



Fire Safety Standard

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1. Introduction and guidance

1.1 The purpose

This document details the minimum fire safety requirements that are applicable across Mace operations globally.

The primary reason to implement fire safety standards is for life safety of staff and public.

The secondary reason is for property protection, minimising fire damage, reducing the impact on costs and business continuity.

These requirements are applicable at all phases from bid, through construction and into handover and operation.

1.2 The scope

These standards are applicable where Mace act as principle contractor or provide facilities management within client premises. In these situations, Mace generally has contractual responsibility to implement and manage minimum fire safety standards.

Where client specific, or regional legislation, fire safety requirements exist, that are higher than Mace requirements e.g., aviation, petrochemical and nuclear, the higher requirements must be achieved.

Where deviation from this standard is required then justification must be included within the applicable fire risk assessment. Any justification must be suitable and sufficient covering the residual risk. The residual risk must be as low as reasonably practicable.

1. Introduction and guidance

1.3 Implementation

1.3.1 Construction

These fire safety standards must be applied at each of the eight principle gateways which form the life cycle of any Mace project (see right).

At the BIDDING stage (gateways 1 and 2) the fire standards determine the high-level fire strategy and associated costs. This stage must define sufficient budget to deliver the minimum fire safety standards.

At the MOBILISATION stage (gateways 3, 4 and 5) the fire standards are used to assess post bid changes to design, develop the fire safety organisation, develop the overall fire strategy and prepare the [Fire Safety Plan](#).

At the DELIVERY stage (gateway 6) the fire standards are used to assist with pre-planning and daily site management to maintain life and property protection standards.

At the AFTERCARE stage (gateway 7 and 8) the fire standards are used to develop any handover strategies (partial public occupation), assist with client handover and implementation of final scheme fire safety systems.

In addition, the fire standards assist with providing advice and support where Mace act as managing agents within client premises.



GATEWAY 1 BID/NO BID: Review implication of fire safety upon project deliverables and associated cost to implement robust fire strategy in line with fire standards.

GATEWAY 2 BID SUBMISSION: Summarise and incorporate fire strategy proposal, costs and cost savings, where possible, as part of bid.

GATEWAY 3 POST BID CHANGES: Review designs against bid to confirm changes do not affect proposed fire strategy and associated costs. Include fire safety as part of 100-day plan.

GATEWAY 4 EXECUTE CONTRACT: Review fire safety strategy against delivery plan. Highlight any issues and confirm fire safety standards are achieved. Develop role and responsibility matrix. Organise and confirm fire safety management. Develop fire safety plan and fire risk assessment.

GATEWAY 5 SERVICE COMMENCEMENT AND START ON SITE: Provide competency briefings to project teams. Implement fire safety plan and control and mitigation measures highlighted in the FRA. Implement management structure identifying roles and responsibilities.

GATEWAY 6 PROJECT DELIVERY: Deliver the fire safety plan through continued management and inspections. Project reviews and pre-planning meetings must include monitoring and implementation of the fire safety plan.

GATEWAY 7 PRACTICAL COMPLETION: Complete final install, inspection and commissioning of all fire safety systems both passive (fire stopping, fire doors) and active (sprinkler systems, fire alarm and detection systems).

GATEWAY 8 PROJECT FINALISATION AND ARCHIVING: Complete fire safety defects. Assist with implementation and management of fire systems. Produce operating and maintenance manuals. Provide advice and deliver fire safety function when acting as managing agents.

1. Introduction and guidance

1.3.2 Macro

These fire safety standards must be applied at each of the eleven principle gateways which form the life cycle of any Macro project (see right).

At the OPPORTUNITY stage (gateway 1) the fire standards help Macro

to advertise, to clients, knowledge of associated fire regulations and minimum standards regarding fire safety management.

At the BIDDING stage (gateways 2, 3, 4 and 5) the fire standards help establish where Macro can benefit the client in terms of compliance with legal fire safety requirements and opportunities for improvements over other providers. This stage must define sufficient budget to deliver the minimum fire safety standards. The fire standards can be used to assess post bid changes to contracts to determine if obligations can be achieved given budget and resource levels.

At the MOBILISATION stage (gateway 6) the fire standards are used support implementation of client fire strategies and set minimum standards.

At the OPERATION stage (gateway 7 and 8) the fire standards are used to support inspection and auditing regimes and support on-site compliance with regional fire safety standards.

At the CONTRACT EXPIRY stage (gateway 9 and 10) the fire standards can be used to highlight ongoing additional benefits of Macro involvement, highlight opportunities for cost savings and highlight benefits of continuing knowledge and experience within Macro.

At the DEMOBILISATION stage (gateway 11) the fire standards can assist with development of strategies for handover of fire safety systems, management procedures, servicing,

testing etc. to the new service provider.

GATEWAY 1 OPPORTUNITY:

Review potential work streams against the fire standards to determine opportunities to advertise where Macro can provide fire safety management benefit.

GATEWAY 2 PRE-TENDER: Review implication of required contractual obligations, deliverables and associated cost to implement client fire safety requirements against the fire standards and determine feasibility of contract.

GATEWAY 3 TENDER SUBMISSION:

Summarise and incorporate advantages, benefits, cost savings etc. in terms of fire safety management as part of bid.

GATEWAY 4 REVISION AND

AWARD: Review sub-contractor competencies, costs and overall contract delivery costs to highlight, if required, a cost/benefit analysis of the Macro bid.

GATEWAY 5 POST TENDER:

Review any post tender documentation, competencies and costs to confirm changes do not affect proposed contractual delivery of fire safety management strategy.

GATEWAY 6 MOBILISATION:

Undertake due diligence review for client and incumbent FM provider. Review contractual obligations and implement fire safety management process and procedures through briefing tool box talk competency briefings etc. Develop a roles and responsibility competency matrix e.g., Responsible, Accountable, Supportive, Consulted and Informed (RASCI) document, organise and confirm fire safety management structure. Develop fire safety strategies, fire risk assessment and organise testing, servicing, commissioning regimes through use of third-party competent persons. Fire companies must be licensed, if applicable, regionally.

GATEWAY 7 STABILISATION:

Support operational teams to implement all mobilisation activities and operating as Business As Usual (BAU).

GATEWAY 8 TRANSFORMATION/SERVICE DELIVERY:

Deliver the contractual fire safety obligations through continued management, inspection and audit. Ongoing

implementation of the fire safety management plan as detailed in the contract. Inspect and audit against the contractual obligations for fire safety management delivery and raise fire safety standards to meet the minimum fire safety standards as detailed in the contract.

GATEWAY 9 RE-NEGOTIATION/RE-TENDER: Identify where Macro can implement changes to benefit client fire safety management regimes, highlight any cost savings and highlight any legal obligations which may affect the client delivery of existing contractual obligations.

GATEWAY 10 RE-IMPLEMENTATION: Where necessary update, rebrief, retrain and implement the associated changes in order to maintain contractual obligations in terms of fire safety management.

GATEWAY 11 EXIT MANAGEMENT/HANDOVER: Undertake handover of the fire safety management strategy to allow the clients continued compliance with fire safety legislation under the new provider.



1. Introduction and guidance

1.4 Quick start guide

The subjects highlighted in the table below are significant in terms of developing and implementing a successful fire safety plan.

