LPCB®

Loss Prevention Standard

LPS 1040: Issue 2.3

Requirements and testing procedures for the LPCB approval and listing of wet alarm valve sets

bre

CONTENTS **PAGE**

PARTICIPATING ORGANISATIONS

This standard was prepared by Expert Group C and approved by the LPC Fire and Security Board of BRE Global Ltd. The following organisations participated in the preparation of this standard:-

Association of British Insurers
Association of Chief Police Officers
Association for Specialist Fire Protection
BRE (FRS)
British Automatic Sprinkler Association
British Fire Protection Systems Association
British Security Industry Association
Confederation of British Industry
Chief & Assistant Chief Fire Officers Association
Door & Shutter Manufacturers' Association
Electrical Contractors Association
Fire Sprinkler Association
Health & Safety Executive
International Fire Sprinkler Association
London Fire and Civil Defence Authority
Local Government Association
National Fire Sprinkler Association
Office of the Deputy Prime Minister
Risk Engineering Data Exchange Group
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Loss Prevention Standards will be revised by issue of revised editions or amendments. Details will be posted on our website at www.redbooklive.com

Technical or other changes which affect the requirements for the approval or certification of the product or service will result in a new issue. Minor or administrative changes (e.g. corrections of spelling and typographical errors, changes to address and copyright details, the addition of notes for clarification etc.) may be made as amendments (see amendments table on page 24)

The issue number will be given in decimal format with the integer part giving the issue number and the fractional part giving the number of amendments (e.g. Issue 3.2 indicates that the document is at Issue 3 with 2 amendments).

USERS OF LOSS PREVENTION STANDARDS SHOULD ENSURE THAT THEY POSSESS THE LATEST ISSUE AND ALL AMENDMENTS.

FOREWORD

This standard identifies the evaluation and testing practices for the LPCB approval and listing of products. LPCB Listing of life safety and security products for inclusion in the "Red Book" is based on the following

i. Satisfactory product performance during testing and audit testing
ii. Satisfactory product construction
iii. Satisfactory manufacturing processes
iv. Satisfactory product service experience.

NOTES

Compliance with this LPS does not of itself confer immunity from legal obligations. Users of LPSs should ensure that they possess the latest issue and all amendments.

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1 SCOPE

This standard specifies the requirements and testing methods for wet alarm valve sets used in wet pipe automatic sprinkler systems, and additional requirements for wet alarm valves, trim, water motor alarms, and retard chambers.

2 DEFINITIONS

2.1 Wet Alarm Valve

A valve that permits flow of water into a wet sprinkler system, prevents reverse flow of water and provides for an alarm under specified flow conditions.

2.2 Wet Alarm Valve Set

An alarm valve assembly complete with wet alarm valve, trim and water motor alarm. Optional items, such as a retard chamber, flow meter, pressure switch and flow switch may also be included as part of the wet alarm valve set.

2.3 Clapper or Clapper Assembly

The main movable sealing element of the valve which prevents reverse flow of water.

2.4 Compensator

An external or internal device such as an auxiliary check valve which minimizes false alarms which may occur due to small increases of service pressure.

2.5 K Factor

The relationship between pressure and flow of an orifice where:

$\text{Flow} = K \sqrt{\text{Pressure}}$

2.6 Maximum Working Pressure

The maximum working pressure at which a valve is intended to operate.

2.7 Retard Chamber

A volumetric device designed to minimize false alarms caused by surges and fluctuation in sprinkler system water supplies.

2.8 Retard Time

This is the time from the first passage of water through the alarm part of the valve (with and without the retard chamber), to the sounding of the alarm device.

2.9 Sensitivity

The minimum rate of flow from a system outlet which will open the wet alarm valve, as indicated by satisfactory operation of alarms, when tested in accordance with the also be included as part of the wet alarm valve set.

2.10 Service Pressure

The static pressure at the inlet to an alarm valve when the valve is in the ready condition.

2.11 Trim

Ancillary pipework and fittings essential for the correct operation of the alarm valve, such as the alarm line, drain, retard chamber, test line and cocks and alarm time drain facilities.

2.12 Differential Ratio

The differential ratio of a wet alarm valve is the ratio of service pressure to system pressure, measured just before the valve clapper opens to equalise the pressure difference across it, when tested in accordance with the differential ratio test, 1.5.

2.13 Product Consistency

It shall be the manufacturer's responsibility to implement a quality plan to ensure that his product continues to meet the requirements of this standard, in the same way as the samples originally tested.

3 WET ALARM VALVE SET – REQUIREMENTS AND TEST METHODS

3.1 Composition of Wet Alarm Valve Set

An alarm valve set shall comprise the following items which shall comply with all the requirements and test methods in the relevant sections. The layout of these items are illustrated in Fig.1.

a) Wet Alarm Valve, which shall comply with Section 4.

b) Trim, to comply with Section 5.

c) Water motor alarm, to comply with Section 6.

d) Optional items, which include:

Retard chamber, to comply with Section 7.

Direct reading flow meter. (Reference LPC Requirements and testing methods for direct reading flow meters)

Pressure switches (Reference LPC Requirements and Testing Methods for Pressure Switches).

Flow switch for signalling purposes. (Reference LPC Requirements and testing procedures for water flow switches).

3.2 Examination

The wet alarm valve set and components shall be examined for compliance with the submitted engineering specification, i.e. Engineering drawings and trim drawings.

