



Fire safety guideline

Fire safety during construction work



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Fire Safety Branch
Community Safety Directorate

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Contents

1	Purpose	4
2	Scope	4
3	Application	4
4	Definitions	5
5	Background	6
6	Legislated requirements	7
6.1	National Construction Code	7
6.2	Work Health and Safety Regulation 2017	8
7	Fire safety	8
7.1	Roles and responsibilities of stakeholders	8
7.2	Planning fire safety into the schedule of works	9
7.3	Fire safety plan	9
8	Fire safety systems	10
8.1	Fire hydrant system	10
8.2	Fire hose reels	12
8.3	Fire extinguishers	12
8.4	Automatic fire sprinkler system	13
8.5	Smoke hazard management	13
8.6	Plans and specifications	15
9	Fire brigade intervention	15
9.1	Fire brigade vehicle access	15
9.2	Firefighter access	15
10	Temporary structures	16
10.1	Fire safety risks	16
10.2	Scaffold and falsework	17
10.3	Moveable buildings	17
10.4	Type B hoardings	18
11	Building works in existing buildings	19
11.1	Segregation of construction zone	19
11.2	Isolation of fire safety systems	20
11.3	Fire impairment notice	20
12	Workplace fire safety	21
12.1	Risk assessment and mitigation	21
12.2	Emergency response procedures	22
12.3	Emergency services information	23
13	References	24
	Appendix A – Example of fire impairment notice	25

1 Purpose

The purpose of this document is to provide fire safety and operational *fire safety systems* during construction work, which is any work carried out in connection with the construction, alteration, conversion, fitting-out, commissioning, renovation, repair, maintenance, refurbishment, demolition, decommissioning or dismantling of a structure¹.

2 Scope

This guideline details the requirements of Fire and Rescue NSW (FRNSW) for:

- a) the builder to develop and implement a fire safety plan during construction work
- b) fire safety systems to be designed and installed in conjunction with construction stages to always facilitate firefighting intervention
- c) a fire hydrant system that is suitable for operational use
- d) fire safety in existing occupied buildings undergoing construction work, and
- e) safe work practices, including emergency response procedures, to be implemented at the construction site.

When this guideline is followed the likelihood of fire and its consequences should be reduced, and firefighters should be able to undertake their duty to protect lives and property.

3 Application

This guideline applies to any new or existing class 2 to 9 building within NSW, that is undergoing building works meeting the *National Construction Code* (NCC²).

Note: Performance requirement EP1.5 of the *NCC* requires suitable means of firefighting be provided for the *fire brigade* to undertake an attack on fire.

This guideline applies to construction work involving an application for demolition, erection, rebuilding, alteration, enlargement or extension to be made under the *Environmental Planning and Assessment Regulations 2000* (EP&A Reg.).

This guideline may also apply to construction work involving exempt development or other development as determined by the relevant authority having jurisdiction.

This guideline is intended to be used by building owners and occupiers, builders, certifying and consent authorities, fire safety engineers, fire safety practitioners, who are responsible for ensuring *fire safety systems* are provided and operational during construction.

The *builder* is recognised as the person conducting a business or undertaking (PCBU) of the construction site. As such, the *builder* is ultimately responsible for developing and implementing a work health and safety plan at the workplace (i.e. the construction site).

This guideline has been developed in the public interest, and is intended to be used by certifying authorities when considering building works which involve a *relevant fire safety system* and relates to an application for CDC or CC.

¹ As defined by clause 289 of the *Work Health and Safety Regulation 2017* (WHS Reg.)

² *National Construction Code 2019, Building Code of Australia Volume One*

4 Definitions

The following definitions apply in this guideline:

builder – means the principal contractor engaged by the property owner or the owner's representative and is responsible for the construction site, including overseeing management of works done by sub-contractors.

complex development – means development involving multi-staged construction, multiple buildings with interconnected systems, a building with an effective height over 50 m, or is development of an existing occupied building having active *fire safety systems*.

effective height – means the same as in the *National Construction Code*.

emergency incident – means any abnormal and dangerous situation that has caused, or threatens to cause, harm to persons, property or the environment, and requires a response by an emergency service organisation to manage back to safe and normal condition.

emergency response procedures – means written procedures outlining the response to an *emergency incident*, such as evacuation and activation of emergency response team etc.

falsework – means the temporary construction that holds *formwork* in place.

fire appliance – means any vehicle that forms part of the equipment of a *fire brigade* and is equipped with an audible warning device and flashing lights.

fire brigade – means a statutory authority constituted under an Act of Parliament having as one of its functions, protect life and property from fire and other emergencies.

fire brigade booster – means a connecting device which enables the *fire brigade* to pump pressurised water into the fire hydrant system and/or automatic fire sprinkler system.

fire brigade station – means a state government operated premises which is a station for a *fire brigade* (i.e. an FRNSW or NSW Rural Fire Service fire brigade station).

fire hydrant valve – means a valved outlet on the fire hydrant system used for direct attachment of a firefighting hose.

fire hydrant, attack – means a *fire hydrant valve* downstream of a *fire brigade booster* and used to directly attack a fire.

fire hydrant, feed – means a *fire hydrant valve* used to supply water to a *fire appliance*.

fire impairment notice – means a notice stating an installed *fire safety system* is impaired and not fully functional to its certified design and performance, for any given reason.

fire-isolated stairway – means a stairway within a fire-resisting shaft and includes the floor and roof or top enclosing structure.

fire safety systems – means one or any combination of the methods used in a building to:

- a) warn people of an emergency
- b) provide for safe evacuation
- c) restrict the spread of fire, and
- d) extinguish a fire.

and includes both active and passive systems.

formwork – means the temporary timber frames that hold poured concrete in place until set.

hardstand – means an apron or section of carriageway specifically designated for use by a stationary *fire appliance* (e.g. for a standing *fire appliance* at the *fire brigade booster*).

hoarding – means a temporary structure that separates the construction site from the public and may also provide an overhead protective barrier to protect the public from falling objects.

hot-works – means a heat or spark producing process (e.g. grinding, welding, allied process, thermal or oxygen cutting, brazing, soldering, thermal spraying, heating etc.).

hard-suction connection outlet – means a connection outlet for large bore suction hose (150 mm) that draws water from a static water supply (e.g. tank, reservoir, dam, lake, river).

moveable building – means any transportable building or structure temporarily placed at the construction site during the period in which building works is being undertaken.