The table provides an overview of why the subject is important and provides a reference to the applicable section, of this document, providing more detailed information.

| Subject | Overview | Section |
|--|---|--------------|
| Documents and roles | Confirm that a fire safety plan and fire risk assessment have been completed and a fire coordinator has been appointed. | 1 & 2 |
| Means of escape | Allows safe evacuation from a building. Must be appropriate in number, length and width, use horizontal routes and stairs to ultimately lead to open air at ground floor level. | 3, 6 & 25 |
| Fire | Use of walls, floors and structure to protect occupants from effects of fire and smoke in means of escape and stairs. Fire doors and fire stopping systems must be used to maintain separation. | 4, 5 & 24 |
| Evacuation | A prompt and well managed evacuation is vital to maintain life safety of occupants. A suitable fire alarm and detection systems combined with correct directional signage and emergency lighting must lead to a suitably sized fire assembly point. | 7, 8, 9 & 10 |
| Lighting | Emergency lighting must be provided to illuminate means of escape routes in the event of mains power failure. To reduce potential ignition sources all sources of artificial light must be of a permitted low energy types e.g. fluorescent, LED. | 11 |
| Fire extinguishers | To allow basic first-aid firefighting provisions appropriate numbers and types of fire extinguishers must be distributed on fire points. To aid occupant evacuation additional information such as fire action notices and fire strategy drawings must be provided. | 12 & 13 |
| Protective coverings and scaffold cladding | Any protective covering materials and scaffold cladding materials must not contribute to fire spread. These materials must be classified as fire retardant. | 14 |
| Flammable liquids and gases | Minimum storage of flammable materials reduces the overall risk of fire developing and spreading. Robust and secure storage in defined locations helps isolate the flammable hazard and aids overall site management. | 15 & 16 |
| Hot works | Management of hot work activities helps control potential ignition sources caused by heat, sparks, naked flames etc. A hot works procedure and permit system must be in place. | 17 |
| Waste management | Removal of combustible waste reduces potential for fire developing and spreading. A robust waste management plan must be in place. | 18 |
| Electrical equipment | Electrical equipment and plant are potential ignition hazards. Risk must be reduced through maintenance, inspection and monitoring. | 19 |
| Fire and rescue authority | Fire damage is reduced significantly by early intervention. Appropriate procedures, access and equipment provisions must be provided. | 20 |
| Smoking and vaping | Designated smoking and vaping areas isolate the ignition risk from smoking materials and vaping device battery failure. | 21 |
| Arson | Potential for arson must be reduced through robust security measures. | 22 |
| Boilers and heating pots | Tar and bitumen heating processes represent an ignition and fire spread hazard. Exchanging the product for alternates not requiring heating or using electrically powered heating equipment will reduce overall process risk. | 23 |

Table 1: Subject Overview

1. Introduction and guidance

1.5 Roles and responsibilities

Fire safety management always involves a number of individuals who enact critical duties and provide organisational structure.

The project director is ultimately responsible for fire safety management using competent persons (fire professionals) within, and external to, the project team or client account.

For construction projects, a fire coordinator is appointed to develop and manage day to day implementation of the project fire safety plan, fire risk assessment etc. For Macro, the account manager is appointed to manage day to day implementation of the account fire safety plan, fire risk assessment etc. For multi-site accounts, this may be delegated to the local facilities manager under the management of the account manager.

On-site fire marshals are employed to typically assist with daily on-site management of standards and to assist with evacuation procedures.

Office based fire wardens are employed to assist with evacuations procedures within temporary buildings and accommodation.

A competent person is an individual with suitable knowledge, training and experience who will undertake specific tasks e.g., a fire alarm engineer. Coordination with security and logistics teams is always required to assist with some fire safety processes e.g., site evacuations, security against arson etc.

When providing facilities management, the Macro team may fulfil the role of competent person who will implement and facilitate the agreed fire strategy e.g., instruct fire wardens, arrange maintenance and inspection of fire systems etc. The individual contract will determine the extent of the Macro role. To support delivery of this role Macro will require assistance from other suitably qualified competent persons e.g., fire consultant/fire alarm engineer.

1. Introduction and guidance

1.6 Fire coordination

Fire safety on construction specific projects must be discussed and coordinated within all disciplines to achieve minimum fire safety standards. This is the role of the fire coordinator.

All projects must have a level of fire coordination proportionate to the fire hazard and risk involved.

A guide on how the level of fire coordination can be assessed is provided in Table 2 and 3. The appropriate sub-category is selected from each category in Table 2 and the respective score 1, 2 or 3 obtained. The individual sub-category scores are then combined and an overall score obtained, as per Table 3, to determine percentage of an individual's time required.

At BID stage, the maximum level of fire coordination should be identified and budgeted for. During the life of the project (MOBILISATION, DELIVERY and AFTERCARE), the level of fire coordination should be assessed considering the stage of the project and fire risks at that time.

A dedicated full time fire coordinator role may be required on some projects and this must be included during bid and mobilisation stage.

| Construction type | | Location | |
|---------------------------------------|---|--|---|
| Major Infrastructure/special projects | 3 | City centre | 3 |
| Residential/offices (high rise) | 2 | Sub-urban | 2 |
| Commercial | 1 | Green field | 1 |
| Value | | Occupancy Type | |
| £100m+ | 3 | Combined public occupancy | 3 |
| £20m - £100m | 2 | Partial public occupation during handover | 2 |
| < £20m | 1 | None | 1 |
| Building Height | | Number of Buildings | |
| Over 18 metres | 3 | More than two | 3 |
| More than 1 storey - less than 18m | 2 | Two | 2 |
| Single storey | 1 | One | 1 |
| Maximum number of operatives | | Effect on neighbouring public means of escape | |
| 400+ | 3 | Continued alteration to public means of escape | 3 |
| 101-400 | 2 | Ongoing effect on a fixed public means of escape | 2 |
| 0-100 | 1 | None | 1 |

Table 2: Fire Category Risk Rating

| Total score | Project fire profile | Fire Coordinator resource |
|-------------|----------------------|--|
| 21-24 | Major Risk | 80%-100% / Multiple Fire co-ordinators |
| 17-20 | High Risk | 60%-79% |
| 9-16 | Medium Risk | 30%-59% |
| 8 | Low Risk | 20%-29% |

Table 3: Fire Co-ordinator Resource

2. Fire documents

2.1 Overview

All projects must have specific documents, processes and procedures in place to support the fire safety management structure.

2.2 Project documentation

2.2.1 Construction project

The following are required throughout construction projects:

- [A fire safety plan.](#)
- [A fire risk assessment.](#)
- [A hot work permit process.](#)

These must be developed and implemented by Mace, in line with the requirements of this standard.

The fire safety plan is an overarching fire strategy document which must detail project specific fire safety information. The information relates to organisation, day to day management and the general and process fire precautions in place to safe-guard life and property.

General fire precautions (GFP) are those provisions and systems which must be in place in the event a fire has started and evacuation is necessary.

Process fire precautions (PFP) are those processes and procedures in place to reduce the potential for a fire starting and developing.

During BID stage a high-level project fire strategy must be developed to confirm sufficient funds are attributed to fire safety. This must allow for cost barriers during on-site implementation.

During MOBILISATION stage the fire safety plan is developed in detail to reflect any post bid changes.

During DELIVERY stage the fire safety plan must be reviewed each month as part of the project delivery plan (PDP) and reviewed if specific site changes invalidate the plan.

During AFTERCARE stage the fire safety plan must consider and detail the handover process and public fire safety considerations.

2.2.2 Facilities management

When providing facilities management Macro typically implement, manage and maintain fire safety systems and procedures previously agreed as documented in the contract and outlined in the Responsible, Accountable, Supportive, Consulted and Informed (RASCI) document.

In these cases, documents and procedures are typically client based, but supported and advised on by Macro.

Where client fire safety management is below regional standards the account manager must agree and document with the client how alignment with regional standards will be achieved.

Where the client occupies part of a tenanted building the overarching landlord fire strategy must be adopted.

During MOBILISATION due diligence must be completed and the existing fire safety plan requested and reviewed.

Where Macro facilities management are required to develop a fire strategy document, this must be developed by third party fire consultants.

During DELIVERY Macro's role will be to implement processes and procedures, manage fire safety systems and maintenance contracts in line with the requirements of the fire strategy (where required by the contract). Where fire strategy document amendments are required, third party fire consultants must be engaged.

During DEMOBILISATION and EXIT MANAGEMENT Macro are required to provide all relevant fire safety documentation to the new FM provider.

Where the fire strategy is produced by the client, examples of Macro responsibilities include:

- Implementing processes and procedures.
- Manage fire safety systems and maintenance contracts to confirm fire strategy is in place.
- Make recommendations to client on changes required.
- Managing fire warden training and refresher processes.

2. Fire documents

2.3 Fire risk assessment (FRA)

All Mace projects must have a [Fire Risk Assessment](#) (FRA) in place to assist with prevention of fire and keeping relevant people safe.