3.3 Maximum Working Pressure

3.3.1 Requirements

Wet Alarm Valve sets shall be designed and constructed to withstand a maximum working pressure of not less than 12 bar. (Pressure gauges may be selected for lower maximum working pressures to match installation conditions).

3.3.2 Test

An assembled wet alarm valve set shall sustain without leakage, permanent deformation, rupture, or sudden release of pressure, an internal hydrostatic pressure of twice the maximum working pressure, applied for a period of five minutes when tested as follows.

The assembled wet alarm valve set shall have all openings plugged, with a connection to the hydrostatic pressure supply. The set shall be hydrostatically pressurised to twice the maximum working pressure for a period of five minutes, and inspected during this time for signs of leakage. The clapper assembly shall be blocked open for the duration of the test. Care must be taken to vent air from all trim pipes.

3.4 Operational

3.4.1 Requirements

The Wet alarm valve set shall operate correctly, without adjustment, at service pressures within the range of 1.4 bar to 12 bar.

An alarm valve set shall stop water flow to audible alarm devices on cessation of water flow from the wet alarm valve installation downstream of the clapper assembly.

The wet alarm valve set shall be capable of transmitting successive alarms without requiring manual resetting.

A wet alarm valve set shall be capable of providing at least 0.5 bar at its alarm port or at the outlet of the retard chamber, if provided, at a service pressure of 1.4 bar while actuating the motor alarm and relevant electric alarm devices.

3.4.2 Test

The alarm valve set shall be installed in a rig depicted in Figure 2 – Test installation for operational tests.

Immediately before each test, with the wet alarm valve set in the ready condition the alarm line drain shall be checked for water discharge. The trim piping shall be fully drained before each test. Prior to each test the service and installation pressures shall be recorded.

The wet alarm valve set shall be subjected to operational tests at water service pressures of 1.4, 8 and 12 bar. Operation of the valve is initiated by opening the alarm test valve or the sprinkler control valve depicted in Figure 2. Each alternative shall be tested.

3.5 Differential Ratio

3.5.1 Requirements

The differential ratio of the valve, i.e. the ratio of service pressure to system pressure, measured just before the valve clapper opens to equalize the pressure difference across it, shall not exceed 1.16 to 1 for a service pressure range of 1.4 to 12 bar.

3.5.2 Test

With the wet alarm valve set installed in a rig depicted in Figure 2, connected to a hydraulic supply with non-pulsating pressure, the test cock shall be opened to generate a small waterflow from the installation. The rate of flow shall be increased until the clapper opens. The maximum difference between the service and system pressures shall be recorded immediately before pressure equalisation occurs, when the valve opens. The test shall be undertaken at service pressures of 1.4, 8 and 12 bar.

$$\text{The differential ratio} = \frac{\text{Service Pressure}}{\text{Service Pressure} - \text{Max Differential Pressure}}$$

3.6 Sensitivity

3.6.1 Requirements

a) The wet alarm valve set shall not signal an alarm when discharge takes place downstream from the alarm valve, at a flow of 15 litres/min with a service pressure of 1.4 bar.

b) The wet alarm valve set shall signal an alarm when continuous discharge takes place downstream from the wet alarm valve at a flow of 60 litres/min at a service pressure of 1.4 bar. The wet alarm valve without retard chamber shall initiate continuous operation of mechanical and electrical alarm devices within 15 seconds from the time that the downstream valve (K=50) is opened.

Wet alarm valve sets with retard chambers shall initiate continuous operation of mechanical and electrical alarm devices between 5 and 90s after the K=50 downstream valve is opened.

3.6.2 Test

Conformance with the above requirements shall be established by operation of the alarm test valve at 1.4 bar. The time from operation of the test valve to ringing of the water motor alarm shall be recorded.

3.7 Requirements with retard chamber fitted

Retard chambers fitted to delay the operation of the water motor alarm shall be tested as below. Adjustable retard chambers shall be adjusted to time delays of:

i) Minimum time delay 5 seconds

ii) Maximum time delay 90 seconds

iii) At least one other intermediate time delay

For alarm valve operation at a service pressure of 1.4 bar when discharge takes place downstream of the alarm valve equivalent to flows through a nozzle K = 50. The delay time shall be taken as the difference between the values obtained with the retard chamber and those without as specified above.

3.7.1 Test

The test cock shall be opened with a service pressure of 1.4 bar and the time for the alarm devices to operate shall be recorded. For adjustable retard chambers the test shall be repeated for at least two time delay adjustments of the retard device.

3.8 Instruction for Use

A set of instructions shall be supplied with each wet alarm valve set, which shall be durable and contain the following details:

a) An illustration(s) of the valve set with trim. The illustration(s) shall include cross-sectional views by which the functioning parts and operating conditions of the valve can be identified.

b) A key of the functioning parts and other major components of the valve set.

c) A description of the operating procedures.

d) Instructions for the alarm and functioning tests.

e) Instructions for regular maintenance.

f) Equivalent length data.

4 WET ALARM VALVE – REQUIREMENTS AND TEST METHODS

These requirements are specific to the wet alarm valve, and are additional to the Requirements and test methods in Section 3.

4.1 Product Consistency

Every valve manufactured shall be subjected to the following tests:

a) a hydrostatic pressure test at twice the rated working pressure for 1 minute.

b) an operational test at 1.4 bar and confirm flow from the alarm port.

c) leakage test across the clapper

d) flow test from alarm port

4.2 Sizes

Alarm valve sizes shall refer to the nominal diameter of the alarm valve inlet and outlet connections, i.e. the pipe size for which the connections are designed.