National Construction Code (NCC) – means the *National Construction Code (NCC) 2019, Building Code of Australia Volume One*, as amended.

person conducting a business or undertaking (PCBU) – means the ‘*builder*’.

relevant fire safety system – means:

- a) a hydraulic fire safety system within the meaning of *clause 165* of the *EP&A Reg.* (i.e. fire hydrant system, fire hose reel system, automatic fire sprinkler system)
- b) a fire detection and alarm system, and
- c) a mechanical ducted smoke control system.

scaffold – means the temporary structure erected to support access or working platforms.

storey – means a space within a building which is situated between one floor level and the floor level next above, or if there is no floor above, the ceiling or roof above.

town main – means a continuous pressurised supply of water to towns through a pipe network, usually below ground, providing potable or recycled water for consumers.

water supply authority – means an authority recognised under the *Water Management (General) Regulation 2011* to supply water to consumers via *town main*.

5 Background

Fire during construction can result in significant property loss and major threat to life safety. Generally, construction site activity results in a high likelihood of early intervention by workers and fires being extinguished. However, if fire develops it will present firefighters with unique risks and hazards that do not exist with a completed building, including:

- incomplete fire safety systems, not being fully operational as per final design
- incomplete compartmentation which allows greater fire spread and intensity
- incomplete egress and evacuation routes
- restricted building access from construction works or security arrangements
- restricted vehicular access due to building materials, equipment or vehicles
- abnormal fuel loads from stored building materials and products
- external fire spread from combustible facade elements and attachments (e.g. scaffold containment netting, hoarding), and
- higher life safety risks in partly occupied buildings.

The *NCC* requires certain precautions be undertaken during the construction of any class 2 to 9 building, with the requirements dependant on the size or stage of development. The scope of works is to determine the degree of *fire safety systems* necessary to each stage of construction and the risks and hazards from fire at any time.

Building works undertaken on an existing building, especially where parts of that building remain occupied, pose much greater risks to the existing building and its occupants. When existing *fire safety systems* are being impacted by any works, additional precautions need to be implemented to ensure required *fire safety systems* remain operational and effective.

As the *PCBU*, the *builder* is to provide information, instruction and training to all workers and other persons as appropriate, including procedures for responding to an *emergency incident*. Making provision for initial firefighting attack, including appropriate training, will allow workers to quickly knock down any small fire when safe to do so.

It is important that fire risks are identified and managed both before and during construction and be relative to the works being undertaken. Fire safety planning should be integrated into the building works plan. This plan should consider contingencies such as fire occurring after-hours (where workers have left, and the construction site secured) and fire spreading to or from an existing and occupied part of the building.

6 Legislated requirements

6.1 National Construction Code

Performance requirement EP1.5 of the *NCC* states:

'Suitable means of fire-fighting must be installed to the degree necessary in a building under construction to allow initial fire attack by construction workers and for the fire brigade to undertake attack on the fire appropriate to —

- a) the fire hazard; and*
- b) the height the building has reached during its construction.'*

Note: An alternative solution to performance requirement EP1.5 may be proposed for the building under construction.

Clause E1.9 of the *NCC* details the related deemed-to-satisfy (DtS) provision which satisfies performance requirement EP1.5, and states:

'In a building under construction —

- a) not less than one fire extinguisher to suit Class A, B and C fires and electrical fires must be provided at all times on each storey adjacent to each required exit or temporary stairway or exit; and*
- b) after the building has reached an effective height of 12 m —*
 - (i) the required fire hydrants and fire hose reels must be operational in at least every storey that is covered by the roof or the floor structure above, except the 2 uppermost storeys; and*
 - (ii) any required booster connections must be installed.'*

The *builder* will often interpret these provisions differently, such as when is a *storey* formally established, what fire hydrant or fire hose reel is 'required', and what level of performance is required from a hydraulic *fire safety system* to be considered 'operational'.

6.2 Work Health and Safety Regulation 2017

Part 3.1 of the *WHS Reg.* requires the *PCBU* to identify hazards and manage risks to health and safety by implementing a hierarchy of control measures at the construction site. A fire safety plan is to be developed and implemented as part of the work health and safety management plan.

Clause 39 of the *WHS Reg.* requires the *PCBU* to provide information, training and instruction to workers at the construction site on the risks identified and control measures implemented. Fire safety training is to be included in the information that is delivered.

Clause 43 of the *WHS Reg.* requires the *PCBU* to provide an emergency plan for their workplace, detailing *emergency response procedures* for all occupants (including construction workers) in case of fire or other *emergency incident*.

Note: Refer to *AS 3745–2010 Planning for emergencies in facilities* for guidance on developing emergency plans and procedures.

Part 6 of the *WHS Reg.* outlines specific work health and safety requirements applicable for all construction work.

Clause 40 of the *WHS Reg.* requires the *PCBU* to ensure, as far as reasonably practicable, that the workplace allows persons to enter, work and exit without risk to health and safety including having sufficient space, surfaces, lighting and ventilation. This includes the provision for safe evacuation in case of fire or *emergency incident*.

Section 274 of the *Work Health and Safety Act 2011* allows the minister to approve a code of practice. SafeWork NSW has published a *Construction Work Code of Practice* which has been approved under this Act.

7 Fire safety

7.1 Roles and responsibilities of stakeholders

7.1.1 The *builder* is the principal contractor engaged by the owner to undertake building works and is the *PCBU* responsible for providing a work health and safety management plan for the construction site.

Note: The work health and safety management plan is to include a fire safety plan.

7.1.2 The *PCBU* is responsible for ensuring all persons at a construction site (e.g. sub-contractors, owner/tenants, visitors etc.) are appropriately inducted, trained and supervised on workplace fire safety (see section 12).

7.1.3 Any sub-contractor, whether engaged directly by the owner or by the *builder*, is also responsible for undertaking risks assessments on the work they are engaged to undertake.

7.1.4 Sub-contractors are responsible for adhering to the work health and safety management plan of the construction site, and if any conflicts in procedures arise, bring the issue to the immediate attention of the *PCBU*.