An FRA must be in place to cover:

- Construction sites.
- Temporary buildings and accommodation on-site.
- Temporary buildings and accommodation off-site (from a chair in an office to the whole building).

An FRA is intended to:

- Evaluate the hazards and risks associated with fire.
- Identify the processes to eliminate or control the hazards.
- Highlight the relevant people e.g., clients, public, staff and contractors, and the risk to them from fire.
- Detail an action plan to resolve identified issues.
- Highlight a time frame for resolution and review.

2.3.1 Construction projects

For construction based projects responsibility for completion of the FRA rests with the project fire coordinator. This includes the construction site and the accommodation and buildings both on-site and off-site.

Where multiple independent projects are located on the same site a FRA must be in place for each project.

2.3.2 Facilities management

For facilities management projects an FRA must be in place to cover Mace people, in addition to any FRA covering the client premises.

Where there is a requirement for Macro to produce a FRA this shall be documented within the contract and/ or RASCI.

The **Fire Risk Assessment Action Plan** can be used to identify actions relevant to Mace facilities management and to track implementation.

2.3.3 Office premises

Where Mace occupy areas or floors in rented accommodation then all FRAs e.g., from neighbouring parties, must be coordinated with the landlord. This is to drive coordination and cooperation and allow resolution of significant issues affecting general fire precautions and fire safety of common areas.

The Mace project team must request copies of all relevant FRA's. Reviewing and coordinating all FRA's allows Mace to confirm if:

- All areas have been considered.
- The FRAs are coordinated.
- All parties understand the remaining significant risks.
- Agreement is reached on resolution of significant issues i.e., timescale and action.

Where a landlord cannot provide an FRA i.e., where it is not a legal requirement, then the Mace fire coordinator (for construction projects) must undertake an FRA covering the specific location and all Mace employees.

For Macro accounts, where a landlord cannot provide an FRA i.e., where it is not a legal requirement, the account manager shall arrange for a suitably competent consultant to complete an FRA.

3. Means of escape

3.1 Overview

Means of escape form part of the life safety strategy for any premises. All means of escape routes must lead to an ultimate place of safety outside the premises via:

- A protected stairwell (high rise building).
- Direct final exits.

Alternative means of escape must be available from all locations. ('Alternative' means two exits separated by more than 45°). In specific instances single direction means of escape are acceptable (where limited travel distances exist). (See section 3.2).

3.2 Travel distance

Travel distance is measured:

- Along the actual walking route and not a direct measurement, and
- To the door of a protected stair, or final exit from the premises.

In the UK for example, allowable travel distances are:

- Single direction - 18 metres.
- Alternate direction - 45 metres.

(The alternative 45 metres distance includes any single direction distance).

In high-risk areas e.g. plant rooms, switch rooms the single direction distance is reduced to nine metres.

Regional standards for travel distance must be adopted where more stringent.

3.2.1 Construction projects

In semi-open structures (no- facade installed) and open-air projects the alternative distance can increase to 100 metres, but must be justified as part of the project FRA.

3.2.2 Facilities management

Travel distances are generally justified and detailed within existing client fire strategy documents approved by third party fire consultants.

3.3 Clear exit width

All exits, and exit routes, must be sized to accommodate the anticipated maximum occupancy of a room or floor served.

In the UK, for example, the following clear exit widths accommodate the persons shown:

- 750 millimetres serves 60 people.
- 850 millimetres serves 110 people.
- 1050 millimetres serves 220 people.

(Widths for occupancies over 220 persons are based on providing five millimetres/person).

Regional standards for clear width must be applied for stair and horizontal means of escape routes.

3.4 Personal emergency evacuation

A Personal Emergency Evacuation Plan (PEEP) must be created for any person who may require assistance evacuating during an emergency. The PEEP must be documented and reviewed regularly to remain suitable. [See Mace PEEP template.](#)

A copy of the PEEP must be provided to any member of staff (Mace/client/ supply chain) who are required to assist any individual in the event of an emergency.

3.4 Management

The clear exit width of the escape routes must be maintained at all times to avoid restrictions.

Means of escape are to be sterile i.e., no waste or storage of combustible materials is permitted.

Any works in a means of escape must be reviewed, approved and works briefed to applicable persons to avoid blockage in the event of an evacuation. If the contractor cannot move materials/tools/equipment, an alternative route must be provided.

Temporary stairs must be used where permanent stairs are not installed. Use of ladders, as a means of escape, must be justified as part of the project FRA.

Only push bars, thumb locks or break glass bolts are permitted on a means of escape route.

A pass door(s) must be installed where a turnstile is positioned on a means of escape route. The pass door must be sized to accommodate the anticipated maximum occupancy.

3.5 Tower cranes

A stay-in-place policy is not permitted. All operators must evacuate upon a fire alarm. (See section 24).

3.6 Third parties

The following must be reviewed to assess potential impact and conflict:

- Existing routes of escape from neighbours, other sites, existing users and public routes.
- Merging means of escape within shared premises.

4. Fire compartmentation

4.1 Overview

Fire compartmentation is the physical separation of a building into areas to limit fire size and to provide protected means of escape e.g., corridors and stairs.

Fire compartmentation is achieved using:

- Fire rated passive systems e.g., walls, floors, ceilings, fire stopping.
- Fire rated active systems e.g., dampers, roller shutters, automatic fire curtains.

Fire rated active and passive systems must be fire tested to achieve a desired period of fire resistance e.g., 30, 60, 90 or 120 minutes.

Any proposed system must be supported with fire test certificates to verify construction method and test results.

4.2 Fire stopping

Where fire compartment walls, floors and ceilings are breached with mechanical, electrical or plumbing services suitable fire stopping must be used to maintain fire compartmentation.

All fire stopping, permanent or temporary, must be installed by competent third-party accredited companies and individuals e.g., in the UK by a FIRAS accredited company with Q-Mark certified products.

4.3 Active system

Where active systems e.g., ducts, dampers, fire curtains are installed the associated control mechanisms must be installed, tested and commissioned. This process is required during end use and during construction phase where active systems may breach (penetrate) temporary compartmentation.

4.4 Construction phase

4.4.1 Horizontal fire compartmentation

All temporary horizontal fire compartmentation must be load bearing i.e., use of mineral fire batts is prohibited.

High rise project must have horizontal fire compartmentation, where reasonably practical, every ten floors to prevent fire and smoke spread (see diagram), On these floors:

- The floor must be of solid imperforate construction.
- All holes, shafts, stairs and openings at this level must be sealed with fire resisting construction.
- The floor and fire seals must achieve a minimum 30-minute fire resistance.

4.4.2 Vertical fire compartmentation

Vertical fire compartmentation is required on all stairs that are designated as a means of escape, this requires:

- All doors leading into the stair must be fire doors (temporary or permanent) and all openings sealed with fire stopping materials.
- The fire doors and seals must achieve a minimum 30-minute fire resistance.

4.4.3 General fire protection

At the earliest opportunity all permanent fire compartmentation and structural fire protection must be installed and certified.

4.5 Management

Temporary and permanent fire compartmentation must be subject to periodic inspection during any FRA review and when alterations are made.

All installers and installations must be subject to third party accreditation e.g., FIRAS (company accreditation) and Q-Mark (individual operative accreditation).

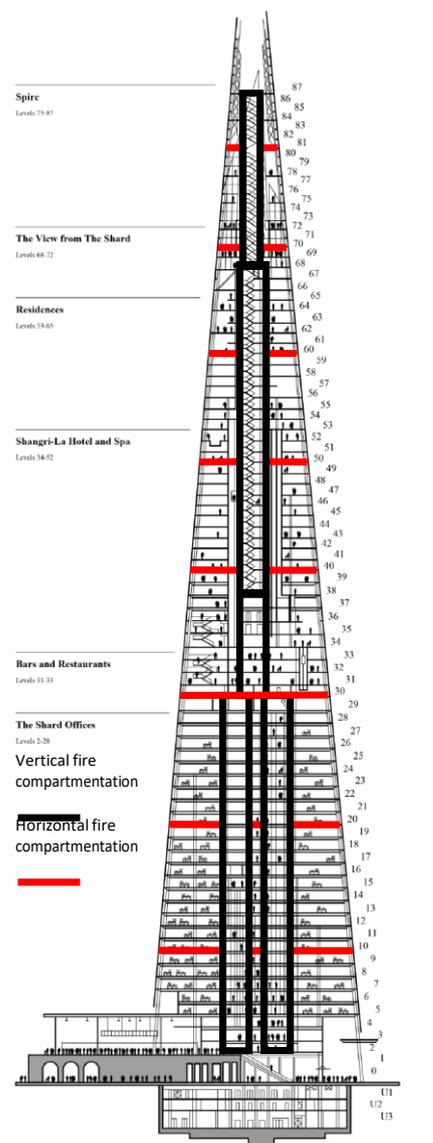


Figure 1: Showing examples of vertical and horizontal fire compartmentation

5. Fire doors

5.1 Overview

A fire door is a door which has been fire tested as part of a door-set to achieve a period of fire resistance in terms of integrity (fire and smoke penetration) and insulation (temperature rise).