Standard sizes are of nominal diameter 50, 65, 80, 100, 125, 150, 200 and 250mm. The diameter of the waterway through the clapper seat ring may be smaller than the diameter of the waterway through the inlet and outlet connections.

4.3 Body Pressure Strength

4.3.1 Requirements

An assembled valve with the clapper assembly open shall sustain without rupture or sudden release of pressure, an internal hydrostatic pressure of four times the maximum working pressure, applied for a period of five minutes when tested in accordance with the body strength test below:

4.3.2 Test

The pressure strength for bodies and covers as described above is not considered to be applicable for bolting strengths, gaskets or seals. Standard production bolts, gaskets and seals may therefore be replaced by components capable of withstanding the pressure. The valve inlet and outlet connections and all other openings shall be suitably blanked-off or plugged. There shall be a connection for hydrostatically pressurizing the valve body at the valve inlet connection and a means for venting air and pressurizing fluid at the outlet connection. With the clapper assembly blocked open or removed, the valve body shall be internally hydrostatically pressurized to 4 times the rated working pressure (but not less than 48 bar) and held for a period of 5 minutes.

The load of any fastener exclusive of the force required to compress the gasket, shall not exceed the minimum tensile strength specified in ISO 898: Part 2 (Specification for nuts with specified proof load values) or equivalent, when the alarm valve is pressurised to four times the rated working pressure. The area of application is to be calculated as follows:

i) If a full faced gasket is to be used the area of force application is that extended to a line defined by the inner edge of the bolts.

ii) If an ‘O’ ring seal or ring gasket is used, the area of the force application is that extending out to the centre line of the ‘O’ ring or gasket.

4.4 High Pressure Leak Resistance

4.4.1 Requirement

A wet alarm valve shall sustain without leakage or visible permanent distortion, an internal hydrostatic pressure of twice the rated working pressure for a period of 5 minutes applied at the downstream end with the clapper assembly closed and the upstream end vented.

4.4.2 Test

The alarm valve under test shall have the downstream outlet blanked off. The assembly shall be fitted with a connector and bleed valve to enable the downstream portion of the valve to be hydrostatically pressurised and vented. All other connections on the portion of the valve downstream of the clapper assembly shall be plugged. An internal hydrostatic pressure of twice the rated working pressure shall be applied downstream of the closed clapper assembly for a period of five minutes.

4.5 Wet Alarm Valve Connections

The valve inlet and outlet connections shall be compatible for use with LPC approved mechanical couplings or BS 4504 (Specification for flanges and bolting for pipes, valves and fittings) or equivalent.

The dimensions of connections other than the inlet and outlet connections shall be compatible with tube or fittings screwed to BS 21 (Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads), ISO 7/1 (Pipe threads where pressure-tight joints are made on the threads – Part 1: Designation, dimensions and tolerances) or LPC approved mechanical coupling systems.

4.6 Alarm Line Connection

An opening not smaller than 15mm nominal diameter tube shall be provided for the alarm line connection.

4.7 Drain Connection

A tapped opening shall be provided for draining water from the valve body when the valve is installed in any intended position. The minimum opening size shall be 20mm. If the drain is also intended for use as an installation drain the size of drain shall comply with Section 5.2.

4.8 Serviceability

Means shall be provided to permit access to working parts of the alarm valve body and allow removal of the clapper assembly where necessary. It shall permit ready maintenance with a minimum of downtime.

If cover plates are fitted, they shall be designed so that they cannot be installed in such a manner as to adversely affect the operation of the valve or improperly indicate flow direction.

Where practical, the design of any component which may normally be unassembled during field servicing shall be such that it cannot be improperly reassembled.

The design of movable parts of a valve shall be such that operation cannot be prevented by misuse and the parts shall not damage the sealing elements during valve operation.

With the exception of the valve seat, all parts intended for field servicing shall be capable of being dismantled and assembled with tools normally employed in the trade.

4.9 Clearances

Clearances shall be provided between working parts and stationary parts so that corrosion of deposits of foreign matter within an assembly will not render a valve sluggish in action or inoperative.

The clearances between the clapper assembly including the hinges area radial clearance, and the inside walls of the body castings, in every position except the wide open position shall not be less than 12mm for cast iron and 6mm for non-ferrous and stainless steel castings.

Radial clearances of not less than 3mm shall be provided to prevent contact between inner edges of a seal ring and metal parts of a clapper or clapper assembly when the valve is in the closed position. (Fig 4)

Any space in which the clapper may trap debris beyond the valve seat shall be not less than 33m deep.

The total diametrical clearance between hinge pins and their bearings shall be not less than 0.125mm. (Fig 4)

The total axial clearance between the clapper hinge and the body bearing surface shall be not less than 0.25mm. (Fig 5)

Any reciprocating guide components in the main valve body, operations of which is essential to allow a valve to open, shall have a minimum diametrical clearance of not less than 0.7mm in that portion over which the moving component enters the fixed component and not less than 0.05mm in that portion of the moving component continuously in contact with the fixed component in the ready position.

Corrosion resistant clapper guide bushings or hinge pin bearings shall project a sufficient distance to maintain not less than 3mm clearance between ferrous metal parts.

4.10 Compensators

A compensator shall be provided at the clapper assembly or alternatively in the alarm valve trim.

