

## Loss Prevention Standard

LPS<sup>®</sup> 1236 : Issue 2.0

Requirements for control panels for diesel engine driven pumps used in automatic sprinkler installations



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## **PARTICIPATING ORGANISATIONS**

This standard has been developed in conjunction with Industry Stakeholders and was the subject of public consultation via the BRE Global website.

## **REVISION OF LOSS PREVENTION STANDARDS**

Loss Prevention Standards (LPSs) will be revised by issue of revised editions or amendments. Details will be posted on our website at [www.redbooklive.com](http://www.redbooklive.com).

Technical or other changes which affect the requirements for the 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 LPSS SHOULD ENSURE THAT THEY POSSESS THE LATEST ISSUE AND ALL AMENDMENTS.**

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## FOREWORD

This Standard identifies the evaluation and / or testing practices undertaken by BRE Global for the purposes of LPCB certification and listing of products and services. LPCB certification and listing and of products and services is based on evidence acceptable to BRE Global:-

- 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 certification and listing, including agreement to rectify faults as appropriate;

The responsibility for ensuring compliance with the technical and managerial process and requirements for the product or service lies with the manufacturer, service provider or supplier.

Suppliers of LPCB Approved pump controllers shall control and be responsible for the design, construction, testing, performance and provision of installation and commissioning instructions for their pump controller as well as compliance with all relevant regulatory requirements and standards.

The installer of the approved pump controller is responsible for the installation of the pump controller in strict accordance with the manufacturer's installation manuals and procedures.

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## 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 [BREGlobalEnquiries@bregroup.com](mailto:BREGlobalEnquiries@bregroup.com).

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## 1 SCOPE

This standard specifies LPCB's requirements for the approval of control panels for diesel driven 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 - Fixed firefighting systems - Automatic sprinkler systems - Design, installation and maintenance).

**This standard is not intended to cover all aspects of the design and build of a control panel. It is limited to addressing certain critical areas, which are known to affect the ability of sprinkler systems to perform and comply with installation codes.**

This standard is part of a series relating to several aspects of a pump set. It should be read in conjunction with the other appropriate standards:

<b>Standard</b>	<b>Status</b>
LPS 1131– Bare shaft pumps	Published – LPCB approved items available
LPS 1239 – Diesel Drivers	Published – LPCB approved items available
LPS 1236 – Control panels for Diesel drivers	This standard
LPS 1237 – Control panels for Electric drivers	Published
LPS 1238 – Electric Drivers	Intended for future publication. No LPCB approved items available
LPS 1240 – Pump Sets	Publication pending

This standard specifies the diesel fire pump set controller requirements by:

- Detailing diesel pump set controller requirements which are not covered by other fire protection standards.
- The detailing requirements in this standard will take precedence (with the exception of regulatory requirements, which must always take precedence) over any other requirements.
- Referencing the relevant standards

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## **2 DEFINITIONS**

In addition to the definitions of BS EN 12845 and “LPC Rules for automatic sprinkler systems” (incorporating EN 12845 - Fixed firefighting systems - Automatic sprinkler systems - Design, installation and maintenance), the following definitions are relied upon in this document.

### **2.1 Diesel pump controller**

The control panel that monitors demand for sprinkler system water, controls the diesel engine start-up sequence when called upon, allows testing of pump set and monitors specified pump set system fault & alarm conditions.

### **2.2 Engine Control Module (ECM)**

Microprocessor controlled engine management systems including feedback, control and fault handling.

Note: Use of ECMs is not acceptable in LPCB fire protection applications until further work considering performance and reliability implications has been undertaken.

### **2.3 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.

### **2.4 Pump set supplier or pump set manufacturer**

The entity responsible for the design, construction, testing, performance, provision of installation instructions and commissioning of their fire pump sets

### **2.5 Pump set installer**

The entity responsible for the installation of the fire pump set, in accordance with the pump set suppliers' instructions.

