

IFE Level 3 Certificate in Passive Fire Protection

Qualification Specification

Qualification Number: 603/3054/5

About the Institution of Fire Engineers (IFE)

The IFE is the professional institution for those working in the fire sector.

The IFE is a registered charity working for societal benefit. Founded in 1918, the IFE's mission is to promote, encourage and improve the science, practice and professionalism of fire engineering with the overall aim of protecting and saving lives. Members of the IFE share a commitment to ensuring that the fire profession remains relevant and valued, protecting people, property and the environment from fire.

The IFE Awarding Organisation

The IFE's awarding organisation is non-profitmaking.

The aim of the of the awarding organisation is to encourage those who work in the sector to engage with, and develop, the critical understanding needed to operate effectively and safely and to best professional standards so that they can protect and save lives. In doing this, the awarding organisation contributes to three of the IFE's (six) over-arching strategic priorities i.e.:

- ◆ Facilitate awareness of fire issues and developments through the communication of ideas, knowledge and information
- ◆ Foster professionalism by establishing and maintaining pathways and recognised standards of fire professionalism and competency.
- ◆ Increase knowledge in the science, practice and professionalism of fire engineering.

All of the IFE's qualifications are designed for those working in the fire sector and to meet the above aims. Qualifications and their associated assessments (examinations and practical activities/assignments) provided by the IFE are designed, assessed and quality assured by experts with extensive experience of working within the fire sector.

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IFE Level 3 Certificate in Passive Fire Protection

Introduction

The IFE Level 3 Certificate in Passive Fire Protection was originally developed by the Institution of Fire Engineers (IFE) in conjunction with the industry specialists. The content and structure of the qualification has been established to cover the basic knowledge and understanding required by those working in the passive fire protection industry.

Aims of the Qualification

This qualification has been designed to recognise:

- ◆ 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
- ◆ knowledge and understanding of the breadth of factors that affect effective passive fire protection measures
- ◆ specialist understanding that supports effective performance in the Passive Fire Protection Industry and those working in the Built Environment.

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:

- ◆ Understand fire science
- ◆ Understand the factors that affect the requirements for fire protection
- ◆ Understand the purpose and implementation of passive fire protection in relation to:
 - fire protection to the structural frame of the building and fire retardant coatings
 - fire resisting walls, floors and ceilings and fire resistant glazing
 - fire stopping and penetration seals, cavity barriers, ductwork and dampers and the building envelope
 - fire resisting doors, industrial shutters and hardware

Membership of the IFE

Achievement of the Level 3 Certificate in Passive Fire Protection will enable successful candidates to meet the academic requirement for membership of the Institution at Technician Grade (TIFireE).

Qualification Content

The detailed content of the qualification is set out in the section entitled “Content” below. This section provides information on the range of topics that must be studied including the way that candidates need to show their understanding (Assessment Criteria) and the scope/range/contexts in which they can be tested (Knowledge and Understanding).

The qualification is made up of two sections:

- ◆ Section 1: Fire and Fire Protection
- ◆ Section 2: Installation of Passive Fire Protection Measures

The section on Installation of Passive Fire Protection Measures is sub-divided into four specialist areas i.e.:

- ◆ fire protection to the structural frame of the building and fire retardant coatings
- ◆ fire resisting walls, floors and ceilings and fire resistant glazing
- ◆ fire stopping and penetration seals, cavity barriers, ductwork and dampers and the building envelope
- ◆ fire resisting doors, industrial shutters and hardware

Assessment

The assessment takes the form of one hour and a half examination.

In order to achieve a pass, candidates will be required to attain at least 45 of the 65 marks available.

Certification

Achievement is not graded. Successful candidates are awarded a Pass Certificate. Successful candidates are awarded a Pass Certificate. The qualification is not graded and the certificate will show that candidates have attained a “Pass”. Candidates will be issued with the mark achieved out of a total of 65.

