NZS 4510:2008

FIRE HYDRANT SYSTEMS FOR BUILDINGS

30 January 2009

Instructions for Amendment No.1

This amendment consists of 6 replacement pages. All pages are identified by a number at the bottom of the page.

Each alteration or addition to the text is identified by a marginal bar indicating the Amendment number and date of publication.

Holders of NZS 4510:2008 are advised to insert the new pages into their copy of the Standard and to discard the replaced pages. That this has been done should then be noted under 'AMENDMENTS' on the inside front cover of the document.

The following is a list of the replacement pages included with this Amendment. We recommend you keep this list as a reference against which a future check can be made that your copy of NZS 4510:2008 has been updated correctly.

Pages 5 & 6
7 & 8
9 & 10
33 & 34
35 & 36
37 & 38

Single User PDF Terms & Conditions

You have material which is subject to strict conditions of use. Copyright in this material is owned by the New Zealand Standards Executive. Please read these terms and conditions carefully, as in addition to the usual range of civil remedies available to Standards New Zealand on behalf of the New Zealand Standards Executive for infringement of copyright, under New Zealand law every person who infringes copyright may be liable to a fine of up to $10,000 for every infringing copy or imprisonment of up to 5 years, or a fine of up to $150,000 or imprisonment not exceeding 5 years.

You have access to a single-user licence to read this non-revisable Adobe Acrobat PDF file and print out and retain ONE printed copy only.

We retain title and ownership of the copyright in this PDF file and the corresponding permitted printed copy at all times.

Under this license use of both the PDF file and the single permitted printed copy of this PDF file you may make are restricted to you. Under no circumstances are you permitted to save, sell, transfer, or copy this PDF file, the one permitted printed copy of this PDF file, or any part of either of them.

You undertake that you will not modify, adapt, translate, reverse engineer, decompile, disassemble or create derivative works based on any of the downloaded PDF file, nor will you merge it with any other software or document, even for internal use within your organization.

Under no circumstances may this PDF file be placed on a network of any sort without our express permission.

You are solely responsible for the selection of this PDF file and any advice or recommendation given by us about any aspect of this PDF file is intended for guidance only and is followed or acted upon entirely at your own risk.

We are not aware of any inherent risk of viruses in this PDF file at the time that it is accessed. We have exercised due diligence to ensure, so far as practicable, that this file does not contain such viruses.

No warranty of any form is given by us or by any party associated with us with regard to this PDF file, and you accept and acknowledge that we will not be liable in any way to you or any to other person in respect of any loss or damage however caused which may be suffered or incurred or which may arise directly or indirectly through any use of this PDF file.

Regardless of where you were when you received this PDF file you accept and acknowledge that to the fullest extent possible you submit to New Zealand law with regard to this licence and to your use of this PDF file.

Table

Figure

VALUE STATEMENT

NZS 4510 will continue to prevent loss of life and provide protection of property for all New Zealanders and enhanced safety for firefighters by ensuring the facilities to apply water for firefighting are available in large buildings.

REFERENCED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARDS AND SPECIFICATIONS

NZS 1170:- - - -	Structural design actions
Part 5:2004	Earthquake actions – New Zealand
NZS/BS 1387:1985	Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads
NZS 3404:- - - -	Steel structures Standard
Part 1:1997	Steel structures Standard
Part 2:1997	Commentary to the steel structures Standard
NZS 3501:1976	Specification for copper tubes for water, gas, and sanitation
NZS 3603:1993	Timber structures Standard
NZS 4219:1983	Specification for seismic resistance of engineering systems in buildings
NZS 4510:1998	Fire hydrant systems for buildings
NZS 4510:1978	Riser mains for fire service use
NZS 4515:2003	Fire sprinkler systems for residential occupancies
NZS 4541:2007	Automatic fire sprinkler systems
NZS 4711:1984	Qualification tests for metal-arc welders
NZS 5807:1980	Code of practice for industrial identification by colour, wording or other coding
SNZ PAS 4505:2007	Firefighting waterway equipment
SNZ PAS 4509:2008	New Zealand Fire Service firefighting water supplies code of practice

JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

AS/NZS 1221:1997	Fire hose reels
AS/NZS 2980:2007	Qualification of welders for fusion welding of steels
AS/NZS 3013:2005	Electrical installations – Classification of the fire and mechanical performance of wiring system elements
AS/NZS 4130:2003	Polyethylene (PE) pipes for pressure applications
AS/NZS ISO/IEC 17020:2000	General criteria for the operation of various types of bodies performing inspection