### **2.6 Diesel pump controller supplier or diesel pump controller manufacturer**

The entity responsible for the design, construction, testing, performance and provision of installation and commissioning instructions for their control panel for diesel engine driven pumps.



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### **3 REQUIREMENTS**

#### **3.1 General**

Control panels for diesel engine driven pumps shall be designed and manufactured to meet the requirements of this standard, referenced documents and the requirements of the applicable installation standard (typically LPC Rules for automatic sprinkler systems, incorporating BS EN 12845).

Control panels for diesel engine driven pumps shall be designed to operate correctly at ambient temperatures from 0°C to 50°C. Where the designer proposes a system that has to operate at temperatures outside this range, successful tests shall be carried out at the relevant extreme temperatures and consideration given to other factors affecting system performance should be considered.

#### **3.2 Enclosure**

##### **3.2.1 Environmental protection**

The control panel housing shall be of non-combustible material [EN 13501:1 – EuroClass A1] and provide a degree of protection at least equal to IP 54 (BS EN 60529 - Specification for degrees of protection provided by enclosures (IP code)) or be suited to its environment where the conditions are more demanding.

##### **3.2.2 Access to control panel**

The enclosure door shall be fitted with a suitable locking device, requiring the use of a key or special tool, in order to restrict access to authorised personnel only. It shall not be possible to open the panel door without having first isolated the AC main supply.

##### **3.2.3 Location**

Control panels for diesel engine driven pumps shall be located as close as practicable to the pump sets, they control and shall be within sight of the pump set. The controller must not be mounted directly on the pump set and must not be exposed to any undue sources of vibration. Mounting on the pump set with suitable vibration damping mounts is permissible.

#### **3.3 Power supply**

##### **3.3.1 Mains feed**

The main AC supply switch operating handle shall be outside the housing of the equipment and interlocked with the enclosure door. If mains power supply is turned off, the panel shall continue to run powered by its batteries. A switch accessible from inside the panel enclosure shall be provided to isolate the battery power when required for maintenance.

The fuse or circuit breaker ratings shall be clearly shown at a point near the devices.

The metal earth for the housing shall be connected directly to a terminal which provides for connection to an earthing point. This terminal shall be labelled.

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### 3.3.2 Batteries

As per LPS 1240 (pump sets), two separate 12 or 24V DC battery power supplies shall be provided for engine starting and control panel backup. They shall be used for no other purpose. They shall be maintained on charge by two chargers connected to the mains.

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), or:
- 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 – Lead-acid stationary cells and batteries. Specification for general requirements (withdrawn) and BS 6290 Part 2 - Lead-acid stationary cells and batteries. Specification for the high-performance Plante positive type).

Each battery shall have the design capacity to rotate the engine at 0 °C and 760 mm mercury atmospheric pressure for not less than 10 cycles each of not less than 15 s cranking and not more than 10 s rest. At the end of the energized part of each cycle the engine cranking speed shall be not less than 120 r/min whilst power is applied.

### 3.3.3 Chargers

Two totally independent, constant, potential/current limited battery chargers are to be provided.

The battery chargers shall be independently powered from the controller single phase A.C. supply via surge limiting fuses or circuit breakers. It shall be possible to remove either charger whilst leaving the other operational.

During standby conditions each battery charger must be continuously energised and permanently connected to its respective battery set. The charger outputs for normal float conditions should be set in accordance with the battery manufacturer's recommendations to allow the optimum trickle current to flow through the batteries, ensuring that they are maintained in a fully charged condition with minimum water loss. The controller circuits' standing load on the batteries should be automatically compensated for. Chargers shall be rated to ensure batteries are restored to 90% of the batteries ampere hour rating within 24 hours.

During engine cranking:

- The controller circuits shall automatically turn off both battery chargers, or;
- The chargers shall be designed to be able to cope with the voltage drop (see 4.2).

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### 3.3.4 Boost charge

A boost charge facility shall be provided for charging to a higher voltage again in accordance with battery manufacturers recommendations. The boost control (if the panel design requires one) should be accessible only from within the panel housing.