A typical fire door-set comprises the following:

- Door (including any glazing).
- Frame.
- All associated ironmongery (hinges, screws, locks etc).
- Any self-closing devices.
- Door stops and trims.
- Intumescent and smoke seals.

Fire door-sets are a life-safety item and are critical to a successful fire evacuation and fire compartmentation in the event of fire.

5.2 Installation and test reports

All fire door-sets (temporary or permanent) must be installed in accordance with the fire test certificate and associated manufacturer installation guidance.

A copy of the fire test report must be obtained from the manufacturer to aid inspection following installation.

The fire door test reports must detail all dimensions, hinge locations and number, any self-closing mechanism, latches, intumescent strips, cold smoke seals etc.

Fire doors must be fitted with identifying signage confirming them as fire doors e.g., in the UK a blue mandatory information sign is installed with specific instructions (Fire Door Keep Shut or Fire Door Keep Clear)

Fire door-sets must be installed with self-closing devices unless:

- The fire door forms part of a riser and is normally locked.
- The fire door uses a magnetic hold-open devices, or hold-closed device, which are released upon activation of the fire alarm and detection system.

5.3 Quality

All fire door-sets must be installed and maintained only by competent persons having suitable third-party certification e.g., UK - Q-Mark scheme operated by Exova BM Trada.

5.4 Management

The condition and operation of all fire door-sets must be subject to inspections e.g., daily inspection via fire marshals.

Inspections must confirm:

- The fire door can be opened to 90° and returns, unassisted, to the closed position.
- Any magnetic hold closed or hold-open device operate and operating handles work correctly.
- All fixing, intumescent strips, seals are in place, not loose, damaged or missing.
- Any observation windows are clear and unobstructed.
- Fire door signs are present and visible.



Figure 2: Fire Door

6. External stairs and ladders

6.1 Overview

Stairs, and sometimes ladders, fixed to the external of a building or structure are often used for means of escape purposes.

External stairs and ladders must therefore be protected against attack from fire and ingress of smoke via external window, openings and door openings in the facade.

6.2 Design during construction

To protect persons the following standards are required:

- Stairs and ladders constructed of a non-combustible structure e.g., fabricated steel, scaffold tubes.
- The external facade of the building or structure, including some doors and windows must achieve a minimum 30-minute fire resisting within the zone indicated in Figure 3:
 - 1800 millimetres either side of the stair.
 - 1800 millimetres above the flights and landings.
 - 9000 millimetres below the flights and landings.
 - 1100 millimetres above the highest landing.

Within the fire resisting zone:

- Any windows and openings must be protected with a 30-minute fire-resisting system.
- Doors used for access to the stair must achieve 30 minutes fire resistance (unless a higher rating is required).

Stairs extending above 6000 millimetres vertically require weather protection.

Use of ladders as a means of escape must be limited to:

- Plant areas with limited occupancy or,
- Working areas where installation of a temporary stair is not practically possible e.g., slip forming.

In all other circumstances a stair must be installed.

6.3 Management

To prevent blockage, or restriction of the route, and to prevent build-up of materials the space within or below any external stair or ladder must remain sterile at all times.



Figure 3: Windows behind this stair have been boarded from the inside with 30-minute fire resistant boarding

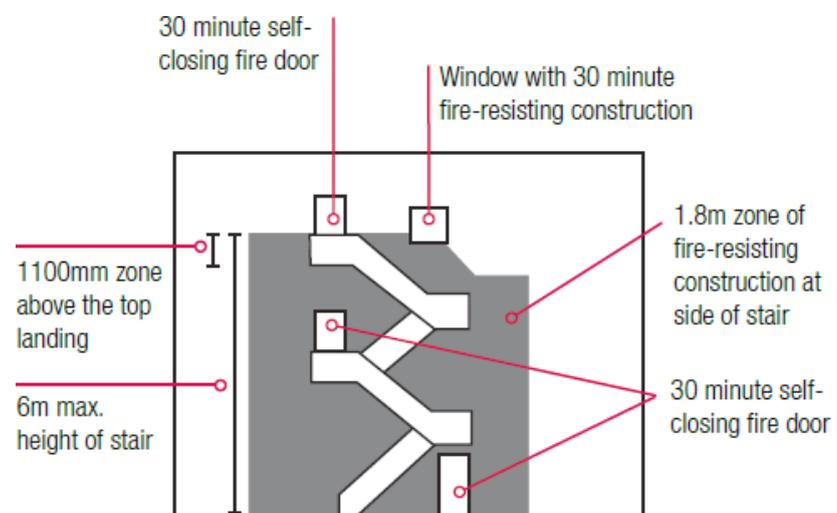


Figure 4: Showing requirement for fire resisting construction and fire doors.

7. Fire assembly point

7.1 Overview

A fire assembly point is a dedicated location for temporary assembly of persons following a fire evacuation.

7.2 General setup

A fire assembly point must be:

- Sized based on the maximum anticipated occupancy of the construction site, or building, using a floor space factor of 0.7m²/person.
- Located on level compacted ground.
- Suitably illuminated.
- Positioned in open air away from structures, means of escape routes and any access routes which may be required by the fire and rescue authority.
- Suitably identified using appropriate signage (see example below).



Figure 5: Fire Assembly Point Sign (example)

7.3 Construction projects

Construction projects may have large numbers of persons and individual contractor groups. The fire assembly point must be:

- Suitably signed to allow clear identification of individual contractor assembly points (using signage or hand-held boards).
- Secured to prevent unauthorised access onto projects before the back-to-work confirmation is given.
- Provided with a prominent and identifiable command point from which to manage the registration process (see 7.6) and act as an information point.

The ideal fire assembly point location is within the project boundary to avoid public interaction and risk from public vehicle routes. Where this is not possible suitable management procedures must be put in place to safeguard movement of persons from the construction project to the off-site fire assembly point.

7.4 Off-site assembly

Off-site fire assembly point locations must additionally consider:

- Public interaction.
- Traffic.
- Client requirements.
- Public events.
- Travel distances.
- Adequately sized walkways.
- Access gates to avoid bottle necking.

7.5 Multiple fire assembly

Where space is restricted then two or more fire assembly points may be required therefore management procedures must include:

- Suitable competency briefings to all persons on the project.
- Clear signage.
- A suitable registration process.

7.6 Registration system

In the event of fire, confirmation must be provided to the fire and rescue authorities that all persons are accounted for or that the building has been swept and all areas are clear.

Fire wardens are used in temporary or permanent accommodation to sweep the occupied areas and confirm all areas are clear.

For construction projects the registration process can utilise electronic security information or use a simple attendance tick-sheet to verify that all persons are accounted.

7.7 Dispersal of persons

Dispersal of persons into the public domain can only be considered if the registration process is complete, and there is no risk to members of public from dispersal of a large group of persons.

7.8 Evacuations

Mace operations need to have planned drills on a regular basis to test effectiveness of evacuation processes.

All fire evacuation (drills or real events) must be recorded on [Fire Evacuation Report](#).

8. Fire signage

8.1 Overview

Fire exit signs are used as visual indicators to direct persons to the nearest storey exit and then to the nearest final exit leading to a place of ultimate safety at a fire assembly point in open air.