Entry Requirements

There are no formal entry requirements. However, candidates are advised that the subject content is wide-ranging and a high level of technical understanding across the breadth of the content is required. As the examination is provided in English only, candidates will need to have a comprehensive understanding of the English language in order to access the examination questions.

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 260 hours preparing for the examination.

Total qualification time is 262 hours comprising:

- ◆ 260.5 hours of study. Study may be self-study (please see the section on recommended reading below) and may include relevant training programmes.



- ◆ 1.5 hours of assessment (directed time) i.e., one 90 minute 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 understanding 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.

Candidates are advised to bear these descriptors in mind when preparing for assessment and when presenting examination responses.

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 such as the IFE Level 4 Certificate in Fire Safety.

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 Certificate in Fire Engineering Science or the IFE Level 3 Certificate in Fire Safety.

Recommended Reading

Candidates should be aware that this reading list is advisory rather than definitive. Candidates should use the content areas set out below as their guide in deciding what reading materials they need to help them prepare for the examination – please see the section on Content below.

The IFE recommends that all candidates should read widely in order to extend the depth and breadth of their knowledge and understanding.

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:



- ◆ Elementary Fire Engineering Handbook (IFE 50) by George Almond, Version issued 2017, available via IFE online shop and Google Books. Section 1 on Fire Engineering Science and Section 3 on Fire Safety
- ◆ <https://www.gov.uk/government/publications/fire-safety-risk-assessment-sleeping-accommodation> Appendix B
- ◆ <https://www.gov.uk/government/publications/fire-safety-approved-document-b> Sections B2, B3 & B4 & Appendix A -Key Terms
- ◆ ASFP YouTube videos
- ◆ [BWF Fire Door Alliance Best Practice Guide](#)
- ◆ Emergency Lighting - https://www.iheem.org.uk/wp-content/uploads/2021/04/Emergency_Lighting_Pocket_Guide_June_2021.pdf
- ◆ [Fire safety risk assessment: small and medium places of assembly](#)
- ◆ IFE Passive Fire Protection Resources [MyIFE > Home > Events and resources > Articles](#)

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

- ◆ ASFP Yellow Book – Fire protection for structural steel in buildings, 5th Edition
- ◆ ASFP Technical Guidance Documents:
 - TGD 15 Code of practice for the installation & inspection of sprayed non-reactive coatings for the fire protection of structural steelwork
 - TGD 16 Code of Practice for Off-site Applied Thin Film Intumescent Coatings
- ◆ ASFP Guide to Passive Fire Protection for Fire Risk Assessors
- ◆ ASFP Ensuring Best Practice for Passive Fire Protection in Buildings

Fire resisting walls, floors and ceilings and fire-resistant glazing

- ◆ ASFP Purple Book – Fire resisting partitions, 2nd Edition
- ◆ ASFP Black Book - Active Fire Curtain Barrier Systems: Compartmentation and Protected Routes
- ◆ Glass and Glazing Federation - A Guide to Best Practice in the Specification and Use of Fire-Resistant Glazed Systems
- ◆ Intumescent Fire Seals Association - The Role of Intumescent Materials in Timber and Metal Based Fire Resisting Glazing Systems
- ◆ Fire Resisting Standards - GN01 - Fire Resisting Standards (london-fire.gov.uk)

Fire stopping and penetration seals, cavity barriers, ductwork and dampers and the building envelope

- ◆ ASFP Red Book – Fire-stopping: Linear joint seals, penetration seals & cavity barriers, 4th Edition
- ◆ ASFP Technical Guidance Document:
 - TGD 17 Code of Practice for the installation and inspection of fire-stopping systems in buildings
 - TGD 18 Code of Practice for the installation & inspection of fire resisting duct systems
- ◆ 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
- ◆ FIS Firestopping of Service Penetrations Best Practice in Design and Installation
<https://www.thefis.org/membership-hub/publications/best-practice-guides/firestopping-of-service-penetrations/>

