



Code of practice for riser
mains for fire service use

NZS 4510:1978

Superseded

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NEW ZEALAND STANDARD

Code of practice for
RISER MAINS FOR FIRE SERVICE USE

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COMMITTEE REPRESENTATION

This standard was completed under the supervision of the Fire Protection Industry Sectional Committee (45/–) for the Standards Council, established under the Standards Act 1965. The committee consisted of representatives of the following:

British Trade Association of New Zealand
 Department of Labour
 Fire Service Commission
 Insurance Council of New Zealand
 Institution of Fire Engineers
 Ministry of Transport –
 Marine Division
 Ministry of Works and Development
 Municipal Association of New Zealand
 New Zealand Counties Association
 New Zealand Institute of Architects
 New Zealand Institution of Engineers
 New Zealand Fire Brigades Institute
 New Zealand Government Railways Department
 New Zealand Manufacturers Federation
 Post Office
 United Fire Brigades Association

The Riser Mains Subcommittee was responsible for the preparation of the standard.

RELATED DOCUMENTS

Reference is made in this standard to the following:

NEW ZEALAND STANDARDS	<i>Clause reference herein</i>
NZS 824 : 1969 <i>Steel tubes and tubulars suitable for screwing to BS 21 pipe threads</i>	5.1.2.1.
NZS 1900 : ---- <i>Model building bylaw –</i> Chapter 5 : 1963 <i>Fire-resisting construction and means of egress</i>	Foreword; 1.1; 2.3; 3.3.1. 3.1.1; 3.1.3;
NZS 4503 : 1974 <i>Code of practice for the distribution, installation and maintenance of hand operated firefighting equipment for use in buildings</i>	3.2.2.
NZS 4505 : 1977 <i>Fire-fighting waterway equipment</i>	5.2.1; 5.3.1; 6.1.2; 6.3.2
NZS 4521 : 1974 <i>Boxes for fire brigade connections</i>	5.2.1; 5.3.1.
NZS 4541P : 1972 (FOC Rules) <i>Rules for automatic fire sprinkler installations</i>	6.2.1.
MP 3801 : 1972 <i>A guide to the adoption of the model building bylaw (NZS 1900) by local authorities using the standard adoption and annual updating procedures</i>	2.2.

BRITISH STANDARD

BS 3601 : 1974 <i>Steel pipes and tubes for pressure purposes – carbon steel with specified room temperature properties</i>	5.1.2.1
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RELATED LEGISLATION

Electrical Wiring Regulations 1976	3.6.1.
Water Supplies Protection Regulations 1961	3.6.1.

FOREWORD

A riser main system which is properly designed, equipped and maintained is one of the best means of providing water for Fire Service use at all floor levels in the quickest possible time.

The Fire Service, as the organization that will use riser main systems in fires, emphasises that compliance with this standard is essential.

NZS 1900* Chapter 5 requires every building that exceeds approximately 24 m in height to be equipped with approved fire mains.

In addition, it is strongly recommended that riser main systems be installed in buildings exceeding 15 m in height, in large area, low height buildings and in other buildings where construction, size, or other features limit the use of hose deliveries from the exterior.

*See list of related documents.

NEW ZEALAND STANDARD

Code of practice for RISER MAINS FOR FIRE SERVICE USE

1 SCOPE

1.1 This standard lays down requirements for wet and dry riser mains systems for fire brigade use and is approved as a means of compliance with the relevant requirements of NZS 1900*.

2 INTERPRETATION

2.1 In this standard the word "shall" indicates a requirement that is to be adopted in order to comply with the standard, while the word "should" indicates a recommended practice.

2.2 Where any other standard named in this standard has been declared or endorsed in terms of the Standards Act 1965, then:

- (a) Reference to the named standard shall be taken to include any current amendments declared or endorsed in terms of the Standards Act 1965, *or*
- (b) Reference to the named standard shall be read as reference to any standard currently declared or endorsed in terms of the Standards Act 1965 as superseding the named standard, including any current amendments to the superseding standard declared or endorsed in terms of the Standards Act 1965.

