessories.
Conductor systems:	In this unit, these refer to insulated and non- insulated conductor systems as specified.
Panel Types:	In this unit, these include: switchboards, mccs, control panels, etc. A control panel is a multi-functional enclosure which contains an electrical system of control components and whose uses are explained by a circuit diagram.
Working environment:	In this unit, this refers to the workplace's environment which may be affected by other associated or allied trades, such as paint spraying work, sheet metal work.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the panel building is due to take place. The physical dimensions of the panel being built may affect the working conditions.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm that your plans for the panel building work meet with the expectations of the relevant person
2. you report, promptly, any changes to the working conditions of the workplace which might impact on the panel building to the relevant person(s)
3. you prepare a schedule of equipment applicable to the panel type from customer information and specifications
4. the conductor systems and equipment you have ready for use meet the requirements of the latest issue of the circuit diagrams and layout drawings
5. you confirm that the conductor systems and equipment are:
 - fit for purpose
 - appropriate for the panel type to be built
6. you obtain all relevant manufacturers' data, publications and the latest, relevant Industry Standards for the panel's conductor systems and equipment
7. you confirm that there are no hazards which could harm yourself or other people prior to commencing work
8. you plan a system of work for use throughout the panel building which is safe and effective.

KNOWLEDGE REQUIREMENTS

In order to prepare to build panels you should know and understand the following aspects relating to:

	Performance objective number
Preparing to build panels	
1. contract responsibilities and legal implications with respect to <ul style="list-style-type: none"> • agreeing variations to the panel building not within the contract/ specification • start and finish dates 	1
2. how to carry out an assessment of risks and plan a system of work with regard to: <ul style="list-style-type: none"> • access to the workplace • preventing unauthorised access • others working at the workplace • systems and equipment integrity • the working environment 	2,6,8
3. the materials, their advantages, limitations and applications used as electrical conductors and insulators	4,5
4. the advantages and limitations of conductor systems, equipment and panel types	4,5
5. methods of determining the quantity and current carrying capacity of conductor systems	4,5
6. how to prepare a schedule of equipment required for panel building from customer information or specifications	3
7. how to determine the suitability of a conductor system and panel building equipment for a particular environment	5
8. how to interpret circuit diagrams and layout drawings and the planned location for conductor systems and equipment within each panel type	4
9. how to use and interpret the relevant Industry Standards and manufacturer's data and publications	7
Health and Safety	
10. responsibilities for health and safety in accordance with current health and safety legislation, regulations and codes of practice	all POs
11. the potential hazards in the panel building environment and how the risks to others can be minimised	all POs
12. the legal responsibilities for health and safety in accordance with current health and safety legislation, regulation and codes of practice	all POs
Principles and Theory	
13. the latest, relevant Industry Standards applicable to the preparation of panel building	all POs

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| 14. where to find out about the principles of electrical theory and installation techniques and those which are appropriate to the preparation of building panels | all POs |
| 15. where to find relevant manufacturers' data and publications. | 6 |

Unit 321

Build panels using safe and approved methods (NET Unit 27)

This unit is for:

you if you build panels in the workplace.

This unit is about:

following the correct procedures for building panels.

This is what you need to show:

that you possess the skills and knowledge to:

- build panels using safe and approved methods
- use drawings, diagrams and specifications to assemble the panels
- check for defects during the building period
- take suitable action to remedy defects.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Connections:	In this unit, this includes: the termination and connection of wiring systems and equipment ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Equipment:	In this unit, this includes switchgear, distribution boards, motor starters, controllers, instrumentation and their control systems, components and accessories.
Conductor systems:	In this unit, these refer to: insulated and non- insulated conductor systems as specified.
Panel Types:	In this unit, these include: switchboards, mccs, control panels, etc. A control panel is a multi-functional enclosure which contains an electrical system of control components and whose uses are explained by a circuit diagram.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks and follow a safe system of work which is safe and effective throughout all panel building activities
2. you assemble the main body of the panel to comply with drawings, diagrams and the relevant specification
3. you measure and mark out locations for panel equipment to comply with the drawings, diagrams and the relevant specification
4. you install and connect the panel's conductor systems and equipment safely to comply with
 - the drawings
 - the diagrams
 - the relevant specification
 - the latest, relevant Industry Standards
5. you label, clearly, the conductors, connections and equipment to meet with the relevant specification and legal requirements
6. when necessary, you take safe and suitable remedial action to correct any identified defects during the building period in accordance with industry practices
7. you complete any necessary documentation relating to the work legibly, accurately and in a timely manner to meet with organisational requirements.

KNOWLEDGE REQUIREMENTS

In order to build panels using safe and approved methods you should know and understand the following aspects relating to:

	Performance objective number
Building panels	
1. how to carry out an assessment of risks and plan a safe system of work with regard to: <ul style="list-style-type: none">• access to the workplace• others working at the site• the working environment• preventing unauthorised access• systems and equipment integrity	1
2. safe methods and techniques of assembling the main body of panels	2
3. main types, the advantages and limitations of different electrical connections	4
4. how to interpret circuit diagrams and drawings to facilitate the building of the main body of the panel and the connection of conductor systems and equipment	2,3,4
5. the procedures and techniques for the connection of single and multi-phase, control circuits and for the connection of equipment within the panel	4
6. the requirements of joints and connections to be of strength and conductance to allow for the passage of fault currents and to prevent corrosion	4
7. industry approved procedures for labelling conductors, connections and equipment for identification purposes	5
8. how to identify defects and the implications of carrying out remedial action	6
9. organisational procedures for the completion of necessary documentation which might include organisational or external QA systems	7
Health and Safety	
10. the importance of using personal protective equipment and safe appropriate tools for specific jobs	all POs
11. the procedures for reporting any potentially dangerous situations or incidents	6,7
12. the legal responsibilities for health and safety in accordance with current health and safety legislation, regulations and codes of practice	all POs
13. handling conductor systems and equipment in the correct manner	all POs
Principles and Theory	
14. the latest, relevant Industry Standards applicable to the building of panels	all POs

15. where to find out about the principles of electrical theory and installation techniques and those appropriate to building panels.

all POs

Unit 322

Carry out inspection and testing of panels (NET Unit 46)

This unit is for:

you if you inspect and test built panels.

This unit is about:

following industry approved practices and procedures for the inspection and testing of built panels.