Fire resisting doors, industrial shutters and hardware

- ◆ BWF-Certifire, Fire Doors and Doorsets Best Practice Guide
- ◆ ASDMA Best Practice Guide to Timber Fire Doors
- ◆ Hardware for fire and escape doors, Code of Practice jointly published by the Door and Hardware Federation and the Guild of Architectural Ironmongers

Content

Fire and Fire Protection

1. Fire science including the chemistry of fire

Assessment Criteria	Knowledge and Understanding
1.1 Describe the fire triangle and the fire tetrahedron and explain the implications for extinguishing fire	• The fire triangle • Elements of the tetrahedron - oxygen, heat, fuel and chemical chain reaction • Exothermic reaction • Principles involved in the extinction of fire by: ○ 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 and explain how this can be affected by passive fire protection	• Fire as a chemical process • Combustion – smouldering and flaming • Stages of fire development: ○ Ignition (incipient) ○ Growth ○ Flashover ○ Fully developed ○ Decay
1.3 Identify and explain the dangers associated with smoke inhalation	• Particles • Vapours • Toxic gases, including carbon monoxide and hydrogen cyanide, and their effects

2. Human behaviour in a fire scenario

Assessment Criteria	Knowledge and Understanding
2.1 Describe the factors that affect behaviour when faced with a threat of fire in a building	• Knowledge of building layout • Regularity of the alarm being heard (e.g. 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 e.g. smell, sight, hearing • Actions of others (i.e., herd instinct) • Clarity of fire exit signage • Panic

2.2 Define and understand the basic principles of means of escape in case of fire	• Means of escape • Occupancy • Construction • Evacuation time • Travel distance • Escape route • Places of safety (reasonable and total) • Management control • Compartmentation
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3. Passive fire protection

Assessment Criteria	Knowledge and Understanding
3.1 Explain what is meant by the term “passive fire protection”	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
3.2 Explain the primary purpose of passive fire protection and explain how passive fire protection can contribute to the prevention and/or extinguishment of fire	• To control the spread of fire and smoke within a given fire compartment for a prescribed period of time • Contribution of different passive fire protection measures in preventing and limiting fire at different stages of fire growth

4. Building performance in fire

Assessment Criteria	Knowledge and Understanding
4.1 Describe factors that affect the fire resistance of a building and components within the building	• Loadbearing capacity – the ability of the building’s 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 – The fire insulation properties of the unexposed face of a compartment specifically to prevent an average rise of not more than 140deg C or a maximum rise of 180°C above ambient for the duration of the fire resistance period.
4.2 Explain the factors that affect the way a material behaves in fire	Measured in terms of how the material will: • 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 Criteria	Knowledge and Understanding
5.1 Describe fire testing procedures and explain limitations of testing	• 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	• 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 and implementation of a fire strategy for a building

Assessment Criteria	Knowledge and Understanding
6.1 Explain why it is important to establish a fire strategy as part of the initial brief for a building	• Determine objective e.g. to protect people from a fire within the building, to allow adequate time to escape, to 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	• Contractors • Specialist sub-contractors • Regulators • Fire risk assessor • Client/Occupier
6.3 Describe the actions to ensure that the fire provision of the building is maintained	• Monitoring of activities that might affect fire performance e.g. amendments to building and maintenance work that could breach essential fire compartmentation • Use of correct materials and qualified contractors to carry out any maintenance work • Reviews following changes in the use of the building • Ongoing checks for wear and tear and adherence to procedures and standards • Fire Risk Assessment

7. Active Fire Protection

Assessment Criteria	Knowledge and Understanding
7.1 Explain what is meant by the term “active fire protection” and explain how active fire protection differs from passive fire protection	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	• Smoke detection ○ Ionisation smoke detectors ○ Optical smoke detectors ○ Aspirating smoke detectors ○ Optical beam detectors • Heat detection ○ Fixed temperature heat detectors ○ Rate-of-rise detectors • Alarm systems ○ 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	• Portable fire extinguishers • Fire blankets • Wet and dry rising mains
7.4 Describe different types of fire suppression equipment available within a building and explain its operation/use in extinguishing fire	• Sprinkler systems • Deluge systems • Mist systems • Drenchers • Gaseous fire suppression systems
7.5 Explain how signage and emergency lighting is used to improve the fire safety in a building	• Signage • Signage location • Emergency lighting • Emergency lighting location