INTERNATIONAL STANDARD

IEC 60947:- - - -	Low voltage switchgear and control gear
Part 4:1990	Contactors and motor-starters

Amd No. 1 Jan. '09

Amd No. 1 Jan. '09

AUSTRALIAN STANDARDS

AS 1074:1989	Steel tubes and tubulars for ordinary service
AS 1432:2004	Copper tubes for plumbing, gasfitting and drainage applications
AS 1572:1998	Copper and copper alloys – Seamless tubes for engineering purposes
AS 2149:2003	Starter batteries – Lead-acid
AS 4041:2006	Pressure piping
AS 4809:2003	Copper pipe and fittings – Installation and commissioning
AS 60529:2004	Degrees of protection provided by enclosures (IP Code)
SA HB 20:1996	Graphical symbols for fire protection drawings

AMERICAN STANDARD

ASTM A106/A106M 2008	Standard specification for seamless carbon steel pipe for high-temperature service
ASTM A312/A312M 2008	Standard specification for seamless, welded, and heavily cold worked austenitic stainless steel pipes
ASTM A380 2006	Standard practice for cleaning, descaling, and passivation of stainless steel parts, equipmment, and systems

BRITISH STANDARDS

BS EN 837-1:1998	Pressure gauges. Bourdon tube pressure gauge dimensions, metrology requirements and testing
BS 2971:1991	Specification for class II arc welding of carbon steel pipework for carrying fluids
BS ISO 3046:- - - - Part 1:2002	Reciprocating internal combustion engines. Performance. Declarations of power, fuel and lubricating oil consumptions, and test methods. Additional requirements for engines for general use
BS 4677:1984	Specification for arc welding of austenitic stainless steel pipework for carrying fluids
BS 5252:1976	Framework for colour co-ordination for building purposes

GERMAN STANDARD

DIN 16005:1995	General purpose pressure gauges with elastic pressure response elements; requirements and testing

OTHER PUBLICATIONS

API Spec 5L:2004	Specification for line pipe
New Zealand Fire Service, Region 1	Interim Code of Practice for Charged Riser Compliance 1990
New Zealand Fire Service	A guide to fire service operations in buildings (draft). Christchurch: NZFS, 2007
Department of Building and Housing	New Zealand Building Code Compliance documents of the New Zealand Building Code

Amd No. 1 Jan. '09

Amd No. 1 Jan. '09

NEW ZEALAND LEGISLATION

Building Act 2004
Building (Forms) Regulations 2004
Building Regulations 1992
Electricity Regulations 1997
Fire Service Act 1975
Hazardous Substances and New Organisms (HSNO) Act 1996

LATEST REVISIONS

The users of this Standard should ensure that their copies of the above-mentioned New Zealand Standards and legislation are the latest revisions or include the latest amendments. Amendments to referenced New Zealand and Joint Australian/New Zealand Standards can be found on **www.standards.co.nz.**

FOREWORD

This revision of NZS 4510 introduces a number of changes to the 1998 edition of the Standard.

The purpose of this Standard is to set out minimum technical and performance requirements for fire hydrant systems installed in buildings. Hydrant systems are primarily for fire service use when attending and dealing with fire emergencies in buildings.

Accepting that demands on internal building hydrant systems are likely to be less for sprinkler-protected buildings, than for buildings without sprinklers is the most significant area of change from the previous edition of the Standard. Given this, the demands for internal hydrant systems have been aligned with those specified under SNZ PAS 4509 New Zealand Fire Service fire fighting water supplies code of practice, with a maximum flow rate of 1500 L/min for buildings fitted with approved sprinkler systems. The demands for buildings not equipped with approved sprinkler systems have not changed from those specified in the 1998 edition of the Standard. The committee preparing this Standard considered the possibility of combining sprinkler and hydrant risers. It was recognised, however, that a level of redundancy was required for riser systems, for the rare occasions when sprinkler systems are decommissioned for maintenance or alterations.

The building hydrant outlet design criteria, which were contentious in preparing the 1998 Standard were reconsidered. The design criteria of the 1998 edition of the Standard were reconfirmed for unsprinklered buildings, and for sprinklered buildings, the flow rates were slightly adjusted to allow them to be aligned to the requirements recommended in SNZ/PAS 4509.