Note: A fire safety plan may often change to align with construction stages. The *builder* and sub-contractors must regularly communicate on such changes.

- 7.1.5 The owner of an existing occupied building is responsible for assisting the [PCBU](#) to develop fire safety plans which apply to the whole building.
- 7.1.6 The owner, tenants and visitors are responsible for adhering to directions from the [PCBU](#) at the construction site, especially in the event of fire or [emergency incident](#).
- 7.1.7 The principal certifying authority is to assess whether required fire safety systems are operational as required by Clause E1.9 of the [NCC](#) when conducting any inspection of building works.
- 7.1.8 FRNSW has the duty to protect persons and property from fire, and will perform either an advisory or regulatory role to building proponents and stakeholders.

Note: In the case of fire, firefighters will take all practicable measures to extinguish fire and to protect and save both life and property.

7.2 Planning fire safety into the schedule of works

- 7.2.1 The [PCBU](#) is to undertake comprehensive risk assessment of fire safety and develop mitigation strategies into the schedule of building works, including activation of [fire safety systems](#) appropriate to each completed construction stage.

Note: Several international guidelines and codes are available and can be used to provide in-depth guidance on fire safety during construction.

- 7.2.2 A fire safety plan (see section 7.3) should be developed, approved and implemented prior to commencing building works to which it relates.
- 7.2.3 For [complex development](#), particularly an existing occupied building where functions or systems are being modified, an external consultant should be engaged to provide specialist advice and assist in the development of appropriate fire safety plans.
- 7.2.4 Clear communication and integration between stakeholders is required to effectively plan fire safety into the schedule of works.

Note: Stakeholders include the [builder](#), owner, certifier, sub-contractors, architect, fire safety engineer, other engineers, hydraulic consultant, [fire safety system](#) installer, emergency planning consultant, fire services etc.

7.3 Fire safety plan

- 7.3.1 The [PCBU](#) is to develop a fire safety plan commensurate to the complexity of the site/building work being undertaken, which is to consider the following:

- reducing possible ignition sources
- reducing potential fuel sources
- fire safety measures/systems, and
- [emergency response procedures](#).

- 7.3.2 The fire safety plan is to be reviewed regularly and in conjunction with planned construction stages (e.g. with each completed [storey](#)) and communicated to all persons at the construction site.

- 7.3.3 When building works involve an existing occupied building, the fire safety plan is to cover both occupied parts of the building and construction zones.

- 7.3.4 The fire safety plan is to identify required *fire safety systems* (e.g. fire hydrant system) and recommended measures to be implemented, such as interim measures for when an existing system is being isolated during the construction period.

Note: Refer to the *NCC* and section 8 of this guideline for *fire safety systems* both required and recommended during construction.

- 7.3.5 The fire safety plan is to identify *emergency response procedures* to be implemented for the construction site in the event of fire (see section 12.2).

Note: The *emergency response procedures* must consider any existing emergency plan in force for an existing occupied building, which may require temporary modification during the construction period.

8 Fire safety systems

8.1 Fire hydrant system

- 8.1.1 A building which has a hydraulic *fire safety system* will need to have the installation properly managed to ensure the part installed or modified is connected to a water supply and can be used in the event of fire.

- 8.1.2 When a building reaches an effective height of 12 m or more, required fire hydrants are to be operational except for those on the two uppermost *storeys*.

Note: The effective height will change with the completion of each added *storey*. Fire on the two uppermost *storeys* can be fought from the floor below.

- 8.1.3 A *storey* is recognised and counted in the rise-in-storeys to calculate effective height when the *falsework* is removed and the floor or roof above supports its own weight.

Note: A *storey* is recognised irrespective of external walls. In Figure 1 below, the effective height reaches 12 m when *falsework* on Level 3 is removed.

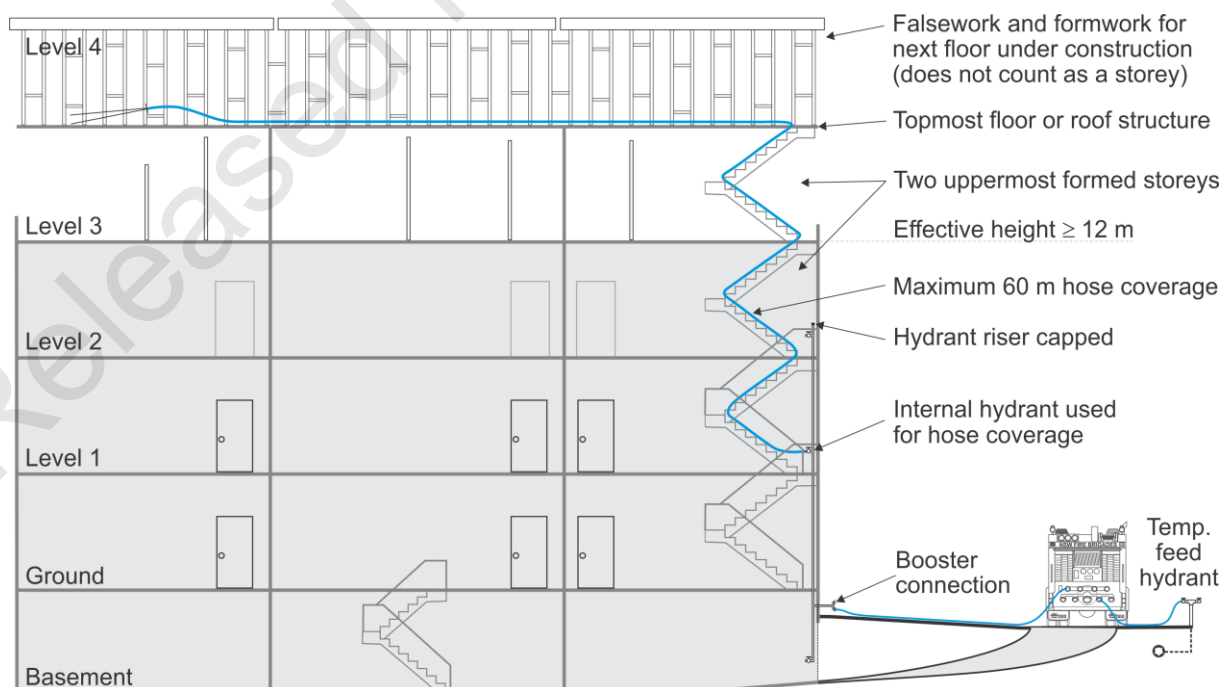


Figure 1 Example of operational fire hydrant system in building under construction

- 8.1.4 The fire hydrant system is to incorporate a *fire brigade booster* so the system can be boosted by a *fire appliance*.

