

BSJ-G-15.2 - CONSTRUCTION FIRE SAFETY STANDARDS

1) Construction Planning

All construction sites shall plan and sequence their construction activities to ensure the early installation and operation of permanent passive and active fire protection measures. These should include:

- Permanent staircases;
- Compartmentation to cores and floor levels, including fire doors and fire stopping as soon as the façade is closed in on each floor;
- Temporary (or permanent) fire doors with automatic closers installed to all apartment front door openings prior to bringing combustible materials into apartments (fire loading).
- Compartmentation to lift shafts, risers, ducts and voids;
- Temporary emergency lighting;
- Fire-fighting lifts; and
- Fire-fighting installations, including automatic sprinkler systems and dry or wet risers.

2) Hot Work Permits

Hot work should be avoided where possible, and alternative methods of work adopted. The potential to eliminate or reduce hot work should be addressed by the design team, and once again, when contractors are appointed for packages that involve hot works.

All construction sites shall implement a system of Hot Work Permits for all work activities that generate heat, sparks or flames, once fitting out work has commenced. Hot work permits shall only cover specific, identified activities and locations, and all of the control measures stated in the Permit to Work shall be implemented prior to works starting.

Permits shall be accurately completed, authorised by the correct person and signed as closed at the end of each working period. In addition, the Permit to Work shall remain at the point of work for the entire duration of the hot work activity.

A continuous fire watch shall be maintained for a period of at least 60 minutes following completion of all hot works. A further 60 minutes shall be carried out with checks being made at no longer than 20 minute intervals as a minimum. This shall be after completion of the works but prior to the permit being signed as closed. A further period of monitoring may be necessary if the Fire Risk Assessment determines complex risk. The correct type of fire extinguishers must be available at all times and the operatives conducting the work must be competent in their use.

3) Arson, Security and Approved Smoking Areas

All construction sites shall be secured against unauthorised access to prevent arson. All combustible materials and waste shall be stored a suitable distance from the site perimeter and in a secure container to prevent contact with ignition sources.

During fit-out, where the fire loading increases significantly, additional security measures shall be implemented, including security patrols, CCTV, security lighting and intruder alarms.

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All construction sites shall provide approved smoking areas, which shall be constructed from non-combustible materials, including any seating or bins that are provided for use. The smoking shelter should be situated 10 metres from any other structure, provided with suitable metal ashtrays and metal bins with fitted lids, and provided with a fire extinguisher.

The smoking shelter should be positioned away from windows, ventilation intakes or extracts, entrances and exits, hazardous materials, waste storage areas and canopies or low-slung eaves.

4) Use of Oxy-fuel Equipment

All construction sites shall avoid using oxy-fuel burning or cutting equipment, or reduce the amount to as low as possible where reasonably practicable, and quantities should not exceed more than one day supply. Oxy-acetylene shall not be permitted on any construction site, unless the contractor has confirmed in writing that there is no safer alternative. Specific control measures required for the use of oxy-acetylene are detailed below.

Oxy-fuel equipment shall be selected and used to reduce the risks of fire on site, and incorporate British Standard regulators, hoses, non-return valves and flashback arresters on both gas lines. The equipment shall be visually checked before use, the gas cylinders secured in an upright position on a purpose-built trolley with straps, the hose kept to a minimum length, and empty cylinders removed from the work area.

Gas cylinders and associated equipment shall only be used by an individual who has received adequate information and instruction on the correct use of that specific equipment. All gas cylinders and associated equipment shall only be inspected and maintained by an individual who has been formally trained in the specific equipment and has practical experience of related gas equipment.

Where acetylene is permitted to be used, the number of cylinders stored on site should be minimal, with deliveries provided on a just-in-time basis. Once a period of work activity involving acetylene is complete, the cylinders shall be returned to the designated storage area. Finally, once cylinders are no longer required, they shall be removed from site. A Hot Work Permit shall be issued for each set of oxy-acetylene equipment used.

If gas cylinders require movement to a point of work by lifting equipment, then a proprietary cage or stillage shall be used and the cylinders properly secured prior to the lift taking place.

5) Storage of Combustible and Flammable Materials

All construction sites shall limit the storage of combustible, flammable and highly flammable materials to limit fire loading as much as can be reasonably achieved.

Combustible materials, such as timber and fabric, may be stored within the building, however, these shall be located away from ignition sources.

Bulk stored materials must be stored as stated below;

- In small batches with combustible and non-combustible materials physically segregated from each other.
- WITHOUT covering the materials with LPS1207 sheeting (even over combustible materials).

