



THE INSTITUTION OF FIRE ENGINEERS
FOUNDED 1918 • INCORPORATED 1924

IFE Level 3 Certificate in Passive Fire Protection

Qualification Number: 603/3054/5

Introduction

The IFE Level 3 Certificate in Passive Fire Protection has been developed by the Institution of Fire Engineers (IFE) and the Association for Specialist Fire Protection. The content and structure of the qualification has been established to reflect best professional practice and covers key knowledge and understanding required by those working in the passive fire protection industry.

Aims of the Qualification

This qualification has been designed to recognise:

- underpinning knowledge and understanding related to fire science and human behaviour that affects the requirements for passive fire protection
- specialist technical understanding of passive fire protection measures
- understanding of the breadth of factors that affect effective passive fire protection measures
- underpinning knowledge of the range of active fire protection systems and how these systems align with passive fire protection measures
- specialist understanding that supports effective performance in the workplace

Target Audience

This qualification will be appropriate for individuals either directly engaged in passive fire protection or those who need to develop an understanding of the passive fire safety systems that are essential to the delivery of their primary role such as:

- Managers and technical supervisors working in passive fire protection roles
- Technical sales staff
- Designers
- Fire Risk Assessors
- Site Inspectors

Learning Outcomes

Candidates who achieve this qualification should be able to:

- Demonstrate understanding of fire science
- Demonstrate understanding of methods of active protection
- Demonstrate understanding of the following passive fire protection measures:
 - Fire protection to the structural frame of the building and fire retardant coatings
 - Fire resisting walls, floors and ceiling and fire resistant glazing
 - Fire stopping, penetration seals, cavity barriers, ductwork and dampers and the building envelope
 - Fire resisting doors, industrial shutters and hardware

Qualification Structure

The qualification consists of a single unit.

The unit is made up of two parts:

- Fire and fire protection
- Passive fire protection measures

Form of Assessment

The assessment takes the form of one three-hour examination.

The examination will be structured in two sections:

Section 1 of the examination will address section 1 of the unit ie fire and fire protection. This section will comprise short questions. Questions will target all aspects of the content of section 1 of the unit. There will be 40 marks available.

Section 2 of the examination will address section 2 of the unit ie passive fire protection measures. This section will also comprise short questions. Questions will target all aspects of the content of section 2 of the unit. There will be 80 marks available.

In order to achieve a pass, candidates will be required to attain at least 70% of the marks available (ie 84 marks).

Grading and Certification

Achievement at unit level is not graded. Successful candidates are awarded a Pass Certificate.

Entry Requirements

There are no formal entry requirements.

Qualification Learning Time

The length of time needed to prepare for this examination will vary depending upon the starting point for each individual.

Candidates should spend around 350 hours preparing for the examination.

Total qualification time is 350 hours.

- 347 hours of study. Study may be self-study but the IFE recommends that candidates undertake at least 35-40 hours of direct training. (Please see the section on recommended reading below.)
- 3 hours of assessment (directed time) ie one three-hour examination.

Qualification Level

This qualification has been designed to enable candidates to demonstrate that they have attained skills and knowledge at Level 3. Other types of qualifications that are set at Level 3 include A levels, NVQs at Level 3 and Diplomas at Level 3 such as the IFE Level 3 Diploma in Fire Science and Fire Safety.

The qualifications regulator, Ofqual, has provided the following descriptors to illustrate the knowledge and skills expected from those who hold qualifications at Level 3.

Level 3 Knowledge Descriptor

The candidate:

- has factual, procedural and theoretical knowledge and understanding of a subject or field of work to complete tasks and address problems that while well-defined, may be complex and non-routine.
- can interpret and evaluate relevant information and ideas.
- is aware of the nature of the area of study or work.
- is aware of different perspectives or approaches within the area of study or work.

Level 3 Skills Descriptor

The candidate can:

- identify, select and use appropriate cognitive and practical skills, methods and procedures to address problems that while well defined, may be complex and non-routine.
- use appropriate investigation to inform actions.
- review how effective methods and actions have been.

Candidates are advised to bear these descriptors in mind when preparing for assessment and when presenting evidence of attainment.