Note: The *fire brigade booster* does not need to be part of a fully completed booster assembly nor be installed in the final design configuration.

- 8.1.5 The *fire brigade booster* is to be connected to hydrant riser pipework which is to be closed-pipe and ready for operational use at any time (i.e. riser pipework is capped, isolation valves kept open, pipework is pressure sealed).

- 8.1.6 A temporary fire hydrant system may be used if it is impractical to have the in-situ system operational during construction (e.g. temporary riser in centre of fire stairs).

- 8.1.7 A fire hydrant system intended to be 'wet-pipe' should be filled with water to minimise the time required to commence firefighting operations.

- 8.1.8 When isolating the fire hydrant system for building works (e.g. extension to the next *storey*), valves must be reopened as soon as works are complete.

- 8.1.9 *Attack fire hydrants* are to be fitted to the hydrant riser pipework on each required *storey* and be accessible and useable always (e.g. kept clear of obstructions).

- 8.1.10 The maximum coverage to any part of the two uppermost *storeys* and the topmost floor under construction is to be 60 m.

Note: In a building requiring multiple *fire-isolated stairways* this means having operational *attack fire hydrants* in multiple stairways.

- 8.1.11 A suitable water supply is to be provided for the fire hydrant system (e.g. *feed fire hydrants* including street hydrants or static water supply such as on-site water tank).

Note: The *feed fire hydrants* or static water supply must be connected to the primary source of water (i.e. connected to *town main*, water tank is full).

- 8.1.12 Temporary water tank/s with a *hard-suction connection outlet* may be needed if the *water supply authority* will not allow connection to the *town main* during construction.

- 8.1.13 A *hardstand* area is to be located within 4.5 m of any *hard-suction connection outlet* fitted to a static water supply and be always accessible by a *fire appliance*.

- 8.1.14 When construction involves *complex development* the functionality of the fire hydrant system is to be commensurate to the building and risks, including:

- integration with fire sprinkler system works when part of a combined system
- enhanced water supply and storage (e.g. storage tank, break tank, inflow)
- operating pump sets including relay pumps for pressure zones above 50 m
- ring main with isolating valves appropriate to building stages and zones
- interconnections and system monitoring when part of an occupied building.

Note: A consultant should be considered to provide specialist advice during the construction of *complex development*.

- 8.1.15 Any large or *complex development* which has a significant fire risk should consider making the fire hydrant system operational at the earliest opportunity.

Note: The fire hydrant system does not need to be commissioned to be operational.

- 8.1.16 All inlets, outlets and valves of the *fire brigade booster* assembly are to be clearly identified by weather resistant signage, temporary or permanent, when the fire hydrant system is operational during construction (see Figure 2).

Note: If both *feed fire hydrants* and *attack fire hydrants* are located at the *fire brigade booster* assembly they must be clearly identified to avoid confusion.



Figure 2 Lack of booster signage will cause confusion for firefighters

8.2 Fire hose reels

- 8.2.1 When a building reaches an effective height of 12 m or more, required fire hose reels are to be operational except for those on the two uppermost *storeys*.

Note: Required fire hose reels are to be operational on the same storey as the fire hydrant system (refer to section 8.1).

- 8.2.2 Required fire hose reels are to be connected to closed pipework with the hose reel service isolating valve opened so they are ready for operational use at any time.
- 8.2.3 Required fire hose reels are to be connected to a pressurised water supply capable of providing the minimum flow and pressures required by AS 2441 (i.e. pump-set).

Note: Any pump-set supplying fire hose reels is to always be operational.

- 8.2.4 The use of fire hose reels by workers on-site should be included within the *emergency response procedures* and by persons trained in their use.

Note: The primary method of initial fire attack should be to use fire extinguishers which are exhaustible and will determine 'fight or flight' decisions.

8.3 Fire extinguishers

- 8.3.1 During construction, at least one AB(E) dry-chemical powder fire extinguisher is to be provided on each *storey* adjacent to each exit, whether a required exit, temporary stairway or other exit that is used by workers (e.g. *scaffold*).

Note: The fire extinguishers are for initial fire attack by workers and are required irrespective of whether planned to be retained post building works or not.

- 8.3.2 Fire extinguishers are to be installed once the *falsework* and *formwork* is removed and prior to commencing other work on the given *storey* (see clause 8.1.3).
- 8.3.3 Each fire extinguisher should be installed in a manner which allows it to be readily visible and accessible by workers (e.g. appropriate location, signage, mounting).
- 8.3.4 Additional fire extinguishers should be provided to cover any specific fire risks and hazards on the *storey* (e.g. water, CO₂, foam fire extinguishers).
- 8.3.5 The condition and contents of each fire extinguisher should be checked at regular intervals to ensure they remain suitable for use in the event of fire.

8.4 Automatic fire sprinkler system

- 8.4.1 An automatic fire sprinkler system is intended to control the development and spread of fire; this includes within a building under construction when commensurate to the level of risk at each stage of construction.

- 8.4.2 The installation of an automatic fire sprinkler system should be managed so that a partly-installed, or modified system, can be made operational in the event of fire.

Note: If the development involves multi-staged construction or modification of an existing occupied building the automatic fire sprinkler system may need to be fully operational in completed or occupied parts of the building.

- 8.4.3 During construction, a fire sprinkler system does not need to be automatic. A partly-installed closed system with isolation valves to completed floors/areas being open can be boosted by a *fire appliance* to assist with firefighting operations.

- 8.4.4 The fire sprinkler system is to incorporate a *fire brigade booster* so that the system can be boosted by a *fire appliance*.

Note: The *fire brigade booster* does not need to be part of a completed booster assembly nor be in final design configuration.

- 8.4.5 The *fire brigade booster* is to be connected to riser pipework which is a closed pipe system ready for operational use at any time (i.e. riser pipe capped, isolation valves kept open, pipework pressure sealed).