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- A suitable gap of at least 3 metres must be in place between all batches of materials.
- Additional heat detection shall be installed to the soffits, linked to the main site alarm system, located above bulk storage areas.
- With Additional firefighting equipment located in and around bulk storage areas.
- Security arrangements appropriate to the site will be implemented.
- Increased recorded daily inspections of bulk storage areas during working hours.
- Out of hours inspection to be risk assessed based on project size and complexity.

Heras fencing around materials storage areas must be free of sheeting or mesh where ever possible. Where sheeting or mesh is unavoidable it should be transparent and must be LPS1207 and/or TS63 certified when used internally, or LPS1215 and/or TS62 certified when used externally, it shall also have the relevant approval mark printed on it. All materials must be located away from escape routes or emergency exits.

Flammable materials, such as paint thinners and adhesives, shall be stored externally to the building, in a securely fenced open compound, with appropriate signage and sufficient exits. If flammable materials cannot be stored externally, then sufficiently robust fire resistant stores shall be constructed inside the building to contain all of the flammable materials. The quantity of flammable material stored shall not exceed that required for a day or one working shift and the storage facility shall have ventilation openings equivalent to 2.5% of the floor and wall area.

Highly flammable materials, such as LPG, shall be stored externally to the building in an open compound, located away from direct sunlight, a sufficient distance from ignition sources, 10 metres from other structures, and with a minimum of two exits if the travel distance exceeds 12m. Oxygen cylinders shall be stored a sufficient distance away from flammable gas cylinders.

6) Protective Coverings

Protective coverings applied to installed structures or items shall be flame retardant to Loss Prevention Standard 1207 or Warringtonfire Certificate Technical Schedule (TS) 63 and shall have the relevant approval mark printed on it.

Protective sheeting or netting used externally, such as Monarflex or debris netting, shall be flame retardant to Loss Prevention Standard 1215 or Warringtonfire Certificate Schedule (TS) 62 and shall have the relevant approval mark printed on it.

7) Fixed Electrical Installations

All construction sites shall ensure that fixed electrical installations are installed to BS 7671 and tested on an annual basis. Temporary electrical installations shall be inspected on a regular basis and tested on a three monthly basis.

8) Portable Electrical Equipment

All construction sites shall ensure that portable electrical equipment is in satisfactory condition and that it carries a durable label that displays the required three monthly inspection and test date for the appliance.

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9) Means of Escape

All buildings under construction shall provide a minimum of two means of escape (stairways) to ground level from each floor level of the building, including basements and roofs, as early as possible in the build process and prior to the commencement of the main fit-out works. This may be achieved through the provision of permanent internal stairway(s) and temporary external stairway(s) that can be accessed from any part of each floor.

The permanent internal stairway(s) shall be made available as early as possible in the build process and must be fully compartmentalised against fire and smoke at the earliest practicable opportunity. At least one stairway must lead to the open air at ground level.

Where a building is designed with a single means of escape in the finished state, and it is not possible to maintain two means of escape at all times, then two means of escape must be maintained for as long as can be reasonably achieved. When only a single means of escape is available, it must comprise of a protected stair core with full compartmentation in place at every level of the building, including basement and roof, and 30 minute temporary or permanent fire-rated doors.

Temporary (or permanent) fire doors with automatic closers must be installed to all apartment front door openings prior to any combustible materials being brought into the apartments (fire loading).

Escape routes and emergency exits shall be uncomplicated, prominently signed, kept clear and properly maintained. Travel distances to a place of safety shall not exceed the following:

Hazard	Alternative means of escape (metres)		Dead-end / single means of escape (metres)	
	Semi-open	Enclosed	Semi-open	Enclosed
Lower	200	60	25	18
Normal	100	45	18	18
Higher	60	25	12	12

Lower hazard areas are those where there is very little flammable or combustible material present and the likelihood of fire is low, such as concrete frame structures in pre-fitting out stage.

Normal hazard areas are those where flammable and combustible material is present, but of such type and disposition that any fire will initially be localised.

Higher hazard areas are those where significant quantities of flammable or combustible materials are present of such a type that a fire will spread rapidly, possibly accompanied by evolution of copious amounts of smoke and or fume. Examples of higher risk areas include where floor and wall coverings are fixed with flammable adhesives, and hot works take place in significantly fitted out areas.

When only a single means of escape is available and travel distances on dead-ends exceed those identified in the table above, additional measures should be provided to protect workers and the building. These include:

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1. Additional fire call points along the dead-end that are connected to the temporary construction site fire alarm system;
2. Additional fire extinguisher stations positioned at the extremities of the dead-end areas on each floor plate;
3. Fire doors fitted to the front of the apartment and additional compartmentation doors fitted in the corridor, if included in the permanent design or if deemed necessary by the fire risk assessment.
4. Fire stopping of open risers on the routes to dead-end areas; and
5. Installation of automatic fire detection (linked to the temporary construction site fire alarm system) along dead-end routes, if deemed necessary by fire risk assessment.

