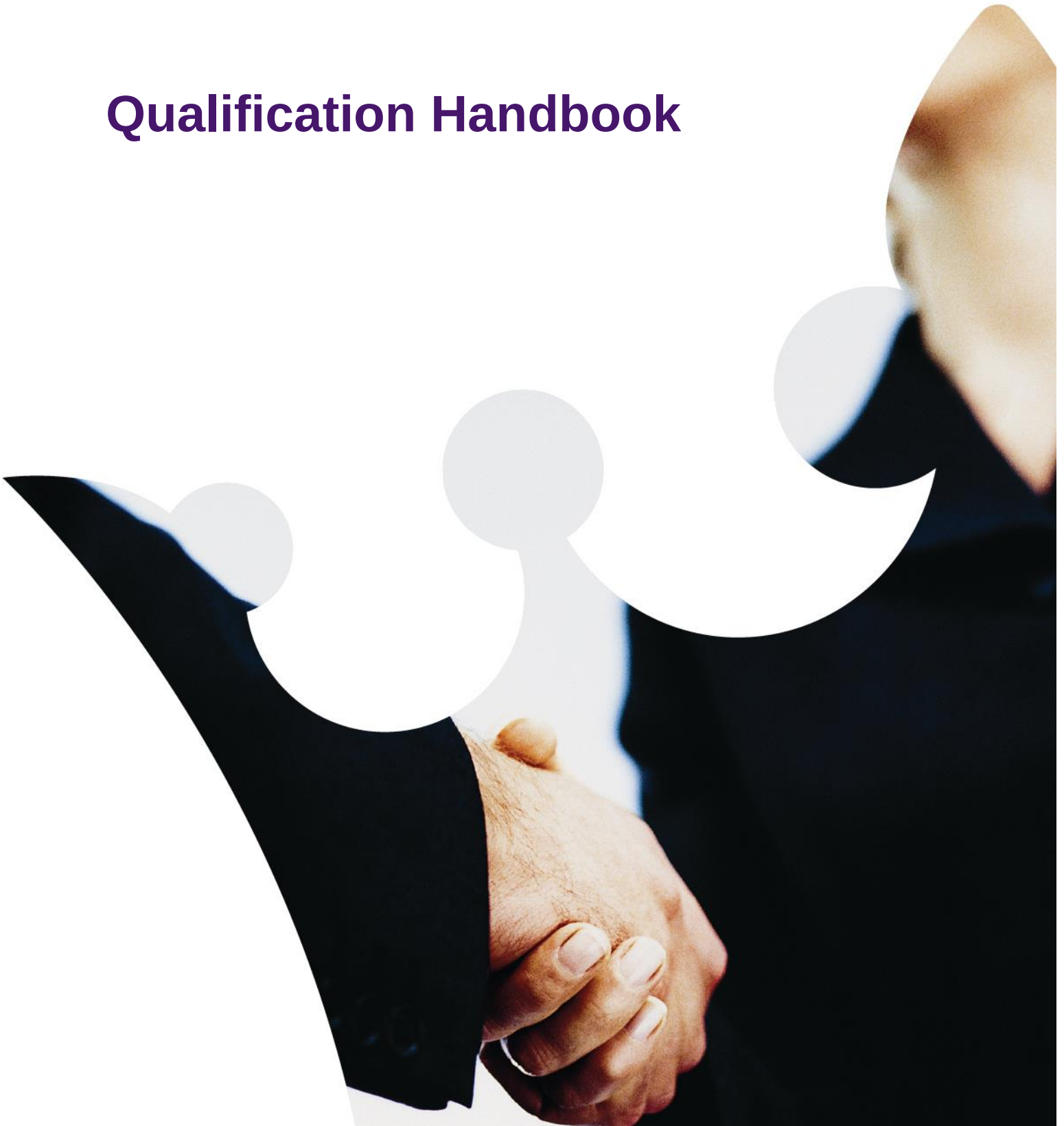
Fire Engineering Design (Technician)

Qualification Handbook



Qualification Handbook

SFJ Awards Level 5 Diploma in Fire Engineering Design (Technician)

Qualification Number: 603/1369/9

Version	Date of issue	Amendment(s)	Page
V1		N/A	

Contents

1 Introduction

1.1 About us

SFJ Awards is part of the Skills for Justice Group. For the last 10 years Skills for Justice has been working with employers, Governments of the UK and agencies within the skills system, to better equip workforces with the right skills now and for the future.

During this time Skills for Justice has earned an enviable reputation for its knowledge of the sector and its proactive approach to the development of skills and qualifications, along with an ability to deliver genuinely workable solutions for the employers it represents.

SFJ Awards is an awarding organisation that builds upon this reputation, and understands the specific challenges facing the Policing, Community Safety, Legal and Armed Forces sectors, enabling us to quality assure learning outcomes that are suited to the needs of the sectors.

Customer satisfaction is the cornerstone of our organisation, and is delivered through an efficient, customer-led service, providing excellent value for money.

1.2 Customer Service Statement

Our Customer Service Statement is published on SFJ Awards website giving the minimum level of service that Centres can expect. The Statement will be reviewed annually and revised as necessary in response to customer feedback, changes in legislation, and guidance from the qualifications Regulators.

1.3 Centre Support

SFJ Awards works in partnership with its customers. For help or advice contact:

SFJ Awards
Consult House
Meadowcourt Business Park
4 Hayland Street
Sheffield
S9 1BY

Tel: 0114 284 1970

E-mail: info@sfjawards.com
Website: www.sfjawards.com

2 The Qualification

2.1 Overall Objective for the Qualification

This handbook relates to the following qualification:

- SFJ Awards Level 5 Diploma in Fire Engineering Design (Technician)

This qualification is for individuals who work or intend to work in a position where they are involved in auditing or risk assessing fire engineering premises and designing or assessing fire engineering design submissions.

The Diploma in Fire Engineering Design is a Level 5 qualification aimed at building control officers, approved inspectors, fire engineers, fire safety auditors, inspectors, fire risk assessors, managers, surveyors, architects and fire safety professionals so that they can work towards achieving Fire Engineering Technician status.

The qualification provides individuals with a practical understanding of fundamental engineering principles, enabling them to identify proven techniques and procedures to solve practical fire engineering problems and, when appropriate, to hand over to a fire engineer.

2.2 Pre-entry Requirements

There are no formal entry requirements although learners should be able to work at level 4 or above, be proficient in the use of English Language and have previous experience of applying fire safety guidance such as Approved Document B (or equivalent) and BS 9999.

2.3 Qualification Structure

This qualification consists of 10 units which have been designed to provide individuals with knowledge, understanding and skills to identify proven techniques and procedures to solve practical fire engineering problems and, when appropriate, to hand over to a fire engineer.

To achieve this qualification, learners must successfully complete all 10 mandatory units shown in the table below.

