

Loss Prevention Standard

LPS 1194: Issue 1.2

Requirements and testing methods for pipe hangers

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REVISION OF LOSS PREVENTION STANDARDS

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 10)

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.

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FOREWORD

This standard identifies The Loss Prevention Certification Board (LPCB) evaluation and testing practices for the certification and listing of suitable products. Certification is based on the following criteria:

- a) Satisfactory product performance and construction, in accordance with the requirements of the LPCB and the manufacturer's specifications.
- b) Satisfactory assessment by LPCB of the manufacturer's quality management systems (in accordance with ISO 9001 Quality Systems).
- c) Satisfactory product service experience.

Products which conform to the published requirements of the LPCB, but the construction of which is considered improper, may be refused certification and listing.

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.

LPCB welcomes comments of a technical or editorial nature and these should be addressed to "the Technical Director" at enquiries@breglobal.co.uk.

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1. SCOPE

This standard specifies the design and performance requirements for pipe hangers used in automatic sprinkler systems complying with the installation rules of the LPC.

2. DEFINITIONS

2.1 Pipe Hanger

An assembly for suspending pipework from elements of a building structure.

2.2 Nominal size (DN)

A numerical designation of size which is common to all components in a piping system other than components designated by outside diameters or by thread size. It is a convenient round number for reference purposes and is only loosely related to manufacturing dimensions.

Note: Nominal size is designated by the letters DN followed by the appropriate reference number. For the purposes of this standard it is used to identify the size of pipe with which the pipe hanger is compatible.

2.3 Proof load

The minimum load a pipe hanger must withstand without structural failure.

3. DESIGN REQUIREMENTS

3.1 Nominal size

Pipe hangers shall be suitable for use with steel pipework in accordance with either ISO 65 or ISO 4200 within the nominal size range DN20 to DN250.

3.2 General construction

Hangers, other than toggle hangers (which may be attached to the swivel rod by rivets) shall be held together by bolts, or threaded rod, with nuts and washers.

Spring clips and other hangers relying on the elasticity of their materials as the means of retention shall not be used.

Open hooks shall not be used.

Split ring assemblies shall be secured by bolts and nuts.

Toggle supports shall only be used for the support of pipe sizes up to DN65.

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Eye rods shall be formed from mild steel bar. The eye shall be either:

- a) Made separately from square bar and attached to the circular cross-section rod by screwing or welding; or
- b) forged integrally; or
- c) a loop or cold formed by stamping the end of the rod.

3.3 Components

Pipe hangers shall be manufactured from components complying with the following standards:

- a) BS 84: Parallel screw threads of Whitworth form.
- b) BS 1083: Precision hexagon bolts, screws and nuts (BSW & BSF threads).
- c) BS 1494: Part 1: Fixing accessories for building purposes (sundry).
- d) BS 1580: Parts 1 & 2: Unified screw threads, ¼" & larger.
- e) BS 1768: Unified precision hexagon bolts, screws and nuts (U.N.C. & U.N.F. threads).
- f) BS 3410: Imperial and Unified series washers.
- g) BS 3643: Part 2: ISO metric screw threads.
- h) BS 3692: ISO metric precision hexagon bolts, screws and nuts.
- i) BS 4190: ISO metric black hexagon bolts, screws and nuts.
- j) BS 4320: ISO metric series washers.

The same thread form shall be used for each component.

3.4 Materials

Pipe hangers shall be manufactured from materials complying with one or more of the following:

- a) BS 970: Part 1: Wrought steels for mechanical and allied engineering purposes.
- b) BS 1449: Parts 1 Steel plate, sheet and strip.
- c) BS EN 1561 - Grey castings.
- d) BS EN 10113 - Weldable fire grade structural steels.
- e) BS EN 1562 - Malleable cast iron.

3.5 Cross-sections

Pipe hanger components without protection against corrosion shall have a minimum thickness of 3mm. Components protected against corrosion to DD24 or manufactured from stainless steel to B.S.1449: Part 2 Grade 304S 15, shall have a minimum thickness of 1.2mm.

All components shall conform to the minimum material sizes shown in Table 1.

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Table 1 Minimum dimensions of pipe clips, sling rods and "U" bolts

Nominal pipe size > DN ≤ DN		Minimum material cross section of pipe clip				Maximum hole size in clip mmØ	Minimum diameter of single sling rod or bolt mm
		Non-corrosion protected ferrous other than stainless steel mm mm		Corrosion protected steel, stainless steel or non-ferrous mm mm			
	20	20 x 3.0		20 x 1.2		11	10
20	65	20 x 3.0		20 x 1.2		11	10
65	100	25 x 3.0		25 x 1.2		11	10
100	150	32 x 3.0		32 x 1.6		13	12
150	200	40 x 3.0		40 x 2.0		18	16
200	250	50 x 3.0		50 x 2.0		22	20

3.6 Marking

Each pipe hanger shall be marked with the following:

- a) The manufacturer's / supplier's name or trademark.
- b) Type designation.
- c) Nominal size.

4. PERFORMANCE AND TEST METHODS

4.1 Examination

Requirement

The principal dimensions and component configuration of a pipe hanger shall conform to the manufacturer's drawings and engineering specification.