- 8.4.6 If the automatic fire sprinkler system is combined with the fire hydrant system (i.e. common riser pipe), the state of fire sprinkler system installation must not affect the operation of the fire hydrant system as required by section 8.1 of this guideline.

8.5 Smoke hazard management

- 8.5.1 Smoke hazard management is intended to maintain safe evacuation routes so that occupants can evacuate the part of the building; this includes any building under construction and being commensurate to the level of risk.

- 8.5.2 Consideration is to be given to areas where air-handling (e.g. smoke exhaust, air pressurisation system, smoke ducts, vents) and fire detection systems (including warning sounders) are not yet installed, operational or fully functional.

Note: The lack of fire detection will allow fire to develop unchecked and compartments having limited ventilation and exhaust will quickly become smoke logged, reducing time for persons to make safe evacuation.

- 8.5.3 A temporary ventilation system such as induction/impulse fans should be considered for zone smoke control when ducted air handling systems are not operational, especially if parts of the building are complete or occupied.
- 8.5.4 If the development involves multi-staged construction or modification of an existing occupied building, existing smoke hazard management systems may need to be fully operational or supplemented in completed stages.
- 8.5.5 Safe evacuation routes are to be provided and maintained always, whether via external *scaffold* stairs, *fire-isolated stairway*, or combination of both (see Figure 3).

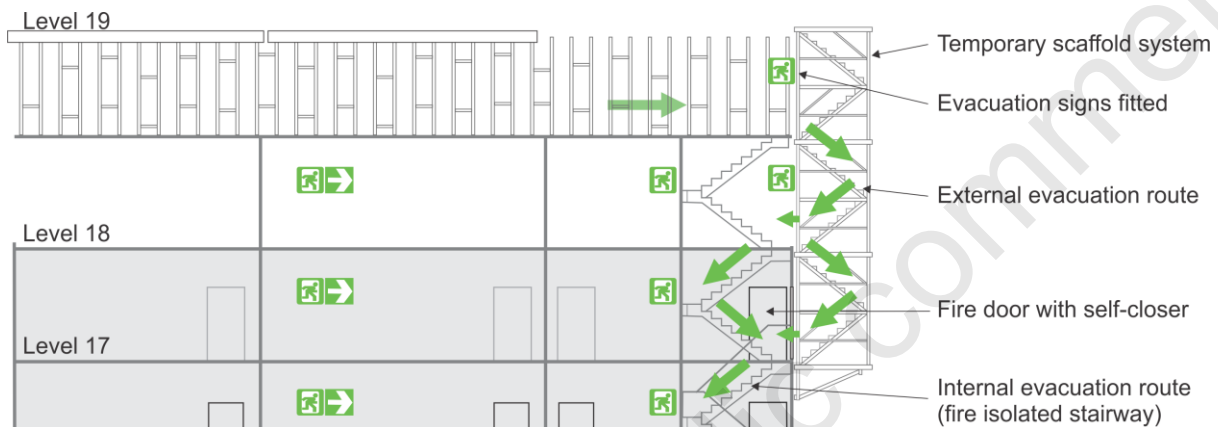


Figure 3 Example of internal/external evacuation routes

- 8.5.6 Fire and smoke doors are to be installed at the earliest opportunity to provide physical separation of compartment spaces during fire.
- Note:** Doors may be kept open to allow workers to move unimpeded, but during fire these doors must be closed to stop fire/smoke spread. This is to be included in the emergency response procedures (see section 12.2).
- 8.5.7 Door self-closing mechanisms should be fitted and made active on fire doors to any *fire-isolated stairway* or corridor that provides a safe route for evacuation.
- Note:** The *emergency response procedures* must instruct workers to close all open fire doors on a *fire-isolated stairway* so that the stairway is not compromised by fire or smoke when fire occurs.
- 8.5.8 When fire doors are installed on a *fire-isolated stairway* the actual floor level is to be permanently identified centrally on the stairway side of the door.
- Note:** Firefighters ascending the *fire-isolated stairway* need to identify which floor level they are on. Temporary markings may be used if the door is to be painted later.
- 8.5.9 A temporary fire detection and alarm system is to be considered in areas under construction, including within *moveable buildings* and under *hoardings*, such as providing interlinked detectors, manual call points and audible sounders.
- Note:** If an alarm system is not provided the *emergency response procedures* must clearly identify the method of warning all persons of fire.

8.6 Plans and specifications

- 8.6.1 *Clause 190B* of the *EP&A Reg.* requires the *PCBU* to keep the most recently endorsed copy of the plans and specifications of any *relevant fire safety system* on the construction site, and to make them available for inspection by the *fire brigade*.

Note: Clause *136AA* and *146B* of the *EP&A Reg.* requires the plans and specifications to be endorsed by a competent fire safety practitioner or certifier before related building work commences.

- 8.6.2 If an interim design of a *relevant fire safety system* is being adopted for the duration of construction, including for staged development, the plans and specifications relating to the interim design are to be provided.
- 8.6.3 The *PCBU* is to keep the plans and specifications in a temporary 'emergency information' container (see clause 12.3.4).

9 Fire brigade intervention

9.1 Fire brigade vehicle access

- 9.1.1 Fire brigade vehicle access to the construction site is to be considered and provided, including access to the *fire brigade booster* and external *attack fire hydrants*.

Note: Refer to guideline *Access for fire brigade vehicles and firefighters*, available at www.fire.nsw.gov.au, for further information.

- 9.1.2 If temporary fencing or *hoarding* is used for site perimeter security, the primary vehicle access point for the site (i.e. door/gate) is to be readily identifiable and accessible at all times, including after-hours when workers have left.
- 9.1.3 When carriageways are not yet constructed or otherwise unavailable (e.g. the space is being used as a construction work space), temporary access and *hardstand* areas may need to be provided including potential use of adjacent public roads.
- 9.1.4 Perimeter roads around buildings which provide fire brigade vehicle access to operational *fire hydrant valves* should be negotiable by a *fire appliance* even if the road is not finished (i.e. minimum clearance and have formed loadbearing surface).
- 9.1.5 Required access and *hardstand* areas are to be kept clear and accessible at all times, including not being used for private parking (by workers), delivery drop-off, building material storage, waste storage, placement of plant and equipment.

