



Guide for Use of Detectors for Flammable Gases

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FM Approvals LLC
FM 121303
First Edition



Underwriters Laboratories Inc.
UL 121303
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PREFACE

This is the harmonized FM and UL standard for Guide for Use of Detectors for Flammable Gases. It is the first edition of FM 121303 and the first edition of UL 121303.

This harmonized standard is based on ISA 12.13.03, Guide for Use of Combustible Gas Detection Equipment.

This harmonized standard was prepared by FM Approvals LLC (FM) and Underwriters Laboratories Inc. (UL).

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard is published as an equivalent standard for FM and UL.

An equivalent standard is a standard that is substantially the same in technical content. Presentation is word for word except for editorial changes.

While the technical content is the same in each organization's version, the format and presentation may differ.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

1 Scope

1.1 The intent of this document is to provide recommendation for use of detectors for flammable gases, which includes fixed, portable and transportable equipment types, to provide protection from explosion or fires by minimizing the possibility of an accumulation of flammable gases reaching ignitable levels and initiating mitigative actions based upon defined gas concentration limits. There are three independent applications for use of gas detection equipment within hazardous locations: personnel and property protection, classified area surveillance, and supplemental protection for the use of otherwise unsuitable equipment.

1.2 Detectors for flammable gases for personnel and property protection provides ability to work in hazardous (classified) locations, alert user to unsafe conditions, and take mitigative actions as appropriate. It is the intent of this document to compile and provide techniques for proper use of this equipment to achieve personnel and property protection.

1.3 Area monitoring gas detection equipment provides surveillance of a hazardous (classified) location to demonstrate that levels of flammable gases are below the accepted levels of ignitable concentrations. When exposure limits are exceeded, alarm and notification are initiated to prompt evacuation of personnel from the affected location. Also, when exposure limits are exceeded and ventilation techniques are not effective, then repair of equipment is warranted, or a shutdown action will be required. This prevents further loss of containment for the affected process and that the electrical equipment not suitable for use in the flammable atmosphere be de-energized. It is the intent of this document to compile and provide techniques for the use of detectors for flammable gases to monitor and control sources of flammable gas release as a means of process safety management.

1.4 In addition, supplemental area protection is provided by use of gas detection equipment to allow the use of otherwise unsuitable electrical equipment within hazardous (classified) locations. Criteria are developed to establish flammable gas levels to initiate alarms, initiate increase in ventilation rates and to initiate shutdown of processes to shut off the flow of flammable gas that has breached containment and to de-energize all unsuitable electrical equipment. It is the intent of this document to compile and provide techniques for the use of flammable gas equipment to monitor and control sources of flammable gas release into the atmosphere within designated spaces. It is also the intent that these products and techniques be adapted by industries and used with processes that have historically not employed flammable gas detection.

1.5 Detectors for flammable gases as described in this document may be applied as stand-alone sensor/controllers or may be incorporated with or into another system such as, Basic Process and Control System (BPCS), Safety Instrumented System (SIS) or Fire and Gas System that may be employed in an industrial facility. When ventilation rates are to be controlled by the various responses of the flammable gas detection and control devices, there may also be interaction with the HVAC control system or devices.

NOTE 1: Applicable Detectors for flammable gases performance standards include FM 60079-29-1/UL 60079-29-1 and FM 60079-29-4/UL 60079-29-4.

1.6 For the purpose of this document flammable gases include flammable gases and vapors.

1.7 This document provides guidance on personnel and property protection by the use of detectors for flammable gases as defined within the following specified documents.

- ANSI/NFPA 72 for all installations.
- Title 29 Code of Federal Regulations 1910.119(k) OSHA regulations to support the hot work permit.

1.8 This document provides guidance on the use of a flammable gas detection system as a means of protection in industrial establishments with restricted public access and where the conditions of maintenance and supervision allow only qualified persons service the installation as defined within the following specified documents:

- ANSI/NFPA 70 (NEC) where for specific applications, electrical equipment that would not otherwise be permitted in the hazardous (classified) location may be used in conjunction with detectors for flammable gases;
- API RP 500 and API RP 505 for the determination of ventilation required to provide adequate dilution of the detected flammable gas to prevent the possibility of ignition;
- API RP 14F and API RP 14FZ also provide guidance on the use of gas detection as a protection technique.

Documents other than API RP 500 and RP 505 that describe area classification techniques are ANSI/NFPA 497 and ANSI/ISA 60079-10-1. Application of flammable gas detection and control as described in this document can provide additional protection from fire and explosion over typical electrical protection techniques by risk reduction methods. Industries that use these and other area classification documents can benefit by application of the techniques and criteria presented in this document.

NOTE 2: Where mandatory text is provided in this Technical Report, the basis of the mandatory text is derived directly from referenced standards.

1.9 This document provides guidance on the use of flammable gas detection as a supplement to other explosion protection in adequately ventilated spaces.

1.10 This document provides guidance on the use of detectors for flammable gases for monitoring classified areas for low LFL level of flammable gas to initiate maintenance actions to locate and repair leaks in addition to providing alarm to notify personnel for evacuation.

2 Referenced Publications

2.1 Any undated reference to a code or standard appearing in the requirements of this standard is referring to the latest edition of that code or standard.

2.2 The following publications are referenced in this standard:

ANSI/ISA 60079-10-1, Recommended Practice for Classification of Locations for Electrical Installations Classified as Class I, Zone 0, Zone 1, or Zone 2

ANSI/ISA-84.00.01 (IEC 61511-1 Mod), Functional Safety: Safety Instrumented Systems for the Process Industry Sector – Part 1: Framework, Definitions, System, Hardware and Software Requirements

ISA-TR84.00.07, Guidance on the Evaluation of Fire, Combustible Gas and Toxic Gas System Effectiveness

ANSI/NFPA 497, Recommended Practice for the Classification of Flammable Liquids, Gases, Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.

ANSI/NFPA 70, National Electrical Code® (NEC®)