TECHNICAL REPORT

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Guide for Combustible Gas Detection as a Method of Protection

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The primary reason for development of this technical report is to support the existing allowance for combustible gas detectors as a method of protection as permitted within ANSI/NFPA 70, National Electrical Code (NEC), Articles 500 and 505. This document also provides guidance on the use of combustible gas detectors as a method of area classification designation, gas free work permit (hot work permit) application and supplemental protection.

Abstract

This document provides guidance on the use of combustible gas detection as a method of protection as permitted by ANSI/NFPA 70 (NEC), the use of combustible gas detection for reduction of area designation by API 500 and API 505, and to support the Hot Work Permit discussed in OSHA regulations 29 CFR 1910.119(k).

Keywords

Apparatus, combustible gas detection, fixed apparatus, combustible gas, combustible vapor, gas concentration, gas free work permit, hot work permit, portable apparatus, transportable apparatus

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Introduction

Combustible gas detection apparatus and systems should be used whenever there is the possibility of a hazard to life or property caused by the accumulation of a combustible gaseous atmosphere. Such apparatus can provide a means of reducing the hazard by detecting the presence of the combustible gas and issuing suitable audible or visual warnings and/or to initiate specific actions such as increased ventilation rates, plant shutdown, evacuation, and operation of fire suppression procedures.

Combustible gas detection apparatus and systems may be used to monitor a gas atmosphere to initiate maintenance or operation action when low levels of combustible gas are detected.

Additionally, combustible gas detection apparatus can be used to confirm that the area is suitable for engagement of work activities or to permit energizing electrical equipment in hazardous (classified) locations.

Performance requirements for combustible gas detecting apparatus are set out in ANSI/ISA-12.13.01 (IEC 61779-1 to -5 Mod) and ANSI/FM 6325/ISA-12.13.04.

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1 Scope

Combustible gas detection used for process safety management may also be used to provide protection from explosion or fires by minimizing the possibility of an accumulation of combustible gases reaching ignitable levels. Criteria are developed to establish combustible gas levels to initiate alarms, initiate increase in ventilation rates and to initiate shutdown of processes to shutoff the flow of combustible gas that has breached containment. It is the intent of this document to compile and refine techniques for the use of combustible gas sensors and controllers to monitor and control sources of combustible 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 combustible gas detection as a method of protection.

1.1 This document provides guidance on the use of a combustible gas detection system as a method of protection in Class I hazardous (classified) locations as defined within the following specific 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 combustible gas detection equipment;
- API RP 500 and API RP 505 for the use of combustible gas detection equipment to augment ventilation to ensure adequate dilution of combustible gas to prevent the possibility of ignition;
- Title 29 Code of Federal Regulations 1910.119(k) OSHA regulations to support the hot work permit.

NOTE 1 — Applicable combustible gas detection equipment performance standards include ANSI/ISA-12.13.01 and ANSI/FM 6325/ISA-12.13.04.

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

Documents other than API RP 500 and RP 505 that describe area classification techniques, but which have not included combustible gas detection as part of the process to reduce the probability of ignition are ANSI/NFPA 497 and ANSI/ISA-TR12.24.01 (IEC 60079-10 Mod). Application of combustible gas detection and control as described in this document can provide additional protection from fire and explosion over typical area classification 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.

1.2 This document provides guidance on the use of portable combustible gas detection apparatus to allow live maintenance on equipment or work with electrical powered tools within hazardous (classified) locations.

1.3 This document provides guidance on the use of combustible gas detection as a supplement in adequately ventilated spaces.

1.4 For the purpose of this document, apparatus includes

fixed apparatus;

portable apparatus; and

transportable apparatus.