Compensators shall be designed such that deposits or sediment will not readily accumulate and interfere with proper operation.

Compensators shall have sufficient play between the working parts to allow proper seating of the main and any auxiliary valves.

4.11 Non-metallic Components

Although not a requirements of LPCB Approval, non-metallic components should have the relevant Water Authority approval.

4.11.1 Clapper Main Sealing Elements

Valve seating surfaces shall have sufficient width of surface contact to withstand ordinary wear and tear, rough usage, compression stresses, and damage to pipe scale or foreign matter carried by the water.

4.11.2 Test

With the clapper assembly in the closed positions, the outlet end of the valve shall be subjected to a hydrostatic pressure of 3.5 bar for a period of 90 days. Water temperature

shall be maintained at (90 + 2) ºC by an immersion or other suitable heating device. Provision shall be made to maintain the water in the inlet end at atmospheric pressure.

At the completion of this period of exposure, the water shall be removed from the valve and permitted to cool (21 + 4) ºC. With the outlet end of the valve at atmospheric pressure, the sealing assembly shall move off the seat when a hydrostatic pressure of 0.35 bar is gradually applied to the inlet end of the valve.

4.12 Fire Resistance

Non-metallic materials (other than for seals or metals with a melting point of less than 800ºC (other than pipe jointing materials) shall not be used in the pressure retaining components of the alarm valve set, except the water motor alarm.

4.13 Design (Misc)

A clapper or clapper assembly shall be such that it will move towards the seat by gravity when no water is flowing through the valve outlet connection. The use of springs to assist sealing is acceptable. Springs shall be retained at both ends so that they remain ‘in situ’ in the event of breakage.

When wide open, the clapper or clapper assembly shall bear against a definite stop, the point of contact being so made that impact or the reaction of the water will not permanently twist or bend the parts or crack the body.

Where employed, bearing plugs shall be long enough to extend inside the walls of cast iron bodies to provide an end bearing surface.

Pressure fitting of bushes shall conform to the appropriate ISO standards.

4.14 Corrosion Resistance

All interior parts (except the valve body) made of materials other than bronze shall have a corrosion resistance at least equivalent to bronze.

4.15 Hydraulic Friction Loss

4.15.1 Requirements

Head losses due to hydraulic friction shall not exceed 0.4 bar at a flow rate which gives a velocity of 5 metres per second in the full size pipe connection to the valve. Parts shall not detach from the valve during the test.

4.15.2 Test

The sample valve shall be installed in its intended mounting position(s). The pressure loss across the valve shall be measured at a flow velocity in the alarm valve full size pipe connection of 5m/s.

5 TRIM – REQUIREMENTS AND TEST METHODS

5.1 Composition

The trim shall comprise the following items:

Installation pressure gauge ('C' gauge), connections, pipe and fittings

Alarm line, fittings, filter, drain and connection for pipe to alarm motor and gong

Alarm line, fittings, stop cock

Installation drain line and stop cock

Tundish and drain connection for alarm line

Tundish and drain connection for test line

Instructions, suitably fixed and protected

Optional items are:

Retard chamber, pressure switches and flow switch (ref Section 3.1)

5.2 Pipes, Fittings, Filters and Drains

5.2.1 Requirements

Pipes used for alarm valve trim purposes shall be in conformance with one of the following:

i)	BS 1387	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.
ii)	BS 1740: Part 1	Specification for wrought steel pipe fittings.
iii)	ISO 49	Malleable cast iron fittings threaded to ISO 7/1-1 Second Edition.
iv)	BS 2051: Part 1	Copper and copper alloys capillary and compression tube fittings for engineering purposes.
v)	BS 2871: Part 2	Tubes for general purposes.

Copper pipe may be used where failure of the pipe does not adversely affect the operation of the clapper. Copper pipe may not be used on the alarm line.

A strainer shall be provided in the alarm line immediately upstream of the water motor nozzle and shall be accessible for cleaning. Strainer baskets shall be of corrosion resistant material and shall have openings with the largest dimension 1.5mm less than the smallest orifice in the alarm line pipework. The total area of openings in the strainer shall be not less than 20 times the cross-sectional area of the water motor nozzle.

The alarm line and all components between the alarm valve body and water motor connections shall automatically drain when not in operation. The drain shall allow a flow equivalent to that through an orifice with a square entry and exit, 3 mm diameter through a section 3mm thick.

The drain restrictor shall be of corrosion resistant material.

An installation drain shall be provided downstream of the clapper assembly. The drain shall be connected at the valve body or the installation pipework immediately downstream of the alarm valve. The connection and drain line shall be at least the minimum size indicated in Table 1.

Table 1. Minimum drain line and connection size.

Valve size	Minimum installation drain Line and connection size
Diameter (mm)	Diameter (mm)
50	20
65	32
80	32
100	50
125	50
150	50
200	80
250	80

An alarm test line shall be provided which is connected downstream of the clapper assembly. The test line with stop valve fully open shall discharge water equivalent to flow through nozzle not greater than K = 80 and not less than K = 57 at a service pressure of 1.4 bar.

5.2.2 Trim Stop Valves

5.2.2.1 Requirements

For trim stop valves which are critical to the operation of the alarm valve i.e. Main Stop Valve and Alarm Control Valve, it shall be readily apparent by visual inspection whether they are fully open, partially open, or closed.

It shall be possible to remove the Alarm Valve whilst the main stop valve closes off the water supply.