Progression

Candidates who are successful in achieving the IFE Level 3 Certificate in Passive Fire Protection will be able to build on their learning and progress to qualifications at Level 4.

Candidates who wish to broaden their knowledge and understanding at Level 3 could consider working towards other fire-specific qualifications such as the IFE Level 3 Diploma in Fire Science and Fire Safety. Candidates may also consider progression to other relevant qualifications at Level 3 and 4.

Reasonable Adjustments

The IFE permits reasonable adjustments to be made where candidates have disabilities (including medical conditions and learning disabilities such as Dyslexia). The IFE's policy on reasonable adjustment aims to enable candidates with disabilities and other difficulties to access the IFE qualifications without comprising the assessment process or the validity of the certificate.

The policy, which includes the arrangements for applying for reasonable adjustments, is published on the IFE's website. The IFE will consider all requests for reasonable adjustments. All requests for reasonable adjustments must be submitted to the IFE.

Recommended Reading

Candidates should be aware that this reading list is **advisory** rather than definitive and they will need to consider the items it contains selectively. Candidates should use the published syllabus for the examination as their guide in deciding what reading materials they need to help them prepare for the examination. The IFE recommends that all candidates should read widely in order to extend the depth and breadth of their knowledge and understanding.

Candidates are also advised to review sample/past examination papers. Past papers, together with the associated examiner reports on the papers, can be downloaded, free of charge, from the IFE website or requested via exams@ife.org.uk.

The IFE has applied the following criteria in determining which resources should be included on this recommended reading list:

- the resource provides information which will be of benefit to the candidate in their professional life, providing depth and breadth of understanding;
- the resource contains some information that will be relevant to part of the syllabus;
- the resource is recognised by industry professionals as providing valuable information.

Candidates preparing for the examinations are advised to refer to the list below:

Association for Passive Fire Protection (ASFP) publications

ASFP Technical Guidance Documents:

- TGD 8 Code of Practice for junctions between different fire protection systems
 - TGD 11 Code of practice for the specification & on-site installation of intumescent coatings for fire protection of structural steelwork
 - TGD 13 Code of Practice for the over cladding of reactive coatings
 - TGD 14 Code of practice for the installation and inspection of board systems for the fire protection of structural steel work
 - TGD 15 Code of practice for the installation & inspection of sprayed non-reactive coatings for the fire protection of structural steelwork
 - TGD 17 Code of Practice for the installation and inspection of fire stopping systems in buildings
 - TGD 19 Fire Resistance Test for 'Open-State' Cavity Barriers used in the external envelope or fabric of buildings
 - TGD 18 Code of Practice for the installation & inspection of fire resisting duct systems
- ASFP Yellow Book – Fire protection for structural steel in buildings, 5th Edition. Volume 1
 - ASFP Guide to Passive Fire Protection for Fire Risk Assessors
 - ASFP Ensuring Best Practice for Passive Fire Protection in Buildings
 - ASFP Purple Book – Fire resisting partitions, 2nd Edition
 - ASFP Black Book - Active Fire Curtain Barrier Systems: Compartmentation and Protected Routes, 1st Edition: Guidance on specification, use and application of product

- ASFP Red Book – Fire-stopping: Linear joint seals, penetration seals & cavity barriers, 4th Edition
- ASFP On-site guide to installing fire stopping
- ASFP Blue Book – Fire resisting ductwork: classified according to BS EN 13501 Parts 3 and 4 European version, 1st Edition
- ASFP Blue Book - Fire resisting ductwork tested to BS476 Part 24, 3rd Edition (Volume 1 of 3)
- ASFP Grey Book - Volume 1: Fire dampers (European standards) E (integrity) & ES (integrity and leakage) classified, 2nd Edition

Other Recommended Reading

- BWF-Certifire, Fire Doors and Doorsets Best Practice Guide
- Hardware for fire and escape doors, Code of Practice jointly published by the Door and Hardware Federation and the Guild of Architectural Ironmongers
- Approved Document B, Volume 1 – Dwellinghouses and Volume 2 – Buildings other than dwellinghouses as amended in 2013
- 2017 changes Approved Document B (Volume 2) which comes into effect from 1 September 2017
- Building Standards Technical Handbook 2017: non-domestic Regulation 7 materials and Workmanship – The Building Regulations 2010
- Glass and Glazing Federation - A Guide to Best Practice in the Specification and Use of Fire-Resistant Glazed Systems
- Managing health and safety in construction - Construction (Design and Management) Regulations 2015

Further Information

Further information on examination conditions is available in the IFE booklet, *Rules and Information for Candidates Taking IFE Examinations*. This booklet can be downloaded from the IFE's website.