The Standard introduces a checklist in an appendix to provide guidance for pump installations (see Appendix F). In addition, the Standard also provides information on the provision of hydrants to protect low-rise buildings (see Appendix C). Given that this is a new addition to the Standard, the committee decided to make this appendix informative, (that is, not mandatory) rather than normative (mandatory). The Standard is expected to be next reviewed around 2018, and at that stage, with experiences over a ten-year period, it is expected that this appendix will be expanded and made normative.

Amd No. 1
Jan. '09

This Standard recognises the value of sprinklers in reducing the overall fire risk in buildings. For this reason the hydrant requirements are relaxed where a sprinkler system is installed in the building. Users of this Standard should be aware that in the event of sprinkler system failure the level of performance of the hydrant system may not be sufficient to meet the design objectives of the system. Concerns over the reliability of the sprinkler system or the adverse consequences of system failure may require additional consideration in the design of the system. It is recommended to users of this Standard that if a system is being installed (fully or in part) to meet property protection requirements that advice is taken from key stakeholders which would be expected to include the insurers of the protected building.

Although an adequate water supply is necessary, the Standard does not require a water supply sufficient for firefighting to be permanently piped to the hydrant system. Since the purpose of the hydrant system is to provide for fire service use, it is assumed that as with any other building, the fire service will, on arrival, access the available water supply and couple-in to the riser system. However, in some industrial buildings for example, the owner may opt to provide a permanently piped supply for use by a private fire brigade. The Standard permits this and provides appropriate criteria.

On multi-storeyed buildings where the combination of pressure loss due to height (static) and friction means that fire service pumps cannot meet the performance criteria pressure at the highest building hydrant outlet, booster pumps are required. The Standard provides for the National Commander of the New Zealand Fire Service to declare the highest fire service pumping pressure to be used in calculating whether pumps are necessary (see Appendix D).

Particular attention has been given to the problem of pressure control at the various levels within multi-storeyed buildings. It is important that firefighters are not confronted with excessively high pressures. Requirements have been included the setting, calibration, and testing of pressure control valves in an effort to overcome the very serious problems that have arisen in overseas fires as a result of incorrectly set valves.

The Standard provides incentives to recognise the advantages (for firefighter safety and operational efficiency) of locating building hydrant outlets in multi-storeyed buildings within a protected lobby. Location within stairwells, while permissible, creates congestion in a fire, and reduces the effective reach of standard length hose lines because of the need to base the fire attack from the landing below.

In preparing this Standard, the committee considered the frequency of flow testing of pump units that is required. As there are limited records of testing results it would be appreciated if all testing authorities conducting tests under this Standard would forward a copy of the test results to Standards New Zealand, so that trends over time can be considered in the next revision. These can be sent to the General Manager, Standards Development.

Internal building hydrant systems need to be operational during both construction and demolition periods – both activities provide a heightened risk of fire. The Standard specifies that during construction, the hydrant system must be enlivened progressively (including pumps, if required) as construction advances.

The correct operation and function of these systems during a fire may be of critical importance to firefighting safety. The Standard therefore assumes that the hydrant system certifier, the designer, and the contractor installing the system have appropriate technical competencies and experience. It is anticipated that the recommendation that a hydrant system certifier be an accredited body will become a mandatory requirement at the next revision. On certain matters consultation with the New Zealand Fire Service at the design stage (section 3) is mandatory as is notification of planned impairments (section 9) during the operating life of the system.

3 DESIGN CRITERIA

This section of the Standard is for buildings which are not defined as low-rise. For guidance on hydrant coverage in low-rise buildings, see Appendix C.

3.1 PRESSURE REQUIRED AT OUTLET

The pressure available at each building hydrant outlet when the design number of hose streams are in simultaneous operation at the design flow, shall be not less than 600 kPa or more than that permitted by 6.2.1.

3.2 NUMBER AND SPACING OF OUTLETS PER FLOOR

3.2.1 Other than on the ground floor, there shall be at least one building hydrant outlet assembly per floor. This building hydrant outlet assembly shall be located in the vertical safe path or a protected lobby at each floor or mid-floor landing. Additional building hydrant outlet assemblies shall be installed in the following locations:

(a) On any floor where in a sprinkler protected building every point on the floor is not covered by an arc of 40 m measured from the point of entry from the safe path onto the floor;

(b) On any floor where in a non-sprinkler protected building every point on the floor is not covered by an arc of 32 m measured from the point of entry from the safe path onto the floor. The arc length from any additional hydrant outlet assemblies shall be 40 m;

(c) On the roof where there is door access to the roof. This building hydrant outlet assembly shall fully comply with 4.2;

(d) On intermediate floors and mezzanines directly accessed to or from the stair tower, where full coverage is not achieved from (a) or (b).

