

# NCC Clause E1D16 Precautions During Building Construction Work

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## 1. Foreword

NCC Performance Requirement E1P5 recognises the significant risk to public safety, health, and amenities in relation to an ‘under-construction’ building fire.

E1P5 requires a suitable means of fire-fighting infrastructure to be installed ‘to the degree necessary’ to facilitate initial fire attack by construction workers and for the fire brigade to undertake fire-fighting activities appropriate to-

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

NCC Clause E1D16 ‘Fire precautions during construction’ states, in part,

(b) after the building has reached an effective height of 12m -

- (i) The required fire hydrants and hose reels must be operational in at least every storey that is covered by the roof or the floor structure above, except the two uppermost storeys, and
- (ii) Any required booster connection must be installed.

A storey is recognised and counted in the rise-in-storeys to calculate effective height when the placement of concrete for a floor slab has been completed (save for infilling of openings or block-outs – for example, tower crane masts and the like).

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

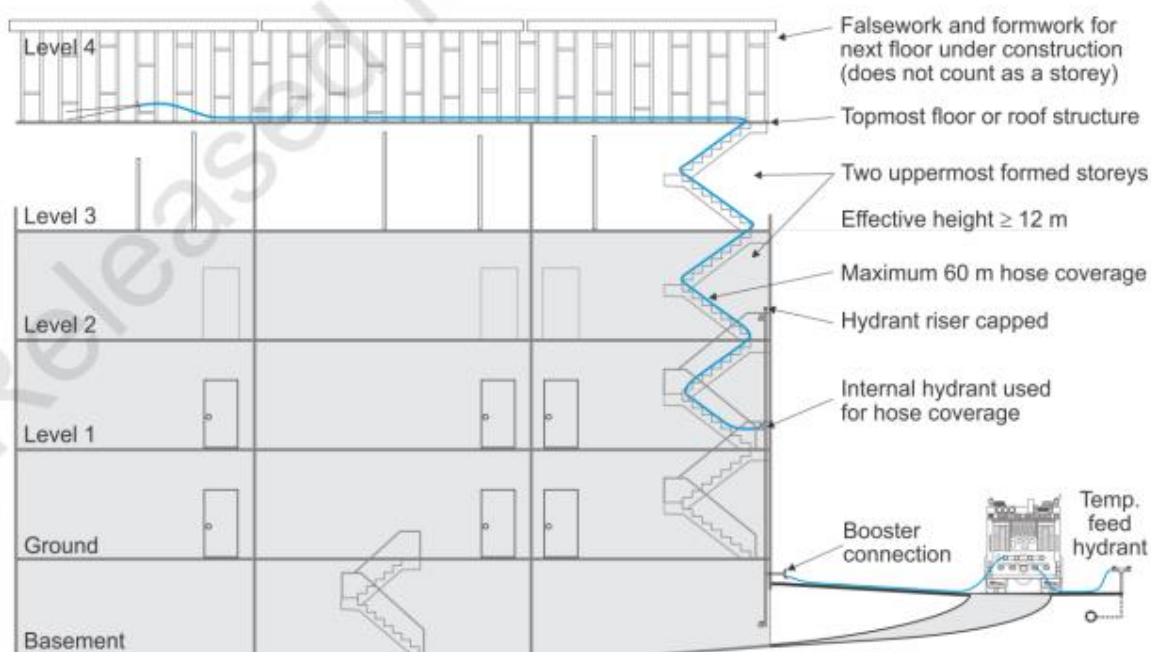


Figure 1 Example of operational fire hydrant system in building under construction

(Diagram courtesy of NSWFR document “Fire safety during construction work” guideline)

It is recognised that a floor level, a large floor plate or towers of a combined building may be under construction in differing stage and the requirements of this document may not be fully satisfied at all times.

## 2. Scope

- This is the Queensland Fire and Rescue (QFR) position on the definition of 'operational' in relation to NCC Clause E1D16. with regards to fire hydrants. In this document, any reference to the word 'temporary' or 'under construction' relates to the period of time a building is under construction before a Certificate of Classification is issued (or it is legally occupied). It infers full functionality and specified performance of the component(s) referenced.
- A building that is exempt from the provisions of NCC Volume 1, Clause E1D2 is also exempt from the requirements of NCC Clause E1D16.
- Farm buildings required to have a hydrant system are to comply with this document.
- Unless otherwise stated, Australian Standard (AS) 2419.1 is the referenced document of which certain concessions are listed throughout this document.
- The design of the "under construction" hydrant system may form part of the Building Certifier's Development Approval process.