Operation of the chargers is to be monitored, and in the event that either charger output fails, or if either battery set becomes faulty or disconnected, then the 'charger fault' alarm should operate. Charger alarms are to be inhibited while the chargers are turned off during cranking.

### 3.4 Operational parameters

The control panel shall ensure the automatic and manual operation, control and monitoring of:-

- engines in the pump assembly
- additional equipment (starter, batteries etc.)
- its own logic and components

When powered up, normal operation must be ensured at temperatures between 0°C and 50°C or over a wider temperature range if specifically requested by the designer.

In addition, the panel shall be equipped with devices which will permit the transfer of information and data, as detailed in section 3.5.

#### 3.4.1 Automatic starting system

Automatic start-up shall be by means of a contact which opens to initiate a start. This shall be triggered by a de-energised pressure switch signal. This sequence shall be initiated automatically on receipt of a signal indicating pressure drop in the fire protection system. The automatic start facility shall remain functional at all times, with only the following exceptions:

- The engine is already rotating under its own power
- After a “fail to start”
- When the Automatic start sequence isolating switch is activated. (This is to be an isolating switch at the control panel, protected from unauthorised use by a key-locked device)

The automatic starting sequence shall make six attempts to start the engine. The system shall switch over automatically to the other battery after each cranking attempt. Each attempt shall be of a minimum of 10 to 15 seconds duration. There shall be a maximum pause of 10 to 15 seconds between each attempt.

If, after the 6 sequences, there is no information that start-up has occurred, the control panel shall:-

- give an audible and visual signal that the engine has failed to start.
- initiate an output signal 'Failed to start' - see paragraph 3.5.1 & 3.5.3.
- lock out the automatic start-up system

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If either battery has insufficient power (determined by monitoring the battery voltage or rotation speed during cranking) to crank the engine during any stage of the cranking cycle, further cranks must automatically be made drawing power from the other battery to complete the six attempt sequence.

The control voltage shall be drawn from both batteries simultaneously. Once started the pump set must continue to run until shut down manually, by means of a shutdown push button located on the enclosure door and connected to the stop control.

After the fire pump has started an engine driven frequency generator, common magnetic pickup shall provide a signal to the electronic speed sensor in the controller to cancel further cranking and automatically re-set the controller for future operation.

Pressure switches, for example on the engine lubricating system or pump discharge, shall not be used as a means of de-energising the starter motor.

The controller shall also provide an output signal to drive the engine mounted tachometer, the nature of the signal being determined by the type of instrument fitted.

### **3.4.2 Emergency manual starting system.**

An **over-ride** emergency manual start facility shall be provided, protected by means of a frangible or hinged cover, and shall be operative at all times even with the automatic start switch in the OFF position. Starting shall be provided by both sets of batteries in parallel. The emergency manual starting circuitry shall not be fuse protected.

**There shall be no delay in operation of the emergency manual start facility.**

The emergency manual start push button shall be clearly labeled:

“EMERGENCY MANUAL START” or “EMERGENCY START”

### **3.4.3 Test facility for manual starting.**

A manual start test button and indicating lamp shall be provided to permit periodic testing of the manual electric start system without breaking the frangible cover over the emergency start button.

The indicating lamp shall be marked “Operate manual start test button if lit “.

The pushbutton and indicating lamp may be a combined device. The manual start test push button shall only be brought on line after an automatic engine start followed by a shut down or after six repeated unsuccessful attempts to start automatically. Either of the two conditions shall cause the indicator lamp to light and bring the manual start test button on line.

The power shall only be drawn from the battery which did not provide power for the last cranking attempt.

When a test manual start has been carried out, the circuit used for this purpose shall automatically become inoperable and the indicator lamp shall be extinguished.

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The automatic start facility shall be available, even when the manual start test button circuit is activated.

Note:- During test, after the engine is stopped there shall be a maximum period of 10 seconds before a start sequence can be initiated by the controller (either by a pressure drop or an emergency manual start).