This is what you need to show:

that you possess the skills and knowledge to:

- visually inspect a built panel
- select and correctly use the appropriate testing equipment
- carry out all tests in the appropriate sequence
- keep good records of the procedures and results.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Connections:	In this unit, this includes: the termination and connection of wiring systems and equipment ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Equipment:	In this unit, this includes switchgear, distribution boards, motor starters, controllers, instrumentation and their control systems, components and accessories.
Conductor systems:	In this unit, these refer to: insulated and non- insulated conductor systems as specified.
Panel Types:	In this unit, these include: switchboards, mccs, control panels, etc. A control panel is a multi-functional enclosure which contains an electrical system of control components and whose uses are explained by a circuit diagram.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Tests:	In this unit, these include tests appropriate to conductors, insulation resistance, pressure tests, polarity and phase-sequencing, the operation of protective equipment, functional operation of control circuits, components and equipment.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you plan and agree the inspection and testing procedures with the relevant person (s)
2. you undertake an assessment of risks prior to carrying out the inspection and testing
3. you conduct a visual inspection and confirm the panel assembly is in accordance with
 - the latest, relevant Industry Standards
 - relevant diagrams
 - relevant drawings
 - the relevant specification
4. you confirm that your test instruments:
 - are appropriate to the job in hand
 - are fit for purpose
 - have a current calibration certificate
5. you follow the correct procedures for carrying out a safe and secure isolation
 - to each functional unit prior to testing
 - to the completed panel on completion of functional testing
6. you conduct, in the correct sequence, appropriate tests in accordance with
 - approved industry practices
 - the latest, relevant Industry Standards
 - manufacturers' recommendations
 - the relevant specification
7. all approved panels conform to
 - the latest, relevant Industry Standards
 - manufacturers' recommendations
 - the relevant specification
8. panels which do not function correctly and safely, you report to the relevant person(s) promptly
9. you prepare and complete relevant documentation to record confirmation of the panel's conformity to the relevant specification
10. your handover of the panel to the relevant person(s) includes accurate and complete information and documentation for its continued safe and effective use.

KNOWLEDGE REQUIREMENTS

In order to inspect and test panels using safe and approved methods you should know and understand the following aspects relating to:

	Performance objective number
Inspecting and Testing	
1. the purpose and requirements of the panel(s) to be inspected and tested	1
2. how to carry out an assessment of risks and plan a safe system of work with regard to: <ul style="list-style-type: none">• access to the workplace• others working at the site• the working environment• preventing unauthorised access• systems and equipment integrity	2
3. the requirements of an inspection with regard to: <ul style="list-style-type: none">• selection, identification and connection of conductors• protection against contact and fire• labelling,• access to switchgear and equipment• availability of danger, warning notices, diagrams and instructions	3
4. the importance of choosing the correct instruments for testing	4
5. the procedures for checking test instruments are fit for purpose and are calibrated	4
6. the correct procedures for a safe isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• application of industry approved testing methods• correct selection of devices for securing isolation	5
7. approved industry procedures and practices for testing the built panel	1,6,7
8. the importance of accurate labelling and recording of the results of test activities	9
9. the characteristics and limitations of different types of conductors and components and how they impact on the testing of the panel	6,7
10. organisational requirements with regard to completing test documentation and reporting failed panels	8,9
Health and Safety	
11. carrying out the tests and their effect on equipment not part of the fixed installation	6,7

- | | |
|--|---------|
| 12. industry approved procedures and practices for the use of test equipment | 1,6 |
| 13. the legal responsibilities for health and safety in accordance with current health and safety legislation, regulations and codes of practice | all POs |

Principles and Theory

- | | |
|---|---------|
| 14. the latest, relevant Industry Standards applicable to the inspection and testing of built panels | all POs |
| 15. where to find out about the principles of electrical theory and installation techniques and those which are appropriate to safe inspection and testing. | all POs |

Unit 323

Diagnose and correct faults in panels (NET Unit 54a)

This unit is for:

you if you diagnose and correct faults in panels and take appropriate action.

This unit is about:

the safe identification and rectification of faults using safe and approved methods.

This is what you need to show:

that you possess the skills and knowledge to:

- use safe methods of diagnosing faults
- rectify faults using safe and approved methods
- make the correct use of test equipment and tools.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Faults:	In this unit, faults include: overload, earth leakage faults, open circuits, short circuits, high resistance joints, incomplete circuits and oversensitive/ non- performing protective devices.
Connections:	In this unit, this includes: the termination and connection of wiring systems and equipment ensuring that every joint and connection is mechanically and electrically sound and suitable for use.
Equipment:	In this unit, this includes switchgear, distribution boards, motor starters, controllers, instrumentation and their control systems, components and accessories.
Conductor systems:	In this unit, these refer to: insulated and non- insulated conductor systems as specified.
Panel Types:	In this unit, these include: switchboards, mccs, control panels, etc. A control panel is a multi-functional enclosure which contains an electrical system of control components and whose uses are explained by a circuit diagram.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Tests:	In this unit, these include tests appropriate to conductors, insulation resistance, pressure tests, polarity and phase-sequencing, the operation of protective equipment, functional operation of control circuits, components and equipment.
Relevant person(s):	In this unit, these are: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues, non-electrical operatives.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you obtain clear and detailed information relating to the faults including the specification and condition of the faulty electrical equipment
2. you advise the relevant people clearly and accurately about the potential disruption and consequences of carrying out a diagnosis and correction of faults
3. you agree the appropriate repairs and their costs with the relevant people in accordance with organisational procedures
4. you undertake an assessment of risks and plan a safe system of work to comply with health and safety regulations
5. you follow the correct procedures for identifying and carrying out a safe and secure isolation
6. you follow the safe system of work to perform suitable tests on the installed equipment to identify the faults
7. you correct the fault, in accordance with specifications for
 - the equipment
 - the conductor systems
 - using the appropriate tools, equipment and materials
8. you inspect and test that the repaired electrical equipment is functioning correctly in accordance with the equipment specifications and conductor systems
9. you complete the relevant documentation to comply with organisational requirements.

