



Examination Standard for Liquid Leak Detectors

Class Number 7745

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Foreword

This standard is intended to verify that the products and services described will meet stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of this standard is to present the criteria for examination of various types of products and services.

Examination in accordance with this standard shall demonstrate compliance and verify that quality control in manufacturing shall ensure a consistent and reliable product.

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1 INTRODUCTION

1.1 Purpose

- 1.1.1** This standard states testing and certification requirements for hydrocarbon leak detectors and water leak detectors.
- 1.1.2** Testing and certification criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a surveillance program.

1.2 Scope

- 1.2.1** This standard states testing and certification requirements for the following applications:
- hydrocarbon liquid leak detectors for above ground
 - hydrocarbon liquid leak detectors for below ground
 - water leak detectors
 - water leak detectors based on water usage pattern
 - water leak detectors for roof assemblies
 - water supply shutoff valves based on leak detection
 - water supply shutoff valves based on water usage pattern
- 1.2.2** This standard includes design and performance requirements for hydrocarbon leak detectors that can provide point, linear, or area detection of hydrocarbon liquid floating on the surface of water or pooling on a flat surface. The hydrocarbon leak detector shall be certified for the specific hydrocarbon liquid that it is claimed to be capable of detecting. Alternate test liquids (if any) will be determined as part of the certification examination.
- 1.2.3** This standard includes design and performance requirements for water leak detectors that can provide point, linear, or area leak detection for water pooling on flat surfaces or within the insulation surrounding pipes. Leak detectors can also be based on a meter that measures and profiles water usage. In addition, leak detector systems that include an optional valve to shut off water flow may also be evaluated with this standard.
- 1.2.4** This standard includes design and performance requirements for water leak detectors used in roof assemblies. This standard applies to two types of detection systems to detect water leakage through the roof membrane of a roof assembly. One type is constantly monitored using a control panel with sensors built into the roof assembly. The second type is performed by a technician conducting a scan of the roof surface using a low or high voltage electronic scanning system over the surface of the roof membrane. The manual scanning device is used to measure the electrical path between the wetted membrane and a conductive layer under the membrane.

1.3 Basis for Requirements

- 1.3.1** The requirements of this standard are based on experience, research and testing, and/or the standards of other organizations. The advice of manufacturers, users, and loss control specialists was also considered.
- 1.3.2** The requirements of this standard reflect tests and practices used to examine characteristics of hydrocarbon or water leak detectors for the purpose of obtaining certification. Hydrocarbon or water leak detectors having characteristics not anticipated by this standard may be certified if performance equal, or superior, to that required by this standard is demonstrated.

1.4 Basis for Certification

Certification is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

1.4.1 Examination and tests on production samples shall be performed to evaluate

- the suitability of the product;
- the performance of the product as specified by the manufacturer and required for certification; and as far as practical,
- the durability and reliability of the product.

1.4.2 An examination of the manufacturing facilities and audit of quality control procedures is made to evaluate the manufacturer's ability to consistently produce the product which is examined and tested, and the marking procedures used to identify the product. Subsequent surveillance may be required by the certification agency in accordance with the certification scheme to ensure ongoing compliance.

1.5 Basis for Continued Certification

The basis for continual certification may include, but is not limited to, the following based upon the certification scheme and requirements of the certification agency:

- production or availability of the product as currently certified;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated by the certification;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory surveillance audits conducted as part of the certification agency's product surveillance program.

1.6 Effective Date

The effective date of this certification standard mandates that all products tested for certification after the effective date shall satisfy the requirements of that standard.

The effective date of this standard is eighteen (18) months after the publication date of the standard for compliance with all requirements.

1.7 System of Units

Units of measurement used in this Standard are United States (U.S.) customary units. These are followed by their arithmetic equivalents in International System (SI) units, enclosed in parentheses. The first value stated shall be regarded as the requirement. The converted equivalent value may be approximate. Conversion of U.S. customary units is in accordance with ANSI/IEEE/ASTM SI 10.

1.8 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the cited edition applies.

ANSI/IEC 60529 – *Degrees of Protection Provided by Enclosures (IP Code)*

ANSI/UL 60079-0 – *Electrical Apparatus for Use in Class I, Zones 0, 1 & 2 Hazardous (Classified) Locations: General Requirements*

ASTM D7877 - *Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes*

ASTM D8231 - *Standard Practice for the Use of a Low Voltage Electronic Scanning System for Detecting and Locating Breaches in Roofing and Waterproofing Membranes*

ANSI/IEEE/ASTM SI-10 - *American National Standard for Metric Practice*

FM 3600 – *Electrical Equipment for Use In Hazardous (Classified) Locations – General Requirements*

ISO/IEC 17025 – *General Requirements for the Competence of Testing and Calibration Laboratories*

UL 50 *Standard for Safety – Enclosures for Electrical Equipment, Non-Environmental Considerations*

2 GENERAL INFORMATION

2.1 Product Information

- 2.1.1 A liquid leak detection system consists of a control unit and one or more sensors. Sensors may also be certified for use with a suitable certified control unit. A voltage free dry contact is typically used to provide the indication a leak, other communication formats can also be used subject to evaluation. The system can be configuration of nodes in the protected area and a control unit or gateway that communicates to other Internet of Things (IoT) devices. The connection between the sensors (nodes) and the gateway may be wired or wireless or a combination of the two.
- 2.1.2 Hydrocarbon leak detectors may be for the detection of hydrocarbon liquid floating on the surface of water or pooling on a flat surface. The hydrocarbon leak detector shall be certified for the specific hydrocarbon to be detected. Alternate test liquids (if any) will be determined as part of the certification examination.
- 2.1.3 Water leak detectors are for detection of water pooling on a surface, leaking from an overhead pipe, leaking between a pipe and the pipe insulation or leaking through a roof membrane.
- 2.1.4 Roof membrane liquid leak detectors consist of a control unit and sensors to continuously monitor the roof assembly for leaks. The roof assembly is built and tested with sensors installed in the assembly. Continuously monitored sensors may also be certified for use with a suitable certified control unit.
- 2.1.5 Low or High Voltage Electronic Scanning Systems are used to verify the integrity of a roof membrane after installation or during the service life of the membrane. The system requires an operator to manually scan the surface of the roof with the scanning system. Manual verification systems alert the operator to the presence of a leak with audible and visual indicators.
- 2.1.6 System components may be tested and certified as a system or can be certified separately, for use with other certified system components. Compatibility between separate system components must be verified by a compatibility evaluation of the electrical characteristics of each component or may require testing and examination if compatibility cannot be established. A system interconnection diagram must be provided for system configurations of separately certified system components. Evaluations of “component only” certification requests will be at the discretion of the certification agency.
- 2.1.7 For systems that incorporate a water meter or valve to shut off water flow, this standard allows designs for use with nominal pipe sizes ranging from NPS ½ through 2 inch (DN15 – DN50). Examination of sizes outside this range will be on a case-by-case basis.

2.2 Certification Application Requirements

The manufacturer shall provide the following preliminary information with any request for certification consideration:

- A complete list of all models, types, sizes, and options for the products or services being submitted for certification consideration.
- General assembly drawings, complete set of manufacturing drawings, materials list, anticipated marking format and electrical schematics, nameplate format, brochures, sales literature, spec. sheets, installation, operation and maintenance procedures.
- The number and location of manufacturing facilities.
- All documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All documents shall be provided with English translation.