Note: Control measures such as signage, markings and bollards should be used to keep required access clear, especially to the *fire brigade booster*.

9.2 Firefighter access

- 9.2.1 Firefighter access to *fire hydrant valves* and the *fire brigade booster* are to be kept clear and accessible at all times, including not being obstructed by parked vehicles, building materials, waste, plant and equipment, vegetation etc.
- 9.2.2 If hoarding is being used for building security, building access points are to be readily identifiable and accessible, including after-hours when workers have left.
- 9.2.3 Stairs and corridors providing safe evacuation routes for persons also be kept clear and fully accessible to provide safe access for firefighters.

- 9.2.4 Exit points should be identified by signage, temporary or permanent, if accessible parts of the building provided by each doorway cannot be readily determined (e.g. multiple unmarked doorways in external wall as shown in Figure 4).



Figure 4 Doorways should identify which floors/areas they will access

10 Temporary structures

10.1 Fire safety risks

- 10.1.1 Temporary structures increase the risk of fire and fire-spread within the construction site and to surrounding or adjoining property, including existing occupied buildings.

Note: Fire spread is particularly relevant in cases where *hoarding* and *scaffold* span over public roads such as laneways (see section 10.4).

- 10.1.2 In designing and installing temporary structures, consideration is to be given to all fire risks including any adverse impact it may have on firefighting operations.
- 10.1.3 Temporary structures must not impede required egress of any existing occupied building nor obstruct firefighter access to any *fire safety system*.
- 10.1.4 Temporary structures must not impact on the operation of any required *fire safety system* of an adjacent occupied building (e.g. obstructing external sprinklers).
- 10.1.5 Temporary structures are to provide a safe means of egress, especially egress from a multi-stack *moveable building* or Type B *hoarding* (see sections 10.3 and 10.4).
- 10.1.6 Signage is to be provided when a temporary structure partly or fully blocks, hides or obscures any required *fire safety system* or building exit.
- 10.1.7 Temporary structures that incorporate containment netting (e.g. *scaffold*) have a high potential for vertical fire spread across all storeys surrounded by the netting; non-flammable netting is to be used in medium and high-rise construction.

10.2 Scaffold and falsework

- 10.2.1 Unprotected metal structures erected to support the construction of building work, such as *scaffold* and *falsework*, are not designed to withstand fire conditions thus pose significant risk to firefighters including failure and collapse.
- 10.2.2 *Scaffold* and *falsework* will comprise tubular props, *formwork* frames, framesets, bracings and wall-ties that are prone to expansion, twisting or buckling when being exposed to heat from fire, whether conductive or radiant.
- 10.2.3 The structural integrity of *falsework* is most critical when concrete has been freshly poured into the *formwork* and not set (see Figure 5).

Note: *Formwork* uses plywood panels containing resins, bond agents and coatings and readily combust to leave concrete uncontained and unsupported.



Figure 5 Damage to falsework and formwork resulting from fire

- 10.2.4 The stability of *scaffold*, in particular the wall-ties that hold the *scaffold* onto the side of the building, may be directly impacted by the heat from fire.

Note: Post-fire cooling may result in metal contraction and failure or collapse.

- 10.2.5 *Scaffold* and *falsework* restrict visibility and access making it difficult to use firefighting equipment, especially at night when there is no ambient lighting.

10.3 Moveable buildings

- 10.3.1 A *moveable building* includes any demountable, portable building, temporary site shed, container or the like which is being used to provide amenities (e.g. project office, meal room, change room), facilities (e.g. ablutions, first aid, site control) or storage (e.g. shipping container) at the construction site.
- 10.3.2 If a *moveable building* has the potential cause fire spread to an existing occupied building, to adjoining buildings and structures or to impact on any required fire exits, the building should be fitted with a temporary fire sprinkler system.
- 10.3.3 The selection, use and positioning of a *moveable building* is to consider the risks and impacts from any fire and the safety of workers and other building occupants, including any impacts to firefighting intervention (see section 9).

Note: Depending on their form, design and contents, a *moveable building* may present significant additional fire risks at the construction site.

10.4 Type B hoardings

10.4.1 Type B *hoarding*, typically a prefabricated modular steel gantry structure, is used to span a public space (e.g. footpath, road) and provides an overhead protection against any object that may fall from the construction site (see Figure 6).

10.4.2 When Type B *hoarding* is installed over a road or entrance, suitable clearance is to be provided for vehicles as required, including for fire brigade vehicles (see section 9.1).

Note: The road or site/building entrance may provide access to the construction area, basement carpark, loading dock, garbage collection area etc.

10.4.3 A *fire brigade booster* is to not be located under any Type B *hoarding* down any side or rear laneway; the *fire brigade booster* is to be located at the front of the building facing the main street.

Note: A temporary *fire brigade booster* may be required. If the *fire brigade booster* cannot be located at the front (e.g. installed in an adjacent existing building) the relevant *fire brigade* is to be consulted.

10.4.4 When Type B *hoarding* is structurally supporting *scaffold* and/or *moveable buildings*, large section structural steel members are to be used and be provided with active or passive fire protection that ensures structural adequacy is not compromised by fire.



Figure 6 Example of Type B hoarding with moveable buildings on its deck

- 10.4.5 When Type B *hoarding* is located within 3 m of an adjacent existing building and has any *moveable building* on its deck, then:
- a) an external fire sprinkler system (i.e. drenchers) is to be installed around the *moveable building* and be spaced not more than 3 m apart
 - b) an internal fire sprinkler system is to be installed within a *moveable building* when being stacked vertically with another *moveable building*
 - c) a fire sprinkler system is to be installed on the underside of the hoarding structure
 - d) the *hoarding* fire sprinkler system is to be connected to a *fire brigade booster* assembly located at the front and provided with a *town main* water supply
 - e) an isolation valve for the *hoarding* fire sprinkler system is to be located at the *fire brigade booster* assembly, and
 - f) the *hoarding* fire sprinkler system is to have appropriate signage identifying temporary *fire brigade booster* assembly and isolation valve.
- Note:** The *hoarding* fire sprinkler system design is to be commensurate to the risks of the temporary structure and fire spread risk.
- 10.4.6 Type B *hoarding* should not impact building ventilation, whether by natural or mechanical means (e.g. the *hoarding* should not block any intake or exhaust ports).
- 10.4.7 Type B *hoarding* should not impact building openings (e.g. windows) including fire-spread from any breached opening to involve the *hoarding* structure and/or material and equipment stored on the *hoarding* deck.
- 10.4.8 Type B *hoarding* should not impact firefighter access to the building and fire safety systems, including obstructing the deployment of ladders, positioning an aerial appliance, positioning a *fire appliance* to connect to a *fire brigade booster* or *hard suction connection outlet*.