Amd No. 1
Jan. '09

NOTE –

(1) It is not necessary to provide a building hydrant outlet on the ground floor of a building where the fire service is expected to use externally fed hoses for its operations. However, it should be noted that Acceptable Solution C/AS1, of the Compliance Document for NZBC Clause C requires that where the length of hose required to access all areas of the ground floor exceeds 75 m, that internal hydrants be provided for use by the fire service, and that this requirement may override this clause.

(2) Where the building has multiple floors served from street level, the ground floor is the one adjacent to the main fire service attendance point.

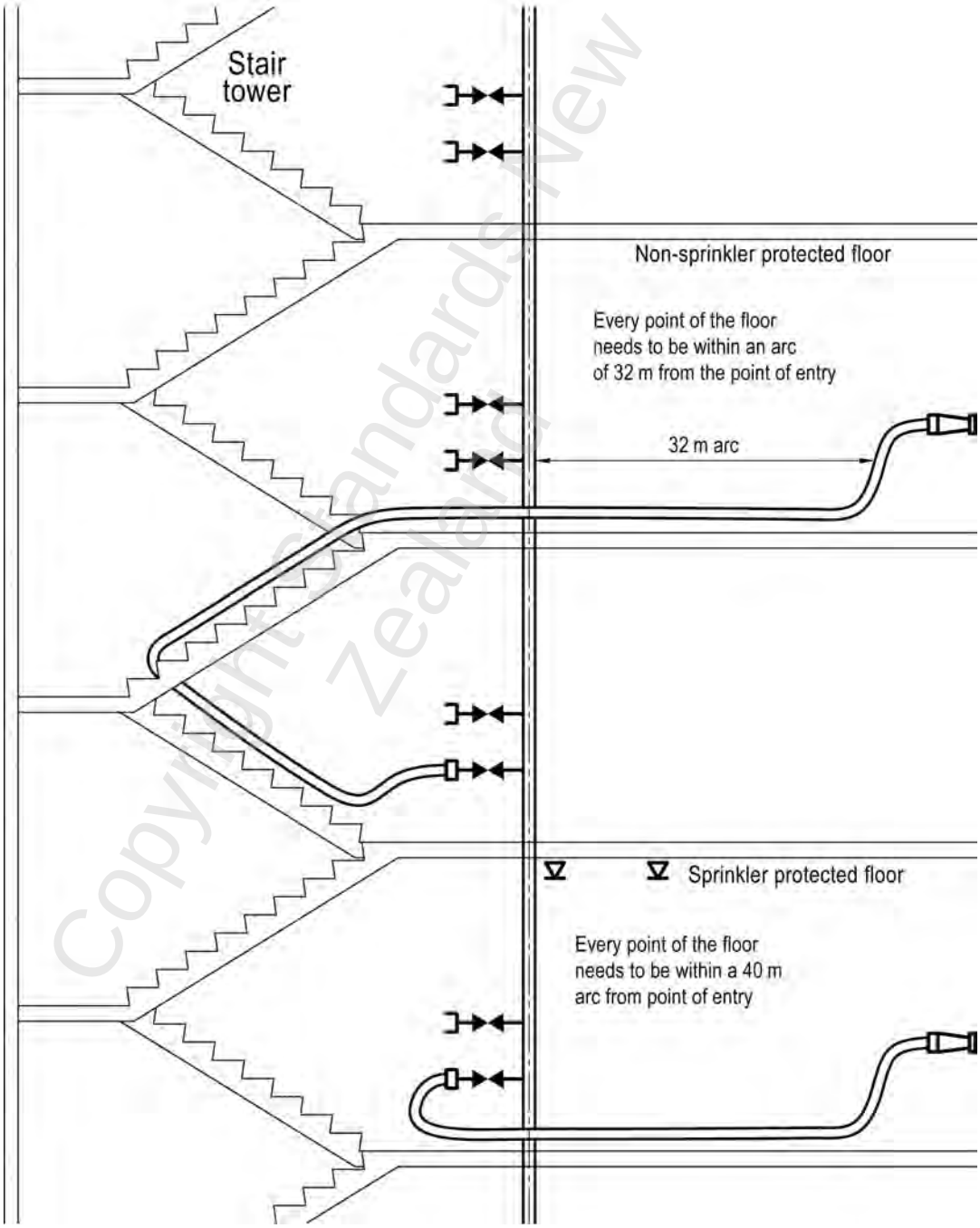
3.2.2 It shall not be required to have building hydrant outlets in every stair (or in a protected lobby directly accessible from the stair) provided that there is a warning sign, as specified in 2.6, to that effect at each level with external access (or in the landing at that level) of each stair which does not have building hydrant outlets.