Mandatory Units					
Unit No	Odyssey Reference	Unit Title	Level	Unit Hours	GLH
1	1265	Principles of fire development and spread	5	20	10
2	1266	Principles of fire engineering	5	60	40
3	1267	Review the effectiveness of automatic fire suppression systems	5	70	50
4	1268	Fire engineering design and its impact on human behaviour	5	30	20
5	1269	Fire engineering design and its impact on the fire resistance of materials and structures	5	25	20
6	1270	Smoke control and heat exhaust ventilation systems	5	60	30
7	1271	Pressure differential systems	5	45	30
8	1272	Fire engineering design and its impact on the external spread of fire	5	20	10
9	1273	Fire engineering design and its impact on access and facilities for fire-fighting	5	20	10
10	1274	Principles of fire and evacuation modelling	5	20	10

2.4 Total Qualification Time (TQT)

Total Qualification Time comprises of the following two elements.[1]

(a) The number of hours which an awarding organisation has assigned to a qualification for Guided Learning, and

(b) An estimate of the number of hours a Learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by – but, unlike Guided Learning, not under the immediate guidance or supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.

[1] Total Qualification Time criteria, Ofqual September 2015
https://www.gov.uk/government/publications/total-qualification-time-criteria

The Total Qualification Time for this qualification is **370** hours, of which **230** hours are Guided Learning. Please note these are estimated hours. It is the responsibility of centres to decide the appropriate course duration, based on their learners' ability and level of existing knowledge. It is possible, therefore, that the number of guided learning hours will vary from one centre to another according to learners' needs.

Guided learning hours consist of all occasions when a member of training centre staff is present to give specific guidance towards the learning aim of the programme. This definition includes lectures, tutorials, supervised study and assignments. It does not include hours where supervision or assistance is of a general nature and is not specific to learners' study.

2.5 Units

The units included in the Level 5 Diploma in Fire Engineering Design (Technician) are made up of the following main components:

- Unit title – providing a clear indication of the content of the unit
- Unit level – indicating the level of the unit
- Learning outcomes – setting out what a learner is expected to know, understand or be able to do as the result of a process of learning
- Assessment criteria – specifying the standard a learner is expected to meet to demonstrate that the learning outcomes have been achieved
- Guided Learning Hours (GLH) – define the number of hours where the learner is given specific input, usually by a tutor, in order to achieve the learning outcomes

2.6 Age Restriction

This qualification is available to learners aged 19 years and over.

2.7 Opportunities for Progression

This qualification creates opportunities for progression in the area of fire engineering.

2.8 Use of Languages

SFJ Awards business language is English and we provide assessment materials and qualification specifications that are expressed in English. Assessment specifications and assessment materials may be requested in Welsh or Irish and, where possible, SFJ Awards will try to fulfil such requests. SFJ Awards will provide assessment materials and qualification specifications that are expressed in Welsh or Irish and support the assessment of those learners, where the number of learners makes it economically viable for SFJ Awards to do so. More information is provided in the SFJ Awards' Use of Language Policy. Policies are available on our website www.sfjawards.com or on request from SFJ Awards.

For learners seeking to take a qualification and be assessed in British Sign Language or Irish Sign Language, please refer to SFJ Awards' Reasonable Adjustments Policy. A learner may be assessed in British Sign Language or Irish Sign Language where it is permitted by SFJ Awards for the purpose of Reasonable Adjustment.

3 Centre Requirements

Centres must be approved by SFJ Awards and also have approval to deliver the qualifications they wish to offer. This is to ensure centres have the processes and resources in place to deliver the qualifications. Approved centres must adhere to the requirements detailed in the SFJ Awards Centre Handbook, which includes information for centres on assessment and internal quality assurance processes and procedures and is available in the centres' area of the SFJ Awards website http://sfjawards.com/approved-centres.

Centres are responsible for ensuring that their assessor and internal quality assurance staff:

- are occupationally competent and/or knowledgeable as appropriate to the assessor or IQA role they are carrying out
- have current experience of assessing/internal quality assuring as appropriate to the assessor or IQA role they are carrying out, and
- have access to appropriate training and support.

Information on the induction and continuing professional development of those carrying out assessment and internal quality assurance must be made available by centres to SFJ Awards through the external quality assurance process.

This qualification handbook should be used in conjunction with the SFJ Awards Centre Handbook, the SFJ Awards Assessment Policy and the SFJ Awards Quality Assurance (Internal and External) Policy. All policies are available on the website www.sfjawards.com or on request from SFJ Awards.

4 Assessment

4.1 Qualification Assessment Methods

SFJ Awards Level 5 Diploma in Fire Engineering Design (Technician)

Assessment methods that can be used for this qualification are as follows:

- Coursework
- E-assessment
- Multiple Choice Examination
- Practical demonstration/assignment
- Portfolio of evidence (including for example records of professional discussions, question and answer sessions, reflective accounts)
- Written examination

4.2 Assessors

4.2.1 Occupational Competence

Due to the risk-critical nature of the work, particularly when assessing in the justice and health sectors, and the legal implications of the assessment process, assessors must understand the nature and context of the learners' work. This means that assessors must be occupationally competent. Each assessor must therefore be, according to current sector practice, competent in the functions covered by the units they are assessing. They will have gained their occupational competence by working within the sector relating to the units or qualification they are assessing.

Assessors must be able to demonstrate consistent application of the skills and the current supporting knowledge and understanding in the context of a recent role directly related to the qualification units they are assessing as a practitioner, trainer or manager.

4.2.2 Occupational Knowledge

Where assessors are assessing knowledge-based qualifications, they must be occupationally knowledgeable.

4.2.3 Qualification Knowledge

Assessors must be familiar with the qualification units they are assessing. They must be able to interpret and make judgements on current working practices and technologies within the area of work.

4.2.4 Assessor Competence

Assessors must be able to make valid, reliable and fair assessment decisions. To demonstrate their competence, assessors must be:

- qualified with a recognised assessor qualification, or
- working towards a recognised assessor qualification, or
- able to prove equivalent competence through training to appropriate national standards, for example, National Occupational Standard 9: Assess learner achievement[2] or Police Sector Standard for the Training of Assessors, Assessor Standard.

Approved centres will be required to provide SFJ Awards with current evidence of how each assessor meets these requirements, for example certificates of achievement or testimonials.

4.2.5 Continuing Professional Development

Assessors must actively engage in continuous professional development activities to maintain:

- occupational competence and knowledge by keeping up-to-date with the changes taking place in the sector(s) for which they carry out assessments
- professional competence and knowledge as an assessor.

4.3 Internal Quality Assurers

4.3.1 Occupational Knowledge

Internal quality assurers (IQAs) must be occupationally knowledgeable across the range of units for which they are responsible prior to commencing the role. Due to the risk-critical nature of the work, particularly in the justice and health sectors, and the legal implications of the assessment process, they must understand the nature and context of the assessors' work and that of their learners. This means that they must have worked closely with staff who carry out the functions covered by the qualifications, possibly by training or supervising them, and have sufficient knowledge of these functions to be able to offer credible advice on the interpretation of the units.