#### **3.4.4 Stopping the pump**

Consistent with BS EN 12845 10.7.5.2, once the pump has started, it shall continue to run until stopped manually. It shall only be possible to stop the pump by manual intervention.

### **3.5 Outputs**

#### **3.5.1 Indicators**

Visual indication is to be provided by indicators having clearly viable labels with relevant data as shown in table 1.

A common lamp test pushbutton shall be provided.

The principle of visual indication used for safety equipment is to be as follows:-

Green indicator	Healthy condition
Red or Amber indicator	Fault - the device in question is defective and is not able to operate normally. Action required.
Red indicator	Alarm - Immediate action required.

Lamps, LCD or LED type display panels may be used, except critical functions as specified below, which must be indicated by a lamp or LED.

The following conditions are considered essential:

- Battery A healthy
- Battery B healthy
- Chargers healthy
- Fail to start
- Pump on demand
- Engine running (note 1)
- Pump running (note 1)
- Not in auto (note 2)
- Common alarm (see screen for more details)
- Operate test start

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Note 1: The indicators “Engine running” and “Pump running” may be combined (in which case the indicator should be labelled ‘Pump running’) provided that it is possible to distinguish between the two states. There would be various ways to implement this functionality. For example:

- if a system has a magnetic pick-up and pressure switch, when the pump is running correctly and achieving discharge pressure, the “Pump running” light should illuminate and the display should show the measured RPM, or;
- the “Pump running” light could flash while the engine is running-up and then go steady while the discharge pressure is met.

Note 2: only required if a mode switch is provided

For other (i.e. non-essential) conditions, healthy, fault & alarm information may be given by an alphanumeric display, and/or by Red, Amber and Green LEDs.

In addition, certain data must be capable of being transmitted over a given distance:

(a) 'PUMP ON DEMAND' output signal, signifying:-

- That the system pressure switch requires the pump to start.

(b) 'TROUBLE AT ENGINE OR CONTROLLER' output signal, which covers:-

- Starter motor lead disconnected
- Low oil pressure
- Low fuel level
- High engine temperature
- Low engine temperature(failure of engine heater)
- Battery / charger fault (System “A”)
- Battery / charger fault (System “B”)
- No cooling flow

(c) 'PUMP FAILED TO START' output signal signifying:-

- The controller has performed 6 automatic crank attempts and failed to start the engine or the pump discharge pressure has not been reached.

(d) 'AUTOMATIC START UNAVAILABLE' output signal signifying:-

- Any switch or protective device which prevents the pump starting automatically is in “off” or “tripped” condition.

(e) 'PUMP RUNNING' output signal signifying the pump is operating

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**Table 1 - Condition status indicators**

<b>Title</b>	<b>Lamp colour</b>	<b>Function</b>	<b>Audible</b>
Battery healthy	Green	Indicates that the batteries are connected and providing power to the control circuits. (two indicators, one for each battery).	Yes (for converse fault condition)
Battery charger status	Green, Amber or Red	Green to indicate healthy, or; Amber or Red to indicate failure of either battery charger while they are switched on (two indicators, one for each circuit).	Yes (fault condition)
Automatic start unavailable	Red	Indicates that. one or more of the switches or protective devices which prevent the pump starting automatically are in the "off" or "tripped "condition.	Yes This alarm shall be Non-Mutable
Pump on demand	Red	Indicates that an initiation signal is present, and the engine should be either running, or attempting to start.	No
Pump running	Red	Pressure at pump outlet (upstream of the pump check valve)	No
Start failure, or; Low discharge pressure	Red	Pump has not started automatically or the pump discharge pressure has not been reached.	Yes
High engine temperature	Amber or Red	Excessive engine temperature, all cooled engines.	Yes
Low oil pressure	Amber or Red	Insufficient oil pressure	Yes
Operate manual test Start	Amber or Red	Illuminated when the engine has stopped, following an automatic start, or after a 'failed to start' condition.	Yes
Low engine temperature.	Amber or Red	Engine temperature below 5°C	Yes
Low fuel Level	Amber or Red	Low fuel level, from diesel fuel tank	Yes
Running	Green	Engine Running.	No
Starter motor disconnect	Red	Starter motor leads disconnected. Motor will not start.	Yes
No cooling flow	Amber or Red	No flow detected in cooling line	Yes

NOTE where graphical symbols are used, an accompanying key shall be affixed to the front of the control panel, clearly relating the functions required by table 1.