NOTE – The date at which amendments or superseding standards are regarded as "current" is a matter of law depending upon the particular method by which this standard becomes legally enforceable in the case concerned. In general, if this is by contract the relevant date is the date on which the contract is created, but if it is by Act, regulation, or bylaw then the relevant date is that on which the Act, regulation, or bylaw is promulgated; for bylaws, promulgation includes updating by the procedure set out in MP 3801*.

2.3 In this standard, unless inconsistent with the context, terms shall have the meanings given in NZS 1900* and in addition:

RISER means a pipe to convey water for fire brigade use to all floors of a building and where appropriate to the roof.

RISER MAIN SYSTEM means either a dry riser main system or a wet riser main system as appropriate.

DRY RISER MAIN SYSTEM means one or more risers complete with all fittings, as required by clause 4.1, not permanently charged with water.

WET RISER MAIN SYSTEM means one or more risers complete with all fittings and connected to a water supply as required by clause 4.2 that is kept permanently charged with water. The term "wet riser main system" includes all associated pumps, storage tanks, and the like, and all associated pipework from the point of connection with a town main.

3 GENERAL

3.1 Provision of riser mains

3.1.1 Riser main systems shall be provided as required by NZS 1900 Chapter 5* and are strongly recommended in all buildings of three or more storeys.

3.1.2 Riser main systems shall be wet riser main systems where the height from the Fire Service inlet connection to the highest Fire Service outlet connection exceeds 45 m, but may be either wet or dry riser main systems in other cases.

3.1.3 Each riser main system shall provide one Fire Service outlet connection for each 1000 m² or part thereof of the net floor area, and in addition shall provide an approved number of extra Fire Service outlet connections in the following cases:

- (a) Where more than two standard 22.5 m lengths of hose would be required to direct a 6 m jet to any part of the floor above or below; and
- (b) In buildings coming within the moderate or high (D2 or D3) fire risk classification of NZS 1900 Chapter 5*.

(See also clause 3.7.)

3.2 Connections to wet riser main systems

3.2.1 A common water supply (see section 6) may be used to supply both the wet riser main system and the

*See list of related documents.

domestic system provided it is adequate to meet the aggregate demand of both systems.

3.2.2 Wet riser main systems may be used to supply first aid fire-fighting hose reels installed to comply with NZS 4503*.

3.3 Structural design

3.3.1 All parts of riser main systems, including tanks and the attachment of pipework to the building, shall comply with the requirements of NZS 1900* for structural design. Particular attention is drawn to the effects of temperature and to the earthquake provisions of NZS 1900*.

3.4 Buildings under construction

3.4.1 During building construction, the riser main system shall be extended as the construction of the building proceeds to ensure that:

- (a) The riser main system shall at all times be fully operational up to a level not more than two floors below the highest level of construction; and
- (b) The riser main system as required by this clause shall be fully operational at all times after construction has reached five storeys or 15 m.

3.4.2 Where the highest level of construction consists of non-combustible framework only, it shall not be regarded as a level of construction for the purpose of clause 3.4.1(a).

3.4.3 Where Fire Service connections are not readily visible from a street, a sign shall be posted in a conspicuous place directing the Fire Service to the connections.

3.5 Testing

3.5.1 On completion the riser main system shall be adequately tested and shown to be fully operational.

3.5.2 All riser main systems should be tested at regular intervals throughout the life of the building in co-operation with the Fire Service.

3.6 Statutory provisions

3.6.1 Attention is drawn to the requirements of the Water Supplies Protection Regulations 1961 regarding the connection of wet riser main systems to town supply water

mains, and to the requirements of the Electrical Wiring Regulations 1976 regarding the electrical earthing of riser main systems.