8.2 Management

Fire exit signs must conform to regional standards e.g., in the UK signs must conform to BS ISO 3864 and 5499:Part 4 2013 (see examples below).



Figure 6: Fire Exit Sign (example)

The primary requirement is for fire exit signs to be visible from any location within a construction project or occupied accommodation.

Fire exit signs must be installed as follows:

- Nominally two metres above finished floor level.
- At all changes of direction along means of escape routes to reinforce the correct direction for escape.
- Positioned and spaced evenly along corridors and open areas so evacuees can effectively and consistently predict signage location.
- Must dominate all other signage to allow clear visibility and prevent obstruction.
- Installed by direct fixing to walls, as a hanging pendant, or secured to moveable prop-stands to facilitate any changes to the site.

Large fire exit signs can be used in open areas with unobstructed views. In these instances, signs must be sufficiently sized to be read clearly from the anticipated viewing distance.

Fire exit signs must be illuminated in the event of mains power failure, therefore, position of emergency lights must be coordinated to maintain minimum illuminance levels.

8.3 Planning

Any proposed changes or closures to means of escape routes must include a review and amendment of fire exit signs to help maintain identification of the correct route.

9. Fire alarm and detection systems

9.1 Overview

A fire alarm and detection system is the primary piece of life safety equipment within premises, including construction sites, to alert staff in the event of fire.

9.2 Construction projects

Use of rotary bells, air-horns and vocal shouts of 'FIRE' are not permitted on construction projects as a means of raising a fire alarm.

A wireless fire alarm system must be installed and maintained to cover the construction delivery phase. The fire alarm system must include a double knock/two-stage activation function.

A wireless fire alarm system must comprise of:

- Manual call points (allowing occupants to raise the alarm) positioned at storey exits, final exits and within maximum travel distances from any location in accordance with regional legislation e.g., in the UK call point must be available within 45 metres of any point on the project.
- Automatic heat or smoke detection positioned to monitor high risk areas e.g., switch rooms, incoming power mains rooms.
- Flashing beacons to provide a visual alert signal.
- Sounders to provide an audible alert signal 5dB above ambient noise.
- Control panel/base station allowing central monitoring of the fire alarm system.

The primary control panel/base station must be sited in the project security office allowing unobstructed access and immediate management response. Additional repeater, or slave devices can be used to assist overall site response.

Where sites are not occupied 24/7 the control/fire panel must be linked to a regional monitoring centre e.g., Mace FM24 to provide external awareness of a possible fire event.

Domestic stick-on smoke and heat devices are not permitted at any time.

Smoke detection, linked to the site fire alarm system must be installed within any individual sub-contractor accommodation/welfare units.

Use of smoke detection within open construction project can cause false alarms. Heat detection can be used as an alternative; however, these are slower reacting so their use must be justified within the project FRA.

9.3 Temporary or permanent accommodation and buildings

A fire alarm and detection system must be installed, tested, commissioned and operated in all temporary or permanent accommodation and buildings in accordance with regional standards e.g., in the UK to BS 5839.

9.4 Management

All persons, security and fire marshals, responsible for monitoring the fire alarm control panel/base station must be given suitable competency training to operate and interrogate the system e.g., be able to read information, identify activation location, silence, reset and operate the system.

A weekly audible fire alarm test must be completed. A different device must be tested each week, the test must be recorded, and any issues actioned.

An isolation permit system must be operated to allow temporary isolation and correct reinstatement of smoke or heat detectors.

Automatic fire suppression systems may be required where catering facilities or electrical rooms/data rooms are in place. **Note:** Where dedicated catering facilities, managed by a third party, are provided then an automatic chemical suppression system must be installed above deep-fat frying equipment. For Macro facilities management sites this will be determined by the client.

10. Fire points

10.1 Overview

A fire point is a portable or static fire safety station used to locate important fire safety equipment and information.

10.2 Construction site

Fire points are required to maintain travel distance between fire extinguishing equipment e.g., in the UK maximum travel distance to the nearest fire extinguisher is 30 metres.

Therefore, once fire points with call point have been installed then additional fire points may be required to achieve the maximum 30 metres distance for fire extinguishers. See section 9.2.

A fire point (see example in Figure 7) must consist of:

- A wireless device to raise the fire alarm (a combined call point, sounder and flashing beacon).
- One 9L AFFF (Aqueous Film Forming Foam) fire extinguisher and associated safety label.
- One two kilograms CO2 fire extinguisher and associated safety label.
- A fire action notice (detailing the emergency evacuation procedure).
- A fire strategy drawing (showing the nearest exit routes).
- A fire alarm call point sign.
- A fire point number (to aid identification on site, on fire strategy drawings and for reference during fire alarm activations).
- A fire point checklist (for daily completion by fire marshals).



Figure 7: Fire point

The number of fire points is dictated by the requirements to provide fire extinguishers within 30 metres of any location on the construction site.

Fire points may also be required to achieve correct location of fire alarm manual call points at storey exits and fire exits.

Further call points may be required to achieve regional travel distance limits between fire alarm manual call points.

Fire points must be inspected daily by the project fire marshal(s) and the inspection noted on the fire point checklist sheet. Daily inspections are required due to the constantly changing nature of construction sites. Records must be maintained.

10.3 Temporary or permanent accommodation and buildings

Within these domains the location of fire alarm call points is fixed by design therefore fire point location is generally predetermined.

The fire points (see example in Figure 8) will consist of the same equipment and information as those for construction sites with the exception of:

- A wired call point, as opposed to a wireless call point (in fixed systems wired connection are more suitable and less maintenance)
- A floor standing plastic tray or wall mounted hooks can be used to mount the fire extinguishers.



Figure 8: An office-based fire point

11. Emergency/working lighting

11.1 Emergency lighting

11.1.1 Overview

Emergency lighting must be installed in all premises, including construction sites, to provide lighting in the event of primary lighting failure.

Emergency lighting devices are normally powered by an internal battery or capacitor, or from a central battery system (associated with permanent systems).

11.1.2 Provision and maintenance

Emergency lighting must be installed in all internal and external areas where means of escape routes are provided e.g., rooms, corridors, stairs, open spaces etc.

Emergency lighting must be installed in accordance with regional guidance e.g., in the UK it must conform to BS 5266- 1:2016.

The lighting illuminance at floor level must achieve compliance with regional guidance e.g., in the UK, the following must provide at finished floor level:

- 1 Lux along means of escape routes.
- 0.5 Lux in open areas.
- 15 Lux in high-risk areas.

Positioning of emergency lighting must be coordinated with fire exit signage locations, so that they are illuminated if primary lighting fails.

The lighting illuminance at every fire exit sign must achieve compliance with regional guidance e.g., in the UK:

- 5 Lux must be achieved at the face of the fire exit sign.

All emergency lighting must be operational for the time period during which evacuation takes place. e.g., 30, 60 minutes, as specified by regional standards.

Maintenance must be carried out in accordance with regional guidance. A sufficient schedule of checks must be undertaken to highlight issues, due to damage or lighting failures, and allow remedial action.

For construction sites the Mace [Site Temporary Services Policy](#) shall be applied in addition to regional legislation.

11.2 Working lights

11.2.1 Overview

Electric lights installed to provide flood lighting, general lighting and individual task lighting must not present an ignition risk.

Excessive heat generation can ignite adjacent flammable or combustible materials. Damaged and poorly maintained cabling can expose live inner cables causing electrical arcing and ignition risk.

11.2.2 Provision and maintenance

Only fluorescent tubes and low energy alternative lighting, including LED lights, are permitted when undertaking construction works.

The following are not permitted:

- Festoon lights (unless LED).
- Halogen work lights.
- Metal-halide lamps.

All temporary and permanent lighting systems must be installed in accordance with regional standards e.g., in the UK BS 7671.

All construction sites must put in place suitable inspection procedures to check lighting systems for lighting defects (damaged cables and connections).

12. Fire extinguishers and fire suppression

12.1 Overview

Fire extinguishers are installed in premises, including construction sites, to provide first aid firefighting ability during the inception stage of a fire.

A single fire extinguisher is only designed to suppress a small fire (the size of a wastepaper basket).

If fire cannot be suppressed with one fire extinguisher operated by trained and competent persons, then those persons must leave the area and await arrival of the fire and rescue authority.