4.3.2 Qualification Knowledge

IQAs must understand the content, structure and assessment requirements for the qualification(s) they are internal quality assuring.

Centres should provide IQAs with an induction to the qualifications that they are responsible for quality assuring. IQAs should also have access to ongoing training and updates on current issues relevant to these qualifications.

[2] National Occupational Standards for Learning and Development, LLUK 2010

4.3.3 Internal Quality Assurer Competence

IQAs must occupy a position in the organisation that gives them the authority and resources to:

- coordinate the work of assessors
- provide authoritative advice
- call meetings as appropriate
- conduct pre-delivery internal quality assurance on centre assessment plans, for example, to ensure that any proposed simulations are fit for purpose
- visit and observe assessment practice
- review the assessment process by sampling assessment decisions
- ensure that assessment has been carried out by assessors who are occupationally competent, or for knowledge-based qualifications occupationally knowledgeable, in the area they are assessing
- lead internal standardisation activity
- resolve differences and conflicts on assessment decisions.

To demonstrate their competence, IQAs must be:

- qualified with a recognised internal quality assurance qualification, or
- working towards a recognised internal quality assurance qualification, or
- able to prove equivalent competence through training to appropriate national standards, for example National Occupational Standard 11: Internally monitor and maintain the quality of assessment[3] or Police Sector Standard for the Training of Internal Verifiers, Internal Verifier Standard.

Approved centres will be required to provide SFJ Awards with current evidence of how each IQA meets these requirements, for example certificates of achievement or testimonials.

4.3.4 Continuing Professional Development

IQAs must actively engage in continuous professional development activities to maintain:

- occupational knowledge by keeping up-to-date with the changes taking place in the sector(s) for which they carry out assessments
- professional competence and knowledge as an IQA.

4.4 External Quality Assurers

External quality assurers (EQAs) are appointed by SFJ Awards to approve centres and to monitor the assessment and internal quality assurance carried out by centres. SFJ Awards is responsible for ensuring that their external quality assurance team have:

[3] National Occupational Standards for Learning and Development, LLUK 2010

- sufficient occupational knowledge
- current experience of external quality assurance
- access to appropriate training and support.

External quality assurance is carried out to ensure that there is compliance, validity, reliability and good practice in centres. EQAs must have appropriate occupational and verifying knowledge and expertise.

4.4.1 External Quality Assurer Competence

To demonstrate their competence, EQAs must be:

- qualified with a recognised external quality assurance qualification, or
- working towards a recognised external quality assurance qualification.

4.4.2 Continuing Professional Development

EQAs must maintain their occupational and external quality assurance knowledge. They will attend training and development designed to keep them up-to-date, facilitate standardisation between staff and share good practice.

4.5 Expert Witnesses

Expert witnesses, for example line managers and supervisors, can provide evidence that a learner has demonstrated competence in an activity. Their evidence contributes to performance evidence and has parity with assessor observation. Expert witnesses do not however perform the role of assessor.

4.5.1 Occupational Competence

Expert witnesses must, according to current sector practice, be competent in the functions covered by the units for which they are providing evidence.

They must be able to demonstrate consistent application of the skills and the current supporting knowledge and understanding in the context of a recent role directly related to the qualification unit that they are witnessing as a practitioner, trainer or manager.

4.5.2 Qualification Knowledge

Expert witnesses must be familiar with the qualification unit(s) and must be able to interpret current working practices and technologies within the area of work.

4.6 Assessing Competence

The purpose of assessing competence is to make sure that an individual is competent to carry out the activities required in their work.

Assessors gather and judge evidence during normal work activities to determine whether the learner demonstrates their competence against the standards in the qualification unit(s). Competence should be demonstrated at a level appropriate to the qualification. The skills required at the different qualification levels are defined in Ofqual's level descriptors.[4] Further information on qualification levels is included in the SFJ Awards Assessment Policy.

Evidence must be:

- Valid
- Authentic
- Sufficient
- Current
- Reliable.

Assessment should be integrated into everyday work to make the most of opportunities that arise naturally within the workplace.

4.7 Methods for Assessing Competence

Qualifications may be assessed using any method, or combination of methods, which clearly demonstrate that the learning outcomes and assessment criteria have been met.

Assessors need to be able to select the right assessment methods for the competences that are being assessed, without overburdening the learner or the assessment process, or interfering with everyday work activities. SFJ Awards expects assessors to use a combination of different assessment methods to make a decision about an individual's occupational competence. Assessment methods which are most likely to be used are outlined below. However these are included for guidance only and there may be other methods which are suitable. Further information on assessment methods is included in the SFJ Awards Assessment Policy.

4.7.1 Observation

SFJ Awards believes that direct observation in the workplace by an assessor or testimony from an expert witness is preferable as it allows for authenticated, valid and reliable evidence. Where learners demonstrate their competence in a real work situation, this must be done without the intervention from a tutor, supervisor or colleague.

However SFJ Awards recognises that alternative sources of evidence and assessment methods may have to be used where direct observation is not possible or practical.

[4] Qualification and Component Levels: Requirements and Guidance for All Awarding Organisations and All Qualifications, Ofqual 2015, www.gov.uk/government/publications/qualification-and-component-levels

4.7.2 Testimony of witnesses and expert witnesses

Witness testimonies are an accepted form of evidence by learners when compiling portfolios. Witness testimonies can be generated by peers, line managers and other individuals working closely with the learner. Witnesses are defined as being those people who are occupationally expert in their role.

Testimony can also be provided by expert witnesses who are occupationally competent **and** familiar with the qualification unit(s). Assessors will not need to spend as long assessing expert witness testimony as they would a witness testimony from a non-expert. Therefore if expert witnesses are involved in the assessment strategy for a qualification a greater number of learners can be managed by a smaller number of assessors.
The assessor is however responsible for making the final judgement in terms of the learner meeting the evidence requirements for the qualification unit(s).

4.7.3 Work outputs (product evidence)

Examples of work outputs include plans, reports, budgets, photographs, videos or notes of an event. Assessors can use work outputs in conjunction with other assessment methods, such as observation and discussion, to confirm competence and assure authenticity of the evidence presented.

4.7.4 Professional discussion

Discussions allow the learner to describe and reflect on their performance and knowledge in relation to the standards. Assessors can use discussions to test the authenticity, validity and reliability of a learner's evidence. Written/audio records of discussions must be maintained.

4.7.5 Questioning the learner

Questioning can be carried out orally or in written form and used to cover any gaps in assessment or corroborate other forms of evidence. Written/audio records of all questioning must be maintained.

4.7.6 Simulations

Simulations may take place either in a non-operational environment which is not the learner's workplace, for example a training centre, or in the workplace. Proposed simulations must be reviewed to ensure they are fit for purpose as part of the IQA's pre-delivery activity.

Simulations can be used when:

- the employer or assessor consider that evidence in the workplace will not be demonstrated within a reasonable timeframe
- there are limited opportunities to demonstrate competence in the workplace against all the assessment criteria
- there are health and safety implications due to the high risk nature of the work activity

- the work activity is non-routine and assessment cannot easily be planned for
- assessment is required in more difficult circumstances than is likely to happen day to day.