3.7 Approvals

3.7.1 The following matters shall be approved only upon the advice of the Fire Service:

- Extra Fire Service outlet connections where required (*see* clause 3.1.3)
- Positions of Fire Service inlet connections (*see* clause 5.2.2)
- Indication of Fire Service outlet connections (*see* clause 5.3.6)
- Areas for portable Fire Service pumps (*see* clause 6.1.2)
- Positions of Fire Service outlets (*see* clause 5.3.3).

4 RISER MAIN SYSTEMS

4.1 Dry riser main systems

4.1.1 A dry riser main system shall consist of the number of risers necessary to comply with clause 3.1.3. Each riser shall comply with clause 5.1 and shall be provided with:

- (a) A Fire Service inlet connection complying with clause 5.2.
- (b) Fire Service outlet connections complying with clauses 3.1.3 and 5.3.
- (c) An air valve complying with clause 5.4.
- (d) Drainage provisions complying with clause 5.5.

4.1.2 A dry riser main system shall be capable of supplying 20 l/s of water at a running pressure of not less than 420 kPa nor more than 700 kPa simultaneously through each Fire Service outlet connection on any one floor or roof level.

4.2 Wet riser main systems

4.2.1 A wet riser main system shall consist of the number of risers necessary to comply with clause 3.1.3, connected to a water supply complying with section 6. Each riser shall comply with clause 5.1 and shall be provided with:

- (a) A Fire Service inlet connection complying with clause 5.2.
- (b) Fire Service outlet connections complying with clauses 3.1.3 and 5.3.
- (c) Drainage provisions complying with clause 5.5.
- (d) A pressure gauge or gauges complying with clause 5.6.
- (e) A system diagram complying with clause 5.7.

*See list of related documents.

- (f) Visual indication of riser main pump operation complying with clause 5.8.
- (g) A remote manually operated pump starting control installed adjacent to the Fire Service inlet.

4.2.2 A wet riser main system shall be capable of supplying 20 l/s at a running pressure of not less than 420 kPa nor more than 700 kPa simultaneously through each Fire Service outlet connection on any one floor or roof level.

4.2.3 Any pressure reducing valve used shall derive its control from the low pressure side.

5 RISERS AND FITTINGS

5.1 Risers

5.1.1 The nominal internal diameter of risers shall be as shown by hydraulic design to be sufficient to meet the pressure and flow requirements of clause 4.1.2 for dry risers or clause 4.2.2 for wet risers.

5.1.2 Construction

5.1.2.1 Risers shall be of galvanized medium grade (blue band) steel pipe complying with NZS 824* where the maximum working pressure does not exceed 2000 kPa and of galvanized steel pipe complying with BS 3601* where the maximum working pressure exceeds 2000 kPa but does not exceed 3500 kPa.

5.2 Fire Service inlet connections

5.2.1 Each Fire Service inlet connection shall comply with NZS 4505*, shall be mounted at $30 \pm 5^\circ$ to the horizontal, and shall be contained in a box complying with NZS 4521*.

5.2.2 Each Fire Service inlet connection shall be placed in an approved position (see clause 3.7) on an external wall of the building not less than 600 mm nor more than 1200 mm above ground level. Underground inlets will not be accepted.

5.2.3 A clear space extending not less than 1200 mm from the face of the box, not less than 300 mm on each side of the box, and from the ground to a height of not less than 1800 mm shall be maintained at all times.

5.2.4 Fire Service inlet connections to underground storage tanks shall comply with clause 6.3.

5.3 Fire Service outlet connections

5.3.1 Each Fire Service outlet connection shall be a

landing valve complying with NZS 4505* (this precludes the use of gate valves) and if it is contained in a box then the box shall comply with NZS 4521*.

5.3.2 The number of Fire Service outlet connections required by clause 3.1.3 shall be provided on each floor and when appropriate on the roof.

5.3.3 Fire Service outlet connections shall be uniformly situated in an approved position at each floor level not less than 600 mm nor more than 1200 mm above the floor level, and shall be where possible in a smoke-stop lobby or smoke-stop stair enclosure (Appendix A).

