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AHJ Considerations for Approving the Plumis Automist Smartscan System

Light Hazard Applications

INTRODUCTION

This document is intended to be an impartial evaluation of the code-compliance of the Plumis Automist Smartscan System as an alternative to prescriptively compliant NFPA 13 and NFPA 750 systems. As this is an evaluation of the applicable codes and standards, this document does not generally provide technical specifications of the Automist Smartscan System; the technical documentation referenced in this document is to be provided in conjunction with this document. The pathway to compliance for new technologies requires careful analysis of the applicable codes and standards, information for which is provided throughout this document. The ultimate *approval* of any alternative approach not specifically prescribed by model codes lies with the *Authority Having Jurisdiction* (AHJ). This document is intended to provide the code references necessary, when evaluated with attached supplemental technical documentation, for the AHJ to make an informed decision regarding approval of the system.

NON-REQUIRED SYSTEMS

If the jurisdiction has exempted one- and two-family dwellings regulated by NFPA 1 from the requirements of §13.3.2.20.1, the installation of the Automist Smartscan System is considered to be “non-required” and must only meet the applicable sections of the *International Plumbing Code,* NFPA 1, NFPA 750 and NFPA 70 – *National Electrical Code*. The plumbing and electrical requirements for both required and non-required systems remain the same.

PLUMBING

The Automist Smartscan System can be connected to the building potable water supply. Installation of the plumbing system up to the point of connection is the responsibility of the building owner and a qualified plumbing contractor. Though the system is not, by definition, an *Automatic Fire Sprinkler System,* the *International Plumbing Code* does not prescribe specific requirements for a *Water Mist Fire Protection System*. *As* the Automist Smartscan System is intended to be equivalent to an *Automatic Fire Sprinkler System,* however, the intent of the code and the level of protection of the potable water supply may be assumed to be equivalent.

> **608.17.4 Connections to automatic fire sprinkler systems and standpipe systems.** The potable water supply to automatic fire sprinkler and standpipe systems shall be protected against backflow by a double check backflow prevention assembly, a double check fire protection backflow prevention assembly or a reduced pressure principle fire protection backflow prevention assembly.

Exceptions:

1. Where systems are installed as a portion of the water distribution system in accordance with the requirements of this code and are not provided with a fire department connection, isolation of the water supply system shall not be required.

2. Isolation of the water distribution system is not required for deluge, preaction or dry pipe systems.

As the system does not contain any water until activated, it is similar to a dry or preaction system. All piping between the potable water supply and the point of connection the system shall be of materials permitted by and installed in accordance with the *International Plumbing Code*. The system is also not included with a fire department connection. Isolation of the water distribution system is therefore *not* required under the IPC for the installation of the Automist Smartscan System. The system is, however, equipped with a single check valve.

If an installation is to be provided with a valve on the connection to the water supply, it must be provided with supervision complying with NFPA 750 §8.8.1.8.1. The typical approved method is that prescribed by §8.8.1.8.1 (3), Valves locked in the correct position. All valves utilized must comply with IPC §605.7.

ELECTRICAL

The Automist Smartscan System utilizes a 20A 230V branch circuit connected to a dedicated breaker. Installation of the branch circuit, including proper sizing of conductors and all other applicable requirements of the National Electrical Code, is the responsibility of the homeowner and a qualified electrical contractor.

The system is hardwired to the provided branch circuit. Connections occur within a box of suitable size for the conductor count in accordance with NFPA 70 §314.16.

At the time of installation, circuit identification is provided at the panel, and a breaker lock is installed to prevent accidental power loss to the system.

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REQUIRED SYSTEMS

If the jurisdiction enforces the requirements of NFPA 1 §13.3.2.20.1, mandating sprinklers in one- and two- family dwellings regulated by NFPA 1, the installation of the Plumis Automist Smartscan System may be considered to be equivalent - in terms of intent, quality, strength, effectiveness, fire resistance, durability and safety - to a system designed in accordance with NFPA 13D.

NFPA 1 recognizes that technologies change and does not seek to prohibit the use of alternative means and methods not specifically prescribed by the code.

> **1.4.1 Equivalencies.**
>
> Nothing in this *Code* is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety to those prescribed by this *Code*, provided technical documentation is submitted to the AHJ to demonstrate equivalency and the system, method, or device is approved for the intended purpose.

This specifies certain criteria for alternative materials, design and methods to meet, which can be broken down into the categories of *Intent* and *Equivalency*.