Trim stop valves shall have the means to be secured open by a padlocked strap. It shall be possible to sever the strap with a sharp knife.

6 WATER MOTOR ALARM – REQUIREMENTS AND TEST METHODS

6.1 General

A water motor alarm shall be designed so that it may be readily installed and serviced without using specialised tools.

Two or more assemblies intended to be assembled in the field as a unit shall be capable of being joined together without misalignment and without requiring any of the parts to be drilled, welded or otherwise altered except for a part requiring to be cut to length and/or threaded.

Bearings shall be self lubricating and all moving parts shall require minimum maintenance.

Water motor alarms shall be provided with a device to afford protection to the operating mechanism from weather and to exclude birds and vermin.

Pockets of water shall not be retained within the water motor alarm, when in its normal installation position, which may prevent operation of the alarm if frozen.

Nozzles shall have a bore diameter of not less than 3mm and shall be made of corrosion resistant material.

Sumps, strainers or other means of preventing foreign matter entering the nozzle or jet immediately upstream of the water motor nozzle shall be accessible for cleaning. Strainer baskets shall be of corrosion resistant material and have openings with the largest dimension 1.5mm less than the water motor nozzle. The total area of openings shall be at least 20 times the cross-sectional area of the water motor nozzle. The aggregate area of the strainer opening shall be at least ten time the nozzle port area.

6.2 Connections

A water motor body shall have an inlet connection suitable for pipe in accordance with BS 1387 20mm minimum diameter. There shall also be a body opening for the water drain connection which shall be at least 50 times the cross-sectional area of the water motor nozzle or jet.

6.3 Materials

An assembled water motor and gong complete with all covers and internal fittings shall be corrosion resistant.

Materials shall be resistant to the effects of temperature within the range of –35ºC to 60ºC and the effects of sunlight where components may be exposed.

6.4 Audibility

The average of three audibility test reading at each of the pressures 2 bar, 3 bar and 10 bar shall not be less than 85 dB(A) at a distance of 3 m, with no individual reading less than 80 dB(A).

The average of three audibility test readings at a pressure of 0.5 bar shall not be less than 70 dB(A) at a distance of 3 m.

6.4.1 Test

Using the test arrangement in Fig 3 conduct audibility tests outside at 0.5 bar, 2 bar, 3 bar and 10 bar at each location A, B and C. Refer to ISO 3740 (Guide for the use of basic standards and for the preparation of noise test codes) for information on audibility testing.

6.5 Operation at Minimum Operating Pressure

6.5.1 Requirements

Water motors and gongs shall operate satisfactorily when tested as below, and rotation shall commence at a pressure of 0.35 bar or less, measured at the nozzle entry.

6.5.2 Test

With a suitable water supply connected to the inlet of the water motor alarm and a lm vertical drain pipe connected to the outlet, the inlet pressure shall be determined for (a) rotation of the motor, (b) sounding of the alarm.

6.6 Durability

6.6.1 Requirements

Water motors and gongs shall be capable of satisfactory operation for the duration of the water motor alarm durability test and shall be capable of meeting the requirements of the minimum operating pressure test before and after the durability test.

6.6.2 Test

A water motor alarm shall be subjected to a continuous endurance run at the pressures, duration and sequence in the Table. Before starting and after completion of the durability test, the minimum operating pressure test and the audibility test shall be carried out. On completion of the test the water motor alarm shall be examined.

Sequence	Pressure at alarm inlet	Duration
1	Rated working pressure	5 minutes
2	0.3 x rated working pressure	50 hours
3	Rated working pressure	5 minutes

6.7 Clearances

Clearances shall be provided between water motor impeller and the water motor body so that corrosion or deposits will not render the water motor sluggish or inoperative.

7 RETARD CHAMBER – REQUIREMENTS AND TEST METHODS

7.1 Design

A retard chamber shall include means for its support. If pipework is used for support the pipe sizes and geometry shall be clearly indicated in the alarm valve set installation instructions.

Retard chambers shall include means for automatic draining as required in 5.2.
Strainers provided at the inlet to the retard chamber to prevent blockage and restrictions shall have baskets of corrosion resistant material. The largest dimension of the opening in the strainer shall be 1.5mm less than the diameter of the smaller office to be protected by the strainer. The total area of openings in the strainer shall not be less than 20 times the cross-section area of openings which the strainer is designed to protect.

7.2 Maximum Working Pressure

Retard chambers shall be capable of withstanding an internal pressure of two times the rated working of the associated alarm valve, without leakage, permanent deformation or rupture for a period of five minutes as described in 3.3

7.3 Operation

The minimum and maximum retard times for retard chambers are stated in 3.7.

7.4 Connections

The retard chamber inlet connections (from the alarm valve) and outlet connections (to the alarm devices) shall be suitable for connecting BS 1387 tube, 20mm diameter.

7.5 Non-metallic Components

As 4.11

8 PUBLICATIONS REFERRED TO

ISO 898: Part 2 EN 20898-2: 1992	Specification for nuts with specified proof load values.
BS 4504: 1989	Specification for flanges and bolting for pipes, valves and fittings.
BS 21: 1985	Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads.
ISO 7/1: 1983	Pipe threads where pressure-tight joints are made on the threads – Part 1: Designation, dimensions and tolerances.
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.
BS 1740: Part 1:1971	Specification for wrought steel pipe fittings.
ISO 49: 1994	Malleable cast iron fittings threaded to ISO 7/1-1 Second Edition
BS 2051: Part 1:1973	Copper and copper alloys capillary and compression tube fittings for engineering purposes.
BS 2871: Part 2:1972	Tubes for general purposes.
ISO 3740: 1980	Guide for the use of basic standards and for the
BS 4196: Part 0:1981	preparation of noise test codes.