5.3.4 A clear space extending not less than 1200 mm from the cap end of the Fire Service outlet connection or from the face of the box, not less than 750 mm wide, and from the floor or roof to a height of not less than 1200 mm shall be maintained at all times.

5.3.5 Outlets on the roof shall be of corrosion resistant material or shall be suitably protected from the weather.

5.3.6 The position of each outlet shall be clearly indicated with the words "Fire Hydrant" in letters 50 mm high in reflectorized paint or an approved equivalent (see clause 3.7).

5.4 Air valves

5.4.1 An automatic air valve not less than 20 mm nominal diameter shall be provided at the highest point of each dry riser to permit air to discharge when the riser is being charged with water and to enter when it is being drained.

5.5 Drainage provisions

5.5.1 Provision shall be made to drain each riser to the local stormwater drainage system or other approved destination.

5.6 Pressure gauges for wet riser main systems

5.6.1 Each riser in a wet riser main system shall be fitted with a pressure gauge mounted inside the Fire Service inlet connection box and so connected as to indicate the pressure at the base of the riser; this gauge shall be permanently marked to indicate the minimum normal standing pressure.

5.6.2 In wet riser main systems incorporating pumps additional pressure gauges shall be provided to indicate:

- (a) the pressure of the incoming town main (where applicable); and

*See list of related documents.

- (b) the pressure of the wet riser system at the pumps.

Each such gauge shall be suitably marked to identify its function.

5.6.3 Any additional pressure gauges required by clause 6.1.2 shall also be provided.

5.6.4 All pressure gauges shall be graduated in kilopascals (kPa).

5.7 System diagrams

5.7.1 A diagram showing the location of the Fire Service outlet connections on each floor, the location of areas for Fire Service portable pumps (see clause 6.1.2), and the water supply to the system shall be provided adjacent to each Fire Service inlet connection of a wet riser main system.

5.8 Visual indication of pump operation

5.8.1 Visual indication of which pumps in the system are operating shall be provided adjacent to each Fire Service inlet connection of a wet riser main system.

6 WATER SUPPLIES

6.1 General

6.1.1 Each wet riser main system shall have a water supply meeting the requirements of clause 4.2.2. This supply shall be:

- (a) A town main of proven ability; *or*
- (b) A town main of adequate flow but insufficient head boosted by pumping provisions complying with clause 6.2; *or*
- (c) Low-level storage complying with clause 6.3 and pumping provisions complying with clause 6.2.

6.1.2 Provision shall also be made in suitably ventilated approved areas (see clause 3.7) at not more than 45 m intervals for portable fire brigade pumps to be connected to any wet riser exceeding 45 m high. The normal Fire Service outlet connection may be used as the supply to the portable pump and a 70 mm instantaneous male inlet complying with NZS 4505* shall be provided as the inlet from the portable pump to the riser main. A stop valve shall be provided in the riser main between outlet and inlet, and shall normally be kept open and suitably secured from

unauthorised operation. Pressure gauges graduated in kilopascals (kPa) shall be provided to indicate the pressure in the riser main at the outlet and at the inlet. (See Appendix B.)

6.2 Pumping provisions

6.2.1 Pumping units for wet riser main systems shall operate on a fall in pressure. The automatic starting device for pumps shall be of an approved pattern (see NZS 4541P*) and set to operate when the pressure in the riser main has fallen to a value of not less than 80 percent of the static pressure. Staging pumps may be arranged to operate on a flow of water if the system is so arranged that the pump will be given the signal to start as soon as any hydrant connected to it is opened.

6.2.2 Pumping units shall meet the requirements of clause 4.2.2 and shall consist of:

- (a) A single electric-powered centrifugal pump with automatic changeover between mains power supply and standby power supply; *or*
- (b) A single, diesel-driven, single-stage or multi-stage centrifugal pump.

6.2.3 Mains power supply used for pumps shall be connected through a separate main switch and separate cables adequately protected from damage by fire.