KNOWLEDGE REQUIREMENTS

In order to diagnose and correct electrical faults in panels you should know and understand the following aspects:

	Performance objective number
Diagnosing and correcting faults	
1. the necessary information for carrying out a successful fault diagnosis	1
2. the implications for relevant parties of carrying out an isolation in order to undertake fault finding	2,3
3. how to carry out an assessment of risks and plan a system of work with regard to: <ul style="list-style-type: none">• access to the workplace• preventing unauthorised access• others working at the workplace• systems and equipment integrity• the working conditions and the working environment	4
4. the correct procedures for a safe and secure isolation with regard to: <ul style="list-style-type: none">• an assessment of safe working practice• correct identification of circuits to be isolated• correct test and proving instruments selected• use of correct testing methods• correct selection of devices for securing isolation	5
5. the advantages and limitations of fault diagnosis techniques	6
6. the correct sequence of tests for locating faults	6
7. the main types, advantages and limitations of test instruments for use with the installation	7
8. the correct methods for checking that test instruments are functional and in calibration	7
9. the main requirements and procedures of inspecting and testing panels when undertaking fault finding	8
10. organisational requirements with regard to completing test results and all relevant documentation	9
Health and Safety	
11. importance of using personal safety equipment and appropriate tools for specific jobs	all POs
12. the legal responsibilities for health and safety in accordance with current health and safety legislation, regulations and codes of practice	all POs
Principles and Theory	
13. the latest, relevant Industry Standards applicable to the diagnosis and correction of faults in built panels	all POs

14. where to find out about the principles of electrical theory and installation techniques and which are appropriate to the diagnosis and correction of faults in built panels.

all POs

Unit 324

Provide technical and functional information to relevant people relating to panels (NET Unit 70a)

This unit is for:

you if you pass on technical or functional information relating to custom-built panels.

This unit is about:

supplying technical and functional information accurately on appropriate occasions or at handover with the right amount of detail bearing in mind the level of awareness of the recipient of the information.

This is what you need to show:

that you possess the skills and knowledge to identify who should receive such information and at what level of detail supply the information that is within your job capabilities and responsibilities pass on the necessary safety considerations in the correct manner.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Technical Information:	In this unit, this will include information covering specifications of the panel types, manufacturers' instructions and data.
Functional Information:	In this unit, this will include information covering user instructions, including the circumstances when other relevant people should be called in.
Relevant people:	In this unit these will include: customers, clients, client representatives, charge-hands, supervisors, other contractors.
Equipment:	In this unit, this includes switchgear, distribution boards, motor starters, controllers, instrumentation and their control systems, components and accessories.
Panel Types:	In this unit, these include: switchboards, mccs, control panels, etc. A control panel is a multi-functional enclosure which contains an electrical system of control components and whose uses are explained by a circuit diagram.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, permits to work, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you identify the relevant people that need to be supplied with technical and functional information
2. you discuss, with the relevant people, their technical and functional information requirements
3. you obtain current and relevant information from appropriate sources
4. you assess the nature and extent of information required by the relevant people in order for the installation, or equipment, to be operated safely and effectively
5. you pass on the information in a timely, courteous and professional manner and in accordance with organisational procedures
6. you provide written technical and functional information to the relevant people in accordance with organisational procedures
7. you confirm that the relevant people receive the necessary health and safety information and advice in the approved manner.

KNOWLEDGE REQUIREMENTS

In order to provide technical and functional information to relevant people you should know and understand the following aspects relating to:

	Performance objective number
Providing technical and functional information	
1. which situations warrant written technical and functional information	4,6
2. methods of checking the relevant person's understanding of the technical and non-technical information provided	1,2
3. sources of technical and functional information including the manufacturer, supplier or own organisation	3
4. ways of checking the relevant people understand those aspects of the information which have a bearing on health and safety	7
5. responsibilities and limitations in your job role with respect to supplying technical and functional information	all POs
6. organisational practice on the amount of information and detail that individual members of the relevant person's organisation are entitled to receive	5
7. the importance of providing information clearly, courteously and professionally	7
8. the safety implications and functional consequences of supplying inaccurate or incomplete information to the relevant person	all POs
Health and Safety	
9. the need for up-to-date, reliable technical and functional information	all POs
10. the legal responsibilities for health and safety according to current health and safety legislation, regulations, codes of practice.	all POs

Unit 325

Maintain a healthy and safe working environment when building panels (NET Unit 81a)

This unit is for:

a person carrying out activities at work - regardless of where that work might be. The scope of the Health and Safety at Work Act 1974 covers 'all persons' whether employers, employees, self-employed, contractors, etc. Amongst other things the Act seeks to do is to secure the health, safety and welfare of people whilst they work and protect other people against risks to health or safety arising from the activity of people at work.

This unit does not require the learner to undertake a full risk assessment, it is about having an appreciation of significant risks in the workplace and knowing how to identify them and deal with them.

It is important to note the following that according to the Health and Safety at Work Act: Employers must safeguard so far as is reasonably practicable, the health, safety and welfare at work of all the people who work for them and 'other persons'. This applies in particular to the provision and maintenance of safe plant and systems of work, and covers all machinery, equipment and substances used.

People at work also have a duty under the Act to take reasonable care to avoid harm to themselves or to others by their working practices, and to co-operate with employers and others in meeting statutory requirements. The Act also requires employees not to interfere with or misuse anything provided to protect their health, safety or welfare in compliance with the Act.

This unit is about:

having an appreciation of hazards which may cause serious harm in the workplace and knowing how to deal with them. It describes the competences required to ensure that:

- your own actions do not create any health and safety risks
- you do not ignore hazards with significant risk in your workplace
- you take sensible action to put things right, including reporting situations which pose a danger to people in the workplace and seeking advice.

This is what you need to show:

that you understand the health and safety requirements in the workplace, and that you check your own work activities and work area for any hazards which may harm you or others. You should be able to identify those risks you can safely deal with yourself, and those which you must report to the 'responsible' person for attention.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

The Health and Safety Executive (HSE) is the body appointed to support and enforce health and safety law. They have defined two important concepts as follows:

Hazard:	`a hazard is something with potential to cause harm'
Risk:	`a risk is the likelihood of the hazard's potential being realised'

Almost anything may be a hazard, but may or may not become a risk. For example:

1. A trailing electric cable from a piece of equipment is a hazard. If it is trailing across a passageway there is a high risk of someone tripping over it, but if it lies along a wall out of the way, the risk is much less.
2. Toxic or flammable chemicals stored in a building are a hazard, and by their nature may present a high risk. However, if they are kept in a properly designed secure store, and handled by properly trained and equipped people, the risk is much less than if they are left about in a busy workshop for anyone to use - or misuse.
3. A failed light bulb is a hazard. If it is just one bulb out of many in a room it presents very little risk, but if it is the only light on a stairwell, it is a very high risk. Changing the bulb may be a high risk, if it is high up, or if the power has been left on, or low risk if it is in a table lamp which has been unplugged.
4. A box of heavy material is a hazard. It presents a higher risk to someone who lifts it manually than if a mechanical handling device is properly used.