11 Building works in existing buildings

11.1 Segregation of construction zone

- 11.1.1 The fire safety plan is to clearly identify the segregation of occupied parts of the building and the construction zone, including means of separating existing *fire safety systems* and spaces (e.g. temporary compartmentation).
- 11.1.2 Access controls are to be implemented at the construction zone boundary to prohibit access by unauthorised persons including building occupants.
- 11.1.3 Suitable measures are to be provided to ensure the protection of building occupants prior to any building works commencing, especially any temporary redirection of safe evacuation routes for the occupants.

Note: Any existing emergency plan for the occupied building may need to be modified during or after building works.

- 11.1.4 If a temporary entrance is provided for the construction zone, means of notifying firefighters of alternate entrances must be provided (e.g. notice at fire control centre, external signage, temporary site plan within 'emergency information' container).

11.2 Isolation of fire safety systems

- 11.2.1 For existing buildings with operable *fire safety systems*, prior to building works commencing an assessment is to be undertaken to establish the required degree of functionality of the system during the works period, where the system may be either:
- isolated wholly during works
 - isolated in-part during works
 - not isolated at all, or
 - decommissioned and removed or replaced.
- 11.2.2 When existing buildings remain occupied during construction works, the fire safety measures applicable to the occupied parts of the building must have performance not less than that identified by the fire safety schedule.
- 11.2.3 If functionality of a given existing *fire safety system* is being reduced or modified during works, interim measures should be implemented to supplement the system and ensure performance requirements will not be compromised.
- 11.2.4 When an existing *fire safety system* is being isolated during building works, either in part or wholly, a *fire impairment notice* is to be completed (see section 11.3).
- 11.2.5 The fire safety plan is to clearly identify when existing *fire safety systems* are being isolated and any interim measures that are being implemented during the period of building works (e.g. alternative access, temporary systems).
- 11.2.6 When a hydraulic *fire safety system* is decommissioned for removal (e.g. demolition works), a *fire impairment notice* is to clearly state the system is decommissioned and alternative firefighting strategies are required.
- Note:** If the *fire brigade booster* temporarily remains in-situ after decommissioning, appropriate signage is to be provided (e.g. 'Do not use fire hydrant system').

11.3 Fire impairment notice

- 11.3.1 A *fire impairment notice* is to inform firefighters when any required *fire safety system* installed in an existing occupied building will be impaired and not be fully functional.
- 11.3.2 The *fire impairment notice* should be used when any of the following apply:
- the impairment period will exceed eight hours duration or extend overnight
 - the impairment impacts more than one floor or 20% of the building, or
 - the impairment involves the isolation or loss of the primary water supply of any hydraulic fire safety system.
- 11.3.3 The *fire impairment notice* is to identify the following:
- a) the premises and affected building or parts that the impairment notice relates to
 - b) the two (2) *fire brigade stations* nearest the premises (refer to '*Find a fire station*' on FRNSW website at www.fire.nsw.gov.au)
 - c) *fire safety systems* that are being impaired, and the degree of impairment to each system (e.g. reduced functionality, isolated sections or zones)
 - d) controls or precautions being implemented during the impairment period, and
 - e) contact details of the responsible person (e.g. *PCBU*, impairment supervisor).

- 11.3.4 The *fire impairment notice* should be used whether works are planned or unplanned, irrespective of reason for works (e.g. fault, failure, accidental damage, extension or modification) and for any time period applicable (i.e. short or long term).
- 11.3.5 A copy of the *fire impairment notice* is to be sent to and kept in locations suitable for firefighters in the event of fire (e.g. fire brigade panel, fire control centre, within 'emergency information' container).
- 11.3.6 If the fire safety system has been fully restored prior to the expiration of the *fire impairment notice*, advise the relevant *fire brigade* in writing (e.g. on form) to cancel the notification.
- 11.3.7 If works on the *fire safety system* will continue beyond the *fire impairment notice* expiration, submit a new notification indicating the new finish date/time of the works.
- 11.3.8 A *Notification of fire system impairment* form is available at www.fire.nsw.gov.au (refer to Appendix A for an example of this form). The building owner, insurer or underwriter may require a specific form be used, which can be provided if it contains the information detailed by this section.

Note: An insurance company or underwriting entity may require notification of an impaired fire system and precautions be implemented as a condition of maintaining insurance or protection during the building works.

12 Workplace fire safety

12.1 Risk assessment and mitigation

- 12.1.1 The *PCBU* is to implement a hierarchy of control measures for the construction site including providing fire safety information, training and instruction appropriate to the fire safety plan that is developed.
- 12.1.2 The *PCBU* is to implement site management procedures for general safety including induction, equipment use, equipment checks, safety inspections, clean site (i.e. rubbish removal), material storage, communications/reporting, drills etc.
- 12.1.3 The *PCBU* is to ensure all '*hot-works*' is undertaken in accordance with Australian Standard AS 1674.1–1997 (R2016).
- 12.1.4 The *PCBU* is to implement procedures to control potential ignition sources, such as:
- **naked flames** – ensure clear space around gas burners/heaters or open-flame equipment, ensure no incineration occurs on-site
 - **hot-works** – ensure permit and safe working practice when undertaking *hot-works*, locate fire extinguishers near the works
 - **smokers' materials** – prohibit smoking via display of 'no smoking' signage, allocate a designated smoking area away from site or combustible materials
 - **plant and equipment** – refuel in a safe area, ensure hot exhaust clearance, use in ventilated areas only
 - **electrical** – use safe electrical equipment (i.e. tagged), do not overload power-boards or circuits, do not bunch cables
 - **other heat sources** – keep lamps, heaters and dryers clear from combustible materials, deter arson by securing the site, and
 - **external threats** – minimise exposure to adjacent potential fire sources (e.g. building, grass) by reducing on-site materials storage and/or install hoardings or non-combustible (metal) sheeting as a barrier.