10) Permanent Protected Stairways and Temporary External Escape Stairs

All construction sites shall ensure that permanent, or temporary protected, stairways are installed as soon as practicable as the structural frame progresses and the façade encloses the building.

The protection installed to stairways shall include fire doors fitted with self-closing devices, intumescent strips, cold smoke seals and infills surrounding the door frame. Fire doors shall be openable from the escape side without the use of a key.

Where it is not possible to provide sufficient internal protected stairways, external escape stairs shall be provided. The external wall against which the escape stairs are erected shall provide 30 minutes fire resistance for 9 metres below the stairs, and 1.8 metres either side and above. Any openings, such as windows or doors, within this zone shall be fire resistant or protected to provide suitable fire resistance.

Where external escape stairs are provided by a proprietary staircase system, and are clad in protective sheeting, one side of the stairway shall be left unclad, to minimise smoke logging and assist fire service rescue.

All construction sites shall ensure that at least one stairway is free from protective coverings, as these can still burn in the event of a fire.

11) Emergency Lighting and Emergency Signs

All construction sites shall install permanent or temporary emergency lighting to enable escape from the building. Where temporary lighting is used, these shall be located away from combustible materials, and be of low voltage or sealed units. Under no circumstances should unprotected halogen lights be used.

Emergency lighting shall be a minimum of 1 Lux in all emergency escape routes to ensure that people can safely evacuate the structure.

Emergency signs shall be installed to assist escape from the building, with signs large enough to be clearly seen, and located 2 metres above the floor level in order to prevent them being obstructed or obscured by smoke.

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12) Fire Alarms

The means of providing early warning on all construction sites shall be via a wireless inter-linked fire alarm system, or if this is not possible, in accordance with the table below.

Stage of construction	Type of fire alarm to be installed
Substructure	Stand-alone battery powered audible alarms
Concrete frame or masonry superstructure	Stand-alone battery powered audible alarms
Commencement of External Envelope	Progressive installation
First fix	Linked battery / mains powered audible alarm. Temporary automatic fire detection to be installed in corridors where deemed necessary by the fire risk assessment.
Second fix	Linked battery / mains powered audible alarm. Temporary automatic fire detection to be installed in corridors where deemed necessary by the fire risk assessment.
Final fix	During final fix, stand-alone battery powered audible alarms shall be used, as the linked system is removed to allow finishing. Stand-alone alarms are to be progressively removed as construction work completes, in line with the Partial Occupation Plan
Partial Occupation	The Partial Occupation Plan is to be agreed prior to first occupation

13) Fire Fighting Equipment

All construction sites shall ensure that an adequate number of portable fire extinguishers are provided on site, which are determined by a risk assessment. However, this should not be fewer than two 9L water or foam extinguishers and two 2Kg CO₂ extinguishers per floor area. Alternative extinguishers, such as dry powder, may be substituted for the above where the risk assessment determines these as the most effective extinguisher.

Where high risk activities are being carried out, the number of extinguishers shall increase to manage the risk. All fire extinguishers shall be serviced annually and records retained.

Fire Points shall be installed at each emergency exit located on each floor, and raised 500mm above ground level with a "Fire Point" sign prominently displayed above.

Where dry or wet risers have been designed as part of the permanent building, these systems shall be made operational to the floor as the fire risk changes from Lower to Normal. In the event that this is not practical, a specific risk assessment should be carried out to ensure any risks are identified. All dry and wet risers must be signposted when ready for use and valves must be secured in a closed position with chain or strap and locked with a padlock to prevent accidental or malicious operation.

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14) Compartmentation and Fire Stopping

All buildings under construction shall be vertically and horizontally fire compartmented to prevent the spread of fire through openings between floor levels. Openings that require protection include all slab penetrations, risers, lift shafts, voids and stair cores.

In all buildings over 30m, vertical fire stopping must be installed to all slab penetrations every 5 floors as soon as the façade is closed in and must be 60 minutes fire resistant. This shall consist of double plasterboard infill for large penetrations and must be sealed with intumescent mastic. Any new penetrations through the temporary fire stopping during works shall be immediately resealed with intumescent sealant / fire bat.

Lift shafts shall be protected against the spread of smoke and flame using proprietary temporary doors. Any gaps around the doors sets shall be infilled with plasterboard or fire-resistant material, and tightly sealed.

