Plumis

Automist Third Party Fire Demonstration Procedure

Introduction

Automist is not your typical fire sprinkler. It has therefore become progressively common practice to run a fire test to demonstrate how the system works and how effective it is at fire suppression. Most of the questions stakeholders would ask about the system are answered the minute they are able to see it installed and subsequently operating in a fire.

The objective of this document is to help third parties other than Plumis to successfully carry out a demonstration fire test to stakeholders, leveraging the experience from hundreds of fire tests that Plumis has successfully carried out, either as part of product development, demonstrations or product approval performance tests.

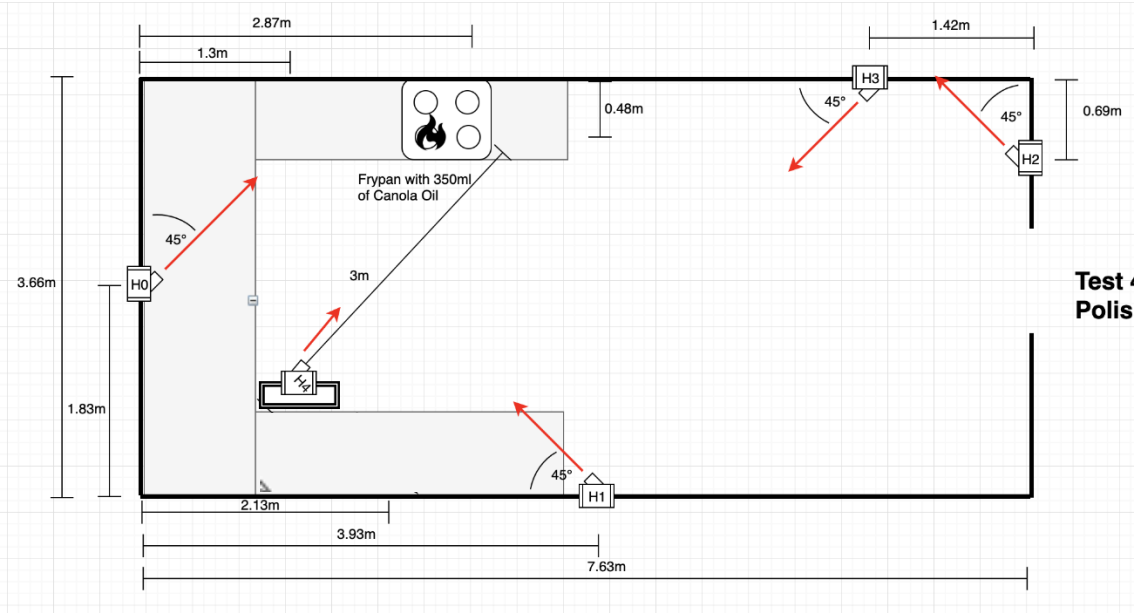
It is also to avoid a mishap during fire testing due to little experience with demo fires or with Automist. A suppression event that has not performed as expected (with no fault from the system itself) can tarnish the reputation of the system and take many successful suppression events to recover. The thorough preparation and execution of a fire test has therefore a bigger potential impact than most stakeholders assume.

Automist, like a sprinkler, is a fire suppression system, not an extinguishing system. It is important for the host of the test to explain to those attending that the objective of the system is to suppress a fire: reduce its size since discharge, not to extinguish it. Extinguishment is a very common outcome, especially with realistic fires, but it should not be an expectation. A useful example of a fire suppression demonstration can be seen here.

System Preparation

The is no reason for the system to be installed any different from what would be used in a fixed installation in a home. Attention should be drawn to the water supply. Running from a tank is not advisable because it will not typically provide the 1bar (14 psi) minimum head pressure to the pump to operate at its intended flow and pressure. A pressurised vessel or pump (upstream to the Automist pump) that can deliver the 8lpm (2.4GPM) flow at 1bar can be used if a tank is being used.

It is also advisable to document the room dimensions, the location of spray heads, pump, controller and cameras, so that when the data is shared with Plumis, it is easy to observe the scenario being tested and any advice that might be sought regarding the test. Plumis routinely documents the layout of a test room as per the example below.