## 3. Design

- The 'under construction' hydrant design may differ from the approved design.
- The minimum performance required for feed hydrants is 10L/s @ 200 kPa. The minimum performance required for attack hydrants is 10L/s @ 350kPa (including at the most disadvantaged point - provided there are no more than 2 construction floors above the most disadvantaged hydrant). Any reference to 10L/s @350kPa (unassisted) may also be interpreted as 10L/s @ 700kPa (boosted) or 5L/s @ 700kPa if a pump set is incorporated in the hydrant system.
- When using EXTERNAL attack hydrants, all portions of the building shall be within reach of a 10m hose stream, issuing from a nozzle at the end of a 60m length of hose laid on the ground, except the two uppermost floors.
- When using INTERNAL attack hydrants, all portions of each floor of the building shall be within reach of a 10m hose stream, issuing from a nozzle at the end of a 30m length of hose laid on the ground, except the two uppermost floors.
- The maximum coverage to any part of the two uppermost storeys and the topmost floor under construction is 60m.
- The number of "under construction" hydrants, risers and booster points are to mirror the approved design, in as much ensuring hose coverage as per AS 2419.1, except the two uppermost floors.
- All hydrant system components must be securely installed to be able to withstand the forces applied them whilst being used for their function.

## 4. Location of Hydrants

Typically, in accordance with AS 2419.1 Section 3. May be a temporary arrangement.

- Temporary hydrants, riser pipes and booster locations are to be easily accessed and clearly identified in line with existing provisions as per AS 2419.1.

- Where installed in a system fitted with a fire brigade booster assembly but having feed fire hydrant performance only, external attack hydrants must be located within 20m of a fire brigade pumping appliance located on a hardstand.
- External feed/attack hydrants must be no closer than 10m from the building being protected by an FRL wall as per AS 2419.1.
- It is preferred that internal attack hydrants are located in stairwells.
- Once the building reaches 12m in effective height, any below ground floors must also be fitted with fire hydrants in line with this document.

## 5. Fire Brigade Booster Assembly Point

May be a temporary arrangement during construction.

- When the minimum requirement of 10L/s @ 350kPa (unassisted) at the most disadvantaged hydrant cannot be achieved, a fire brigade booster assembly must be installed. The temporary feed hydrant may be a street hydrant if it is within 20m of hardstand - however it is preferable that the feed hydrant is located within 5m of the boost point.
- During the construction period, one hydrant booster inlet (temporary) is allowable. If located within 10m of the building it is protecting, passive protection in accordance with AS 2419.1 is to be provided.
- The hydrant booster assembly is to be located as per AS 2419.1. If located within 10m of the building it is protecting, passive protection in accordance with AS 2419.1 is to be provided.
- The height of feed outlets and Booster inlet/s is to comply with AS 2419.1. Water authority valving and non-return valves to meet requirements of the water authority.
- Boosters in parallel with fixed on-site pumps shall be installed as per AS 2419.1.
- Boosters in series (relay) with fixed on-site pumps shall be installed as per AS 2419.1.
- Fire Brigade relay pumps shall be installed in buildings having an effective height greater than 50m, installed as per AS 2419.1 and shall operate manually with clear operating instructions to the Fire Service.
- Manual operating switches are to be located at the relay pump and Fire Control Room.
- A Fire Brigade Booster Assembly enclosure (if installed) may be of a temporary nature, must be safe to use and shall be installed generally as per AS 2419.1.
- A Fire Brigade Booster Assembly Cabinet or enclosure doors (if installed) may be of a temporary nature and shall be generally installed as per AS 2419.1 with 003 type locks fitted.
- Signage -
  - All inlets, outlets and valves of the fire brigade booster assembly are to be clearly identified by weather-resistant signage (temporary – laminated paper is acceptable - or permanent).
  - A fade resistant temporary sign indicating Boost and Test Pressure must be installed as per AS 2419.1. This sign may require updating as more stories are constructed.
  - Location identification - Doors on fire brigade booster assembly cabinets, recesses, and enclosures (if installed), shall be clearly identified with fade-resistant signs as per AS 2419.1 indicating the buildings it serves. The signs may be temporary in nature.
  - Signage materials may be of a temporary nature for the construction period - however they must always be legible and mechanically fastened.

## 6. Block Plan

May be a temporary arrangement during construction.

- A block plan, A3 minimum size, shall be mechanically fixed within the booster cabinet, enclosure, recess, fire control room and pump room (as necessary) where it can be readily seen.
- The block plan shall be water and fade-resistant temporary laminated paper (acceptable) (and clearly display the requirements of a block plan as stated in AS 2419.1. All lettering to be 3mm minimum. Additional references may be required to direct fire crews via access routes to gain access to all areas covered by the hydrant system should a fire occur while the building is unoccupied. The Block Plan is to be reviewed as each additional floor is added and updated as necessary to reflect the changing layout of the hydrant system.
- Hose Reels may be shown on the same 'temporary' Block Plan.
- A dry pipe hydrant system is only permitted if it is an approved permitted concession under NCC for that building. Additional signage must be installed at each boost point and hydrant outlet. Such signage must be approved by the local fire service/referral agency.
- Where a wet hydrant system is required to be installed as per the NCC, a 'temporary' dry system is not recognised to satisfy E1D16.

## 7. Water Supplies

May be a temporary arrangement during construction.