12.2 Provision and maintenance

Fire extinguishers are generally required at:

- Fire points.
- Locations of significant fire hazard e.g., fuel stores, kitchens.
- Hot works operations.
- Locations to comply with regional legislation e.g., in the UK the maximum allowable travel distance within a building to a fire extinguisher is 30 metres.

On construction projects where fire extinguishers are provided on fire points the spacing of fire points must be adjusted to achieve the 30 metres requirements.

All fire extinguishers, provided for Mace (construction and facilities management), or used by sub-contractor for hot works, must be:

- Regularly maintained and serviced in accordance with regional standards e.g., in the UK all fire extinguishers must be serviced every 12 months or sooner if deemed not compliant with BS 5839-8.

All fire extinguishers provided for Mace construction sites must be:

- Clearly identified e.g., with a sticker indicating 'Mace', a visible colour marking or through use of bar coding.

Fire extinguishers supplied by sub-contractors, for use during hot works, must be identifiable to indicate ownership.

Where individual hazards are identified e.g., fuel stores, kitchens etc. dedicated fire extinguishers, applicable to the fire class must be provided.

12.3 Management

Fire extinguishers provided at any fire point must not be used for carrying out hot works. Fire extinguishers must:

- Be protected from atmospheric conditions when exposed externally e.g., use plastic covers to reduce impact of moisture (causes rust) and sunlight (accelerates aging of rubber hoses).
- Have anti-freeze solution added, at correct proportions, if AFFF or water extinguishers are to be exposed through sub-zero conditions.

| | |
|----------------------------------|---------------------------------------|
| AFFF (Aqueous Film Forming Foam) | Flammable liquids, combustible solids |
| CO2 | Electrical equipment |
| Powder | Flammable Gases |
| Wet Chemical | Cooking Oil and fats |

Table 4: Fire extinguisher types

13. Protective coverings, scaffolding, cladding

13.1 Overview

Materials which are used to temporarily protect finished installations during fit out and handover e.g., carpets, wall coverings, glazing etc. must not contribute to fire development.

Materials which are used for cladding of scaffold structures must not contribute to fire development.

13.2 Protective coverings

When positioned in the vertical and horizontal orientation these protective covering materials must not readily ignite, spread flames or deposit flaming droplets.

The protective covering materials must be certified as fire retardant to an applicable regional standard e.g., either Loss Prevention Certification Board (LPCB) LPS 1207 scheme or CERTIFIRE Technical Schedule 63 (T63).

The UK schemes require the scheme logo and certification number to be printed on the material. Regional schemes may have different requirements.

Example of the LPCB scheme logo is shown below.



13.3 Scaffold cladding

When positioned in the vertical orientation these scaffold cladding materials must not readily ignite, spread flame or deposit flaming droplets.

The scaffold cladding materials must be certified as fire retardant to an applicable regional standard e.g., in the UK compliance with either Loss Prevention Certification Board (LPCB) LPS 1215 scheme or CERTIFIRE Technical Schedule 62 (T62).

The UK schemes require the scheme logo and certification number to be printed on the material.

Certified debris netting will be identified using tags or visible markings as confirmed by the accreditation certificate.

Regional schemes may have different identification requirements.

Example of the LPCB scheme logo is shown below.

13.4 Printed branding

Where branding of protective covering materials or scaffold cladding materials is required then projects must check that this is allowed under the terms of the material certification.

In the UK, for example, the LPCB certificate must state that the product has been tested with 'Print Option' to allow additional advertising to be applied.

13.5 Advertising banners

Where projects are requested to install large scale facade advertising banners appropriate checks must be completed to confirm they are certified as fire retardant e.g., in the UK comply with either Loss Prevention Certification Board (LPCB) LPS 1215 scheme or CERTIFIRE Technical Schedule 62 (T62).

Any banners must be included in the site fire risk assessments, and insurance approval obtained.



Figure 9: Example of advertising banner

14. Flammable liquids and gases - quantities and refuelling

14.1 Overview

The use of flammable liquids and gases must be limited by use of non-flammable alternatives and restriction to essential processes only.

Where a flammable liquid or gas is required, the quantities must be restricted to reduce overall risk.

14.2 Quantities

Overall quantities for fuel need to be managed and co-ordinated. Volumes and storage must be supported by a fire risk assessment and appropriate controls implemented. (See DESEAR requirements in 14.5).

The maximum quantities permitted per contractor are as follows:

- Petrol, five litres.
- Diesel, 40 litres.
- LPG, 300 kilograms.

Maximum total quantity allowable in any flammable liquids storage container (cabinet or box) is 50 litres including the petrol or diesel. Should these quantities need to be exceeded then the higher volumes need to be assessed as part of the fire risk assessment.

14.3 Diesel and petrol refuelling

Refuelling regimes must be in place for all plant and equipment.

Diesel or petrol refuelling of plant and equipment within any excavation, enclosed or covered section of a construction site is prohibited under normal operational working conditions.

The following control measures must be in place at the location of refuelling:

- All refuelling must be in the open air away from means of escape, vehicle access routes, walking routes, public areas, etc.
- Fuel must be transferred from the container using a funnel or spout to avoid spilling.
- 1 x AFFF and another appropriate fire extinguishers.
- A full spill kit.
- Plant must be cold or a shield installed to prevent fuel contact with the hot engine parts/exhaust.
- A drip tray under the refuelling point.
- Where access to the equipment fuel filler point is restricted due to machine height access must be via an access platform or scaffold, to allow for safe access and to prevent spilling.

Refuelling operations must be undertaken by a person who has received a competency briefing including expected control and mitigation solutions.

14.3.1 Facilities management

Where refuelling of static back-up generators is required then the responsible contractor must provide a suitable and sufficient FRA covering the refuelling process.

14.4 Acetylene

Due to the highly flammable nature and explosive potential of acetylene gas cylinders, the storage and use of the gas on Mace projects is prohibited.

As part of project pre-planning during the MOBILISATION stage the inclusion of any process requiring acetylene must be eliminated. Alternative processes must be selected or works involving acetylene undertaken offsite.

Contact the fire topic specialist for further information.

14.5 Explosion potential

Application of some products can lead to formation of a flammable atmosphere with explosive potential.

Manufacturer information must be consulted prior to application of flammable materials to implement appropriate control and mitigation measures are in place.

A risk assessment must be completed where there is potential for an explosive atmosphere e.g., in the UK the Dangerous Substances and Explosive Atmosphere Regulations (DSEAR) must be consulted.

15. Flammable liquids and gases - storage

15.1 Overview

All flammable liquids and gasses must be clearly labelled and stored appropriately.

15.2 Flammable liquid storage

All products labelled as flammable must be stored in a flammable liquids storage container, which meets the following requirements:

- Made from steel on all sides including the lid, fixings and support mechanisms with no opening or gaps.
- Made to have an overlap between the lid/door and box structure in the closed position.
- Capable of retaining spills up to 110% of the capacity of the largest drum or container stored within it (Note: Some industrial applications may require a bund capable of retaining spills equivalent to 110% of the total volume stored within the bund).
- Marked with a flammable symbol which is clearly visible.
- Clearly signed with the contact details of the responsible contractor.
- Be clearly signed with a list of contents.
- Locked at all times unless being in use.
- Positioned on compacted level ground.
- Positioned away from vehicle, routes to avoid impact, pits, drains and low-lying areas.

Use of flammable liquids cabinets is restricted to temporary buildings and accommodation (cabinets are less stable than boxes). In all other instances flammable liquids boxes must be used.

Petrol must be stored in a certified metal or plastic containers. Diesel must be stored in metal container only. Petrol and diesel must be stored separately. Where large quantities of diesel are required then a detailed justification must be included within the site and contractor FRA.

Where large capacity storage tanks (bowsers) are utilised a spill kit must be provided adjacent to the tank. Sufficient spill kit must be provided on site to accommodate the largest potential spill. Flammable liquids storage locations must be highlighted on site fire strategy drawings.

15.3 Flammable gas storage

All large cylinders storing compressed flammable gas must be stored securely to prevent tipping and unauthorised access.

