



Loss Prevention Standard

LPS 1240: ISSUE 1.0

REQUIREMENTS FOR LPCB APPROVED FIRE SPRINKLER PUMP SETS USED IN AUTOMATIC SPRINKLER INSTALLATIONS

*This standard specifies the requirements for
the certification of fire pump sets for use in
automatic sprinkler system installations.*

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PARTICIPATING ORGANISATIONS

This standard was approved by the LPC Fire and Security Board and Expert Group C.

The following organisations participated in the preparation of this standard:-

Association of British Insurers / Lloyd's
 Association of Building Engineers
 Association of Chief Police Officers
 Association for Specialist Fire Protection
 British Automatic Fire Sprinkler Association
 British Security Industry Association
 BT
 Confederation of British Industry
 European Fire Sprinkler Network
 Chief Fire Officers' Association
 Door & Hardware Federation
 Electrical Contractors Association
 FIA
 Health & Safety Executive
 Home Office
 INFIREs
 International Fire Sprinkler Association
 MetroNet
 National Fire Sprinkler Association
 Risk Engineering Data Exchange Group
 Royal and Sun Alliance
 Royal Institution of Chartered Surveyors
 The Fire Protection Association

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.

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 evaluation and testing practices undertaken by LPCB for the purposes of approval and listing of products. LPCB listing and approval of products and services is based on evidence acceptable to LPCB:-

- that the product or service meets the standard
- that the manufacturer or service provider has staff, processes and systems in place to ensure that the product or service delivered meets the standard

and on:-

- periodic audits of the manufacturer or service provider including testing as appropriate
- compliance with the contract for LPCB listing and approval including agreement to rectify faults as appropriate

This standard stipulates the requirements for certification of pump sets for use in automatic sprinkler systems conforming to BS EN 12845:2003 (Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance).

This standard should be read in conjunction with LPCB Scheme Document SD139 (Pumps Sets for Automatic Sprinkler Installations)

NOTE:- Compliance with this LPS standard does not of itself confer immunity from legal obligations. Users of Loss Prevention Standards 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.com.

- This standard is for intended to apply to pump sets for use in sprinkler systems conforming to sprinkler system installation standards, for example the “LPC Rules for automatic sprinkler systems” (incorporating EN 12845:2003)
- This standard specifies requirements for pump sets for use in automatic sprinkler systems. Any regulatory requirements e.g. the Building Regulations, Health and Safety at Work Regulations, the Fire Precautions (Workplace) Regulations, the various European Directives all take precedence over this standard.
- Scheme Document SD139 specifies the method to be used to undertake & maintain approval.

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Listed products and services appear in the LPCB “List of Approved Products and Services” which may be viewed on our website:- www.redbooklive.com or obtained in hard copy or CD by telephoning +44 (0) 1923 664100.

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1 SCOPE

This standard specifies LPCB's requirements for the approval of Fire Pump Sets for use in sprinkler systems conforming to sprinkler system installation standards, for example the "LPC Rules for automatic sprinkler systems" (incorporating EN 12845:2003)

This standard is not intended to cover all aspects of the design and build of a pump set. It is limited to addressing certain critical areas, which are known to affect the ability of sprinkler systems to perform.

The requirements for both diesel fire pump sets and electric fire pump sets are covered in this standard.

This standard specifies the fire pump set requirements by:

- Referencing the relevant standards
- Detailing pump set requirements which are not covered by other fire protection standards (eg. engine protection during weekly test, couplings, base plates and installation requirements)
- The detailing requirements in this standard will take precedence (with the exception of regulatory requirements, which must always take precedence) over any other requirements.

Suppliers of LPCB Approved Fire Pump Sets shall control and be responsible for the design, construction, testing, performance, provision of installation instructions and commissioning of their fire pump sets.

The installer of the approved fire pump set is responsible for the installation of the pump set in strict accordance with the manufacturer's installation manual and procedures. An LPCB approved sprinkler system installer, with sufficient knowledge and training in relation to the manufacturer's product, should always be used.

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2 DEFINITIONS

Fire pump set – An assembly comprising at least a pump, driver or motor, partial wiring loom, drive coupling and a mounting and/or base, which is intended to supply water to an automatic sprinkler installation.

