

Sprinkler System Testing & Maintenance

Understanding the risk

Since their initial development in the 19th century sprinklers have been proven to be a very effective means of controlling the development and spread of fire. Their effectiveness is however dependant upon:

- The reliable operation of key equipment.
- The current fire challenge remaining within the design capability of the sprinkler system.

Regular testing

It is best practice that sprinkler systems are maintained in good order and that a weekly inspection and test is carried out. This is necessary to regularly check the general condition of equipment and exercise moving components to ensure their reliable operation when called upon in an emergency.

There is a wide range of sprinkler installation types and associated water supply configurations with varying testing and maintenance needs for which a system user needs to obtain specific guidance from a specialist sprinkler system installer / maintenance engineer. This Insight Guide is therefore limited to generic aspects. All items of equipment shall be fully maintained in accordance with manufacturers' specified criteria.

A competent person who has received appropriate training shall undertake weekly testing. It is recommended to be a person normally present at the premises (employee or site based maintenance contractor) as such familiarity with the system is beneficial if the need arises for the emergency isolation and draining of any part of the system. At least two people shall be trained and regularly involved with testing to facilitate continuity of testing in the event of holidays or illness.

Upon completion of an installation, it is normal practice for the installing engineers to provide users with the necessary training to enable them to undertake regular weekly testing and know how to isolate and drain the system if needed due to leakage. Most sprinkler system maintenance contractors are happy to provide refresher training at the time of routine maintenance visits.



Weekly testing

Regular weekly testing requires to be recorded. Weekly Sprinkler Test Cards are available from RMC, a separate card is needed for each installation. Each card includes space to also record electric motor and diesel engine driven fire pump tests, but these only need to be noted on one card where the water supply feeds more than one installation.

Inspection

Check that all valves that will isolate an installation or pump are secured in the fully open position. A leather strap (or light chain) and padlock is normally used as a means to deter tampering while providing a clear indication if any interference has occurred, but they can also be easily cut in case of the need for emergency isolation.

In the case of dry or alternate type installations charged with air, the installation air pressure and compressor operation need to be checked. Installation air pressure is normally only a fraction of system water pressure, so any change in the installation pressure to a magnitude similar to the water pressure in the feeding main would indicate the installation has tripped over to water. If an accelerator device has been installed, it is essential that it is correctly set and operational when the installation is on air.

Where a pressure tank forms part of the water supply, the water level and air pressure need to be checked.

In winter, consideration shall be given to the potential risk of frost damage to water charged pipework, necessitating a minimum temperature of 4°C to avoid problems. The correct operation of general space heaters and any pipework trace heating shall be checked. Pump houses in which diesel engine driven pumps are situated require to be maintained at a minimum of 10°C.

Opening the alarm test valve runs water to waste, simulating the operation of a single sprinkler. The time taken for the water motor driven alarm gong to ring is recorded. Any significant change in this should be investigated by the sprinkler maintenance engineer.

Bell Test



Hydraulic Alarm Gong

The time taken varies depending on the size of the installation and the amount of air trapped in the pipe array, but is normally expected within 60 seconds. When an alternate / dry type installation is charged with air, the bell test is limited to diverting water directly to the alarm gong, resulting in instantaneous ringing.

Where an installation alarm pressure switch provides an electronic alarm to the general fire alarm system and / or a remote alarm receiving centre (ARC), the actuation of the pressure switch needs to be verified. If remote alarm communication is normally isolated to facilitate weekly

testing a separate test shall be arranged with the ARC every 3 months without isolation to verify the full operation of the alarm system.



Diesel engine driven fire pump

The basic operation of fire pumps shall be verified by checking the pump cut in (start) pressure and noting the running pressure under a closed valve condition (no flow). Any significant changes need to be investigated by the sprinkler maintenance engineer.

Pump Tests

A check is to be made that there is a flow of water from the pump relief valve, which is frequently used for the cooling system of diesel engine driven pumps.

Electric motor driven pumps shall be run for 10 minutes and diesel engine driven pumps for 30 minutes, this is necessary to ensure the engine reaches a normal working temperature.

Where pump controllers have a manual start facility, the correct operation of this shall also be checked.

Diesel engine lubrication oil level shall be checked, with notice taken that the oil has not become contaminated with water. Fuel tanks shall be regularly topped up, the level should never be left below full. Battery condition shall be checked.

Although not specifically detailed on the test record card, system pressure maintenance pump (jockey pump) cut in (start) and cut out (stop) pressures shall be checked.

Water storage tank levels shall be checked. This shall include a periodic physical check of the actual water level, as content gauges have frequently been found to be inaccurate.

Planned maintenance & testing

Planned maintenance of sprinkler systems shall be undertaken by engineers who are familiar with the equipment and required maintenance schedules. Normal practice is for the maintenance of sprinklers, pipework, and all valves to be undertaken by a specialist sprinkler system installer / maintenance engineer. Within the UK, a contractor with LPS1048 or equivalent accreditation is recommended. The maintenance of fire pumps, including

diesel engines, and water storage tanks is normally undertaken by specialist engineers, often acting as sub contractors of the primary sprinkler maintenance engineers.

