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.

1.5 This document is NOT intended to cover the following:

a) Guidance on area classification

b) Apparatus intended only for the detection of non-combustible toxic gases

c) Apparatus of laboratory or scientific type intended only for analysis or measurement purposes

d) Apparatus intended for mining applications

e) Apparatus intended for applications in explosives processing and manufacture

f) Apparatus intended only for process control applications

g) Apparatus intended for the detection of a potentially combustible atmosphere resulting from dust or mist in air

h) Appartus intended for confined space entry.

1.6 Combustible gas hardware 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 must be controlled by the various responses of the combustible gas detection and control devices, there must also be interaction with the HVAC control system or devices.

2 References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/ISA-60079-0 (12.00.01), Electrical Apparatus for Use in Class I, Zones 0, 1 & 2 Hazardous (Classified) Locations: General Requirements

ANSI/ISA-TR12.24.01 (IEC 60079-10 Mod), Recommended Practice for Classification of Locations for Electrical Installations Classified as Class I, Zone 0, Zone 1, or Zone 2

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/ISA-12.13.01 (IEC 61779-1 to 5 Mod), Performance Requirements for Combustible Gas Detectors

ANSI/ISA-RP12.13.02 (IEC 61779-6 Mod), Recommended Practice for the Installation, Operation, and Maintenance of Combustible Gas Detection Instruments

ANSI/FM 6325/ISA-12.13.04, Performance Requirements for Open Path Combustible Gas Detectors

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

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

ANSI/NFPA 72, National Fire Alarm Code®