Permanent compartmentation shall be installed at the earliest opportunity, with all openings infilled with a suitable fire stopping material that provides an equivalent fire resistance. If permanent compartmentation cannot be achieved, such as the installation of finished doors, then temporary alternatives should be installed.

Once installed the integrity of permanent compartmentation shall be maintained and any work that breaches these shall be monitored and the compartment restored at the end of the work activity with a suitable fire stopping material.

If temporary compartmentation is installed, this shall provide a fire resistance of 30 minutes, and may be achieved through the use of 12.5mm plasterboard with a 5mm plaster skim to protect joints.

15) Temporary Buildings and Accommodation

Temporary buildings or temporary accommodation should be erected in locations that provide ease of evacuation, and facilitate access for the Fire Service. As a result, it is recommended that locating facilities within basements or at high-level are avoided.

All construction sites shall ensure that temporary buildings and the building under construction are separated by a minimum distance of 6 metres. If this is not possible, the temporary buildings shall be constructed with materials that do not contribute to the spread of fire and comply with BS 476 fire test requirements, achieving 30 minutes fire resistance to the walls, roof, doors and windows. Alternatively, temporary buildings should conform to Loss Prevention Standard 1195. Temporary buildings shall be provided with adequate fire and smoke detection or alarms, connected to an external sounding device and linked to a central monitoring station unless 24 hour security provision is available.

Where temporary accommodation is erected, all construction sites shall ensure that it is constructed with materials that do not contribute to the spread of fire and comply with BS 476 fire test requirements, achieving 30 minutes fire resistance to walls, ceiling, doors and windows. Temporary accommodation shall be provided with adequate fire and smoke detection or alarms, connected to an external sounding device and linked to a central monitoring station unless 24 hour security provision is available.

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Automatic fire detection systems must be installed where temporary accommodation facilities are installed for cooking or drying clothes. All temporary buildings or accommodation shall be provided with a minimum of two fire extinguishers appropriate to the fire risk.

16) Emergency Fire Plans and Drills

All construction sites must have emergency fire arrangements, which are detailed in the Construction Phase Fire Plan and include detailed information relating to means of escape, emergency escape routes and assembly points. These items should also be included on drawings for each floor level and used in the relevant fire points in addition to the Fire Action Notices.

Fire drills must be carried out on each construction site on a three monthly basis, in order to test the effectiveness of the emergency fire arrangements. The fire alarm should be initiated, all personnel evacuated to the designated assembly / muster point, and the roll call completed. Any issues observed during the fire drill by the Fire Marshals should be recorded in the Construction Phase Fire Plan and the items actioned by the Fire Safety Co-ordinator.

17) Fire Precautions for High-Rise buildings

All construction sites shall carry out a specific fire risk assessment for buildings defined as high-rise, where the Fire & Rescue Service cannot effect a rescue due to the 30 metre distance from the fire appliance being exceeded. The risk assessment shall determine the additional control measures to be implemented, and those detailed below shall be incorporated into the assessment.

Where reasonably practicable, high-rise buildings should be horizontally fire compartmented at intervals not exceeding 5 floors. This should be done at the earliest opportunity following completion of the relevant floors, using temporary fire stopping materials that achieve 60 minutes fire resistance. This should include all shafts and openings, such as risers, lift shafts and stair cores.

All shafts and openings between floors shall be closed off with doors having 30 minutes fire resistance and installed on all levels.

Fire doors with self-closers shall be fitted to protect the escape stairs and shall be in place when the structure becomes a high-rise building. At least one escape staircase shall be designated as the firefighting stair, for exclusive use of the fire service during an emergency. If a firefighting lift is included within the building, this shall be commissioned and brought into service at the earliest opportunity.

An electrically operated fire alarm system, either hard wired or wireless inter-linked, should be provided throughout the height of the building, including break glass call points and sounders on all levels, plus a link to a permanently occupied security office from where the Fire & Rescue Service can be summoned and other actions instigated. Each component or all parts of the system must have battery back-up to ensure continuity of operation in the event of a loss of power supply.

A wet riser shall be installed and commissioned to provide water in sufficient quantities and pressure on each floor.

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18) Partial Occupation

Prior to partial occupation of a building, automatic fire detection connected to the temporary construction site fire alarm system should be provided on all floors under construction, where a construction site fire could expose occupied premises.

In addition, an effective means of monitoring the automatic fire alarm system out of hours should be implemented, such as a security guard, development concierge, or via an automated alert system to a designated local emergency responder. Effective communication arrangements for alerting those monitoring the occupied floors of the building must also be in place to make them aware of a fire on the construction site.

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