Quarterly

Flow switches provided in life safety installations shall be checked for the correct function.

Half-yearly

Dry, alternate, and pre-action type alarm valves together with any associated accelerator devices, shall be exercised in accordance with the manufacturers' instructions.

Water supplies (pumps and towns mains) shall be "flow tested" to verify the continued adequacy of the available pressure and flow to satisfy the system design requirement.

RMC shall immediately be informed of any significant deterioration in the available water supply, and this shall be investigated by the sprinkler system maintenance engineers to seek restoration to an adequate magnitude as a matter of urgency.



Flow test meter

Emergency electrical power supplies. The operation of any secondary power supply provided by a generator shall be verified.

Stop valves shall be exercised and the operation of any tamper monitoring devices shall be verified.

Yearly

Fire pump sets, including associated diesel engines and electric motors, shall be fully maintained in accordance with manufacturers' schedules.

Diesel engines are to be subject to an engine failed to start test.

Stop valves, alarm valves, and non-return valves are to be checked for correct operation, with seals replaced as necessary.

Water storage tank float valve operation is to be checked.

Suction lift priming tanks – check the correct operation of all tank refilling mechanisms and low-level alarms.

Water from open sources – check and clean screens, settling chambers, and foot valves.

Sprinkler head, pipework and pipe support condition to be checked.

Three Years

Water storage tanks

Externally inspect the condition of all water storage tanks, making good any defects identified.

Drain, internally inspect, and repair all tanks that have not been approved for an extended initial maintenance period (10 or 15 years from the date of manufacture).

Five Years

Where multiple jet controls form part of an installation, a sample shall be removed and subjected to function testing by the manufacturer or an accredited sprinkler equipment test house.

Ten / Fifteen Years

Drain, internally inspect, and repair all tanks at the end of their initial extended maintenance period (10 or 15 years from the date of manufacture). The frequency of subsequent inspections is to be based on the tank engineers' advice, depending on the tank's condition.

Twenty Five Years

Pipework should be flushed and subjected to a hydrostatic pressure test.

A sample of sprinkler heads shall be removed for function testing by the manufacturer or a recognised approval body. Note that for certain types of sprinkler the product approval specifies this is to be carried out every 5 years.

Landlord controlled sprinkler systems

Where the water supply and/or installation control valves are under the control of a landlord, it is expected that they will undertake the relevant testing and maintenance. It is recommended that tenants seek annual verification of this from their landlord, which can be evidenced by copies of their test record cards and specialist service engineers' reports.

In the case of life safety sprinkler systems there may be flow switches within a tenant's demise that they are responsible for testing (quarterly). Unless an electronic test device (e.g. "Zoncheck") has been provided this test will need to be undertaken by a sprinkler maintenance engineer who will need to liaise with the landlord.



Tenants zone isolating valve with “zonecheck” flow switch test device.

Review of hazard

To ensure a sprinkler system remains adequate for the current fire challenge, occupiers need to be continuously aware of changes that may impact the effectiveness of sprinkler systems.

This shall include the following key points:

- Structural modifications, new ceilings, and new mezzanine floors.
- Changes of use, i.e., from production to storage.
- Introduction of any plant, ducts, or gantries that may obstruct the distribution of water from sprinklers.
- Significant change in ambient temperature and the adequacy of frost protection measures.
- Contamination of sprinkler heads, i.e., paint, plaster fly, etc.



Sprinkler head fouled by plaster

- Has there been any change in materials associated with the stored commodities or their packaging?
- Has packaging, there been any change in the height of storage or the storage configuration.

- Are the specified storage height limitations being complied with?
- Is adequate vertical clearance being maintained between sprinkler heads and stored goods (ordinary hazard 500mm, high hazard 1000mm).
- Are adequate clear flue spaces being maintained in rack storage?
- Are aisles between storage racks and blocks of storage being kept clear of combustible materials?

As a minimum, an annual review shall be undertaken and documented by a competent person, normally an engineer from the sprinkler servicing firm.

This shall be supplemented by a quarterly review, but this may take the form of a document completed by the occupier that is returned to the competent person for review.

Sprinkler system impairments

A sprinkler impairment arises when an automatic sprinkler system is shut off or otherwise taken out of service, either completely or in part, such that it can no longer provide the intended fire protection.

Where all or part of a sprinkler system is impaired for more than 7 hours or outside working hours, RMC must be informed in advance using the RMC Sprinkler Impairment Notification Form, which should be e-mailed to: techsupport@rmcgrp.com

References

- RMC Weekly Sprinkler Test Card.
- RMC Insight Guide – Automatic Sprinklers
- RMC Insight Guide – Sprinkler Impairments.
- NFPA25 Standard for the Inspection Testing & Maintenance of Water Based Fire Protection Systems.
- LPC Rules for Automatic Sprinkler Installations incorporating BSEN12845.

For further information, contact your local **RMC** Risk Engineer

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