9 FIGURES

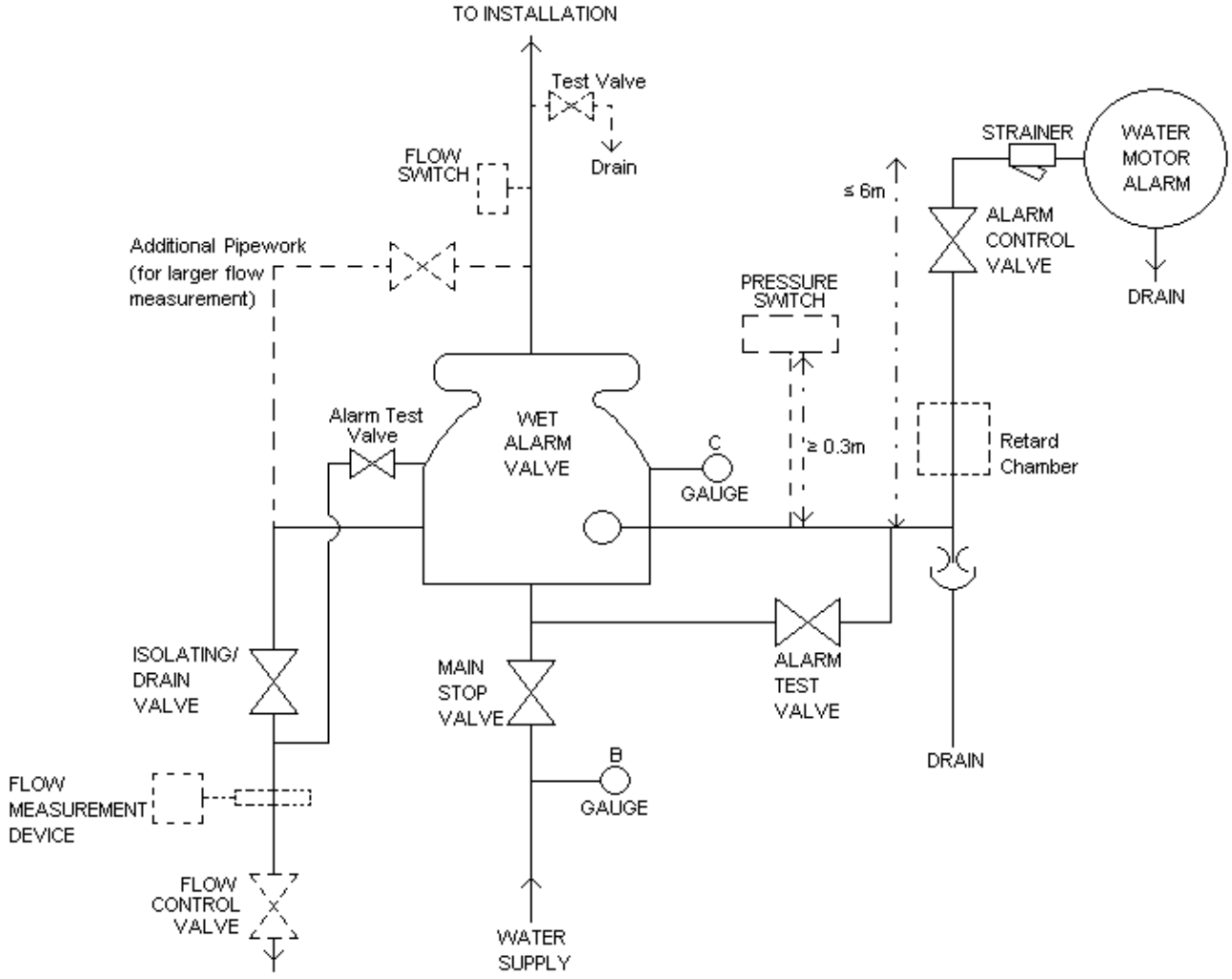


FIGURE 1 TYPICAL WET ALARM VALVE SET

NOTE: Gauges shall be provided with isolating devices