6.2.4 Pumps shall not be automatic in closing down. The controls for closing down pumps shall be watertight and shall be adjacent to the Fire Service inlet connection box.

6.2.5 The pump shall be fully operational within 45 s after starting.

6.2.6 A loud ringing bell that will operate when the pump is running, and is labelled accordingly, shall be located in a place where it will alert the building's owner or maintenance staff to the condition.

6.3 Low-level storage

6.3.1 Low-level storage for a wet riser main system shall have a capacity of not less than 45 000 l (45 m³).

6.3.2 The complete capacity of low level storage tanks shall be accessible to the Fire Service and tanks shall be fitted with:

- (a) A 100 mm female round thread suction connection complying with NZS 4505*, where storage is below the ground level direct access point.

*See list of related documents.

- (b) A pipe from the suction connection to the storage tank with a nominal internal diameter of not less than 100 mm and with a metal strainer complying with NZS 4505*.
- (c) An automatically-controlled filling connection if a continuous water supply is available.
- (d) An adequate man-hole.
- (e) Drainage provisions complying with clause 5.5.1. The drain pipes shall have a nominal internal diameter of not less than 80 mm.
- (f) An overflow discharging to an approved location and having a nominal internal diameter of not less than 100 mm.

6.3.3 In no case shall the bottom of the storage tank be in excess of 5 m below the suction connection.

6.4 Staging tanks

6.4.1 If the pumping provisions include staging pumps then appropriate staging tanks shall also be provided.

6.4.2 Each staging tank shall have a capacity of not less than 4500 l (4.5 m³).

6.4.3 Each staging tank shall be automatically replenished at a rate of not less than 20 l/s and shall be provided with an overflow capable of discharging 40 l/s to the local stormwater drainage system or other approved destination.

6.4.4 Staging tanks may be fed from the riser.

7 TESTS

7.1 All new systems shall be tested hydrostatically at

not less than 1400 kPa pressure for two hours, or at 450 kPa in excess of the normal pressure, whichever is the greater.

8 MAINTENANCE, INSPECTION, AND TESTING

8.1 Every riser main system shall be the subject of a systematic maintenance programme, which should comply with Appendix C.

8.2 Every riser main system shall be the subject of annual inspection and testing, which should comply with Appendix D and be undertaken by an appropriately qualified person.

8.3 For the purposes of clause 8.2 an appropriately qualified person shall be:

- (a) For a dry riser main system: the New Zealand Fire Service;
- (b) For a wet riser main system: the person or organization responsible for the engineering design of the system, his or its duly authorized representative, or some other approved person having similar skills and experience.

8.4 Access to all parts of the riser main system for the purposes of annual inspection and testing shall be made available at any reasonable time and subject to any reasonable conditions relevant to the nature and use of the building concerned.

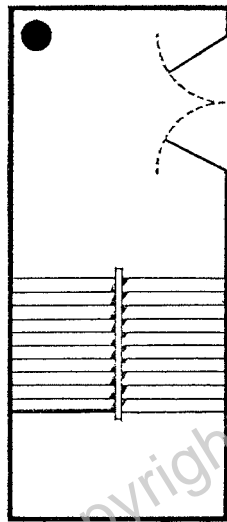
9 RISERS TO BE KEPT CHARGED WITH WATER

9.1 Every riser in a wet riser main system should be kept fully charged with water and operational at all times irrespective of failure of the main electric power supply and irrespective of the electric power supply to the building being turned off (*see also* clause 3.5.2).

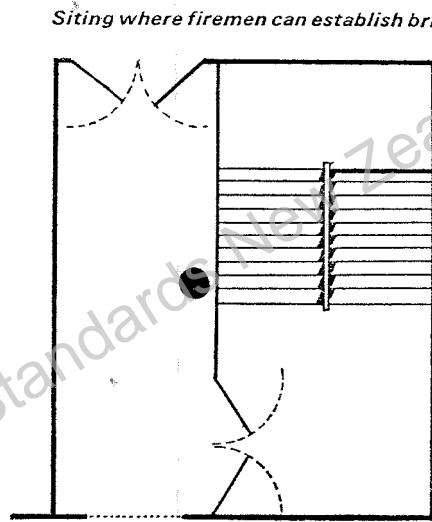
*See list of related documents.