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### 3.5.2 Meters – measurement indication

The following parameters must be measured independently to an accuracy of  $\pm 5\%$  with the actual measurements being displayed:-

The charging level of the chargers, by means of ammeters (one per charger) permitting readings with maximum increment scale of 0.5A.

For all the measuring equipment, the normal functional ranges and units must be stated, preferably by direct display on the device. Where it is not reasonably practical to present normal functional ranges on the device, this information shall be provided in the manual.

### 3.5.3 Terminal numbering

In order to maintain compatibility between engine sets and controllers supplied by different manufacturers, a numbering system has been introduced which shall be adhered to. See Table 2

**Table 2 - Terminal numbering for LPCB Diesel controllers for use with engines approved to LPS 1239**

<b>Controller &amp; Engine terminal No.</b>	<b>Engine, Pump Set or System Mounted Device</b>
1	Electronic governor +VE Supply hours run counter
2	Magnetic pickup
3	Magnetic pickup (0 Volt)
4	Oil pressure switch close at low pressure (earth return)
5	Engine temperature switch close at high temperature (earth return)
6	Battery A positive supply
7	Not used
8	Battery B positive supply
9	Start solenoid from battery A
10	Start solenoid from battery B
11	Common negative / earth. Both terminals linked
12	Stop control
13	Not used
14	Reserved for future use
15	Low engine temp switch
16	Low engine temp switch (insulated return)
17	Low fuel level
18	Pump running pressure switch
19	Pump running pressure switch
20	Signal to engine mounted tachometer / hours run indicator.
21	Remote start / low water start
22	Remote start / low water start
23	Pressure switch start (open to start )
24	Pressure switch start (open to start )
25	No cooling flow
26	No cooling flow



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### 3.6 Auxiliary and Supplementary Functions

Any device or function of a supplementary nature provided in the equipment and not covered by this present specification shall not interfere with the functional requirements set out by the specification and referenced documents; they shall further comply with the data relating to them.

### 3.7 Documentation

General requirements:

- All schematics and drawings shall be numbered and indexed.
- Any modification carried out to the equipment, to the schematics and/or to the drawings must be covered by a change to the revision level (letter or number). LPCB must be notified of all changes which may affect the approval)
- A list of all the drawing and schematic numbers must be provided.
- All documents must be in the English language.

The following shall be provided:

- 1 Design details.
  - 1.1 A technical operating sheet.
  - 1.2 Detailed explanation of the operation of each of the circuits (charger, battery switching, monitoring, surveillance, start-up etc.).
  - 1.3 Description of electrical characteristics: mains power voltage and battery voltage tolerances (type, capacity, voltage, manufacturer, breaking capacity of contracts available to the user, power consumption etc.).
  - 1.4 Description of possible external connections (indicators, inputs etc.)
  - 1.5 Description of ways and means of controlling battery chargers.
  - 1.6 Description of how to start the diesel engine.
- 2 Commissioning instructions.
- 3 Operating instructions (explanation of indicator lamps, trouble-shooting instructions, in the event of an alarm or malfunction). These instructions shall in particular include a clearly visible statement, prohibiting the use of the batteries for any purpose other than for motor start-up.
- 4 Instructions covering checks, maintenance and storage.
- 5 Electrical and key component schematics.
  - 5.1 Manufacturers' recommended functional test procedures.
- 6 Manufacturing drawings. Each drawing shall have the dimensions marked on and be accompanied by a listing of all the items making up the equipment and protection, where this is appropriate (paint, varnish, etc.).
  - 6.1 Drawings showing views of the panel from the front, from above and from the side, showing the indicator lamps, pushbuttons and inscriptions (a photograph shall also be provided of the front face).
  - 6.2 Sectionalised drawing of the panel, showing the positions of the various items and devices (these shall be labelled).
  - 6.3 Drawing showing the positions of the terminal blocks and cabling, labelled with cross-reference to the schematics.
- 7 Means to safely disable engine and panel for service and maintenance activities.
- 8 Test certificates, where applicable, showing compliance with applicable directives.