Simulations must follow the principles below:

1. The nature of the contingency and the physical environment for the simulation must be realistic
2. Learners should be given no indication as to exactly what contingencies they may come across in the simulation
3. The demands on the learner during the simulation should be no more or less than they would be in a real work situation
4. Simulations must be planned, developed and documented by the centre in a way that ensures the simulation correctly reflects what the specific qualification unit seeks to assess and all simulations should follow these documented plans
5. There should be a range of simulations to cover the same aspect of a unit and they should be rotated regularly.

4.8 Assessing Knowledge and Understanding

Knowledge-based assessment involves establishing what the learner knows or understands at a level appropriate to the qualification. The depth and breadth of knowledge required at the different qualification levels are defined in Ofqual's level descriptors.[5] Further information on qualification levels is included in the SFJ Awards Assessment Policy.

Assessments must be:

- Fair
- Robust
- Rigorous
- Authentic
- Sufficient
- Transparent
- Appropriate.

Good practice when assessing knowledge includes use of a combination of assessment methods to ensure that as well as being able to recall information, the learner has a broader understanding of its application in the workplace. This ensures that qualifications are a valid measure of a learner's knowledge and understanding.

A proportion of any summative assessment may be conducted in controlled environments to ensure conditions are the same for all learners. This could include use of:

[5] Qualification and Component Levels: Requirements and Guidance for All Awarding Organisations and All Qualifications, Ofqual 2015 www.gov.uk/government/publications/qualification-and-component-levels

- Closed book conditions, where learners are not allowed access to reference materials
- Time bound conditions
- Invigilation.

4.9 Methods for Assessing Knowledge

SFJ Awards expects assessors to use a variety of different assessment methods to make a decision about an individual's knowledge and understanding, which are likely to include a combination of the following:

a) Written tests in a controlled environment
b) Multiple choice questions
c) Evidenced question and answer sessions with assessors
d) Evidenced professional discussions
e) Written assignments (including scenario-based written assignments).

Where written assessments are used centres must maintain a sufficient bank of assignments which are changed regularly.

4.10 Assessment Planning

Planning assessment allows a holistic approach to be taken, which focuses on assessment of the learner's work activity as a whole. This means that the assessment:

- reflects the skills requirements of the workplace
- saves time
- streamlines processes
- makes the most of naturally occurring evidence opportunities.

Planning assessment enables assessors to track learners' progress and incorporate feedback into the learning process; assessors can therefore be sure that learners have had sufficient opportunity to acquire the skills and knowledge to perform competently and consistently to the standards before being assessed. The assessment is therefore a more efficient, cost effective process which minimises the burden on learners, assessors and employers.

4.11 Standardisation

Internal and external standardisation is required to ensure the consistency of evidence, assessment decisions and qualifications awarded over time.

4.11.1 Internal standardisation

IQAs should facilitate internal standardisation events for assessors to attend and participate, in order to review evidence used, make judgments, compare quality and come to a common understanding of what is sufficient.

4.11.2 External standardisation

SFJ Awards will enable access to external standardisation opportunities for centres and EQAs over time.

Further information on standardisation is available in the SFJ Awards Quality Assurance (Internal and External) Policy and the SFJ Awards Standardisation Policy.

4.12 Recognition of Prior Learning (RPL)

'Recognition of prior learning (RPL) is the process of recognising previous formal, informal or experiential learning so that the learner avoids having to repeat learning/assessment within a new qualification. RPL is a broad concept and covers a range of possible approaches and outcomes to the recognition of prior learning (including credit transfer where an awarding organisation has decided to attribute credit to a qualification)'.[6]

The use of RPL encourages transferability of qualifications and/or units, which benefits both learners and employers. SFJ Awards supports the use of RPL and centres must work to the principles included in Section 6 Assessment and Quality Assurance of the SFJ Awards Centre Handbook and outlined in SFJ Awards Recognition of Prior Learning Policy.

4.13 Equality and Diversity

Centres must comply with legislation and the requirements of the RQF relating to equality and diversity. There should be no barriers to achieving a qualification based on:

- Age
- Disability
- Gender
- Gender reassignment
- Marriage and civil partnerships
- Pregnancy and maternity
- Race
- Religion and belief
- Sexual orientation

Reasonable adjustments are made to ensure that learners who are disabled are not disadvantaged in any way. Learners must declare their needs prior to the assessment and all necessary reasonable adjustment arrangements must have been approved by SFJ Awards and implemented before the time of their assessment.

Further information is available in the SFJ Awards Reasonable Adjustments and Special Considerations Policy and the SFJ Awards Equality of Opportunity Policy.

[6] After the QCF: A New Qualifications Framework, Ofqual 2015
https://www.gov.uk/government/consultations/after-the-qcf-a-new-qualifications-framework

4.14 Health and Safety

SFJ Awards is committed to safeguarding and promoting the welfare of learners, employees and volunteers and expect everyone to share this commitment.

SFJ Awards fosters an open and supportive culture to encourage the safety and well-being of employees, learners and partner organisations to enable:

- learners to thrive and achieve
- employees, volunteers and visitors to feel secure
- everyone to feel assured that their welfare is a high priority.

Assessment of competence based qualifications in the justice sector can carry a high risk level due to the nature of some roles. Centres must therefore ensure that due regard is taken to assess and manage risk and have procedures in place to ensure that:

- qualifications can be delivered safely with risks to learners and those involved in the assessment process minimised as far as possible
- working environments meet relevant health and safety requirements.

5 Qualification Units

Title	Unit 1: Principles of fire development and spread
Level	5
GLH	10 hours
Unit summary	This unit is about understanding how fires in compartments ignite, their stages of development and spread to adjacent compartments. It is also about understanding how a compartment's design, construction, fire load, ventilation and weather conditions impact on fire growth. It is relevant to a broad range of buildings e.g. small, large, simple and complex. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes *The learner will:*	Assessment Criteria *The learner can:*	Indicative Content
1. Understand how fire develops and spreads in buildings	1.1 Explain the principles of fire development	Behaviour and growth of fires, fire growth rates, time-based growth calculations. Building characteristics; dimensions, nature and geometry of construction, flashover, backdraft, neutral plane. Enclosure; wall/ceiling linings, ventilation systems, unusual fire hazards, potential ignition sources. Fire load; type, location, arrangements and quantity of combustibles. Environmental influences (internal); temperature, air movement. Fuel controlled and ventilation controlled fires. Approved Document B (plus UK equivalents), BS 9999, BS 9991, BS 7974 Principles of fire behaviour (Quintiere). Ignition handbook, Fire Science Publishers (Babrauskas) Enclosure fire dynamics (Karlsson and Quintiere) BS ISO/TR 13387-2 Part 2: Design fire scenarios and design fires Note: 'Products of combustion' include smoke and toxic gases.
	1.2 Explain how fires are initiated and develop within the enclosure of origin	
	1.3 Explain how products of combustion spread within and beyond the enclosure of origin	

Additional information about the unit	
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge and understanding. These can be assessed using a variety of methods including: • Written test and exams • Reflective accounts • Professional discussion This is a knowledge-based unit; assessment should come from a learning and development environment.
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standard FS2: Assess risks associated with fire in complex premises and environments.