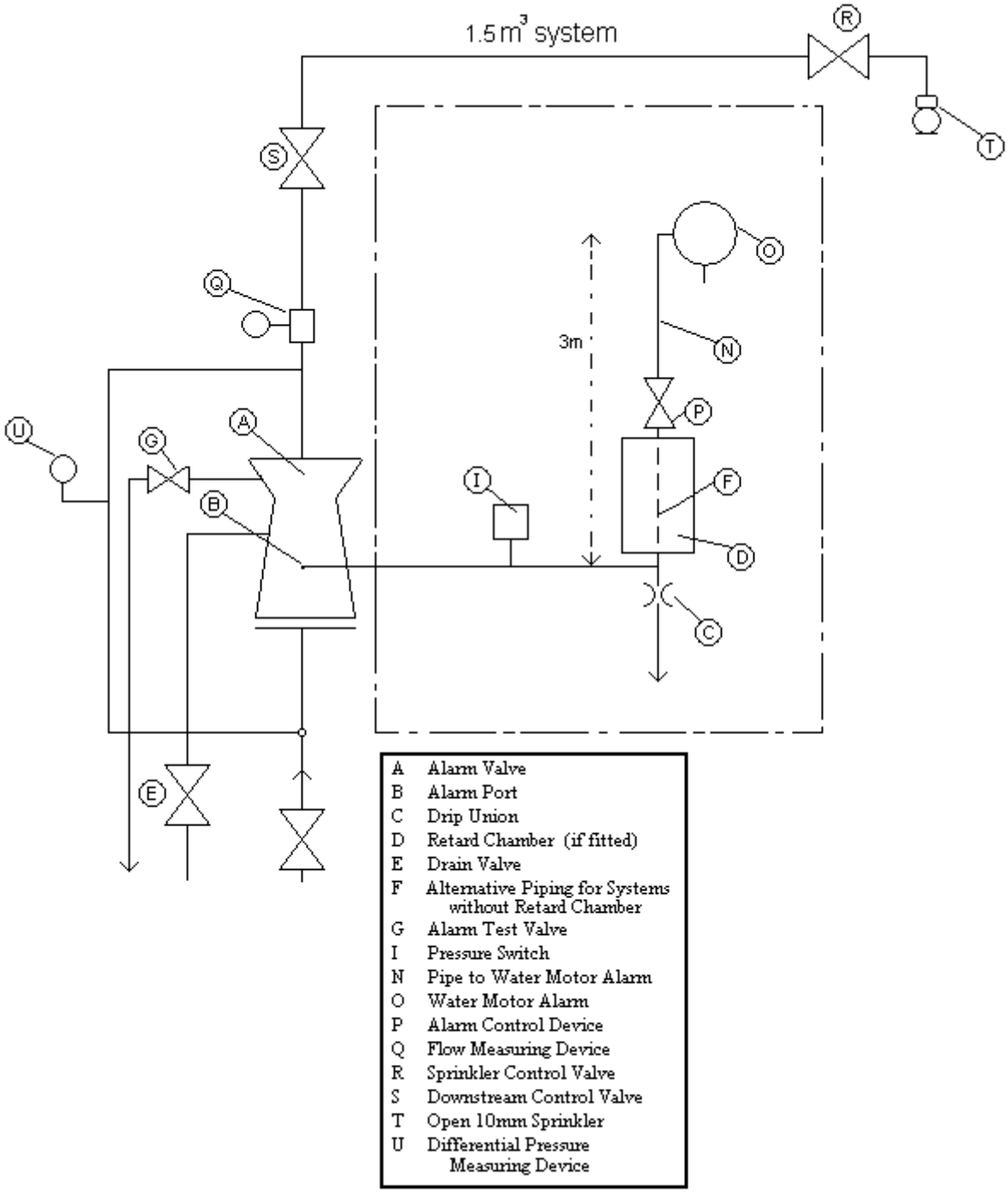
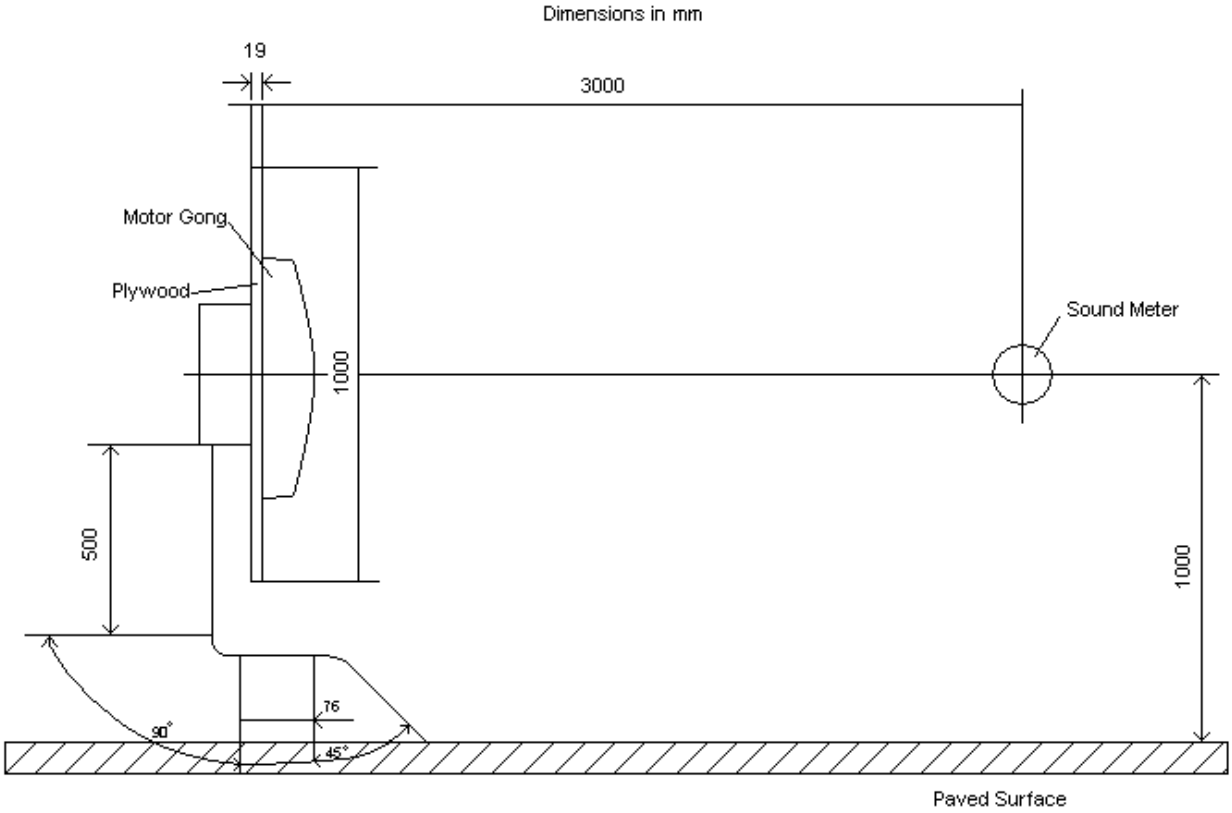
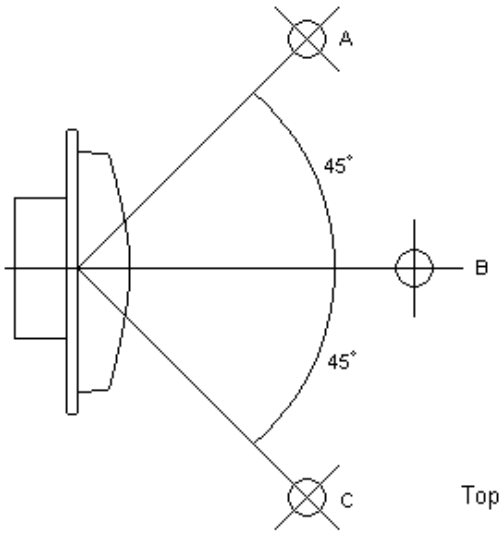