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## 4 TYPE TESTING

The control panel manufacturer shall submit a complete panel to the BRE Global, including:-

- Connecting cabling between the panel and the batteries;
- Two batteries of the same voltage as those used in the installation but of a lower capacity, so as to ensure merely the operation of the devices included within the panel.
- A test harness and associated equipment wired to the control panel to enable:
  - All inputs to be simulated, including engine running
  - All volt free contacts to be monitored
  - All solenoid outputs to be monitored

The designer shall also provide a technical dossier, covering the items listed in 3.7.

### 4.1 Function tests

Verification tests shall be carried out to confirm that all the functionality required by this standard and referenced document is provided by the controller.

#### 4.1.1 Battery monitoring

Low battery voltage. A reduced battery voltage of half the nominal voltage shall be simulated and applied to the panel.

Required results: Control panel shows battery failure on the appropriate battery  
Trouble at engine or controller volt free activates  
Audible alarm, non muteable

#### 4.1.2 Automatic start unavailable

If the controller is equipped with a mode switch, then when any mode other than auto is selected, or when the failed to start condition is reached.

Required results: Control panel shows not in auto  
Automatic start unavailable volt free activates  
Periodic audible alarm, non muteable  
Automatic start sequence is not activated with start command

#### 4.1.3 General Alarms

When each of the following alarms are activated: Low engine temperature, Low fuel level, and starter motor disconnected.

Required results: Appropriate alarm is shown on the controller  
Trouble at engine or controller volt free activates  
Audible alarm, may be muteable  
Auto-start function remains available

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#### 4.1.4 Engine alarms

With the engine running only, when each of the following alarms are activated: Low oil pressure, High water temperature:

Required results: Corresponding alarm is shown on the controller  
 Trouble at engine or controller volt free activates  
 Audible alarm, may be muteable  
 Auto-start remains available  
 Engine does not shutdown when these alarms are activated

#### 4.1.5 Pump on demand

The controller shall be equipped with a pressure switch input (normally closed) and a remote input to signal the pump should start, both normally closed. When either input is opened in any mode other than auto:

Required results: Appropriate pump on demand indication is shown on the controller  
 Pump on demand volt free activates  
 Automatic crank sequence is NOT activated.

When either start input is opened in auto mode:

Required results: Appropriate pump on demand indication is shown on the controller  
 Pump on demand volt free activates  
 Automatic crank sequence is activated, with timings shown in 3.4.1

#### 4.1.6 Automatic starting system (see section 3.4.1)

When the automatic crank sequence has completed 6 attempts to start:

Required results: Failed to start alarm on the controller  
 Failed to start volt free activates  
 Audible alarm, non muteable  
 No further automatic cranking attempts until the controller is reset.  
 Operate test is shown and is available, section 3.4.3

Replace the batteries with a DC power source and set both battery inputs to 75% of nominal and repeat cranking test and ensure operation is as above.

Return to the nominal input voltage. Repeat cranking test, disconnect Battery A and ensure all remaining cranking attempts are from battery B. Battery failure conditions should be as per section 4.1.1.

At the nominal input voltage, repeat cranking test, disconnect Battery B and ensure all remaining cranking attempts are from battery A. Battery failure conditions should be as per section 4.1.1.