Emergencies:	In this unit this includes: fire, explosions, toxic atmosphere, electrical shocks.
Working conditions:	In this unit this refers to the working conditions which exist at that point in time when the panel building takes place. One example may be the physical dimensions of the panel being built may affect working practices.
Working environment:	In this unit this refers to the work area where the panel building is to take place and this may be affected by other associated or allied trades, for example, paint spraying, sheet metal work, etc.
Relevant people:	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Working practices:	This includes: activities, procedures, use of materials or equipment and working techniques used in carrying out your job.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you identify which workplace health and safety procedures are relevant to your working environment
2. you identify evacuation procedures and emergency exits before work commences
3. you review your working practices and your working environment for hazards which could cause serious harm
4. you control those health and safety hazards within your capability and job responsibility limits
5. you report those hazards which may present a high risk to the relevant persons responsible for health and safety in the workplace
6. your personal conduct around the workplace does not endanger the health and safety of yourself or other persons
7. you follow the workplace policies and suppliers' or manufacturers' instructions for the safe use of tools, plant and equipment
8. you follow agreed procedures in the event of an emergency warning
9. you follow correct procedures in the event of injuries to self and others.

KNOWLEDGE REQUIREMENTS

In order to maintain a healthy and safe working environment when building panels you should know and understand the following aspects relating to:

	Performance objective number
Health and Safety	
1. your legal duties for health and safety in the workplace as defined by the Health and Safety at Work Act 1974	1
2. your duties for health and safety as defined by any specific legislation covering your job role	1,2
3. what hazards may exist in your workplace	3
4. the particular health and safety risks which may be present in your own job role	3
5. the importance of remaining alert to the presence of hazards in the whole work place	all POs
6. agreed workplace health and safety procedures including site evacuation procedures and procedures for dealing with injured persons	6,7,8,9
7. responsibilities for health and safety in your job description	4
8. the responsible persons to whom to report health and safety matters.	5

Unit 326

Ensure safe working practices for electrical machine repair and rewind (NET Unit 18d)

This unit is for:

you if you are repairing an electrical machine as you will need to ensure the workplace is safe for working.

This unit is about:

ensuring that the workplace is safe for work to start through an assessment of the working environment where the work will take place. It is also about using safe working practices, including monitoring that the workplace continues to be safe and that the workplace is left in a tidy and safe condition on completion of the work.

This is what you need to show:

that you possess the skills and knowledge to:

- assess the working conditions for health and safety purposes
- carry out safe working practices including use of mechanical handling equipment
- monitor that the workplace continues to be safe for work to continue
- and store tools and equipment away safely after use.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Workplace:	In this unit, this refers to the immediate area where the repair and rewinding of the electrical machine takes place.
Working environment:	In this unit, this refers to the location where the machine repair is to take place and this may be affected by other associated or allied trades.
Working conditions:	In this unit, this refers to the working conditions which exist at that point in time when the machine repair is due to take place. One example may be the physical dimensions of the machine which may affect working practices.
Mechanical Handling equipment:	In this unit, these include: slings, shackles, hoist blocks, overhead cranes, hydraulic floor cranes.
Relevant person(s):	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Electrical machines:	In this unit these will include: static machines (transformers; magnetic coils) and rotating machines (motors and generators).
Component parts:	In this unit these are individual parts which make up the machine and will include: bearings, brushgear, machine frame, machine enclosures, laminations, windings and accessories.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks of the workplace and the working environment to comply with health and safety regulations and other legislation applicable to the electrical machine to be repaired
2. you agree a safe programme of work with the relevant person(s)
3. you use suitable warning notices and barriers as identified by the assessment of risks to prevent unauthorised entry
4. you minimise the risks associated with the tools, plant, equipment, materials and mechanical handling applicable to the electrical machine to be repaired
5. you monitor regularly that the working conditions remain safe for work to continue
6. you operate the tools, equipment, plant and, when necessary, mechanical handling equipment, following suppliers' instructions and health and safety requirements
7. you check that your tools, equipment, plant and materials at the workplace are stored safely and securely during work activities and removed on completion
8. on completion of your work the immediate workplace is left in a safe and satisfactory condition in accordance with health and safety regulations and good housekeeping practice.

KNOWLEDGE REQUIREMENTS

In order to be able to understand safe working practices when repairing and rewinding electrical, you should know and understand the following aspects relating to:

	Performance objective number
Health and Safety	
1. how to carry out an assessment of risks and plan a safe system of work with regard to: <ul style="list-style-type: none">• access to the immediate workplace• preventing unauthorised access• others working at the workplace• systems and equipment integrity• the working environment• your work activity	1,2,3
2. the regulatory and your organisation's requirements for correctly handling and storing tools, equipment, materials and mechanical handling equipment	6,7,8
3. when it is safe for work to proceed, continue or to leave when work finishes	5,8
4. the need for safety, welfare and access arrangements to be in force at the workplace	3
5. use, care and storage of substances covered by COSHH	6,7,8
6. responsibilities for health and safety in accordance with the health and safety legislation, regulations and codes of practice	all POs
Working practices	
7. the importance of 'good housekeeping' procedures in maintaining a safe working environment	8
8. the implications of not following specified working practices and suppliers' instructions for the use of tools, equipment, plant and materials	4,6
9. your organisation's procedures for safe working practices and the monitoring of working conditions.	all POs

Unit 327

Prepare electrical machines for repair (NET Unit 25)

This unit is for:

you if you prepare to repair electrical machines.

This unit is about:

dismantling the machine to be repaired in order to identify the state of its condition and the extent of the repair required.