Content

Section 1: Fire and Fire Protection

1. Fire science including the chemistry of fire

Assessment Objective	Knowledge, Understanding and Skills
1.1 Describe the fire triangle and the fire tetrahedron and explain the implications for extinguishing fire	<ul style="list-style-type: none"> • The fire triangle • Elements of the tetrahedron - oxygen, heat, fuel and chemical chain reaction • Exothermic reaction • Principles involved in the extinction of fire by: <ul style="list-style-type: none"> ○ Smothering ○ Cooling ○ Starvation • Actions and media to remove elements in the fire triangle - water, inert gas, foam, vaporising liquids, carbon dioxide and inert gases, dry chemical powders, blanketing, beating
1.2 Describe the process of fire development	<ul style="list-style-type: none"> • Fire as a chemical process • Combustion • Stages of fire development: <ul style="list-style-type: none"> ○ Ignition (incipient) ○ Growth ○ Flashover ○ Fully developed ○ Decay
1.3 Identify and explain the dangers associated with smoke inhalation	<ul style="list-style-type: none"> • Particles • Vapours • Toxic gases

2. Human behaviour in a fire scenario

Assessment Objective	Knowledge, Understanding and Skills
2.1 Describe the factors that affect behaviour when faced with a threat of fire in a building	<ul style="list-style-type: none"> • Knowledge of building layout • Regularity of the alarm being heard (eg history of false alarms/tests) • Fire drill discipline • Physical state of sleeping, under the influence of alcohol, medication, drugs • Whether able bodied or physically and/or mentally impaired • Friends or family in the building • Whether senses recognise danger eg smell, sight, hearing

	<ul style="list-style-type: none"> • Actions of others (ie herd instinct) • Clarity of fire exit signage • Panic
2.2 Understand the basic principles of means of escape in case of fire	<ul style="list-style-type: none"> • Means of escape • Occupancy • Construction • Evacuation time • Travel distance • Escape route • Places of safety (reasonable and total) • Management control • Responsible person • Compartmentation

3. Passive protection

Assessment Objective	Knowledge, Understanding and Skills
3.1 Explain what is meant by the term “passive fire protection” and explain its primary purpose	<ul style="list-style-type: none"> • Passive fire protection: components materials and systems that go to make up or sit within the fabric of a building and which do not need any special energisation or command signal to operate • Function: control the spread of fire and smoke within a given fire compartment for a prescribed period of time
3.2 Describe passive fire protection systems	<ul style="list-style-type: none"> • Fire protection to the structural frame of the building • Internal compartmentation and fire resisting construction <ul style="list-style-type: none"> ○ Walls (partitions) and floors ○ Suspended ceilings ○ Fire-resisting glazing ○ Fire doors and hardware, Industrial fire shutters, fire curtains ○ Firefighting shafts and stairwells • Building services <ul style="list-style-type: none"> ○ Fire-resisting dampers, fire-resisting ductwork, fire-resisting service ducts and shafts ○ Penetration seals for pipes, cables and other services, linear joint seals, cavity barriers, fire-resisting air transfer grilles • The building envelope <ul style="list-style-type: none"> ○ fire-resisting external walls ○ curtain walling systems ○ Cladding systems ○ Insulation applied to outside of buildings • Materials designed to improve reaction to fire <ul style="list-style-type: none"> ○ Paint, coatings, varnishes ○ Surface impregnation