3.2.3 Where hydrants are located in a scissors stair serving a common protected lobby or floor area, building hydrant outlets shall be located at each floor level accessible from the stair designated for fire service use.

NOTE – The provisions requiring building hydrant outlets in both stairwells of a scissor stair have been deleted from this edition of the Standard.

3.2.4 Where building hydrant outlets have been provided in every stair in a building on an optional basis, it is not necessary for the purposes of table 5, to assume all building hydrant outlets are operating.

NOTE – See section 4 on the location of individual building hydrant outlets.



NOTE – See 1.4.1 and Appendix E for meaning of abbreviations and graphical symbols.

Figure 4 – Measurement of hose lengths

3.3 REQUIRED FLOW RATES

3.3.1 Buildings fitted with an approved fire sprinkler system

For buildings fitted with an approved sprinkler system, the design number of hose streams in simultaneous use shall be three flowing at 500 litres per minute each (total design flow shall be 1500 litres/minute).The design number of flowing streams per floor shall be two on the hydraulically most remote floor, and the third stream on the floor immediately adjacent.

3.3.2 Buildings not fitted with an approved fire sprinkler system

For buildings not fitted with an approved sprinkler system, the design number of hose streams in simultaneous use shall be determined from table 5.

The minimum flow rate per hose stream shall be 440 L/min.

Amd No. 1
Jan. '09

Table 5 – Determination of design number of simultaneous hose streams in unsprinklered buildings

Greatest number of building hydrant outlets required on any floor (see 3.2)	**Design number of flowing streams per floor**	**Number of simultaneous floors** (see Note 1)	**Design number of simultaneous hose streams**
1	2	2	4
2	4	2	8
3	5	2	10
4 or more	6	2	12

NOTE –
(1) In single-storeyed buildings, this value reduces to 1.
(2) See 6.4.6 for design flow.
(3) See Appendix C for low-rise buildings.

3.4 REQUIREMENT FOR BOOSTER PUMPS

3.4.1 If, in order to meet the pressure required at every building hydrant outlet (as specified in 3.1) the pressure required at the downstream side of the building hydrant inlet (P_R) is greater than (P_A) as derived by the formula in equation 2, then one or more booster pumps shall be provided in accordance with 3.4.2.

$$P_A = P_{NC} - \Delta P_I \quad \text{.....(Eq. 2)}$$

where

P_A is the pressure available

P_{NC} is the pressure declared by the National Commander (see Appendix D).

ΔP_I is the loss or gain of pressure due to friction and elevation in the hoselines between the fire service pumping appliance and the building hydrant inlet, and in the building hydrant inlet assembly calculated in accordance with 6.4.

3.4.2 In buildings not fitted with approved sprinkler systems, if the required boost is less than 150 kPa, one booster pump shall be required, otherwise 100% redundancy in pumping shall be required. In buildings fitted with an approved sprinkler system, one booster pump is required.

3.5 PIPEWORK TO BE CHARGED WITH WATER

3.5.1 Every section of the hydrant system pipework shall be kept charged with water at a positive pressure of at least 15 kPa by means of a permanently connected pressurised water supply.

NOTE – If a pressurising pump is used to pressurise the system, a larger pressure differential may be required in order to detect pressure drop to start this pump.

3.5.2 The pressurised supply shall be through a pipe of not less than 15 mm diameter and be capable of maintaining a flow of 25 L/min. It shall be controlled only by a locked open, indicating valve labelled 'Fire Service Hydrant System: Normally Open'. A backflow prevention device or check valve (if not connected to a potable supply) shall be provided in this connection. The backflow prevention unit shall be provided in a position conducive to inspection and maintenance.