This is what you need to show:

that you possess the skills and knowledge to:

- dismantle the electrical machine
- collect and establish data on the machine
- establish the extent of the repair required
- prepare records about the dismantled machine.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Electrical machines	In this unit these will include: static machines (transformers; magnetic coils) and rotating machines (motors and generators).
Component parts:	In this unit these are individual parts which make up the machine and will include: bearings, brushgear, machine frame, machine enclosures, laminations, windings and accessories.
Machine repair:	In this unit this will include: overhaul, refurbishment, rewind, component replacement and modifications.
Records:	In this unit these may be written and will include: job sheets, damage repair sheets, test results/findings, nameplate details.
Relevant person(s):	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Mechanical Handling equipment:	In this unit, these include: slings, shackles, hoist blocks, overhead cranes, hydraulic floor cranes.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risks and plan a safe system of work
2. you confirm the electrical machine is secure and in the correct location in readiness for dismantling
3. you obtain all relevant details on the machine to be repaired including the customer's information about possible faults
4. you record all necessary data about the machine including nameplate details prior to dismantling
5. you perform the correct diagnostic tests to establish and identify the faults using safe and industry approved methods
6. you prepare and clean the machine ready for dismantling using safe and industry approved methods
7. you dismantle the machine in accordance with the original equipment manufacturer's instructions using safe and industry approved industry methods
8. you uniquely identify each relevant component part to ensure an effective re-assembly and tracking process in accordance with organisational procedures
9. you establish the status of each component part and identify the type and location of the fault
10. you have obtained accurate and sufficient data on all of the component parts
11. you record, clearly and accurately, those component parts which are faulty or damaged to provide for an efficient evaluation of repair viability
12. your records are passed on to the relevant person(s) promptly.

KNOWLEDGE REQUIREMENTS

In order to prepare to repair electrical machines you should know and understand the following aspects relating to:

	Performance objective number
Preparing to repair electrical machines	
1. the principles of safe manual and mechanical handling and lifting techniques appropriate to electrical machines	1
2. methods of locating and securing different types of machines in readiness for a safe repair	1
3. the main types and constructional characteristics of electrical machines	2
4. the application, advantages and limitations of electrical machines	2
5. organisational procedures for establishing the required data and the importance of collecting the correct data	3
6. the main types of diagnostic tests and the safe procedures for carrying these out on machines and their component parts	4
7. industry approved methods for <ul style="list-style-type: none">• preparing and cleaning the machine appropriate to their location and• dismantling the machine	5,6
8. how to interpret diagrams, drawings and original equipment manufacturer's instructions to be able to dismantle electrical machines	6
9. the organisational procedures for uniquely identifying and reading component parts of dismantled electrical machines	7
10. common types of faults and where they may be found on electrical machines	8
11. the type of repairs that can be undertaken within the limitations of the electrical machine	10
12. organisational requirements for compiling records	9,10,11
Health and Safety	
13. the legal responsibilities for health and safety according to current health and safety legislation	all POs
14. the safe and correct use of diagnostic test equipment	all POs
15. potential dangers arising from the hazardous substances from original source	all POs
16. the health and safety legislation in relation to lifting and mechanical handling of equipment	all POs
Principles and Theory	
17. the latest Industry Standards for electrical machines	all POs
18. where to find out about the principles of electrical theory for electrical machines.	all POs

This unit is for:

you if you rewind electrical machines.

This unit is about:

rewinding the machines effectively and in the correct sequence.

This is what you need to show:

that you possess the skills and knowledge to:

- strip and remove the windings
- select the correct materials to conform with industry practice
- insert the coil
- insulate and secure the coils.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Electrical machines:	In this unit these will include: static machines (transformers; magnetic coils) and rotating machines (motors and generators).
Component parts:	In this unit these are individual parts which make up the machine and will include: bearings, brushgear, machine frame, machine enclosures, laminations, windings and accessories.
Records:	In this unit these may be written and will include: job sheets, damage repair sheets, test results/findings, nameplate details.
Relevant person(s):	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm the electrical machine is secure and in the correct location in readiness for the rewind
2. you use tools and test instruments when carrying out rewinding operations which are:
 - of the right type
 - are suitable for the task
 - fit for purpose
 - where appropriate, have a current calibration certificate
3. you collect and record all relevant information, accurately, on
 - the windings
 - the connections
 - the components
 - when you strip the component parts from the electrical machine
4. using materials appropriate to the rewinding required on the electrical machine, you insulate the component parts safely and correctly
5. you use winding techniques appropriate to the type of coils and machine and in accordance with industry approved procedures
6. you install and secure, correctly, the coils in the electrical machine in accordance with industry practice and industry approved procedures
7. you make connections according to the type of winding and which comply with the original equipment manufacturer's instructions
8. you undertake the correct static tests on the windings safely in accordance with industry approved procedures
9. where appropriate, you take safe and suitable action to remedy any identified defects after connection has taken place
10. your tests and checks before varnishing confirm the rewind meets the specification
11. you complete all records about the tests legibly, accurately and timely in accordance with organisational requirements
12. you follow industry procedures to varnish and cure the new windings in the correct manner
13. you report the successful completion of the rewinding operation to the relevant person(s).

KNOWLEDGE REQUIREMENTS

In order to rewind electrical machines you should know and understand the following aspects relating to:

	Performance objective number
Rewinding	
1. the principles of safe manual and mechanical handling and lifting techniques appropriate to electrical machines	1
2. methods of locating and securing different types of machines in readiness for a safe repair	1
3. the main types of windings associated with machines	3
4. the main types of winding connections associated with machines	3
5. how to collect information on the dimensions of coils	3
6. the advantages and limitations of materials used in windings	4
7. factors affecting the number of turns in coils and the type of conductors used within coils	4
8. the advantages and limitations of insulation applicable to the machine and its coils	4
9. selection of correct formers appropriate to the coils size and type	4
10. the methods of winding coils and the various winding techniques applicable to the types of electrical machines	5
11. the methods of installing coils into electrical machines	6
12. the implications of not insulating the coils or group of coils correctly or of using incorrect materials	6
13. the correct selection and safe application of tools and test instruments and the correct methods for checking test instruments are functioning and in calibration	2
14. the correct procedures for connecting different types of electrical machines	7
15. the advantages and limitations of different types of static tests	8
16. appropriate action to take where tests reveal defects or faults	9
17. procedures for carrying out pre-varnish tests and checks	10
18. the methods of varnish impregnation and curing	12
19. organisational procedures for completing records and reporting	11,13
Health and Safety	
20. the legal responsibilities for health and safety according to current Health and Safety legislation	all POs

21. safe and correct use of test equipment all POs

Principles and Theory

22. the latest Industry Standards for electrical machines all POs

23. where to find out about principles of electrical theory and
constructional features for electrical machines. all POs

This unit is for:

you if you repair electrical machines.

This unit is about:

undertaking effective repairs of electrical machines.