Installer - The installer of the approved fire pump set is responsible for the installation of the pump set in strict accordance with the manufacturer's installation manual and procedures. (An LPCB approved sprinkler system installer, with sufficient knowledge and training in relation to the manufacturer's product, should always be used.)

Supplier – Supplier of LPCB Approved Fire Pump Sets shall control and be responsible for the design, construction, testing, performance, provision of installation instructions and commissioning of their fire pump sets.

3 REQUIREMENTS

3.1 Prerequisites

The pump set manufacturer should be able to demonstrate to LPCB at least 3 years previous experience of fire pump set manufacture, or heavy duty process pump set manufacture.

The pump set shall use LPCB approved components, where available (for example diesel driver, bare-shaft pump and control panel). Where approved components are not available, components suitable for the intended installation code must be used.

Table 1 – pre-requisites component approvals.

| Standard | Status |
|---|---|
| LPS 1239 – Bare shaft pumps | Published – LPCB approved items available |
| LPS 1131 – Diesel Drivers | Published – LPCB approved items available |
| LPS 1238 – Electric Drivers | No LPCB approved items available. Intended for future publication. |
| LPS 1236 – Control panels for Diesel drivers | Draft – No LPCB approved items available. Intended for publication 2008 |
| LPS1237 – Control panels for Electric drivers | No LPCB approved items available. Intended for future publication. |

3.2 Documentation

Each fire pump set shall be supplied with a set of comprehensive documentation as follows:

Where installation, service or maintenance operations described are sequential, this should be identified and each stage should be presented in the correct sequential order.

Note: It is permissible & preferable for the information to be divided up between different sets of documents (e.g. User manual, installer manual, service manual).

The following items marked with bullets identify general headings and specific items of

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critical importance which shall be clearly presented in the pump set manufacturer's documentation.

A list of suggested general headings are provided below as a guide (but not a complete list of all items):

- Commissioning and operation
- Maintenance and service
- Faults and remedial action
- Pump dimensions
- Pump connections
- Pump sections and parts list

Documentation must contain all required information, also specific, detailed information about the following items:

- Pump set component details
- Coupling misalignment tolerance dimensional limits (in x, y, z plane & angular)
- Transport, handling and storage procedures
- Site assembly and installation of pump set. Specifically the following items should be included as part of a pre-commissioning checklist :
 - Foundation and mounting plinth details for pump set base – dimensions, material, reinforcing rods details
 - Foundation bolt hole size and positioning, and bolt fixing (if applicable)
 - Positioning and mounting instructions for pump base plate, with initial levelling and alignment instructions, and;
 - Details of shimming, packing or wedge materials, sizes and exact positioning (with diagrams)
 - Bolt grouting requirements (if applicable)
 - Fixing base plate to plinth - bolt tightening procedure (sequence and torque)
 - Bolt requirements (size and type)
- Connection of suction and delivery piping (including maximum allowable misalignment which can be tolerated by the pump set)
- Final alignment and levelling instructions (if applicable), with;
 - Final shimming/packing materials, sizes and positioning, with diagrams (if different from above)
 - Grouting the base plate at the relevant stage (if applicable)

Operating and maintenance instructions shall include all aspects of the servicing and maintenance of the unit and have a declaration of life expectancy, for specified loading conditions and degrees of misalignment.

The hydraulic characteristic curve for the pump shall be provided by the manufacturer with the pump set.

Details of all pump set labels shall be supplied to LPCB.

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Pump set general arrangements drawings shall be supplied to LPCB.

3.3 Design and Construction

3.3.1 General design

Fire pump sets shall be designed to comply with the client's performance requirements and the applicable installation standard, for example The LPC Rules. The pump and driver shall be sized accordingly.

Fire pump sets shall comprise major component parts which are LPCB approved to the following standards (where approved components are available).

For Diesel Fire Pump Sets:

- LPCB approved pump, in accordance with LPS 1131
- LPCB approved diesel engine, in accordance with LPS 1239
- LPCB approved controller, in accordance with LPS 1236 (to be published)

For Electric Fire Pump Sets:

- LPCB approved pump, in accordance with LPS 1131
- LPCB approved controller, in accordance with LPS 1237 (to be published)

3.3.2 Protection of the diesel engine during the weekly test

No measures to protect the driver or motor by shutting down the driver or motor during the weekly test are permitted. Outputs to allow for audible and visual alarms for the following conditions are permissible: over speed, low oil pressure or high coolant temperature.