INTENT

The Automist Smartscan System is intended to be used as an alternative to residential fire sprinklers. As such, the full intent of this system mirrors that of NFPA 13D and NFPA 750.

The intent of NFPA 13D, as stated by §1.2.1:

> **1.2.1** The purpose of this standard shall be to provide a sprinkler system that aids in the detection and control of residential fires and thus provides improved protection against injury and life loss.
>
> **1.2.2** A sprinkler system shall be designed and installed in accordance with this standard to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated.

The key takeaways from the intent are:

- Detection and control of residential fires
- Provide improved protection against injury and life loss
- Prevent flashover
- Improve the chance for occupants to escape or be evacuated

While the Automist Smartscan System meets the intent laid out in NFPA 13D, §1.1.2 states: "*This standard shall not provide requirements for the design or installation of water mist fire protection systems, which are not considered fire sprinkler systems and are addressed by NFPA 750.*" **This is not stating that water mist systems are an unacceptable technology to meet the intent of NFPA 13D**; rather that they are outside of the scope of NFPA 13D and are considered a different system altogether, one which is regulated by NFPA 750.

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The Intent of NFPA 750, as pertaining to one- and two-family dwellings, is defined:

> **10.3.2.2.1** The purpose of this section shall be to provide a water mist system that aids in the detection and control of residential fires and thus provides improved protection against injury and life loss
>
> **10.3.2.2.2** A water mist system shall be designed and installed in accordance with this section to prevent flashover (total involvement) in the room of fire origin, where water mist protection is provided, and to improve the chance for occupants to escape or be evacuated.

The key takeaways from the intent are:

- Aid in detection and control of residential fires
- Provide improved protection against injury and life loss
- Prevent flashover in the room of fire origin
- Improve the chance for occupants to escape or be evacuated

The Plumis Automist Smartscan System is claimed to fully meet the intent(s) of a conventional One- and Two-family Dwelling (NFPA 13D) Residential Sprinkler System *and* a Water Mist Fire Protection System (NFPA 750).

EQUIVALENCY

NFPA 1 has a considerable amount of language pertaining to consideration and approval of alternative/equivalent methods, which grant the AHJ authority to permit such methods when provided with suitable evidence of equivalency:

> **1.4.2 Alternatives.** The specific requirements of this *Code* shall be permitted to be altered by the AHJ to allow alternative methods that will secure equivalent fire safety, but in no case shall the alternative afford less fire safety than, in the judgment of the AHJ, that which would be provided by compliance with the provisions contained in this *Code*.
>
> **1.4.6 Approval.** The AHJ shall approve such equivalent, alternative, or modified construction systems, materials, or methods of design when it is substantiated that the standards of this *Code* are at least equalled. If, in the opinion of the AHJ, the standards of this *Code* are not equalled by the alternative requested, approval for permanent work shall be refused. Consideration shall be given to test or prototype installations.

Looking back to §1.4.1, the alternative systems, methods or devices must be "…of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety to those prescribed by this *Code*..." Additionally, NFPA 750 states in §1.5:

> **1.5 Equivalency.** Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

The methods of determining and proving equivalency are also provided in the codes. NFPA 1 §1.4.7 grants the AHJ the authority to require tests as evidence to substantiate claims:

> **1.4.7.1** Whenever evidence of compliance with the requirements of this *Code* is insufficient or evidence that any material or method of construction does not conform to the requirements of this *Code*, or to substantiate claims for alternative construction systems, materials, or methods of construction, the AHJ shall be permitted to require tests for proof of compliance to be made by an approved agency at the expense of the owner or his/her agent.
>
> **1.4.7.2** Test methods shall be as specified by this *Code* for the material in question. If appropriate test methods are not specified in this *Code*, the AHJ is authorized to accept an applicable test procedure from another recognized source.

As the Automist Smartscan System is a relatively new system that was primarily developed in the UK, there are currently no recognized U.S. test standards for this specific system. However, §1.4.7.2 grants the AHJ the authority to approve testing procedures, and have tests performed by an *approved* agency. NFPA 1 defines *approved* as:

> **APPROVED** – Acceptable to the AHJ

NFPA 750 contains similar language:

> **1.5.1** Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.
>
> **1.5.2** The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.
>
> **1.6.1** Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered.