APPENDIX A

TYPICAL LOBBY APPROACH
STAIRCASE WITH RISER MAIN



In staircase



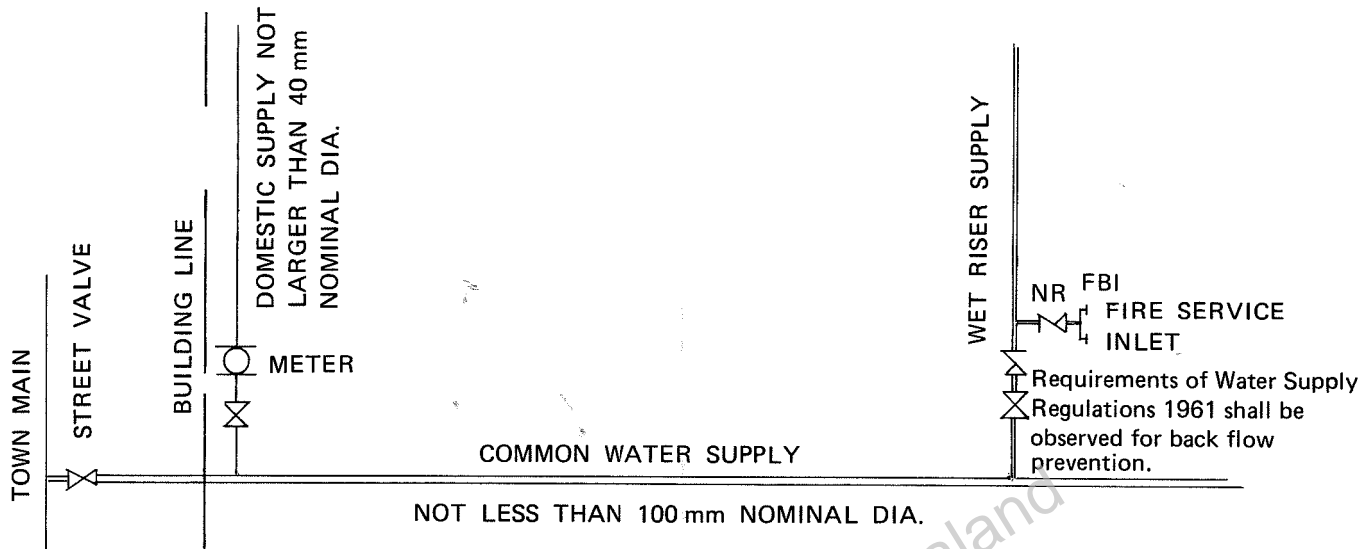
In ventilated lobby


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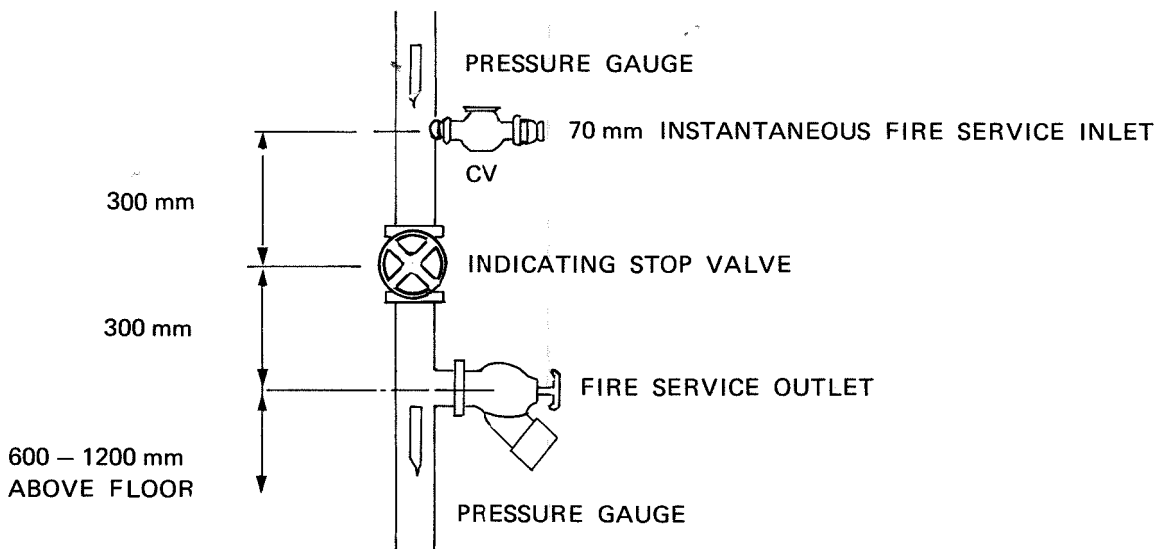
APPENDIX B

LAYOUT OF COMMON WATER SUPPLY



 STOP VALVE – ALL STOP VALVES TO BE CLEARLY LABELLED AND STRAPPED AND PADLOCKED OPEN. UNDERGROUND STOP VALVES TO BE OF STANDARD WATER WORKS PATTERN AND CONTAINED IN STANDARD TOBY BOXES.

THE USE OF A DOMESTIC SUPPLY LARGER THAN 40 mm MAY BE PERMITTED SUBJECT TO SPECIAL ARRANGEMENTS BEING MADE TO SHUT DOWN THE DOMESTIC SUPPLY ON OPERATION OF THE WET RISER OR FIRE SPRINKLER SYSTEM, SUCH ARRANGEMENTS TO BE APPROVED BY THE INSPECTING AUTHORITY.



ARRANGEMENT FOR PORTABLE PUMP CONNECTIONS

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APPENDIX C

MAINTENANCE PROGRAMMES

C 1 The maintenance programme required by clause 8.1 shall be appropriate to maintain the system as a whole and each component of it in a fully operational condition.

C 2 Each diesel pumping unit shall be inspected not less than once a week when the unit shall be operated for not less than 20 min and the following items shall be recorded in a suitable inspection report book:

- (a) That the street valve has been checked to be fully open;
- (b) That the fuel tank has been checked to be full;
- (c) The system standing pressure;
- (d) The pump cut-in pressure;
- (e) The engine oil pressure;
- (f) The engine oil temperature after 20 min continuous operation; and
- (g) Any other relevant items.

C 3 Each electric pumping unit shall be inspected not less than once a month when the unit shall be operated and the following items shall be recorded in a suitable inspection report book:

- (a) That the street valve has been checked to be fully open;
- (b) The system standing pressure;
- (c) The pump cut-in pressure; and
- (d) Any other relevant items.

APPENDIX D

ANNUAL INSPECTION AND TESTING

D 1 The annual inspection and testing required by clause 8.2 shall include all items set out in this appendix.

D 2 All components of the system shall be visually inspected for defects and for compliance with this standard.

D 3 The system shall be tested for leaks at the pressure specified by clause 7.1; compressed air may be used to apply this pressure to a dry riser main system.

D 4 A flow test at not less than 20 l/s shall be made on each wet riser main system. During this test all valves from the water supply shall be operated. The New Zealand Fire Service shall be notified before this test is made.

D 5 Each pumping unit shall be tested as required by clause C2 or C3 as appropriate.

D 6 The inspection report book for each pumping unit shall be scrutinised.

D 7 Any defects or shortcomings in the system, and any components found to need maintenance, repair, or replacement, shall be noted and appropriate remedial action shall be taken to the satisfaction of the person undertaking the annual inspection and testing.

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