3.3.3 Base plate / supporting chassis

The base plate and supporting chassis or equivalent assembly shall:

- Support the pump and driver assembly and allow the pump set assembly to operate as intended
- Ensure the pump set retains correct alignment, once mounted, as specified by the manufacturer.

This clause will require design calculations (verified by an independent chartered engineer) to be supplied to LPCB. LPCB may in turn appoint an independent expert to review these design calculations if LPCB deem this to be necessary.

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3.3.4 Driver or motor and pump mounts

Driver or motor and pump mounts shall be capable of withstanding expected loadings and shall be manufactured from materials appropriate for use in a machinery room.

This clause will require design calculations (verified by an independent chartered engineer) to be supplied to LPCB. LPCB may in turn appoint an independent expert to review these design calculations if LPCB deem this to be necessary.

3.3.5 Batteries

Two separate battery power supplies shall be provided for engine starting and control panel backup. They shall be used for no other purpose.

Batteries shall be either:

- Open nickel – cadmium prismatic rechargeable cells complying with BS EN 60623 (Secondary cells and batteries containing alkaline or other non-acid electrolytes. Vented nickel-cadmium prismatic rechargeable single cells) (or BS 6260 (Specification for open nickel-cadmium prismatic rechargeable single cells – withdrawn).
- Lead-acid Plante positive batteries complying with BS EN 60896 part 1 Stationary lead-acid batteries. General requirements and methods of test. Vented types (or BS 6290 part 1 – withdrawn) and BS 6290 Part 2.

3.3.6 Wiring loom

Wiring provided by the pump set engine manufacturer shall be adequately rated for its purpose, in accordance with BS 7671 (Wiring Regulations).

Shielded wire or some other type of EMF protection is to be used for the circuit between terminals 2, 3 and 20 which are the magnetic pickup signal wires.

The cable insulation and any conduit used shall be oil, gas and fuel resistant and it shall be rated in excess of the expected temperature conditions it will be exposed to. The bundle of wires should be protected in some sort of loom, and should be routed away from hot areas of the engine.

For electric motors, requirements are given in the LPC Rules for automatic sprinkler systems, BS EN 12845 clause 10.8 and Technical Bulletin 220 clause 2.11.

3.3.7 Fuel System

The fuel plumbing between the tank and engine shall be of all metallic design or steel braided reinforced hose with an independent fire resistance approval to BS EN ISO 7840 or BS EN ISO 15540.

The fuel supply shall have a lockable on-off valve sized according to the engine manufacturer's recommendations. Galvanized metal piping shall not be permitted (diesel fuel and zinc react causing the plating to detach).

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3.3.8 Cooling Water Lines – Heat Exchanger Cooling

Cooling water lines to the heat exchanger are to be a minimum 15 mm nominal bore copper taken from the discharge side of the pump, prior to the pump discharge valves. The piping shall incorporate a strainer of at least one pipe size larger than the pipe work, a pressure regulator (if required), pressure gauges and automatic flow valve.

Components shall be assembled in the following order (in the direction of flow): a manual shut-off valve, strainer (as detailed above), pressure gauge, manual shut-off valve, automatic flow valve, pressure regulator (if required) and pressure gauge. A full sized by-pass line shall allow isolation of the strainer and manual shut-off valve, for maintenance purposes only.

In normal operation, cooling water flow shall be through the strainer with the by-pass line secured closed. This strainer shall be capable, by type or use of unions, of being easily removed for maintenance, during which time the by-pass line shall be opened.

3.3.9 Cooling system

Where the heat exchanger is cooled by sprinkler water, the cooling water flowing through the heat exchanger shall discharge into an open tundish and be clearly visible. The tundish shall be at least 150 mm diameter, and connect to a drain of at least 80 mm diameter.

3.3.10 Exhaust

The exhaust piping and silencer shall be sized to not exceed the engine manufacturer's exhaust back pressure limits.