Test

Inspect pipe hanger and measure principal dimensions, compare component configuration and dimensions with manufacturer's drawings / specification.

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4.2 Resistance to deformation

Requirement

The elastic and plastic elongation of a pipe hanger shall not exceed 5mm when subjected to the proof load corresponding to its size (see Table 2).

Test

The pipe hanger specimen shall be installed in accordance with the manufacturer's instructions and a datum established on the underside of the specimen when subjected to the pre-measurement load corresponding to its size specified in Table 2. A linear instrument having a resolution of 0.01mm shall be used.

The load shall then be increased to the corresponding proof load for 2min + 30s/-0s and whilst the load is still applied the deflection registered on the linear displacement instrument minus the datum reading (if applicable) shall be recorded.

Table 2 Pre measurement and proof loads

Nominal pipe size		Pre measurement nominal load N	Proof load N
> DN	≤ DN		
-	20	150	1500
20	50	150	1500
50	65	200	1650
65	80	400	3400
80	100	500	5200
100	150	1000	10200
150	200	1000	16250
200	250	1000	25000

4.3 Strength

Requirement

A pipe hanger shall be capable of withstanding the proof load corresponding to its size without structural failure.

Test

Following completion of the deformation measurement maintain the load for a further 3 min i.e. a total of 5 mins + 30s/-0s. Record details of any structural failure.

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4.4 Resistance to corrosion

Requirements

A pipe hanger shall remain intact following sulphur dioxide corrosion conditioning and subsequently the elastic and plastic elongation shall not exceed 5mm and no structural failure shall occur when subjected to the proof load corresponding to its size.

Test

Dissolve 40g of sodium thiosulphate crystals in 1L of distilled water and pour solution into the glass vessel of a 10L sulphur dioxide corrosion test apparatus.

Suspend specimen for test in its normal mounting position within the glass vessel.

Set controller to regulate the temperature in the glass vessel to $45^{\circ}\text{C} \pm 3^{\circ}\text{C}$.

The temperature sensor shall be positioned centrally $45\text{mm} \pm 5\text{mm}$ above the bottom of the vessel.

When temperature in vessel has stabilized as required, commence adding a 15.6% by volume solution of sulphuric acid (1N of H_2SO_4) in distilled water to the vessel at a rate of $40\text{ml} \pm 1\text{ml/day}$.

Condition the specimen in the sulphur dioxide atmosphere thus generated for 16 days +3h/-0h ensuring that the vessel is emptied and cleaned after 8 days +3h/0h and recharged with a fresh solution of sodium thiosulphate and water.

After conditioning allow specimen to dry and cool to $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ by storing for 7 days ± 1 day in an atmosphere with a relative humidity not greater than 70% RH.

Inspect for damage and record details.

Conduct resistance to deformation and strength tests in accordance with Clauses 4.2 and 4.3 respectively.

5. PUBLICATIONS REFERRED TO

ISO 9001: Quality management systems – Requirements

BS 84:1956 Specification for parallel screw threads of Whitworth form.

BS 970: Part 1:1983 General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels.

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BS 1083:1965	Specification for precision hexagon bolts, screws and nuts (B.S.W. & B.S.F. threads).
BS 1449: Part 1:1983	Specification for carbon and carbon manganese plate, sheet and strip.
BS 1449: Part 2:1983	Specification for stainless and heat-resisting steel plate, sheet and strip.
BS 1452:1990	Specification for flake graphite cast iron.
BS 1494: Part 2:1967	Sundry fixings.
BS 1580: Part 1:1962 (1985)	Specification for Unified screw threads (U.N.C.).
BS 1580: Part 2:1962 (1985)	Specification for Unified screw threads (U.N.F.).
BS 1768:1963	Specifications for Unified precision hexagon bolts, screws and nuts (U.N.C. & U.N.F. threads). Normal series.
BS 3410:1961	Specification for metal washers for general engineering purposes.
BS 3643: Part 2:1981	Specification for selected limits of size.
BS 3692:1967	Specification for ISO metric precision hexagon bolts, screws and nuts. Metric units.
BS 4190:1967	Specification for ISO metric black hexagon bolts, screws and nuts.
BS 4320:1968	Specification for metal washers for general engineering purposes.
BS 4360:1990	Specification for weldable structural steels.
BS 6681:1986	Specification for malleable cast iron.
ISO 65: 1981	Carbon steel tubes suitable for screwing in accordance with ISO 7/1.
ISO 4200:1991	Plain end steel tubes, welded and seamless - General tables of dimensions and masses per unit length.

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Amendments Issued Since Publication

DOCUMENT NO.	AMENDMENT DETAILS	SIGNATURE	DATE
LPS 1194-1.0	Copyright change	CJA	30/07/02
LPS 1194-1.1	Further copyright changes	CJA	20/09/05
LPS 1194-1.2	<ol style="list-style-type: none"> 1. New front cover 2. Title added to header 3. Contents page moved to Page 1 and updated 4. Revision of Loss Prevention Standards added on Page 2 5. Notes added on Page 3 6. Repagination 7. Update to copyright information 8. Update of references to ISO 9001 standard (Foreword, Clauses 5) 	DC	Jan. 2014