This is what you need to show:

that you possess the skills and knowledge to:

- set the machine up correctly for repair
- gather information about the repair required
- select, prepare, install and fit the correct materials and component parts
- report problems and that the repair is complete.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Electrical machines	In this unit these will include: static machines (transformers; magnetic coils) and rotating machines (motors and generators).
Machine repair:	In this unit this will include: overhaul, refurbishment, component replacement and modifications.
Component parts:	In this unit these are individual parts which make up the machine and will include: bearings, brushgear, machine frame, machine enclosures, laminations, windings and accessories.
Records:	In this unit these may be written and will include: job sheets, damage repair sheets, test results/findings, nameplate details.
Relevant person(s):	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you carry out an assessment of risk and plan a safe system of work
2. you confirm the electrical machine is secure and in the correct location in readiness for the repair
 - you use tools and test instruments when carrying out repairing activities which are:
 - of the right type
 - are suitable for the task
 - fit for purpose
 - have a current calibration certificate (where appropriate)
3. you confirm the information available is in accordance with the required repair
4. you select the correct materials and component parts in accordance with the required repair
5. you install and fit the materials and component parts in the correct sequence to comply with the required repair appropriate to the electrical machine
6. you record problems incurred during the repair activity promptly and report them to the relevant person(s)
7. you report to the relevant person(s) that the repair is complete and ready for assembly.

KNOWLEDGE REQUIREMENTS

In order to repair electrical machines you should know and understand the following aspects relating to:

	Performance objective number
Repairing	
1. the principles of safe manual and mechanical handling and lifting techniques appropriate to electrical machines	1
2. methods of locating and securing different types of machines in readiness for a safe repair	1
3. the main types of repairs associated with electrical machines	3
4. the main types of component parts associated with electrical machines	3
5. how to collect information on the electrical machine requiring repair	3
6. the advantages and limitations of materials used in repairs of electrical machines	4
7. the advantages and limitations of materials and component parts applicable to the machine and its fault	5
8. the methods of installing materials and component parts into electrical machines	6
9. the implications of using incorrect materials	6
10. the correct selection and safe application of tools and test instruments and the correct methods for checking test instruments are functioning and in calibration	2
11. organisational procedures for completing records and reporting problems	7,8
Health and Safety	
12. the legal responsibilities for health and safety according to current Health and Safety legislation	all POs
Principles and Theory	
13. the latest Industry Standards for electrical machines	all POs
14. where to find out and the principles of electrical theory for repairing electrical machines.	all POs

Unit 330

Assemble, inspect and test repaired electrical machines (NET Unit 39)

This unit is for:

you if you assemble, inspect and test repaired electrical machines.

This unit is about:

assembling, inspecting and testing repaired electrical machines effectively and in the correct sequence.

This is what you need to show:

that you possess the skills and knowledge to:

- assemble the component parts
- inspect and test the repaired electrical machines using appropriate methods
- use the test instruments correctly
- complete records on the inspection and tests and about the repaired electrical machine.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Electrical machines:	In this unit these will include: static machines (transformers; magnetic coils) and rotating machines (motors and generators).
Component parts:	In this unit these are individual parts which make up the machine and will include: bearings, brushgear, machine frame, machine enclosures, laminations, windings and accessories.
Machine repair:	In this unit this will include: overhaul, refurbishment, component replacement and modifications.
Records:	In this unit these may be written and will include: job sheets, damage repair sheets, test results/findings, nameplate details.
Relevant person(s):	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Safe system of work:	In this unit, this refers to a system of work which will include procedures such as safe isolation, wearing personal protective equipment and other procedures, as appropriate, identified during an assessment of risks. The system of work may take the form of a method statement.
Industry Standards:	These standards can include relevant British, European and International Standards.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you confirm the electrical machine is secure and in the correct location in readiness for assembly
2. you use tools and test instruments when carrying out assembly operations which are:
 - of the right type
 - are suitable for the task
 - fit for purpose
 - have a current calibration certificate (where appropriate)
3. you have the correct data and component parts to complete the assembly process
4. you carry out final connection in the terminal box, safely and accurately and in accordance with the electrical machine's specification
5. you undertake the assembly
 - safely
 - in the correct sequence
 - in accordance with the manufacturers' instructions
6. you conduct a pre-test inspection to confirm the machine is ready for testing
7. you record all relevant details, accurately, on the repaired machine in accordance with workplace requirements
8. you undertake an assessment of risks in relation to testing the repaired electrical machine
9. you conduct, in the correct sequence, appropriate static and functional tests in accordance with:
 - a safe system of work
 - the type of machine being tested
 - manufacturers' recommendations
 - relevant Industry Standards
 - industry approved procedures
10. where appropriate, you take safe and suitable action to remedy any identified defects after testing has taken place
11. all test results comply with the original equipment manufacturer's specification
12. you record inspections and test results in accordance with organisational procedures.

KNOWLEDGE REQUIREMENTS

In order to assemble, inspect and test repaired electrical machines you should know and understand the following aspects relating to:

	Performance objective number
Assemble and test	
1. the principles of safe manual and mechanical handling and lifting techniques appropriate to electrical machines	1
2. methods of locating and securing different types of machines in readiness for a safe repair	1
3. the correct selection and application of tools and test instruments and the correct methods for checking test instruments are functioning and in calibration	2
4. the need to have the correct information from the dismantling activity in order to carry out an effective assembly process	3
5. the advantages and limitations of the main types of winding connections associated with electrical machines	4
6. the correct procedures for connecting different types of electrical machines	4
7. the methods of assembling different types of electrical machines	5
8. the different methods and purpose of pre-test inspections	6
9. how to carry out an assessment of risks and plan a safe system of work with regard to inspection and testing	8
10. the types, purpose and requirements of the electrical machine to be inspected and tested	9
11. the advantages and limitations of static and functional tests	9
12. safe and suitable action to take to remedy defects or faults	10
13. the importance of recording the test results and checking those against the equipment manufacturer's specifications	11
14. organisational procedures with regard to completing records	12
Health and Safety	
15. the legal responsibilities for health and safety according to current Health and Safety legislation	all POs
16. safe and correct use of test equipment	all POs
Principles and Theory	
17. the latest Industry Standards for electrical machines	all POs
18. where to find out and the principles of electrical theory for assembling, inspecting and testing electrical machines.	all POs

Unit 331

Provide technical and functional information to relevant people about relating to electrical machine repair and rewind (NET Unit 70d)

This unit is for:

you if you pass on technical or functional information relating to electrical machine repair and rewind.