Fire Load Preparation

A realistic fire load is a key factor for a representative fire demonstration. The use of furniture or kitchen pan fires is not only acceptable, but also advisable as it is the closest to a real fire test one can expect in a home. Home furniture which contains natural or synthetic cloth, or an oil pan fire, will produce significant amounts of smoke prior to the development of a significant flaming fire. This is aligned to how the system is expected to tackle a real fire in a home: by detecting smoke **before** a large flaming fire has developed.

Therefore, if a fire load other than furniture is used, care must be taken not to create an artificially clean fire which produces little smoke. A large liquid or gas fuel fire, or even a wood fire which is kickstarted with the use of flammable liquids, will produce proportionally little smoke with respect to the fire heat release. This will result in a delay in detector activation and a delay in recognising the fire as a large fire, as well as being an unrealistic domestic fire.

The standardised tests used to test a sprinkler or water mist system, as found in UL 199, UL 2167, BS 8458 etc are fire which develop fast flaming fire (ultra-fast heat release growth according to fire engineering speak). These are great to test temperature activated only bulbs but they are not ideal for demonstration purposes for Automist as there is very little initial smoke production, which is not a realistic residential scenario. It is nevertheless an easy to specify fire load for test laboratories which can certainly be used for demonstration purposes, but which do not provide the most realistic or impressive observations.

It is typical for a fire sprinkler demonstration to involve the ignition of a long curtain early on in the fire. The intention there is to get the flames to travel to the ceiling as quick as possible (to trigger the frangible bulb) while still having a small overall fire, causing little fire damage. Even though Automist will perform in such an unlikely scenario, this is a setup best suited to show the **best** outcome possible with a **sprinkler,** not with Automist.

Since the 1990s, furniture in the UK contains fire retardants. It is therefore quite difficult to allow a fire to develop only using new furniture. For the fire to develop, a blanket, duvet or similar is

advisable. Alternatively, older furniture will develop into a dangerous fire by itself. In the US, the use of fire retardants on furniture is limited so most furniture will develop a dangerous fire. Synthetic materials such as polyester duvets will burn faster than natural cloth so the realistic scenario of both being present in a bed also contributes to a more realistic fire.

Execution

The ignition of a furniture type fire load should be done with a single, small fuel package, like a handful of cotton wool embedded in a flammable liquid fuel like heptane or alcohol. This should be enough to allow the fire to develop naturally and realistically. There should then be plenty of flammable material (with no flame retardant) for the fire to progress and develop. A fire that starts but that does not develop into a dangerous fire will not activate Automist. This is not a bug, it is a feature, as Plumis has “taught” the algorithm to activate only when the fire becomes and “looks thermally dangerous”.

If possible, it would help the collection of data, if the stop button is pressed on the controller at the exact same moment of ignition of every fire test. This creates a time stamp on the controller log which allows Plumis to accurately document the fire growth and the time the system took to discharge. The same can be inferred by looking at video footage where the sounds of the controller and the pump can be heard but it requires a significant amount of additional post-processing time and effort.

Plumis will, in the near future, allow for the download of the log fire from the controller. This will allow stakeholders to observe what the system has interpreted from the fire and how the algorithm decided where and when the fire was. In the meantime, an example of its log output can be seen here. Upon request, Plumis can extract the log data from the fire test if the fire test footage is shown to be unique an of interest to the Plumis Product Development or Marketing teams.

If the system is to be fire tested more than once, it is advisable to recommission the system before every test. This allows the spray heads to be checked and it also ensures that the hoses are drained and returned to a dry state before the next test, to allow it to be realistic. It is also **imperative** that between every test, the thermopile sensor is carefully cleaned with a wet, and then dry, cotton bud. The combination of smoke and mist from a fire being suppressed will eventually deposit itself on the lens of a spray head and will reduce the sensor’s visibility. If the system has been used in a particularly “smokey” fire, it is also advisable to replace the detector as its sensitivity will be progressively impaired with repeated fires. This is what would happen to a system that has discharged in a fixed installation in a home. Plumis has successfully used the same spray heads, pump and controller repeatedly in dozens of fire tests by following this procedure.

Reporting

Plumis welcomes the sharing of all data generated in a fire test. We also welcome comments in how to improve the fire demonstration procedure.