Installation of Passive Fire Protection Measures

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

Assessment Criteria	Knowledge and Understanding
1.1 Explain the factors affecting the fire resistance of concrete frames and describe the additional passive fire protection measures that may be considered	• 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	• Heavy timber construction ○ Glulam or other similarly fabricated beams ○ sacrificial timber • Lightweight timber framing ○ requires additional fire protection, usually by a board system
1.3 Explain the factors affecting the fire resistance of steel frames and describe the additional passive fire protection measures that may be considered	• 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
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	• 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 of different products • Inspection process
1.5 Explain the issues to be taken into account when determining choice of fire protection system for different purposes	Issues for consideration • Junctions between different fire protection systems • Level of fire rating required • Appearance/Aesthetics • 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	• Materials to include: ○ Hardwoods ○ Softwoods ○ Chipboard

	○ 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 ceilings and fire resistant glazing

Assessment Criteria	Knowledge and Understanding
2.1 Describe the function, composition and performance characteristics of fire resisting walls, floors and ceilings and of active fire barrier systems	• Fire walls • Fire resisting floors • Compartment walls and floors • Fire resisting ceilings • Fire resisting partitions • Active fire barrier systems • Firefighting shafts and stairwells
2.2 Explain the factors affecting fire performance	• 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 i.e., 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	• 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	• 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	• Timber frames • Steel and aluminium frames • Composite frames
2.6 Describe different glazing options and explain the factors to be considered when selecting	• Integrity rated glazing ○ Wired glass ○ Laminated float glass

and implementing options	○ Modified toughened glass ○ Borosilicate glass ○ Glass ceramic ○ Partially insulating organic interlayer technology ● Insulation rated glazing ○ 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 Criteria	Knowledge and Understanding
3.1 Explain the purpose of fire stopping and describe the products and systems that may be used to achieve fire stopping	● Penetration seals ● Linear joint seals ● Small cavity barriers ● Large cavity barriers ● Open state cavity barriers
3.2 Explain the factors to be considered when selecting and installing fire stopping	● 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
3.3 Describe fire stopping and sealing systems and explain the factors relevant to their use and installation	● 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) ● 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.	• Range of uses: ventilation, smoke extract, kitchen extract and pressurisation
3.5 Explain the methods used to maintain the fire resistance of walls and floors penetrated by ventilation ducts	• Fire dampers • Fire resisting enclosures • Fire resisting ductwork (including types of ductwork) • Automatically actuated fire and smoke dampers triggered by smoke detectors
3.6 Describe the use of different types of dampers and explain the considerations in the selection and installation fire damper systems	• 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
3.7 Explain the factors that affect the construction and design of the building envelope and the implications for building in fire protection	• Fire-resisting external walls • Curtain walling systems • Cladding systems • Insulation applied to outside of buildings

4. Fire resisting doors and hardware

Assessment Criteria	Knowledge and Understanding
4.1 Explain the role of fire doors and shutters and describe the construction of different types of door and shutter	• Different uses and protection against different hazards • Operation of doors – door closing devices, electrically powered hold open devices, door co-ordinator devices, exit devices • Difference between door assemblies and doorsets • Materials used in construction
4.2 Describe the components of a fire doorset or assembly and explain the considerations in relation to selection, installation	• Door leaf • Door frame • Door ironmongery

and testing	• Air transfer grills • Intumescent seals • Smoke seals • Glazing apertures • Signage
4.3 Describe the factors relevant to fire door installation	• Delivery and storage prior to installation • Checks • Finishing doors on site/coatings • Fitting the frame, door leaf, ironmongery seals • Post-installation checks
4.4 Explain the considerations in relation to the use of fire doorsets and assemblies	• Ongoing wear and tear • Maintenance and inspection regime • Third party certification