#### 4.1.7 Engine Running

With the engine running, simulated by applying a suitable frequency to control panel terminals 2 and 3:

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Required results: Engine is shown as running on the controller  
Automatic cranking attempts cease  
Engine tachometer operates, showing correct rpm  
Engine hours run meter operates  
Frequency output, proportional to engine speed on terminal 20  
Close the pump running simulated pressure input  
Engine running volt free activates  
Engine is only stopped by manual means when there is no demand  
After each automatic start and run, the operate test is available

Repeat the above, but do not close the pump running pressure switch input.

Required results: Pump failure alarm on the controller  
Failed to start volt free activates  
Audible alarm

Note: frequency (rotation) shall be used to stop cranking, not the pump running pressure switch.

#### **4.1.8 Emergency Start (see section 3.4.2)**

The emergency start push button, when operated:

Required results: Engine is cranked from both batteries  
Crank outputs are separate from the automatic circuits and non-fused

#### **4.2 Battery chargers (see section 3.3.3)**

##### **4.2.1 Float Voltage**

The battery charger output voltage shall maintain the batteries in a fully charged condition all of the time. This output voltage shall remain stable even when the mains voltage is at 85% and then 110% of nominal AC line voltage.

Required results: The output of the battery charger shall be less than 500mA when the battery is fully charged, and while the mains voltage fluctuates.  
Output current shown on ammeter at trickle charge is accurate to 5%.  
(see section 3.5.2)

##### **4.2.2 Output Current**

The charger shall produce maximum output current when the battery is discharged. This output current shall remain stable even when the mains voltage is at 85% and then 110% of nominal AC line voltage.

Required results: When the battery voltage is more than 2v below the float voltage then the output of the battery charger shall be at its maximum rated output, even when the mains supply fluctuates. (A drop in output current is permitted when the mains voltage falls).  
Apply a suitable load and when the battery voltage is down to 50% of nominal, the output current shall remain stable and no fuses or circuit breakers shall trip.

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Output current shown on ammeter at maximum output is accurate to 5%. Section 3.5.2

#### **4.2.3 Boost charge (see section 3.3.4)**

A manual or automatic boost charge facility, when required (i.e. automatically activated on detection of a voltage drop and/or manually switched, as per the panel design) shall boost charge the batteries:

Required results: When activated, manually and/or automatically, the charger output voltage shall be raised by an appropriate amount.  
Indication shall be shown (internally or externally) to indicate that the boost charge is activated.  
The boost facility shall automatically cancel after no more than 12 hours.

#### **4.2.4 Charger failure**

When the battery charger output current stops due to a charger failure or mains supply failure:

Required results: Appropriate alarm is shown on the controller  
Trouble at engine or controller volt free activates  
Audible alarm, may be muteable

#### **4.2.5 Charger independent operation**

Each battery charger shall be independent of the other, even when a charger is removed.

Required results: When a charger is removed, the other shall operate as normal.  
Appropriate charger failure alarm is shown on the controller  
Trouble at engine or controller volt free activates  
Audible alarm, may be muteable

### **4.3 Temperature tests**

#### **PURPOSE**

The temperature test is intended to verify operability of the controller at extremes of specified operating temperature range.

#### **METHOD OF OPERATION**

The equipment shall be placed in an environmental test chamber, with both AC and DC supplies connected.

A complete functional check should then be performed.

The chamber shall then be brought up to a temperature of 50°C, which must be maintained for a period of 24 hours continuously.

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## REQUIREMENTS

During the course of the test the equipment must continue to operate as specified.

At the end of the test, the oven shall be switched off. The panel shall be allowed to return to ambient temperature. Then, the equipment must:-

- not reveal any defect or change which might affect operation in the course of time.
- satisfy the necessary functional tests (clause 4.1), which should be carried out at 85% & 110% of nominal battery voltage.

### **4.4 Electrical safety checks (AC Circuits)**

In addition to statutory electrical safety design and test requirements applicable to the region of use:

Perform an insulation resistance test at 1000 Volts DC, between the circuit and Earth.