Gas cylinders must be stored vertically at all times.

All cylinder storage cages must be:

- Located external to the building envelope.
- Made entirely of steel, with steel mesh to all sides but with a solid base (if a base is provided).
- Located on stable level ground.
- Fixed to the ground where a cage base is not provided (to prevent tipping).
- Secured to a fixed structure where a cage base is provided (to prevent tipping).
- Positioned away from vehicle routes to avoid impact, pits, drains and low-lying areas.
- Shaded from the sun.
- Highlighted with a flammable symbol adhered to a visible side of the cage.

- Clearly signed with the contact details of the responsible contractor.
- Locked at all times unless being accessed.

Empty bottles have an equivalent risk as full bottles and must therefore be stored with the same controls.

Flammable gases must be separated from other compressed gases by a minimum of three metres in distance.

Regional guidance must be followed where higher standards exist e.g., in the UK further information can be found in LPG Code of Practice No.7 Storage of full and empty LPG Cylinders and Cartridges.

15.4 Management

Any handheld petrol driven plant e.g., petrol cutters/disc saws must be returned back to a flammable liquids storage box when not in use.

Flammable liquids, oxidising agents and LPG must not be stored together. A sterile area, nominally three metres wide, must be created around all flammable storage areas to reduce potential for fire spread.

LPG cylinders can be used internally during construction activities but must be returned to an external storage cage after use.

When in use LPG cylinders must be:

- Minimum three metres from the piece of equipment supplied e.g., open flame burner, hot melt pot.
- Secured in the upright, vertical, position with the valve at the top of the cylinder, unless specifically designed for a forklift truck.
- Chained to the transport trolley on level compacted ground, or individual cylinders secured to a solid structure e.g., column, to prevent tipping.

16. Hot works

16.1 Overview

Hot work processes have the potential to cause ignition and development of fire and include (for example):

- Welding, (MIG, TIG, ARC, gas welding etc.).
- Grinding/cutting.
- Open flame torching, cutting etc.
- Gas brazing, soldering.
- Hot air gun heating.
- Tar boiling/bitumen pot.

16.2 Management

All Mace projects must implement a [hot works permit system](#) (CN-HSW-FM-0023) including a management procedure to open and close the permits.

Where clients operate a hot works permit, there must be agreement on whether a Mace or Client permit system is used. If the client permit system has lower controls than Mace, then additional controls should be implemented to meet the Mace requirements.

The hot work permit process must be highlighted within the project fire safety plan including those persons authorised to open and close the permits.

Proposed hot work activities must be highlighted as part of pre-planning meetings e.g., daily activity briefings. This will allow an overall assessment of the fire risk by introducing the hot work activity.

The following must be implemented for all hot works:

- Identified in pre planning meetings.
- Hot works permits must only cover a single shift, no weekly permits are allowed.

- Where hot works is occurring in a sterile zone (defined in section 16.5), the fire watch is not required. A hot works permit is still required, and the task needs to be planned.
- Where hot works is occurring in a non-sterile zone (defined in section 16.5), a fire watch is required.
- Additional fire watchers may be required if there is a risk of sparks discharging beyond the area of the hot works e.g., into voids, shafts or lower floor levels.
- Use of Thermal Imaging cameras that demonstrate the heat source is in line with ambient temperature can justify reducing the cool down period. This process must be noted in the FRA. See [Thermal Imaging Knowledge Share](#) for more details.
- Contractors must provide two appropriate fire extinguishers for all hot works (one AFFF and another suitable extinguisher e.g., CO₂).
- Combustible materials and flammable liquids must be a minimum two metres from the hot works to create a sterile zone.
- In addition, protective barriers/ screen may be required (see 16.4).

16.3 Fire watch

A fire watch is a person who is tasked with observing a hot works process.

A fire watch is responsible for fire prevention during hot works and for tackling any fire that may occur.

A fire watch must have attended a Fire Marshall course that is accredited by a recognised body e.g., Institute of Fire Engineers in UK.

The fire watch is additional to the persons carrying out the hot works.

The fire watch must be in continuous attendance throughout any hot works process at the location of the hot works.

The fire watch must also be in attendance during the required post hot work cool down period as follows:

- In general: 30 minutes continuous fire watch, then further checks up to 60 minutes,
- High risk activities: 60-minute continuous fire watch,
- Timber framed building: 60 minutes continuous fire watch then further checks up to 120 minutes.

16.4 Protective barriers/ screens

Where protective barriers/screens are required, this can be typically achieved using a glass fibre reinforced fire blanket which has been tested to achieve a minimum 30-minute fire resistance period.

16.5 Sterile zone

A sterile zone is a zone where hot work activity cannot transmit heat/sparks to a fuel source, with potential to start a fire e.g., designated cutting areas/shelter/room, all combustible materials is removed to a safe distance (considering vertical and horizontal heat/sparks transfer) or no combustible materials exists.

Note: Where there is an unseen risk of fire then the area should not be defined as a sterile zone e.g., potential sparks entering voids or lower/higher levels.

17. Waste management

17.1 Overview

Combustible waste must not be allowed to accumulate or be placed within areas where it poses a fire risk to life and property protection.

All construction projects must have a waste management strategy in place.

All temporary buildings and accommodation must have a waste strategy in place.

When providing facilities management roles, then waste management must form part of any FRA process. This allows the potential for fire development and spread via combustible waste to be reviewed.

17.2 Combustible waste

The following controls are required for management of combustible construction waste:

- All waste must be immediately placed into the waste containers provided (waste bins, waste receptacle).
- All waste containers must be provided with lids.
- Waste containers must not be overfilled to the extent that lids cannot be closed.
- Where practical, waste containers must not be stored within a building structure.
- Where waste is temporarily stored within a building structure, it must be positioned away from means of escape routes.
- Where practical, waste must be stored at least six metres from the building facade.

- Where six metres separation is not possible, due to site restrictions, waste must be stored as far as practically possible away from the building facade, but within the site boundary.
- Where practical, waste must not be stored within two metres of site boundary, to prevent potential for deliberate or accidental arson (from discarded smoking materials).
- Where practical, combustible waste containers must be cleared from the inside of buildings when full to prevent waste accumulating and becoming a potential fire source.
- Combustible waste skips must be protected from ignition hazards e.g., use of enclosed skips, positioned away from smoking areas, protected during hot work processes.
- Combustible waste skips must be removed from site when full.

In addition, all waste management strategies must take into consideration local landlord and client requirements.

17.3 Flammable waste

Lockable storage containers must be provided for waste flammable liquids containers e.g., paints tins, spray canisters, floor adhesives.

A suitable specialist collection scheme must be employed and details of collections, and on-site storage regime, highlighted as part of the waste management strategy.

Flammable waste containers must be located within a designated area which is highlighted on project fire strategy drawings.

18. Electrical tools and plant

18.1 Electrical tools

All portable electrical equipment must be subject to routine safety checks. This process is known as 'in-service inspection and testing of electrical equipment'. In the UK and other countries this is referred to as Portable Appliance Testing or PAT testing.

All applicable equipment on-site (drills, grinders, extension leads) and office-based equipment (computers, monitors, microwaves, fridges) must be subject to an in-service inspection and test. For construction activities PAT testing should occur at least every 12 months, with increased frequency based on usage and risk. For permanent offices frequency, typically this is 1-3 years depending on equipment type and usage (See regional guidance).

18.2 Mobile plant

All mobile plant (excavators, dumpers, forklifts) must be subject to annual testing and inspection in addition to servicing in line with manufacturers specification. Regional testing regimes must be in place to help reduce ignition risk and fire spread potential.

A documented regime of daily pre-use and post-use checks must be in place.

Plant must be parked a minimum two metres from flammable and combustible materials, not directly below or within four metres of scaffold structures.

18.3 Transformers, cables and connections

Transformers must be marked 'DO NOT COVER' on the top face.

The fuse box cover must be secured with a lock to prevent unauthorised access.

Transformer cable entry points, not in use, must be blanked off.

All supply cables entering the transformer must have a secondary means of fixing to prevent additional tension on the cable, gland and connection. ([Refer to temporary services policy](#)).