FIGURE 2 TEST INSTALLATION FOR OPERATIONAL TESTS

NOTE: The figure shows a typical layout which may be varied in accordance with the manufacturer's trim.



Side View



Top View

FIGURE 3 TEST INSTALLATION FOR AUDIBILITY TEST

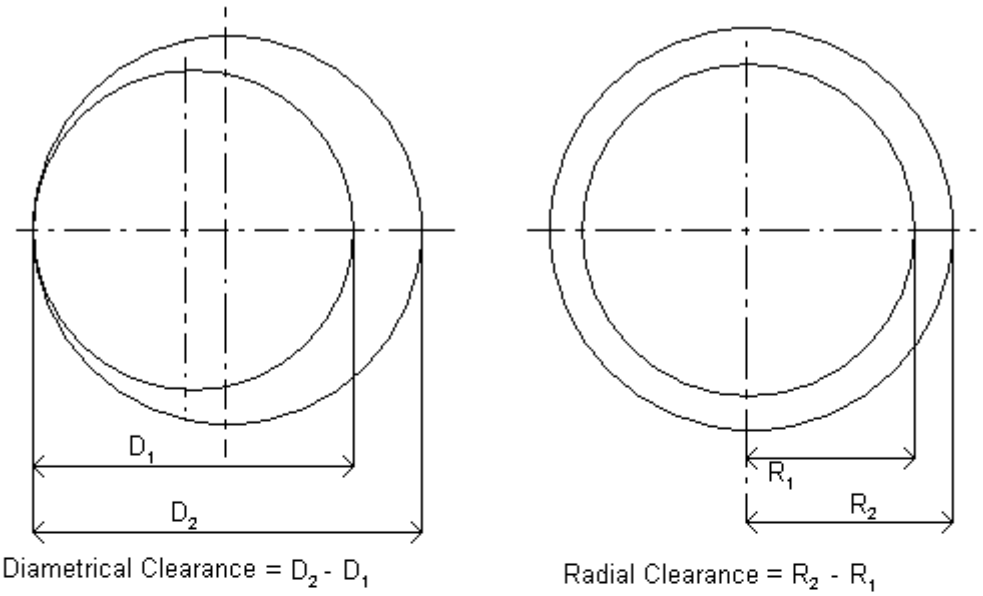


FIGURE 4 DIAMETRICAL & RADIAL CLEARANCES

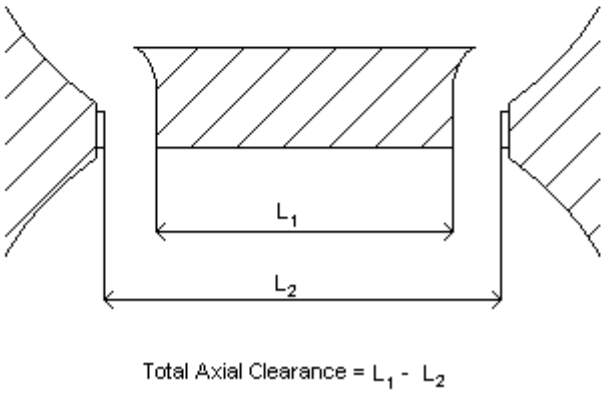


FIGURE 5 AXIAL CLEARANCE

Amendments Issued Since Publication

DOCUMENT NO.	AMENDMENT DETAILS	SIGNATURE	DATE
LPS 1040-2.1	Reformatting to standard plate	CJA	14/11/03
LPS 1040-2.2	Changes to copyright	CJA	16/09/05
LPS 1040-2.3	1. New front cover 2. Title added to header 3. Contents page moved to Page 1. 4. Web address updated on Page 2 Notes added on Page 3. 5. Correction to 4.11.2 – degree symbol added to ºC 6. Repagination	DC	Jan. 2014