This unit is about:

supplying technical and functional information accurately on appropriate occasions or at handover with the right amount of detail bearing in mind the level of awareness of the recipient of the information.

This is what you need to show:

that you possess the skills and knowledge to identify who should receive such information and at what level of detail supply the information that is within your job capabilities and responsibilities pass on the necessary safety considerations in the correct manner.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

Technical Information:	In this unit, this will include information covering specifications of electrical machine types, manufacturers' data and instructions.
Functional Information:	In this unit, this will include information covering user instructions, including the circumstances when professional expertise should be called upon.
Relevant people:	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Electrical machines:	In this unit these will include: static machines (transformers and magnetic coils) and rotating machines (motors and generators).

PERFORMANCE OBJECTIVES

You must ensure that:

1. you identify the relevant people that need to be supplied with technical and functional information
2. you discuss, with the relevant people, their technical and functional information requirements
3. you obtain current and relevant information from appropriate sources
4. you assess the nature and extent of information required by the relevant people in order for the installation, or equipment, to be operated safely and effectively
5. you pass on the information in a timely, courteous and professional manner and in accordance with organisational procedures
6. you provide written technical and functional information to the relevant people in accordance with organisational procedures
7. you confirm that the relevant people receive the necessary health and safety information and advice in the approved manner.

KNOWLEDGE REQUIREMENTS

In order to provide technical and functional information to relevant people you should know and understand the following aspects relating to:

	Performance objective number
Providing technical and functional information	
1. which situations warrant written technical and functional information	4,6
2. methods of checking the relevant person's understanding of the technical and non-technical information provided	1,2
3. sources of technical and functional information including the manufacturer, supplier or own organisation	3
4. ways of checking the relevant people understand those aspects of the information which have a bearing on health and safety	7
5. responsibilities and limitations in your job role with respect to supplying technical and functional information	all POs
6. organisational practice on the amount of information and detail that individual members of the relevant person's organisation are entitled to receive	5
7. the importance of providing information clearly, courteously and professionally	7
8. the safety implications and functional consequences of supplying inaccurate or incomplete information to the relevant person	all POs
Health and Safety	
9. the need for up-to-date, reliable technical and functional information	all POs
10. the legal responsibilities for health and safety according to current health and safety legislation, regulations, codes of practice.	all POs

Unit 332

Maintain a healthy and safe working environment when repairing or rewinding electrical machines (NET Unit 81d)

This unit is for:

a person carrying out activities at work - regardless of where that work might be. The scope of the Health and Safety at Work Act 1974 covers 'all persons' whether employers, employees, self-employed, contractors, etc. Amongst other things the Act seeks to do is to secure the health, safety and welfare of people whilst they work and protect other people against risks to health or safety arising from the activity of people at work.

This unit does not require the learner to undertake a full risk assessment, it is about having an appreciation of significant risks in the workplace and knowing how to identify them and deal with them.

It is important to note the following that according to the Health and Safety at Work Act: Employers must safeguard so far as is reasonably practicable, the health, safety and welfare at work of all the people who work for them and 'other persons'. This applies in particular to the provision and maintenance of safe plant and systems of work, and covers all machinery, equipment and substances used.

People at work also have a duty under the Act to take reasonable care to avoid harm to themselves or to others by their working practices, and to co-operate with employers and others in meeting statutory requirements. The Act also requires employees not to interfere with or misuse anything provided to protect their health, safety or welfare in compliance with the Act.

This unit is about:

having an appreciation of hazards which may cause serious harm in the workplace and knowing how to deal with them. It describes the competences required to ensure that:

- your own actions do not create any health and safety risks
- you do not ignore hazards with significant risk in your workplace
- you take sensible action to put things right, including: reporting situations which pose a danger to people in the workplace and seeking advice.

This is what you need to show:

that you understand the health and safety requirements in the workplace, and that you check your own work activities and work area for any hazards which may harm you or others. You should be able to identify those risks you can safely deal with yourself, and those which you must report to the 'responsible' person for attention.

What you need to do next:

turn to 'Key Words and Phrases', which explains how some words and phrases have been used in this unit, and will help you understand it more easily.

KEYWORDS AND PHRASES

The Health and Safety Executive (HSE) is the body appointed to support and enforce health and safety law. They have defined two important concepts as follows:

Hazard:	`a hazard is something with potential to cause harm'
Risk:	`a risk is the likelihood of the hazard's potential being realised'

Almost anything may be a hazard, but may or may not become a risk. For example:

1. A trailing electric cable from a piece of equipment is a hazard. If it is trailing across a passageway there is a high risk of someone tripping over it, but if it lies along a wall out of the way, the risk is much less.
2. Toxic or flammable chemicals stored in a building are a hazard, and by their nature may present a high risk. However, if they are kept in a properly designed secure store, and handled by properly trained and equipped people, the risk is much less than if they are left about in a busy workshop for anyone to use - or misuse.
3. A failed light bulb is a hazard. If it is just one bulb out of many in a room it presents very little risk, but if it is the only light on a stairwell, it is a very high risk. Changing the bulb may be a high risk, if it is high up, or if the power has been left on, or low risk if it is in a table lamp which has been unplugged.
4. A box of heavy material is a hazard. It presents a higher risk to someone who lifts it manually than if a mechanical handling device is properly used.

Emergencies:	In this unit this includes: fire, explosions, toxic atmosphere, electrical shocks.
Working conditions:	In this unit this refers to the working conditions which exist at that point in time when the panel building takes place. One example may be the physical dimensions of the panel being built may affect working practices.
Working environment:	In this unit this refers to the work area where the panel building is to take place and this may be affected by other associated or allied trades, for example, paint spraying, sheet metal work, etc.
Relevant people:	These include: customers, clients, client representatives, charge-hands, supervisors, other contractors, colleagues.
Working practices:	This includes: activities, procedures, use of materials or equipment and working techniques used in carrying out your job.

PERFORMANCE OBJECTIVES

You must ensure that:

1. you identify which workplace health and safety procedures are relevant to your working environment
2. you identify evacuation procedures and emergency exits before work commences
3. you review your working practices and your working environment for hazards which could cause serious harm
4. you control those health and safety hazards within your capability and job responsibility limits
5. you report those hazards which may present a high risk to the relevant persons responsible for health and safety in the workplace
6. your personal conduct around the workplace does not endanger the health and safety of yourself or other persons
7. you follow the workplace policies and suppliers' or manufacturers' instructions for the safe use of tools, plant and equipment
8. you follow agreed procedures in the event of an emergency warning
9. you follow correct procedures in the event of injuries to self and others.