Using these definitions and the aforementioned provisions of NFPA 1 and NFPA 750, the conclusion is that alternative systems may be acceptable if the AHJ finds the credibility and reputation of the testing agency, as well as the procedures and results of their tests, to be acceptable. The Automist Smartscan System has been Independently tested by Exova Warringtonfire and demonstrated to meet the fire performance standards of BS 8458:2015 and BS 9252:2011. Exova Warringtonfire is ISO/IEC 17065:2012 Accredited. The documentation from the Exova Warringtonfire tests (provided separately from this document) may therefore meet the requirements for approval as satisfactory documentation of testing and performance.

PERFORMANCE-BASED COMPLIANCE

In *The SFPE Code Official's Guide to Performance-Based Design Review*, the introduction states: "Performance-based design is an engineering approach to fire protection design based on established fire safety objectives and functional statements, analysis of fire scenarios, and assessment of designs based on those objectives and functional statements. Performance-based design differs from traditional prescriptive design in that specific methods for achieving compliance with the design intent are established by the design team, subject to the code official's concurrence, and a fire/life safety solution is developed that is tailored to the specific building, fire, and occupant characteristics contained within the building being assessed."

Essentially, prescriptive codes are, in simplest form, a “one-size-fits-all” approach with a wide range of allowable approaches. Under the guidance of highly qualified professional engineers, however, a performance-based design looks at each individual building to custom tailor design objectives and approaches for that specific occupancy and its unique hazards.

The Automist Smartscan System is the type of system that fits within the intent of performance-based design. It is designed for individual occupancies based on the layout, hazards, and design objectives – all to meet the intent of NFPA 1, NFPA 750, and NFPA 13D. A sample proposal and fire testing documentation is attached to this document – an example of a portion of the documentation necessary for review and approval of any performance-based design. An analysis of review and approval of performance-based design is a separate document altogether, and *The SFPE Code Official’s Guide to Performance-Based Design Review* is the leading resource for this.

SYSTEMS ACCEPTANCE

As with any fire protection system, acceptance testing must be conducted and often witnessed by the AHJ. Where conventional prescriptive systems have defined acceptance testing procedures, NFPA 750 recognizes the wide variation in designs and places the requirement to provide acceptance testing procedures on the manufacturer.

> **14.1.2** A complete step-by-step description of the proposed acceptance test procedure, identifying all devices, controls, and functions to be tested and how the test will be conducted shall be approved prior to scheduling of acceptance testing.

The attached document “Automist Smartscan Hydra Design, Installation, Operation and Maintenance (DIOM) Manual” details what it refers to as the “Commissioning Procedure”, which is a functional check of all aspects of the system, and is in line with the intent of acceptance testing. The AHJ must approve this procedure prior to scheduling any acceptance testing.

SYSTEM INSPECTION, TESTING AND MAINTENANCE

As with any fire protection system, regular Inspection, Testing and Maintenance (ITM) is essential to ensuring proper functionality of that system. Again, recognizing variations in design, NFPA 750 places the requirement to provide ITM instructions on the manufacturer.

> **§15.1.2** A water mist system installed in one- and two-family dwellings shall be inspected, tested, and maintained in accordance with the instructions provided by the installer.

The ITM procedures for the Automist Smartscan System are included in the attached DIOM manual.

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CONCLUSION

This document was designed to provide the most current code references to assist the Authority Having Jurisdiction in making an informed decision regarding approval of the Plumis Automist Smartscan System. As this system falls outside of current prescriptive compliance, an alternative, performance-based approach must be utilized if it is to be approved. As such, certain local amendments to adopted codes may need to be considered in addition to this baseline document. Documentation will need to be provided with each permit and plan submission to prove the system is suitable as an equivalent alternative to residential automatic fire sprinkler systems. The whole process is designed to provide the AHJ with all necessary materials to make an informed decision in approving alternative and innovative approaches to meeting the intent of the codes.

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REFERENCED STANDARDS AND PUBLICATIONS

2018 NFPA 1

2018 International Plumbing Code

2017 NFPA 70 – National Electrical Code

2016 NFPA 13D – Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes

2015 NFPA 750 – Standard on Water Mist Fire Protection Systems

Society of Fire Protection Engineers, The SFPE Task Group on Performance-Based Design Review. (2004). *The SFPE Code Offical's Gude to Performance-Based Design Review*.

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REFERENCED TECHNICAL DOCUMENTATION

1. Exova Warringtonfire BS 8458:2015 Testing Report
2. LABC Validation Testing Report
3. Automist Smartscan Hydra Design, Installation, Operation and Maintenance (DIOM) Manual
4. Sample Performance-Based Design Proposal