Title	Unit 2: Principles of fire engineering
Level	5
GLH	40 hours
Unit summary	This unit is about development of a fire engineering framework for design of buildings based on scientific and engineering principles to protect people, property and the environment from fire. It applies to large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand the principles of fire engineering design	1.1 Explain the principles of fire engineering design frameworks	General approach, advanced approach, fire safety engineering, BS 7974, Qualitative Design Review (QDR), analysis, deterministic studies, probabilistic risk assessment
	1.2 Evaluate fire engineering design frameworks	Design approaches, architectural design of building, fire safety objectives, fire hazards and possible consequences, trial fire safety designs, acceptance criteria and methods of analysis, fire scenarios for analysis

	1.3 Explain the principles of fire development, fire spread and the impact of fire on buildings	Pre-flashover, flashover, fully developed fire, decay, spread of smoke and toxic gases, characteristics of smoke and toxic, fire severity, temperature, heat flux, ability of elements to withstand exposure to fire Fundamentals of fire phenomena. Quintiere The SFPE Handbook of Fire Protection Engineering. NFPA CIBSE Guide E Principles of fire behaviour. Quintiere (basic) Fire safety engineering, Chitty BRE (basic) An introduction to fire dynamics. Drysdale (basic)
	1.4 Analyse management levels for fire engineering designs	Design concept, Regulation 38 (Building Act) - (plus UK equivalents), ADB (plus UK equivalents), BS 9999, BS 7974, BS 9991
	1.5 Explain detection and activation systems	Detection of fire, activation of alarm and fire protection systems, sprinklers, smoke venting, roller shutters, fire service notification
	1.6 Explain the requirements for fire service intervention	Time: call to arrival, time: arrival to initial attack, time: additional resources to arrive, extent of resources available and extinguishing capacity
	1.7 Evaluate evacuation strategies	Assess response of people to fire, evacuation time of occupants from any space within building

	1.8 Explain the principles of a Qualitative Design Review (QDR)	Design and occupant characteristics, fire safety objectives, fire hazards and possible consequences, trial fire safety designs, acceptance criteria and methods of analysis, fire scenarios for analysis
2. Understand best practice for fire engineering consultations	2.1 Explain best practice for fire engineering pre-consultations	BS 9999, BS 9991, BS 5588, BS 7974, Government guidance, industry and professional body guidance
	2.2 Explain best practice for fire engineering consultations	
3. Be able to evaluate the effectiveness of fire engineering designs	3.1 Explain the principles of quantitative design analysis	BS 9999, BS 9991, BS 7974, Government guidance, industry and professional body guidance
	3.2 Evaluate the effectiveness of a quantitative analysis review	
4. Be able to conduct an impact assessment of a fire engineering design	4.1 Explain the principles of an impact assessment	BS 9999, BS 9991, BS 7974, PD8
	4.2 Conduct an impact assessment of fire engineering designs	
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including:	

	• Direct observation • Expert witness testimony • Work products • Records • Reflective accounts • Professional discussion Assessment Criteria 3.2 and 4.2 are competence-based. Simulation in a learning and development environment is recommended, but practical assessment in a workplace environment is also permitted. All other Assessment Criteria are knowledge-based; assessment should come from a learning and development environment.
Links to National Occupational Standards (NOS)	This unit has links to the following National Occupational Standards: FS2: Assess risks associated with fire in complex premises and environments FS3: Ensure measures are in place to protect people from fire in complex premises and environments FS7: Review fire protection systems in complex premises and environments

Title	Unit 3: Review the effectiveness of automatic fire suppression systems
Level	5
GLH	50 hours
Unit summary	This unit is about the range of automatic systems which suppress and control fire development. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand the principles of automatic fire suppression systems	1.1 Explain automatic fire suppression systems	Approved Document B (plus UK equivalents), BS 9999, BS 9991, BS 7974, advantages, vulnerabilities and suitability of system types, vulnerable persons, compensatory features, special circumstances An Environmental Impact and Cost Benefit Analysis for Fire Sprinklers in Warehouse Buildings (BRE) BB100 risk assessment tool
	1.2 Confirm the suitability of automatic fire suppression systems for risk	
	1.3 Compare the advantages and disadvantages of automatic fire suppression systems	

2. Be able to assess the effectiveness of sprinkler systems	2.1 Explain technical guidance relating to sprinkler systems	BS 9251, BS 9252, Approved Document B (plus UK equivalents), Third party schemes, NFPA 13D, NFPA 13R BS EN 12845, LPC Rules for Automatic Sprinkler Installations, Technical Bulletins, BS 5306, NFPA 13 Sprinkler heads, RTi, UL 1626, Red Book, pumps, pump sets, valve sets, pipework, valves, alarm arrangements Towns mains, booster pumps, tanks and pumps, duration, effective/reduced capacity, reduced capacity, automatic pump sets, storage and pressure tanks, reservoirs, superior, duplicate and combined water supplies. Hazard classes, light, ordinary and high hazard, occupancy, storage. Design criteria, design density, design points, hydraulic calculations, pre-calculated, fully calculated, area of coverage, head spacing, locations, zoning, protection of property and protection of life systems Commissioning, testing, maintenance, frequency, competency, documentation
	2.2 Evaluate the suitability of sprinkler system components	
	2.3 Explain water supply arrangements for sprinkler systems	
	2.4 Explain the design criteria of sprinkler systems	
	2.5 Evaluate the effectiveness of sprinkler system designs	
	2.6 Determine the effectiveness of a maintenance programme for sprinkler systems	
3. Be able to evaluate the effectiveness of water mist systems	3.1 Explain technical guidance relating to water mist systems in premises	BS 8458, BS 8489, NFPA 750, PREN 14972, residential, domestic, commercial low, medium and high pressure systems, design criteria, design points, hydraulic calculations, pre-
	3.2 Evaluate the effectiveness of water mist system designs	

	3.3 Determine the effectiveness of a maintenance programme for water mist systems	calculated, fully calculated, area of coverage, head coverage, locations
4. Understand the principles of oxygen reduction systems	4.1 Explain technical guidance relating to oxygen reduction systems 4.2 Explain the principles of oxygen reduction systems	BS EN 16750, oxygen reduction, oxygen dilution (nitrogen).
5. Understand the principles of gaseous, foam systems and other fire suppression systems	5.1 Explain technical guidance relating to gaseous, foam systems and other fire suppression systems	BS EN 12094, BS EN 13565, foam systems, CO2 systems, portable systems, specialised fire suppression systems, new developments
	5.2 Explain the principles of gaseous, foam systems and other fire suppression systems	
	5.3 Recognise future developments in fire suppression systems	
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including: • Direct observation • Expert witness testimony • Work products • Records	