3.5.3 On systems including a booster pump or pumps, the point of connection shall be in accordance with figure 13 or figure 14 and the flow rate shall also be sufficient to provide the total water required for pump and driver cooling when all pumps are operating at maximum load under test conditions. (See 7.5.2.)

3.5.4 Where the hydrant system forms part of the reticulation for hose reels in the building, the required flow rate in 3.5.3 shall be increased by a flow equivalent to the simultaneous operation of the two hydraulically most favourably placed hose reels. The required pressure shall be sufficient to ensure compliance with AS/NZS 1221, according to the Standard of manufacture, when any two reels are operating.

NOTE – Attention is drawn to the pressure limits of various hose reel assemblies.

3.6 OPTIONAL PROVISION OF PRESSURISED WATER SOURCE

3.6.1 An owner may elect to provide a permanently piped connection from a reliable pressurised water source to the hydrant system to permit firefighting hose streams to be established prior to fire service arrival. This shall only be permitted if, having regard to the flow and pressure characteristics of the water source, there will be available at any building hydrant outlet, a pressure of at least 600 kPa when the system is delivering a flow of 1500 L/min and this will be sustained for at least 30 min.

3.6.2 Should it be necessary to use a booster pump to meet this requirement, either an electric motor or diesel-driven pump, conforming to section 7 and, additionally, arranged to start automatically on detection of pressure drop shall be provided for this purpose. The pump may also function as a booster pump for the primary function of the hydrant system.

The automatic starting arrangements and components shall be of a type which is listed for NZS 4541.

3.6.3 The building hydrant inlet enclosure shall be labelled in accordance with 5.2.4.

NOTE – Incorporation of a pressurised water source is not recommended unless, associated with the hydrant system outlets, there are cabinets containing adequate hose and branches, so that such equipment is routinely maintained in good condition, and staff are trained in the safe and correct use of the equipment. The New Zealand Fire Service should be consulted on these matters.

4 BUILDING HYDRANT OUTLETS

4.1 LOCATION

4.1.1 Building hydrant outlets shall be so located to allow ready and efficient use by the fire service. Clearances shall conform to 4.2.3.

NOTE – Refer to any Standard Operating Procedure declared by the National Commander (see Appendix D).

4.1.2 Building hydrant outlets in vertical safe paths shall be situated on floor or mid-floor landings.

Amd No. 1
Jan. '09

4.1.3 Locks on enclosures, where fitted, shall comply with figure 7. The door of any such enclosure shall be frangible.

NOTE –
(1) Enclosures are permitted but not required by this Standard.
(2) Other types of lock to that shown in figure 7 may be declared acceptable by the National Commander.

4.1.4 Building hydrant outlet enclosures may incorporate a hose reel or other fire equipment but in all cases, the clearances specified in 4.2.3 shall be maintained and the door shall not be locked. Hose reels shall not be mounted on the enclosure door.

4.1.5 Enclosures shall be clearly marked with the words 'BUILDING HYDRANT OUTLET' in 50 mm high contrasting lettering.

4.1.6 Where required by the building owner, valves may be locked using the type of lock shown in figure 7. Alternatively they may be secured using keyed alike standard padlocks acceptable to the National Commander.

4.2 OUTLET ASSEMBLY

4.2.1 Each building hydrant outlet shall incorporate two 70 mm double-lugged instantaneous female hose couplings conforming to SNZ PAS 4505. Each coupling shall be controlled by a lever operated ball valve, or by a pressure reducing valve incorporating a handwheel shut-off (one per coupling), and a tool-adjusted pressure reducing setting which shall be sealed at the set pressure.

Where there are multiple fire hydrant inlet assemblies within a single building complex, they shall be interlinked so that any inlet may be used to serve any building hydrant outlet.