- Use acceptable sources of supply as per AS 2419.1.
- Minimum 2-hour supply at 10L/s @ 350kPa = 72,000 litres.

## 8. Water Storage

Required when the minimum requirement of a total of 10L/s cannot be achieved using the water authority street main. May be a temporary arrangement during construction.

- Except for any concessions below, water storage is to be in accordance with AS 2419.1.
- Onsite water tanks may be of a temporary nature and may be sited in temporary locations, being moved to suit the construction phases.
- Water Supplies to storage tanks to comply with AS 2419.1. Where the effective tank storage capacity has allowed for automatic inflow to reduce the size of the tank below 72,000 litres, provision shall be made to measure and confirm the rate of inflow.
- Effective capacity of storage tanks to comply with AS 2419.1, except a minimum 2 - hour supply at 10L/s @ 350kPa = 72,000 litres is required.
- Storage tank connections, valves, and signs to comply with AS 2419.1.
- Large and Small-bore suction connections points shall be within 4.5m of hardstand.
- Maximum suction pipe length to be less than 15m, including a maximum suction lift to the suction point of less than 4m as per QFR Guideline, unless the tank is above the horizontal height of the suction point. In all cases, specified performance must be met.

## 9. Pump Sets

May be a temporary arrangement during construction.

- On-site pump set/s provided to achieve pressure and flow requirements of 10L/sec at 350kPa or 5L/s @ 700kPa at the most hydraulically disadvantaged point may be in temporary locations during the construction phase. Location/s to be indicated on the Block Plan.
- The static pressure at any fire hydrant outlet at no flow, with the pump running, shall not exceed 1300kPa, unless agreed by the relevant fire brigade.
- The maximum discharge pressure at any hydrant outlet under design flow conditions shall not exceed 1200kPa, unless agreed by the relevant fire brigade.
- A compression ignition engine pump set must be provided with a minimum 2-hour fuel supply.
- On-site pump set/s provided to achieve the hydrant flow and pressure requirements of this document may comprise of a total of one compression ignition engine or electric pump only.
- The pump room is to be sufficiently ventilated, signed, accessible at all times and secured with a 003 lock. Unless protected in accordance with AS 24190.1, the pump room must not be located within 6m of the building it protects.

## 10. Pipework and Valves

- Above ground pipes to comply with AS 2419.1 Section 9.2.1.
- Below ground pipes are to comply with AS 2419.1 Section 9.2.2.
- Metal pipe joints are to comply with AS 2419.1 Section 9.2.3.
- Temporary fire mains sizes may be reduced provided the required performance can be achieved.
- External pipework should be below ground or protected to prevent freezing.
- Ring main design criteria shall be incorporated into the installation as per AS 2419.1 Section 8.6.
- Isolating valves to be in accordance with AS 2419.1 Section 8.7.
- Above ground isolating valves to be locked and labelled as per AS 2419.1 Section 9.3.2.1.
- Fire hydrant valves shall be in accordance with AS 2419.1 Section 9.3.1.
- Hydrant system protection and identification: Protection of pipework shall meet the provisions of AS 2419.1 Section 3.5.5.
- Support of fire hydrant pipework shall meet the provisions of AS 2419.1 Section 10.
- Thrust blocks and anchors shall meet the requirements of AS 2419.1.

## 11. Ancillary Equipment

- Pressure gauges are to be in accordance with AS 2419.1 Section 11. A test gauge shall always be located at the most hydraulically disadvantaged hydrant to indicate available pressure.
- Backflow prevention is to be in accordance with AS 2419.1 Section 9.

## 12. Commissioning

- Once the building reaches an effective height of 12m, commissioning is to take place on initial installation and at every subsequent rise in storey as that storey is completed. A hydrant system will be deemed unsuitable if current commissioning documents cannot be produced. Commissioning can be recorded on a Form 71. Any changes to boost pressures to be reflected in signage as per AS 2419.1, Section 11.
- Performance of the fire hydrant system is to achieve a minimum of either 10L/s @ 350kPa (no building pump) or 5L/s @ 700kPa (incorporating a building pump). Where a system fails to comply with the performance requirements, any faults shall be investigated, rectified and the system retested.
- Hydrostatic tests shall be conducted upon initial installation, at every subsequent rise in storey as that storey is completed or following any alteration or extension to the hydrant system.
- Systems that incorporate a booster shall be in accordance with AS 2419.1 Section 11.
- The pressure and flow rate at each hydrant outlet shall be recorded for each pump or pump group operating.
- Where a tank is incorporated within a system and it has connections for a fire brigade pumping appliance, then a pumping appliance shall be connected to the tank and the system boosted to achieve the required flow rate and outlet pressure at the required number of the most hydraulically disadvantaged hydrants. The pressure and flow rate at each hydrant outlet shall be recorded.
- Fire Hydrant installation water supply flow chart found in AS 2419.1 may be used for reference to meeting the requirements of this document.