	• Reflective accounts • Professional discussion Assessment Criteria 2.6 and 3.3 are competence-based. Simulation in a learning and development environment is recommended but practical assessment in a workplace environment is also permitted. All other Assessment Criteria are knowledge-based; assessment should come from a learning and development environment.
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standards: FS2: Assess risks associated with fire in complex premises and environments FS3: Ensure measures are in place to protect people from fire in complex premises and environments FS7: Review fire protection systems in complex premises and environments

Title	Unit 4: Fire engineering design and its impact on human behaviour
Level	5
GLH	20
Unit summary	This unit is about understanding how fire, heat and toxic gases impact on humans. It is also concerned with studies in human behaviour in fire and how fire engineering design is used to improve human survival. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand the effect of fire on human bodies and behaviour	1.1 Explain the principles of tenability limits	Heat transfer and thermo-fluids, examples of heat transfer; convective portions and Archimedes principle Radiated heat, fire separation: Boltzmann Law, configuration factor, tenable limits for escape and ignition Simple criteria, zero exposure, willingness to enter, ability to move through smoke, effects of smoke on walking speed, human factors, occupant evacuation, behaviour and condition Studies in human behaviour; historically, its place
	1.2 Identify the tenability criteria for exposure to fire, heat and toxic gases	
	1.3 Explain the impact of heat and smoke on the human body	
	1.4 Explain the impact of heat and smoke on human behaviour	
	1.5 Explain the effect~~s~~ of fire on group dynamics	

		in evacuation analysis; introduction to evacuation models and interpretations Movement in smoke, smoke densities, effects of heat and fire, lethal dose rates, breathability, vulnerable persons, disabilities, effects of alcohol, smoke obscuration/visibility, impacts on vision, breathing and burning, awake, asleep, familiar/unfamiliar, group dynamics, flight/fight, fractional lethal dose, fractional incapacitating dose BS 7899-2, BS 5839 voice alarm systems Case studies; Summerland, Woolworth, Stardust, Bradford City, Darley and Latané study, Station Night Club
2. Understand how fire engineering design impacts on human behaviour and Safe Egress Times	2.1 Explain how fire engineering design impacts on human behaviour	PD 7974-6 Exit routes, alarms, pre movement times, response time, movement/travel times, signage, emergency lighting, management Effects fire effluent and heat, ASET, RSET, principles, concepts Calculation of available safe egress time (ASET) for differing criteria
	2.2 Define the principles of Available Safe Egress Times (ASET) and Required Safe Egress Times (RSET)	
	2.3 Review simple Available Safe Egress Times (ASET) and Required Safe Egress Times (RSET) calculations	
3. Be able to review the impact of fire engineering design on human behaviour	3.1 Assess the impact of fire engineering design on human behaviour	Design assessment, fire safety principles, management, principles of human behaviour, impact of design on human behaviour, alternative solutions, advantages/disadvantages of solutions
	3.2 Identify areas of non-compliance with best practice, design standards and guidance	

	3.3 Propose options to resolve areas of non-compliance in human behaviour	
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including: • Direct observation • Expert witness testimony • Work products • Records • Reflective accounts • Professional discussion Learning Outcome 3 is competence-based. Simulation in a learning and development environment is recommended but practical assessment in a workplace environment is also permitted. All other Assessment Criteria are knowledge-based; assessment should come from a learning and development environment.	
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standards: FS2: Assess risks associated with fire in complex premises and environments FS3: Ensure measures are in place to protect people from fire in complex premises and environments FS7: Review fire protection systems in complex premises and environments	

Title	Unit 5: Fire engineering design and its impact on the fire resistance of materials and structures
Level	5
GLH	20
Unit summary	This unit is about understanding how fire engineering is utilised to comply with the functional requirements for internal spread of fire. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals - to ensure that, within the scope of their responsibility, suitable understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of Fire Safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand the effects of fire on materials and structures	1.1 Explain the effects of fire on materials 1.2 Evaluate the suitability of materials used for building structures 1.3 Explain the methods for testing the levels of fire resistance of materials	Testing, approval bodies, ventilation, BS 476, BS EN 1363, BS EN 1364, BS EN 1365, Approved Document B (plus UK equivalents), BS 9999, BS 7974, BR368 Eurocode 1: Part 2: Actions on structures exposed to fire Case studies; Monte Carlo fire (Las Vegas), The Windsor Tower fire (Madrid)

2. Understand how fire engineering design impacts on the fire resistance of materials and structures	2.1 Explain guidance relating to achieving suitable levels of fire resistance 2.2 Evaluate methods of reducing impact of fire on materials 2.3 Propose alternative methods for reducing levels of fire resistance	Approved Document B (plus UK equivalents), BS 9999, BS 9991, BS 7974, ventilation Suppression, fire resting covering, intumescent coating, ventilation, separation
3. Be able to review the impact of a fire engineering design on the fire resistance of materials and structures	3.1 Assess the impact of a fire engineering design on levels of fire resistance 3.2 Assess levels of fire resistance on a fire engineering design 3.3 Identify areas of non-compliance with best practice, design standards and guidance 3.4 Propose options to resolve areas of non-compliance on the levels of fire resistance	Design assessment, fire resistance levels, suitability of materials, alternative solutions, advantages and suitability of solutions, ventilation
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including: • Direct observation • Expert witness testimony • Work products • Records • Reflective accounts	

	• Professional discussion Learning Outcome 3 is competence-based. Simulation in a learning and development environment is recommended but practical assessment in a workplace environment is also permitted. All other Assessment Criteria are knowledge-based; assessment should come from a learning and development environment.
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standard FS6: Review fire safety matters relating to existing or proposed construction.

Title	Unit 6: Smoke control and heat exhaust ventilation systems
Level	5
GLH	30 hours
Unit summary	This unit is about understanding how natural and mechanical ventilation systems are used to control and exhaust heat and smoke to allow occupants to escape from a building which is affected by fire. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand smoke control and heat exhaust ventilation systems	1.1 Explain the principles of smoke control and heat exhaust ventilation systems	Natural ventilation systems, mechanical ventilation systems, safe evacuation, compensatory features, design purpose
	1.2 Explain technical guidance relating to smoke control and heat exhaust ventilation systems	

	1.3 Analyse the objectives of smoke control and heat exhaust ventilation systems	Functional requirements of Building Regulations, Approved Document B (plus UK equivalents), BS 9999, BS 9991, BS 7974, BR 368. Guidance from industry and professional bodies BR 79204, BD 2410, BR 186, BR 375 Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (SCA)
2. Be able to determine a suitable design fire	2.1 Define the concept of a design fire	Radiated heat, fire separation, suppression, growth rates, radiation calculations Heat release rate, mass production rate of smoke, mass production rate of fire effluents, flame size and temperature, temperature within enclosure, time to flashover, area of fire involvement, space separation, radiation calculations, smoke calculations
	2.2 Analyse design fire parameters	
	2.3 Provide a suitable design fire	
3. Be able to determine the mass flow of smoke and temperature in smoke layers	3.1 Identify the mass flow of smoke within a smoke layer	
	3.2 Identify the temperature within a smoke layer	
	3.3 Check for the stratification of a smoke plume	
4. Be able to evaluate smoke control and heat exhaust ventilation system components	4.1 Explain the requirements for components of smoke control and heat exhaust ventilation systems	Fans, pulse/jet fans, detection, vents BS 7346 components for smoke and heat control systems
	4.2 Evaluate the effectiveness of system components	