3.3.11 Power transmission - Driver to pump couplings

Driver or motor to pump coupling arrangements shall be capable of being serviced. When following the manufacturer's service and maintenance documentation, the coupling shall:

- Be 'fail safe' – of a design that provides emergency drive capability if flexible elements fail
- Be misalignment tolerant, within limits specified by the manufacturer (see section 3.2)
- Have a declaration of life expectancy, given loading conditions and degrees of misalignment (see section 3.2)
- Have dampening characteristics
- Have an adequate means of attachment to shafts, given expected loadings and permissible misalignment *

* This clause will require design calculations (verified by an independent chartered engineer) to be supplied to LPCB. LPCB may in turn appoint an independent expert to review these design calculations.

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3.4 Factory Testing.

The requirements for factory testing are defined by BS EN 12845 & LPC sprinkler rules clause 10.9, 13.1, which is repeated here for ease of reference:

“Supplier's test and certification of results. Each complete engine and pump set shall be tested by the supplier for no less than 1½ hrs at the rated flow. The following shall be recorded on the test certificate:

- a) the engine speed with the pump churning;*
- b) the engine speed with the pump delivering water at the rated flow;*
- c) the pump churning pressure;*
- d) the suction head at the pump inlet;*
- e) the pump outlet pressure at the rated flow downstream of any outlet orifice plate;*
- f) the ambient temperature;*
- g) the cooling water temperature rise at the end of the 1,5 h run;*
- h) the cooling water flow rate;*
- i) the lubrication oil temperature rise at the end of the test run;*
- j) where the engine is fitted with a heat exchanger the initial temperature and the temperature rise of the engine closed circuit cooling water.”*

3.5 Site Installation - Base Plate Fixing

The method of base plate fixing shall be detailed in the Instruction Manual (ref.3.2). Where shimming locations are critical, these shall be specified by the manufacturer, and marked clearly and permanently (paint resistant to water and diesel) on the base plate.

3.6 Site - Inspection, Performance Testing & Commissioning

Shimming and grouting (where used) shall be inspected by the LPCB approved installer for compliance with the pump set manufacturer's instructions.

The water supplies shall be tested as specified in BS EN 12845 clause 19.1.3, and diesel engine driven pump sets shall be subjected to the “fail to start” test in BS EN 12845 clause 10.9.13.2. These clauses 19.1.3 & 10.9.13.2 are repeated here:

“10.9.13.2 - When commissioning an installation the automatic starting system of the diesel engine shall be activated with the fuel supply isolated for the six cycles each of no less than 15 s cranking and no more than 15 s or less than 10 s rest. After completion of the six starting cycles the fail to start alarm shall operate. The fuel supply shall than be restored and the engine shall start when the manual start test button is operated.

19.1.3 - Water supplies shall be tested once as specified in 8.6, and diesel engine driven pumps shall be tested as specified in 20.2.2.5.”

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4 MARKING, LABELLING AND PACKAGING

The manufacturer shall provide appropriate marking, labelling and packaging for the safe transport and subsequent operation of the product as well as a clear designation of the manufacturer, their contact address, the product model identification and any other safety requirements. See section 3.2 and Scheme Document 139 (SD139) for further details.

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5 PUBLICATIONS REFERRED TO:

BS 6260 - Specification for open nickel-cadmium prismatic rechargeable single cells

BS 6290-1 - Lead-acid stationary cells and batteries. Specification for general requirements

BS 6290-2 - Lead-acid stationary cells and batteries. Specification for the high-performance Plante positive type

BS 7671 – The wiring regulations.

BS EN 12845 - Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance

BS EN 60623 - Secondary cells and batteries containing alkaline or other non-acid electrolytes. Vented nickel-cadmium prismatic rechargeable single cells

BS EN 60896-1 - Stationary lead-acid batteries. General requirements and methods of test. Vented types

BS EN ISO 7840 – Small craft – fire resistant fuel hoses.

BS EN ISO 15540 – Ships and marine technology – fire resistance of hose assemblies – test methods

LPS 1131 - Requirements and testing methods for pumps for automatic sprinkler installation pump sets.

LPS 1239 - Requirements and Testing Procedures for the LPCB Approval and Listing of Diesel Engines for Sprinkler Pump Sets

LPS 1236 - Requirements for control panels for diesel engine driven pumps used in automatic sprinkler installations (unpublished draft)

LPS 1237 - Requirements for control panels for electric motor driven pumps used in automatic sprinkler installations (unpublished draft)

The LPC Sprinkler rules - LPC Rules for Automatic Sprinkler Installations Incorporating BS EN 12845

For undated references please refer to the latest published issue.

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