4. Building performance in fire

Assessment Objective	Knowledge, Understanding and Skills
4.1 Describe factors that affect the fire resistance of a building and components within the building	Factors to include: <ul style="list-style-type: none"> • Loadbearing capacity – the ability of the buildings supports system to remain intact for a specified period of time • Integrity – ensuring that no gaps of sufficient size open up which allow penetration of hot gases, smoke and flames • Insulation – properties of the of the unexposed face of a compartment
4.2 Explain how loadbearing capacity of a building is supported and describe the factors affecting the effectiveness of each type of system	Building support systems: <ul style="list-style-type: none"> • Structural steel • Reinforced concrete • Timber
4.3 Explain the factors affecting the fire integrity of a building’s structure and describe methods to preserve integrity	<ul style="list-style-type: none"> • Factors - penetrations through floors/walls in form of pipes, cable, ducting • Methods – fire stopping, application of coatings and encasing structural elements
4.4 Explain the factors that affect the way a material behaves in fire	Measured in terms of how the material will: <ul style="list-style-type: none"> • Ignite • spread flame (over their surface) • release heat (rate of/fire propagation) • be combustible to any extent at all • produce flaming droplets and smoke (not used in UK regulations)

5. Fire testing, assessment and product certification process

Assessment Objective	Knowledge, Understanding and Skills
5.1 Describe fire testing procedures and explain limitations of testing	<ul style="list-style-type: none"> • Practicalities of testing in every possible circumstance • Assessments undertaken by laboratories • Importance of documentation specifying the testing that has taken place
5.2 Describe the evidence used to support manufacturers’ products in the market	<ul style="list-style-type: none"> • Certification from a Third-Party Certification Body • Assessment / Expert Judgment from an accredited fire test laboratory or suitably qualified fire consultant • A fire test report

6. Development of a fire strategy for a building

Assessment Objective	Knowledge, Understanding and Skills
6.1 Explain why it is important to establish a fire strategy as part of the initial brief for a building	<ul style="list-style-type: none"> • Determine objective eg to protect people from a fire within the building, to allow adequate time to escape, or is it to also protect the building and its contents from a fire • Integral to building design • Installation – plan for correct order and to the correct standard
6.2 Describe roles and responsibilities and their impact on fire safety	<ul style="list-style-type: none"> • Contractors • Specialist sub-contractors • Inspectors • Fire risk assessor • Client/occupier
6.3 Describe the actions to ensure that the fire provision of the building is maintained	<ul style="list-style-type: none"> • Monitoring of activities that might affect fire performance eg amendments to building and maintenance work that could breach essential fire compartmentation

7. Active Fire Protection

Assessment Objective	Knowledge, Understanding and Skills
7.1 Explain what is meant by the term “active fire protection”	<ul style="list-style-type: none"> • Active fire protection: systems that need special energisation or command signal to operate
7.2 Describe smoke and heat detection alarm systems and explain how these may be activated	<ul style="list-style-type: none"> • Smoke detection <ul style="list-style-type: none"> ○ Ionisation smoke detectors ○ Optical smoke detectors ○ Aspirating smoke detectors ○ Optical beam detectors • Heat detection <ul style="list-style-type: none"> ○ Fixed temperature heat detectors ○ Rate-of-rise detectors • Alarm systems <ul style="list-style-type: none"> ○ Electronic sounders ○ Bell ○ Visual indicators ○ Voice alarms
7.3 Describe different types of firefighting equipment available within a building and explain its operation/use in tackling fire	<ul style="list-style-type: none"> • Portable fire extinguishers • Fire blankets • Wet and dry rising mains • Gaseous fire suppression systems
7.4 Describe different types of fire suppression equipment available	<ul style="list-style-type: none"> • Sprinkler systems • Deluge systems

within a building and explain its operation/use in tackling fire	<ul style="list-style-type: none"> • Mist systems • Gaseous fire suppression systems
7.5 Explain how signage and emergency lighting is used to improve the fire safety in a building	<ul style="list-style-type: none"> • Signage • Signage location • Emergency lighting • Emergency lighting location

8. Regulation

Assessment Objective	Knowledge, Understanding and Skills
6.1 Explain the responsibilities of the owners of property for fire safety arrangements	<ul style="list-style-type: none"> • Fire risk assessment • Different types of property • Testing and maintenance measures