5. Be able to evaluate the effectiveness of existing smoke control and heat exhaust ventilation systems	5.1 Explain the design principles of smoke control and heat exhaust ventilation systems	Calculation for natural ventilation systems, calculation for mechanical ventilation systems Number of extract points, areas of stagnation, plug holing, air inlet provision Pressurisation systems do not work and present a risk to life safety (Lay) Types of system, occupancies, car parks, underground areas, shopping malls, atria, flats, smoke shafts, corridors, staircases
	5.2 Evaluate the effectiveness of existing smoke control and heat exhaust ventilation systems	
6. Be able to design ~~a~~ simple natural and mechanical smoke control and heat exhaust ventilation systems	6.1 Identify design calculations for smoke control and heat exhaust ventilation systems	
	6.2 Design natural and mechanical smoke control and heat exhaust ventilation systems	
7. Be able to evaluate the effectiveness of the maintenance and commissioning programme for smoke control and heat exhaust ventilation systems	7.1 Identify the maintenance and commissioning requirements of a smoke control and heat exhaust ventilation system	Maintenance requirements and commissioning, weekly, monthly and yearly tests, test results, documentation
	7.2 Evaluate the effectiveness of a maintenance and commissioning programme for a smoke control and heat exhaust ventilation system	
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including:	

	• Direct observation • Expert witness testimony • Work products • Records • Reflective accounts • Professional discussion Learning Outcome 1 and Assessment Criteria 2.1, 4.1, 5.1 and 7.1 are knowledge-based; assessment should come from a learning and development environment. All other Assessment Criteria are competence-based. Simulation in a learning and development environment is recommended but practical assessment in a workplace environment is also permitted.
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standards: FS2: Assess risks associated with fire in complex premises and environments FS3: Ensure measures are in place to protect people from fire in complex premises and environments FS7: Review fire protection systems in complex premises and environments

Title	Unit 7: Pressure differential systems
Level	5
GLH	30
Unit summary	This unit is about understanding how pressure differential systems are used to prevent spread of combustion products to escape routes. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand pressure differential systems	1.1 Identify codes of practice and technical guidance relating to pressure differential systems	History, BS 12101-6, pressurisation systems, depressurisation systems, protected space, unprotected space, high pressure side, low pressure side, supply air, exhaust air, control of smoke by airflow, pressure differences, leakage paths, system classes Airflow velocity (open door), pressure differential (closed door), large gaps, small gaps, cracks, supply air parameters, door velocity, design differential, series leakage paths, parallel leakage paths, volumetric flow rates, air supply
	1.2 Explain the principles of pressure differential systems	
	1.3 Identify the objectives of pressure differential systems	
	1.4 Explain how smoke moves in buildings	
	1.5 Identify methods of controlling smoke	

	1.6 Explain the requirements for components of pressure differential systems	requirements, air release and over pressure requirements
2. Be able to evaluate existing pressure differential systems	2.1 Analyse pressure differential system components	BS 12101-6, Smoke control by pressurisation (Fläkt Woods), Pressurisation Systems (Colt), design principles, concept and criteria, design calculations. Pressurisation systems do not work and present a risk to life safety (Lay)
	2.2 Evaluate existing pressure differential systems	
3. Be able to evaluate a simple pressure differential system design	3.1 Explain the design criteria for pressure differential systems	BS 12101-6, Smoke control by pressurisation (Fläkt Woods), Pressurisation Systems (Colt), design principles, concept and criteria, design calculations. Pressurisation systems do not work and present a risk to life safety (Lay)
	3.2 Identify design calculations for pressure differential systems	
	3.3 Evaluate a simple pressure differential system design	
4. Be able to evaluate the effectiveness of the maintenance and commissioning programme for pressure differential systems	4.1 Identify maintenance and commissioning requirements for pressure differential systems	Maintenance requirements, weekly, monthly and yearly tests, re-tests, test results, documentation
	4.2 Evaluate the effectiveness of the maintenance and commissioning programme for pressure differential systems	
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards.	

	All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including: • Direct observation • Expert witness testimony • Work products • Records • Reflective accounts • Professional discussion Learning Outcome 1, Assessment Criteria 3.1 and 4.1 are knowledge-based; assessment should come from a learning and development environment. All other Assessment Criteria are competence-based. Simulation in a learning and development environment is recommended, but practical assessment in a workplace environment is also permitted.
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standards: FS2: Assess risks associated with fire in complex premises and environments FS3: Ensure measures are in place to protect people from fire in complex premises and environments FS7: Review fire protection systems in complex premises and environments

Title	Unit 8: Fire engineering design and its impact on the external spread of fire
Level	5
GLH	10
Unit summary	This unit is about understanding how fire engineering is used to comply with the functional requirements for external spread of fire. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand how fire engineering design impacts on the external spread of fire	1.1 Explain the principles of space separation	Radiation calculations, cladding, shielding, occupancy, CFD Functional requirements of Building Regulations, Approved Document B (plus UK equivalents), BS 9999, BS 9991, BS 7974, BR187
	1.2 Explain the effect of external spread of fire on materials	
2. Be able to apply fire engineering design to the external spread of fire requirements	2.1 Assess the external spread of fire for a fire engineering design	Functional requirements of Building Regulations, Approved Document B (and equivalents), BS 9999, BS 9991, BS 7974, BR187, DIN, NFPA, Government guidance, guidance from industry and professional bodies
	2.2 Identify areas of non-compliance with best practice, design standards and guidance	

	2.3 Propose options to resolve areas of non-compliance in the external spread of fire requirements	Case studies: Bradford City, “Walkie Talkie” skyscraper (Fenchurch Street, London) Fire from adjacent building overriding sprinkler system, when space separation has been reduced as a compensation for sprinklers
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including: • Direct observation • Expert witness testimony • Work products • Records • Reflective accounts • Professional discussion Learning Outcome 1 is knowledge-based; assessment should come from a learning and development environment. Learning Outcome 2 is competence-based. Simulation in a learning and development environment is recommended but practical assessment in a workplace environment is also permitted.	
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standard FS6: Review fire safety matters relating to existing or proposed construction.	