**THE INSULATION RESISTANCE MUST EXCEED 10 MEGOHM**

Using Dielectric high voltage test equipment, apply a voltage of 2000 volts AC between the circuit and Earth, for a period of one minute.

**NO BREAKDOWN SHALL OCCUR**

Remove any links fitted in the above tests.

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## 5 CLASSIFICATION AND DESIGNATION

LPCB certificated products will be listed in the Red Book of approved products and services and published on the product certificate.

Accompanying the listings & certificates will be any key supporting information relevant to the LPCB approval. Any special limitation to the approval will also be set out in the listing and on the certificate.

## 6 MARKING, LABELLING AND PACKAGING

For details of acceptable use of the mark, see LPCB publication PN103 “Use of the certification marks”

The controller housing shall have a data plate, positioned visibly and showing:-

- Diesel pump controller manufacturers’ name or trademark
- Diesel pump controller manufacturers’ address
- model designation
- serial number
- year of manufacture
- LPCB approval mark [see PN103]
- the nominal voltage for the main power supply source
- the voltage of the 2 secondary sources (batteries)
- battery type Nicad / Planté (lead acid)

A label shall be affixed to the front of the controller providing clear and concise instructions regarding the weekly test procedure. For example:

### WEEKLY TEST PROCEDURE

1. Open test line (in the pump house) to start engine by creating a pressure drop in the fire protection system.
2. Allow engine to run for 30 minutes.
3. Close test line.
4. Stop engine (manual operation).
5. Operate Manual Test Start push button.
6. Allow engine to start and attain full speed.
7. Stop engine (manual operation).

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## 7 ADDITIONAL GUIDANCE DOCUMENTATION

This standard is part of a series relating to pump sets. It should be read in conjunction with LPCB Scheme Document SD246 “*Certification requirements for control panels for diesel engine driven pumps used in automatic sprinkler installations*”

## 8 PUBLICATIONS REFERRED TO:

BS EN ISO 12100	Safety of machinery. General principles for design. Risk assessment and risk reduction
BS EN 809	Pumps and Pump Units for Liquids – Safety Requirements
BS EN 12845	Fixed firefighting systems - Automatic sprinkler systems - Design, installation and maintenance
BS EN 60529	Specification for degrees of protection provided by enclosures (IP code)
BS EN 60204-1	Safety of Machinery - Electrical Equipment
BS EN IEC 61000-6-2	Electromagnetic compatibility (EMC). Generic standards. Immunity standard for industrial environments
BS EN IEC 61000-6-3	Electromagnetic compatibility (EMC). Generic standards. Emission standard for equipment in residential environments
BS EN 60623	Secondary cells and batteries containing alkaline or other non-acid electrolytes. Vented nickel-cadmium prismatic rechargeable single cells
BS 6260	Specification for open nickel-cadmium prismatic rechargeable single cells – withdrawn
BS EN 60896 Part 1	Stationary lead-acid batteries. General requirements and methods of test. Vented types
BS 6290 Part 1	Lead-acid stationary cells and batteries. Specification for general requirements (withdrawn)
BS 6290 Part 2	Lead-acid stationary cells and batteries. Specification for the high-performance Plante positive type)

For undated references please refer to the latest published issue.



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**AMENDMENTS ISSUED SINCE PUBLICATION**

<b>DOCUMENT NO.</b>	<b>AMENDMENT DETAILS</b>	<b>SIGNATURE</b>	<b>DATE</b>
LPS 1236-1.1	<ol style="list-style-type: none"> <li>1. New front cover</li> <li>2. Title added to header</li> <li>3. Notes amended on Page 4</li> <li>4. Repagination</li> <li>5. Update to copyright information</li> </ol>	DC	Jan 2014
LPS 1236-2.0	<ol style="list-style-type: none"> <li>1. Addition and clarification of several function test requirements</li> <li>2. Removal of vibration test</li> <li>3. Removal of ECM material</li> <li>4. Scheme Document (SD) number updated</li> <li>5. Further editorial and technical changes in response to consultation</li> </ol>	SNB	Oct 2022
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