Section 2: Installation of Passive Fire Protection Measures

1. Fire protection to the structural frame of the building and fire retardant coatings

Assessment Objective	Knowledge, Understanding and Skills
1.1 Explain the factors affecting the fire resistance of concrete frames and describe the additional passive fire protection measures that may be considered	<ul style="list-style-type: none"> • Most designed to specific fire resistance period and no need for additional protection • Spalling – circumstances where this may be an issue and actions to protect structure
1.2 Explain the factors affecting the fire resistance of timber frames and describe the additional passive fire protection measures that may be considered	<ul style="list-style-type: none"> • Heavy timber construction, usually 'Glulam' or other similarly fabricated beams - fire resistance is provided via a sacrificial layer of the wood that chars in a fire. • Lightweight timber framing - requires additional fire protection, usually by a board system, for example, plasterboard.
1.3 Explain the factors affecting the fire resistance of steel frames and describe the additional passive fire protection measures that may be considered	<ul style="list-style-type: none"> • Steel will lose safety margin at around 550°C but varies depending on load and temperature profile • Thicker and heavier steel section will take longer to heat • Insulation to counter the rise in temperature by means of a range of proprietary passive fire protection products
1.4 Describe fire resistant materials that can be applied to structural designs and the quality and inspection processes to be applied during the application process	<ul style="list-style-type: none"> • Reactive (intumescent) paint coatings • Plaster or cementitious-based coating systems to structural steel sections • Cladding systems made from fire-resisting boards or stone wool products • Processes for application/installation • Inspection process
1.5 Explain the issues to be taken into account when determining choice of fire protection system for different purposes	<p>Issues for consideration</p> <ul style="list-style-type: none"> • Junctions between different fire protection systems • Level of fire rating required • Appearance • Environmental conditions • Robustness • Potential future adaptations • Whether developed on-site or off-site • Correct installation • Guidance from manufacturers • Testing and meeting appropriate standards • Regulatory requirements
1.6 Describe the way in which fire retardant coating systems affect the performance of building materials	<ul style="list-style-type: none"> • Materials to include: <ul style="list-style-type: none"> ○ Hardwoods ○ Softwoods ○ Chipboard

	<ul style="list-style-type: none"> ○ Medium density fibreboard (MDF) ● Impact on spread of flame ● Impact on fire propagation ● Methods to retard the combustion process ● Impregnation and surface coating treatments
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2. Fire resisting walls, floors and ceiling and fire resistant glazing

Assessment Objective	Knowledge, Understanding and Skills
2.1 Describe the function, composition and performance characteristics of fire resisting walls, floors and ceilings and of active fire barrier systems	<ul style="list-style-type: none"> ● Fire walls ● Fire resisting floors ● Compartment walls and floors ● Fire resisting ceilings ● Fire resisting partitions ● Active fire barrier systems
2.2 Explain the factors affecting fire performance	<ul style="list-style-type: none"> ● The specified fire resistance period ● Whether fire resistance is expected from one side of both sides of the barrier ● The type of fire performance required ie stability, integrity and insulation
2.3 Identify and explain factors to be considered in incorporating compartmentation into building design and ensuring that compartmentation remains effective over time	<ul style="list-style-type: none"> ● Local building regulations/codes ● Internal designs/client brief ● Ensuring that fire is unable to penetrate for the prescribed period of time ● Level of fire rating required ● Robustness (impact damage) ● Consideration of future adaptations (future penetration of the fire resisting wall/floor due to new services installation) ● Access for future inspection
2.4 Describe how glass behaves in fire and describe the use of glass in fire resisting situations	<ul style="list-style-type: none"> ● Non-fire rated glass ● Fire integrity under the classification “E”/ Fire protective glazing ● Fire integrity with limited heat radiation capability under the classification “EW” ● Fire integrity with full radiant fire insulating capability under the classification “EI”
2.5 Explain how the framing and support structure affects the ability of glass to perform its function and explain the factors to be considered when specifying and installing fire resistant glazing	<ul style="list-style-type: none"> ● Timber ● Steel and aluminium ● Composite frames

<p>2.6 Describe different glazing options and explain the factors to be considered when selecting and implementing options</p>	<ul style="list-style-type: none"> • Integrity rated glazing <ul style="list-style-type: none"> ○ Wired glass ○ Laminated float glass ○ Modified toughened glass ○ Borosilicate glass ○ Glass ceramic ○ Partially insulating organic interlayer technology • Insulation rated glazing <ul style="list-style-type: none"> ○ Water content gel interlayers between toughened glass plates ○ Laminated composites combining a hard intumescent interlayer between annealed glass
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3. Fire stopping and penetration seals, cavity barriers, ductwork and dampers and the building envelope