Title	Unit 9: Fire engineering design and its impact on access and facilities for fire-fighting
Level	5
GLH	10
Unit summary	This unit is about understanding how fire engineering is used to comply with the functional requirements for access and facilities for fire-fighting. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand how fire engineering design impacts on the access and facilities for fire-fighting	1.1 Explain access and facility requirements for fire-fighting	Functional requirements of building regulations, Approved Document B (plus UK equivalents), BS 9999, BS 9991, BS 7974 Suppression systems, compensatory features Vehicle and fire-fighter access, fire-fighting shafts, stairs and lifts, water supplies, dry risers, wet risers, fire mains, communications, control centres, control systems. Physiological Assessment of Firefighting, Search and Rescue in the Built Environment BDAG07
	1.2 Explain the impact of fire engineering design on access and facility requirements for fire-fighting	

2. Be able to apply fire engineering design to the access and facility requirements for fire-fighting	2.1 Evaluate the effectiveness of the access and facilities requirements for fire-fighting in a fire engineering design	
	2.2 Identify areas of non-compliance with best practice, design standards and guidance	
	2.3 Propose options to resolve areas of non-compliance in the access and facilities requirements for fire-fighting in a fire engineering design	
Additional information about the unit		
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge, understanding and skills. These can be assessed using a variety of methods including: • Direct observation • Expert witness testimony • Work products • Records • Reflective accounts • Professional discussion Learning Outcome 1 is knowledge-based; assessment should come from a learning and development environment. Learning Outcome 2 is competence-based. Simulation in a learning and development environment is recommended but practical assessment in a workplace environment is also permitted.	

Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standard FS6: Review fire safety matters relating to existing or proposed construction.

Title	Unit 10: Principles of fire and evacuation modelling
Level	5
GLH	10 hours
Unit summary	This unit is about understanding how fire and evacuation modelling programmes are used to support fire engineering solutions. It applies to small, large and complex premises. It is recommended for practitioners i.e. those who are employed or contracted to work with others in an organisation – surveyors, architects, fire engineers, fire risk assessors, managers, surveyors, architects and fire safety professionals – to ensure that, within the scope of their responsibility, suitable and sufficient understanding and application is developed and maintained. It is also appropriate for regulators i.e. those who have the responsibility for ensuring the requirements of fire safety and associated regulation are achieved through cooperation or enforcement.

Learning Outcomes ***The learner will:***	**Assessment Criteria** ***The learner can:***	**Indicative Content**
1. Understand principles of fire and evacuation modelling	1.1 Explain the principles of fire and evacuation modelling	Principles and concepts of CFD, model types, zone and field models, suitability, limitations, justification, functional requirements of building regulations Smart Fire, Exodus, NIST (CFAST, FDS, Smoke view), PyroSim CFD files, inputs (text files), parameters, compensatory features
2. Understand how to identify suitable fire and evacuation models	2.1 Explain best practice relating to fire and evacuation modelling	
	2.3 Evaluate the suitability of fire and evacuation models	

Additional information about the unit	
Assessment methods	Assessment for this qualification is by portfolio, internally set and marked and externally quality assured by SFJ Awards. All assessment criteria must be met. Assessment criteria must be assessed using methods appropriate to the assessment of knowledge and understanding. These can be assessed using a variety of methods including: • Written test and exams • Reflective accounts • Professional discussion This is a knowledge-based unit; assessment should come from a learning and development environment.
Links to National Occupational Standards (NOS)	This unit has links to National Occupational Standard FS3: Ensure measures are in place to protect people from fire in complex premises and environments.

Annex One
Core Reference Documents

- BS 7974: Application of fire safety engineering principles to the design of buildings and PD 7974-0 to PD 7974-8
- Building Regulations, Statutory Instruments, Regulatory Reform (Fire Safety) Order 2005 and UK equivalents
- Approved Document B and UK equivalents
- BS 9999: Fire safety in the design, management and use of buildings
- BS 9991: Fire safety in the design, management and use of residential buildings
- CIBSE Guide E: Fire Safety Engineering
- BS 12101: Smoke and heat control systems
- BS 7346: Components for smoke control systems
- BS EN 12094: Fixed firefighting systems
- BR 187: External fire spread: building separation and boundary distances
- BR 368: Design Methodologies for Smoke and Heat Exhaust Ventilation
- BR 375: Natural ventilation in atria for environment and smoke control: An introductory guide, BRE BS 9251: Fire sprinkler systems for domestic and residential occupancies
- NFPA 13D: Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes
- NFPA 13R: Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies
- NFPA 13: Standard for the Installation of Sprinkler Systems
- BS EN 12845: Fixed firefighting systems. Automatic sprinkler systems
- LPC Rules for Automatic Sprinkler Installations and Technical Bulletins
- BS 8458: Residential and domestic watermist systems BS 8489: Industrial and commercial watermist systems NFPA 750: Standard on Water Mist Fire Protection Systems
- BS EN WI 16750*:* Design of oxygen reduction systems
- BS 7899: Assessment of hazard to life and health from fire
- BS 476: Fire tests on building materials and structures
- BS 5839: Fire detection and fire alarm systems for buildings

Supplementary reference documents

- BDAG07: Physiological Assessment of Firefighting, Search and Rescue in the Built Environment (ODPM) Smoke control by pressurisation (Fläkt Woods)
- Pressurisation Systems (Colt) Principles of fire behaviour (Quintiere) Fire safety engineering, Chitty (BRE)
- An introduction to fire dynamics (Drysdale)
- Fundamentals of fire phenomena (Quintiere)
- The SFPE Handbook of Fire Protection Engineering (NFPA)
- An Environmental Impact and Cost Benefit Analysis for Fire Sprinklers in Warehouse Buildings (BRE) Enclosure fire dynamics (Karlsson and Quintiere)
- Ignition handbook, Fire Science Publishers (Babrauskas) Eurocode 1: Part 2: Actions on structures exposed to fire
- BS ISO/TR 13387-2: Part 2: Design fire scenarios and design fires
- BR 79204: Smoke Ventilation of Common Access Areas of Flats and Maisonettes (BRE) Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (SCA) BD 2410: Smoke Ventilation of Common Access Areas of Flats and Maisonettes (BRE)
- BR 186: Design principles for smoke ventilation in enclosed shopping centres (BRE)
- BR 375: Natural ventilation in atria for environment and smoke control: An introductory guide (BRE) BS 5588: Fire precautions in the design, construction and use of buildings
- BD 2410: Smoke Ventilation of Common Access Areas of Flats and Maisonettes (BRE)
- BD 2552: Fire spread in car parks (BRE)
- BS 7346: Components for smoke and heat control systems Pressurisation systems do not work and present a risk to life safety (Lay) BS 9252: Components for residential sprinkler systems
- BS 5306: Specification for sprinkler systems
- UL 1626: Standard for Residential Sprinklers for Fire-Protection Service
- BB100: Design for fire safety in schools (risk assessment tool)
- An Environmental Impact and Cost Benefit Analysis for Fire Sprinklers in Warehouse Buildings BRE BS EN 1363: Fire resistance tests
- BS EN 1364: Fire resistance tests for non-loadbearing elements BS EN 1365: Fire resistance tests for loadbearing elements Eurocode 1: Part 2: Actions on structures exposed to fire