12.1.5 The *PCBU* is to implement procedures to control fuel sources, such as:

- **open structure** – minimise exposure of combustible materials in an open building structure (e.g. lack of fire compartmentation)
- **hoarding and formwork** – consider fire spread, provide fire barriers or other forms of protection
- **stored products** – minimise volume and separate piles, consider collapse hazard risks during a fire through appropriate methods of storage
- **scaffold netting** – use fire-resistant sheeting or low-flammability netting, do not use domestic shade-cloth
- **waste and rubbish** – remove waste daily and do not allow to pile; dispose of packaging and protective coverings immediately, especially foam and plastic
- **flammable liquid or gas** – quarantine in a safe and well-ventilated area and keep clear from heat and ignition sources, do not allow smoking/naked flames near flammables
- **finishes, fixtures and furnishings** – store and install in safe manner, keep clear from potential ignition sources, dispose of packaging material, and
- **fall arrest bags** – use fire resistant air cushions/bags (i.e. no polystyrene).

12.1.6 The *PCBU* is to implement appropriate security arrangements (e.g. fencing with locked gate). Alarm system, video surveillance, 24/7 security should also be considered to restrict unauthorised access and deter arson, particularly after-hours when workers have left the site.

Note: The security should not prohibit firefighter access (e.g. use non-hardened metal chain and lock which can be forced open using bolt-cutters if needed).

12.1.7 The *PCBU* should nominate a person responsible for overseeing the implementation of the fire safety plan, including checking fire extinguishers, ensuring clear access to *fire safety systems*, and keeping evacuation routes clear and free of obstructions.

12.2 Emergency response procedures

12.2.1 The fire safety plan is to identify the *emergency response procedures* for the workplace (i.e. construction site) in the event of fire, which includes:

- a) activation of emergency warning sounders to alert persons on-site (e.g. air-horn)
- b) first attack firefighting by persons (e.g. use of fire extinguishers, hose reels)
- c) specific instructions relating to high-risk construction or combustible materials
- d) an evacuation plan which identifies safe egress routes and assembly area/s
- e) assisting isolated persons (e.g. crane driver, harnessed operator at height), and
- f) alerting and evacuating adjacent occupied buildings, including within the same building, any *moveable building* or from the deck of any Type B *hoarding*.

12.2.2 The *PCBU* is to ensure all persons receive appropriate training on the *emergency response procedures* including activating emergency warning sounders, safe evacuation, use of firefighting equipment.

Note: First attack firefighting training must include basic fire awareness education such as identifying when to cease firefighting and evacuate.

12.3 Emergency services information

12.3.1 The *PCBU* is to provide information specifically relevant to emergency services in the event of a fire or other *emergency incident* during the construction period.

Note: Refer to guideline *Emergency services information package and tactical fire plans*, available at www.fire.nsw.gov.au, for further information.

12.3.2 Emergency services information is to include:

- a general layout drawing of the current as-built building and/or construction site, which clearly identifies occupied areas and construction zones
- the most recent endorsed copy of plans and specifications of any *relevant fire safety system* (see section 8.6).
- the current evacuation plan applicable to the construction site
- the emergency plan applicable to an existing occupied building
- any *fire impairment notice* applicable to any existing *fire safety system* serving an existing occupied building, and
- any hazardous chemicals manifest or safety data sheets applicable.

12.3.3 The *relevant fire safety system* plans are to identify the state of installation and whether fully operational or part-operable, including identifying the actual locations of installed *fire hydrant valves*, fire hose reels, *fire brigade boosters*, isolation valves, fire pumps and water supplies, and whether being permanent or temporary.

Note: When fire occurs, firefighters require plans that show the actual stage of construction and current state of fire safety system installation.

12.3.4 A copy of the emergency services information is to be kept within a weather proof 'emergency information' container prominently located at the designated site or building entry point and/or adjacent to the *fire brigade booster*.

Note: The 'emergency information' container does not need to be permanently installed if it's not required after the completion of building works.

12.3.5 The 'emergency information' container is to be secured with a 003 lock to prevent unauthorised access (i.e. the container is a locked box).

12.3.6 The 'emergency information' container is to be coloured red with white 'Emergency Information' lettering, minimum 40mm height, on the front (see Figure 7).



Figure 7 Emergency information container

13 References

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Standards Association of Australia, *AS 3745-2010 Planning for emergencies in facilities*, Standards Australia, 2010, Sydney NSW, Australia.

United Kingdom Health and Safety Executive, *HSG168 – Fire safety in construction*, HSE Books, 2010, Suffolk, United Kingdom.

Appendix A – Example of fire impairment notice



This form is to be used by the person conducting a business or undertaking within an existing occupied building where a required fire safety system will be temporarily impaired and not fully functional, whether for planned works, maintenance or rectification of any fault or failure of the system.

1 Premises

Building name	Premises name (if applicable)
Street address	Street address
Suburb	Premises suburb
Post code	Post code

2 Impairment details

Date start	Select date	Time start	Time (if applicable)
Date finish	Select date	Time finish	Time (if applicable)
Fire system	Select		
Reason	Select		
Areas affected	Provide details such as building part of, areas, zones, floors that are affected		
Degree of impact	Select		

3 Precautions taken

Indicate what precautions are being taken during the period of fire system impairment:

☐ Local fire stations notified (see overleaf)	☐ No hazardous processes (e.g. smoking)
☐ Building management notified (see emergency plan)	☐ Fire watch duty provided (not patrols)
☐ Supplementary fire protection equipment	☐ Unserviceable tags fitted (to system)
☐ No cutting, welding or hot works permitted	☐ Fire protection restored each night
☐ Other: Provide details of any other special precautions that are taken	

4 Contact person

Name of company	Company name
Contact name	Contact name
Position	Position title
Phone number	Phone number
Email address	Email address

5 System restoration

This notification expires on the finish date/time identified in Section 2, unless indicated otherwise below:

Date restored	Select date	Time finish	Time (if applicable)
Validated by	Name of validator		
Position	Position title		

Fire and Rescue NSW

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