Assessment Objective	Knowledge, Understanding and Skills
<p>3.1 Explain the purpose of fire stopping and describe the products and systems that may be used to achieve fire stopping</p>	<ul style="list-style-type: none"> • Penetration seals • Linear joint seals • Small cavity barriers • Large cavity barriers • Open state cavity barriers
<p>3.2 Explain the factors to be considered when selecting and installing fire stopping</p>	<ul style="list-style-type: none"> • Fire resistance • Preventing conduction of temperatures along the service to the side isolated from the fire • Providing service supports • Use of penetration sealing systems • Use of loadbearing seals
<p>3.3 Describe fire stopping and sealing systems and explain the factors relevant to their use and installation</p>	<ul style="list-style-type: none"> • Horizontal cable tray penetration – Mortars, Plugs/blocks, Bags / pillows • Horizontal pipe penetration - Pipe closures (plastic pipes only), Sealants (metal pipes only) • Sealing of blank opening – Mortars, Plugs/blocks, Coated batts • Horizontal multiple penetration – Mortars, Plugs/blocks, Coated batts • Temporary multiple horizontal penetration - Bags / pillows. (Note: If adequately supported some bags / pillows can also be used for vertical penetrations), Plugs / blocks • Cable penetration – Mortar, Coated batts, Sealants • Vertical duct penetration – Mortar, Mineral fibre and sealant/mastic • Vertical pipe penetration - Pipe closures (plastic pipes only), Sealants (metal pipes only)

	<ul style="list-style-type: none"> • Multiple penetrations (vertical and horizontal) – Mortar, Coated batts, Pipe closures (plastic pipes only), Sealants (metal pipes only), Plugs/blocks • Vertical and horizontal cable penetration – Mortar, Coated batts • Movement joints – Sealants, Foam, Preformed elastomeric seals, Mineral fibre and sealant/mastic coatings • Horizontal duct penetration- Mortar, Mineral fibre and sealant/mastic • Fire (including cavity) barrier - Coated batts, Mineral wool curtains, Woven textiles, Ridged boards
3.4 Describe the uses of ductwork and explain the considerations in relation to selection and installations of fire-resistant ducting.	<ul style="list-style-type: none"> • Range of uses eg ventilation, smoke extract, kitchen extract and pressurisation • Criteria applied to fire resisting ductwork: stability, integrity, insulation
3.5 Explain the methods used to maintain the fire resistance of walls and floors penetrated by ventilation ducts	<ul style="list-style-type: none"> • Protection using fire dampers • Protection using fire resisting enclosures • Protection using fire resisting ductwork (including types of ductwork)
3.6 Describe the use of different types of dampers and explain the considerations in the selection and installation fire damper systems	<ul style="list-style-type: none"> • Types to include: curtain fire dampers, intumescent fire dampers, multi-blade fire dampers, single blade fire dampers, multi-section dampers, leakage classified fire dampers, insulated fire dampers, smoke control damper, fusible link

4. Fire resisting doors, industrial shutters and hardware

Assessment Objective	Knowledge, Understanding and Skills
4.1 Explain the role of fire doors and the construction of different types of door	<ul style="list-style-type: none"> • Different uses and protection against different hazards • Operation of doors • Difference between door assemblies and doorsets • Materials used in construction • Purpose and construction of fire shutters
4.2 Describe the components of a fire doorset or assembly and explain the considerations in relation to selection, installation and testing	<ul style="list-style-type: none"> • Door leaf • Door frame • Door ironmongery • Air transfer grills • Intumescent seals • Smoke seals • Glazing apertures • Signage • Fire resisting rolling shutters

<p>4.3 Describe the factors relevant to fire door installation</p>	<ul style="list-style-type: none"> • Delivery and storage prior to installation • Checks • Finishing doors on site/coatings • Fitting the frame, door leaf, ironmongery seals • Post-installation checks
<p>4.4 Explain the considerations in relation to the use of fire doorsets and assemblies</p>	<ul style="list-style-type: none"> • Ongoing wear and tear • Maintenance and inspection regime