All cable installations, temporary and permanent (including buildings and accommodation) must comply with regional regulations e.g., in the UK temporary and permanent installations must comply with BS 7671.

18.4 Temporary cables

All temporary cables and connections must be suitably secured to prevent damage (see Figure 10) which can lead to exposure of live inner core wires and resulting in a possible ignition risk.

All cables must be of an appropriate power rating for the device they are supplying, to prevent overload.



Figure 10: Temporary cable support

18.5 Cable extension reels

Cable extension reels (coiled cable reels) can overheat and ignite when coiled and overloaded. To manage this issue Mace prohibit their use, only loose extension cables are permitted on projects and in accommodation.

18.6 Battery charging

All charging of power tool batteries must occur at a battery bank ([see temporary services policy](#)).

19. Fire and rescue authority - access and equipment

19.1 Overview and provisions

Where Mace act as principal contractor or managing agent there is responsibility for managing associated access routes and equipment, and meet and greet processes with the local Fire and Rescue Authority (F&RA).

The following must be reviewed and included as part of temporary or permanent fire strategies and included in associated documentation:

- A meet and greet process that details who, how, when, where and what (a fire service pack) the F&RA will be briefed upon arrival.
- A fire service pack which includes building/site drawings, important contact numbers, access keys etc. to be presented to F&RA on arrival.
- Protected access routes and stairs allowing safe access in and up/down a building.
- Access routes suitably sized for F&RA vehicles e.g., for UK ; 3.7 metre wide, four metre high, minimum 12.5 tonne weight capacity.
- Access routes to wet/dry rising/falling mains inlet point e.g., for UK F&RA vehicle access routes must be within 18 metres of the mains inlet point.
- Wet/dry rising/falling mains to allow a water supply to the internal of a building.
- Suitable identification of all dry/wet rising/falling main inlet and outlet points.
- Testing and commissioning of all wet/dry rising mains and associated equipment.

On some projects it may be necessary to provide a site radio to the F&RA, (as part of the 'meet and greet' process), to aid communications between the site team and F&RA (tunnels, basements and confined areas may cause F&RA equipment to be inoperable). Radio transmissions can be reviewed during F&RA operational visits.

Construction projects must confirm that the above F&RA access and equipment provisions are planned for installation as soon as practically possible e.g. dry rising mains must be installed and commissioned as each new floor level is constructed.

19.2 Management

19.2.1 Construction

At the earliest opportunity Mace must invite the F&RA to undertake an orientation visit.

19.2.2 Facilities management

Macro must co-operate with F&RA requested to undertake an orientation visit or inspection of any managed site. Where this is requested, the client must be informed.

A copy of any F&RA report must be provided to the account manager and client on receipt.

20. Smoking and vaping facilities

20.1 Overview

Dedicated smoking and vaping facilities help isolate the ignition hazard presented by smoking materials e.g., matches, smouldering cigarette/cigar butts and vaping devices e.g., exploding batteries.

20.2 Construction

Smoking and vaping are only permitted in designated areas outside of accommodation buildings or in dedicated facilities on construction sites.

The planning of smoking and vaping facilities must include the following:

- Positioning facilities away from building entrances and walkways to avoid risk of fire spread into the building.
- Facility design: The facility must have openings (ventilation) in walls equating to more than 50% of the wall area.
- For fully open facilities solid two-metre-high vertical hoardings must be used to segregate the smoking facility from adjacent buildings and walkways.
- 1 x AFFF extinguishers positioned within one metre of the facility.
- A non-combustible receptacle is positioned within the facility to place smoking materials.
- Cleaning regime to prevent build-up of smoking materials.
- The use and storage of flammable gases or liquids is not permitted within ten metres of the facility.
- Suitable signage to instruct placement of smoking materials in receptacle provided.
- Smoking and vaping facilities must be separated.

20.3 Facilities management

Smoking and vaping facilities must be provided in accordance with regional legislation and guidelines.

20.4 Special measures

Specific smoking restrictions may apply in certain environment e.g., aviation, petrochemical industry, nuclear etc. Restrictions must be identified as part of any pre-mobilisation review.

21. Security/arson prevention

21.1 Overview and provisions

The risk of fire from arson attack can be reduced through robust security management and use of physical security measures. In combination with management of ignition sources and flammable/combustible materials the risk of ignition and fire spread as a result of arson, can be reduced further.

Key security guidelines for Mace construction projects can be found in the [Mace Site Security Strategy Guidelines](#).

22. Tar boilers/bitumen pots/hot melt pots

22.1 Overview and provisions

Electrically operated boilers and pots must be used in preference to those requiring LPG.

Electrically operated drying equipment must be used in preference to those requiring LPG.

Preference must be given to materials that do not require use of LPG heating equipment in order to be applied.

Bulk delivery of off-site heated material should be used in preference to on-site heating.

Use of LPG equipment, in exceptional circumstances, must be fully justified in an FRA.

The following control and mitigation measures must be in place:

- Boilers/pots must be positioned on top of non-combustible boarding/ protective covering, and away from flammable materials and liquids (minimum two metres from the hot works to create a sterile zone).
- A hot work permit must be in place for each boiler or pot (this includes requirement for fire extinguishers, fire watch etc.). The exception for this is electric operated pots.
- Boilers/pots must be serviced in accordance with manufacturer guidelines.

23. Temporary project buildings and accommodation

23.1 Overview

Temporary project buildings and accommodation must not cause a fire risk to adjacent public buildings and project structures (construction site).

23.2 Construction

The following must be implemented regarding temporary project building and accommodation:

- A six metre-wide fire break (sterile area) must be provided between any temporary project buildings and any adjacent building or project structure.
 - Where a six metre-wide fire break is not possible then temporary buildings must be constructed to achieve a minimum 30-minute fire resistance (load bearing capacity, integrity and insulation) or local code equivalent e.g., in the UK in line with Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation.
 - Where temporary buildings are raised above the ground any void formed below it must be enclosed to prevent accumulation of rubbish and storage of combustible materials.
 - Temporary accommodation located within project structures must be separated from the project structure by 30 minutes fire resisting construction (load bearing capacity, integrity and insulation).
 - Locating temporary accommodation within a basement or upper level of a project structure must be avoided; ground level must be used. Where use of ground level is not possible consult with the topic specialist.
- Doors on means of escape must be designed and installed to open in the direction of travel.
 - Sleeping facilities are prohibited on Mace projects.
 - Only enclosed element electric heaters are permitted on projects.
 - Food heating and cooking facilities must be limited to kettles, toasters and microwaves within general office accommodation.
 - Kettles, toasters and microwaves must be located on work-tops and not positioned below wall mounted cupboards.
 - All furniture, fixtures and fittings must comply with applicable local regulations e.g., in the UK 'The Furniture and Furnishings (Fire Safety) Regulations.
 - **Note:** Where dedicated catering facilities, managed by a third party, are provided then an automatic chemical suppression system must be installed above deep-fat frying equipment. For Macro facilities management sites this will be determined by the client. (Also see section 12)

24. Tower cranes

24.1 Means of escape

Where a tower crane(s) is in use the fire safety plan must include the means of escape strategy for the operator(s).

A stay-in-place policy for tower crane operators is prohibited on Mace projects. Upon a fire alarm activation all operators must make operations safe and descend the crane.

Topic specialists must be consulted where the highlighted options below cannot be implemented

There are four possible means of escape options:

1. Operator descent via the mast with fire resisting structure around the base to provide a protected means of escape route leading to an ultimate place of safety outside the structure.
2. A horizontal walkway from the crane mast to the upper level of a building leading to an internal protected means of escape.
3. Assisted rescue allowable by oversailing of one crane jib/boom over the operator cab or counterweight of another crane.
4. Self-rescue via controlled decent equipment direct to ground level.

24.2 Protection

To reduce fire risk at the base of tower cranes the following control and mitigation measures shall be followed:

- Five metres sterile zone (no storage of combustibles, flammables, plant etc.).
- 15 metres exclusion zone (no powered generators, working plant).
- Steel anti-climb fencing including 45° top-hat section (no timber), see photograph below.
- When the tower crane base is located within a project structure additional fire extinguishers shall be provided around the base.



Figure 11: Example of tower crane base setup

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