KNOWLEDGE REQUIREMENTS

In order to maintain a healthy and safe working environment when building panels you should know and understand the following aspects relating to:

	Performance objective number
Health and Safety	
1. your legal duties for health and safety in the workplace as defined by the Health and Safety at Work Act 1974	1
2. your duties for health and safety as defined by any specific legislation covering your job role	1,2
3. what hazards may exist in your workplace	3
4. the particular health and safety risks which may be present in your own job role	3
5. the importance of remaining alert to the presence of hazards in the whole work place	all POs
6. agreed workplace health and safety procedures including site evacuation procedures and procedures for dealing with injured persons	6,7,8,9
7. responsibilities for health and safety in your job description	4
8. the responsible persons to whom to report health and safety matters.	5

Unit 399

Electrotechnical occupational competence (ELT OC1)

This unit is about:

This unit is designed to enable learners to demonstrate 'Electrotechnical occupational competence' in accordance with approved industry practices and the current statutory and non-statutory regulations:

- The Electricity at Work Regulations (1989)
- The current edition of BS7671 Wiring Regulations
- Health & Safety Act (1974)
- Building Regulations (2000)
- Management of Health & Safety at Work Regulations
- Reporting of Injuries, Diseases & Dangerous Occurrences Regulations
- Provision & Use of Work Equipment Regulations
- Manual Handling Operations Regulations
- Personal Protective Equipment at Work Regulations
- Work at Height Regulations
- Control of Substances Hazardous to Health Regulations
- Control of Asbestos at Work Regulations

The outcomes and the assessment criteria of this unit underpin the electrotechnical industry's competence requirements for qualified operatives in an installation or maintenance role.

This is what you need to show:

To undertake this unit, learners must provide auditable formal evidence that they have the relevant electrotechnical knowledge, understanding, experience and skills at the appropriate level that enables them to carry out the assessment activities effectively and safely as prescribed for each learning outcome.

This unit must only be assessed in a National Electrotechnical Training (NET) approved centre. All criteria set by NET must be met full and continuously for each assessment. NET, rather than City & Guilds, should be contacted regarding any queries regarding the delivery and/or assessment for this unit.

As with all assessments, the candidates result for this unit must be submitted to City & Guilds on the Walled Garden to allow for certification.

This unit will be assessed by:

- a knowledge assessment at a NET approved AM2 centre
- a simulated practical exercise at a NET approved AM2 centre.

PERFORMANCE OBJECTIVES

You must:

1. **be able to interpret specifications, drawings and diagrams**
 - 1.1 interpret specifications and technical data for the installation of:
 - a. protective earthing systems
 - b. a ring final circuit
 - c. a general lighting circuit
 - d. a control system for a three-phase motor
 - e. a central heating/sustainable energy system
 - f. a safety service circuit
 - g. a data cabling system
 - h. a three-phase socket-outlet
2. **be able to undertake risk assessments**
 - 2.1 review safe working practices
 - 2.2 undertake a risk assessment
 - 2.3 complete risk assessment documentation in accordance with organisational procedures
3. **be able to carry out the safe isolation of electrical circuits and complete electrical installations**
 - 3.1 locate correct means of isolation
 - 3.2 follow correct procedures for the isolation of electrical circuit(s) and complete electrical installations
 - 3.3 isolate circuit(s) in correct sequence
 - 3.4 select correct test and measuring instruments
 - 3.5 correctly test for the presence of an electrical supply
4. **be able to plan and prepare to install, terminate and connect wiring systems**
 - 4.1 in accordance with an installation specification select the correct cables, accessories, equipment, components and protective devices for the installation of:
 - a. protective earthing systems
 - b. a ring final circuit
 - c. a general lighting circuit
 - d. the control of a three-phase motor
 - e. a central heating/sustainable energy system
 - f. a safety service circuit
 - g. a data cabling system
 - h. a three-phase socket-outlet
5. **be able to complete the installation, termination and connection of wiring systems in accordance with industry requirements**
 - 5.1 in accordance with an installation specification install, terminate and connect cables, accessories, equipment, components and protective devices for the installation of:
 - a. protective earthing systems
 - b. a ring final circuit
 - c. a general lighting circuit
 - d. the control of a three-phase motor
 - e. a central heating/sustainable energy system
 - f. a safety service circuit
 - g. a data cabling system
 - h. a three-phase socket-outlet

6. **be able to complete the visual inspection, initial verification and certification of an electrical installation**

- 6.1 comply with correct procedures
- 6.2 record relevant findings on correct documentation

7. **be able to complete the testing and certification of an electrical installation in accordance with industry requirements**

- 7.1 select and use the correct measuring instruments
- 7.2 confirm instruments function accurately
- 7.3 measure the continuity of protective conductors
- 7.4 measure the continuity of ring final circuit conductors
- 7.5 measure the insulation resistance of the installation and its circuits
- 7.6 confirm the polarity of the installation's electrical outlets and components
- 7.7 determine the installation's Earth Fault-Loop Impedance (EFLI)
- 7.8 determine the installation's Prospective Fault Current (PFC)
- 7.9 carry out functional tests on the installation's equipment and components
- 7.10 complete the correct documentation in accordance with statutory and non-statutory regulations

8. **be able to diagnose, and recommend how to rectify, electrical faults in an electrical installation in accordance with industry requirements**

- 8.1 undertake an assessment of risk accordingly
- 8.2 carry out safe isolation in the correct sequence as appropriate to fault diagnosis procedures
- 8.3 select and use correctly, fit for purpose tools, equipment and instruments
- 8.4 carry out relevant checks and preparations
- 8.5 locate faults from given information
- 8.6 state how the identified faults can be rectified

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 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

E: learnersupport@cityandguilds.com

International learners

General qualification information

E: intcg@cityandguilds.com

Centres

Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results

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

E: singlesubjects@cityandguilds.com

International awards

Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports

E: intops@cityandguilds.com

Walled Garden

Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems

E: walledgarden@cityandguilds.com

Employer

Employer solutions, Mapping, Accreditation, Development Skills, Consultancy

E: business@cityandguilds.com

Publications

Logbooks, Centre documents, Forms, Free literature

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