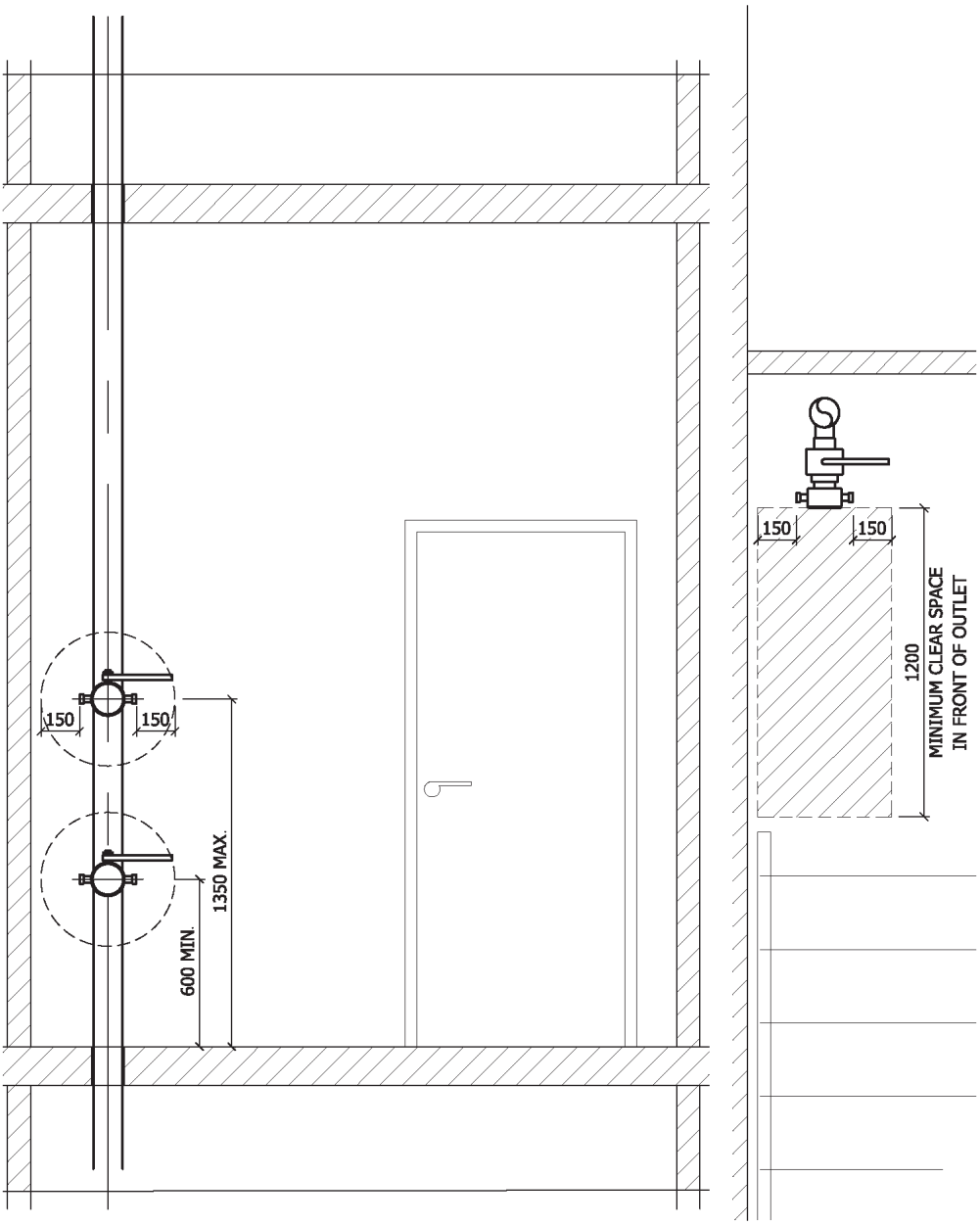
NOTE –
(1) An example of a location where lever operated ball valves may not be fit for purpose is an area where environmental conditions could cause corrosion which could seize the operating lever.
(2) Lever operated ball valves are not suitable for throttling purposes. The standard building hydrant outlet specified in this Standard is based on the fire service fully opening the building hydrant outlet and controlling flow at hose nozzles. Where building hydrant outlets may be used by the building's occupants for non-firefighting purposes, and flow is required to be controlled at the building hydrant outlet, the use of alternative valves such as landing valves described in SNZ PAS 4505 may be required.

4.2.2 The axis of each coupling shall be 45° down from the horizontal with lugs positioned horizontally.

NOTE – Couplings need not be side by side.

4.2.3 There shall be a 150 mm clear space around the outer edge of the lugs and the operating arc of the lever of the ball valves (and, on existing systems, the handwheel).
See figure 5.

4.2.4 Unobstructed access shall be provided to a clear space of 1200 mm in front of the couplings. Couplings shall not be closer than 600 mm to the floor or further than 1350 mm.
See figure 5.



All dimensions are in mm.

Figure 5 – Outlet assembly spatial requirements