(c) The gas detection system shall only use point-type sensors. The system shall be permitted to be augmented with open-path (line-of-sight)–type sensors, but open-path–type sensors shall not be the basis for this protection technique.

(d) The type of detection equipment and its listing, installation location(s), alarm and shutdown criteria, and calibration frequency shall be documented where gas detectors are used as a protection technique.

(e) The applications for the use of gas detection systems as a protection technique shall be limited to 500.7(K)(2), (K)(3), or (K)(4).

The gas detection system must be suitable for the original division classification of the area, even though the remainder of installed equipment is permitted to be suitable for the next lower division.

Informational Note No. 1: See ANSI/UL 121303, *Guide for Use of Detectors for Flammable Gases*, or ANSI/FM 121303, *Guide for Use of Detectors for Flammable Gases*, for additional information.

Informational Note No. 2: See ANSI/UL 60079-29-1, *Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases*, or ANSI/FM 60079-29-1, *Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases*, for additional information.

Informational Note No. 3: See ANSI/API RP 500, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2*, for additional information.

Informational Note No. 4: See ANSI/UL 60079-29-2, *Explosive Atmospheres — Part 29-2: Gas Detectors — Selection, Installation, Use and Maintenance of Detectors for Flammable Gases and Oxygen*, or ANSI/FM-60079-29-2, *Explosive atmospheres — Part 29-2: Gas Detectors — Selection, Installation, Use and Maintenance of Detectors for Flammable Gases and Oxygen*, for additional information.

Δ **(2) Inadequate Ventilation.** A location, enclosed space, or building that is classified as a Class I, Division 1 location due to inadequate ventilation and is provided with a detection system for flammable gases shall be permitted to use electrical equipment, installation methods, and wiring practices suitable for Class I, Division 2 installations. Sensing a gas concentration of not more than 40 percent of the lower flammable limit or a gas detector system malfunction shall activate an alarm (audible or visual, or both, as most appropriate for the area).

Section 17.11 of NFPA 30, *Flammable and Combustible Liquids Code*, and 3.3.1 of NFPA 497, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, provide information on what is considered adequate ventilation.

Δ **(3) Interior of a Building or Enclosed Space.** Any building or enclosed space that does not contain a source of flammable gases or vapors that is located in, or has an opening into, a Class I, Division 2 hazardous (classified) location and is provided with a detection system for flammable gases shall be permitted to use electrical equipment, installation methods, and wiring practices suitable for unclassified installations under all of the following conditions:

(1) An alarm (audible or visual, or both) shall be sounded at not more than 20 percent of the lower flammable limit.
(2) Sensing a gas concentration of not more than 40 percent of the lower flammable limit or a gas detector system malfunction shall activate an alarm (audible or visual, or both, as most appropriate for the area) and initiate automatic disconnection of power from all electrical devices in the area that are not suitable for Class I, Division 2.
(3) The power disconnecting device(s) shall be suitable for Class I, Division 1 if located inside the building or enclosed space. If the disconnecting device(s) is located outside the building or enclosed space, it shall be suitable for the location in which it is installed.

Redundant or duplicate equipment (such as sensors) shall be permitted to be installed to avoid disconnecting electrical power when equipment malfunctions are indicated.

When automatic shutdown could introduce additional or increased hazard, this technique shall not be permitted.

Δ **(4) Interior of a Control Panel.** Inside the interior of a control panel containing instrumentation or other equipment using or measuring flammable liquids, gases, or vapors which is provided with a detection system for flammable gases shall be permitted to use electrical equipment, installation methods, and wiring practices suitable for Class I, Division 2 installations.

An alarm (audible or visual, or both) shall be sounded at not more than 40 percent of the lower flammable limit.

(L) Inherently Safe Optical Radiation "op is." This protection technique shall be permitted for equipment in Class I or II, Division 1 or 2 locations for which the equipment is identified.

Informational Note: The identified class and division depends on the intended explosive atmosphere and the number of faults applied as part of the protection technique evaluation.

(M) Protected Optical Radiation "op pr." This protection technique shall be permitted for equipment in Class I or II, Division 2 locations for which the equipment is identified.

Informational Note: The identified class and division depends on the intended explosive atmosphere as part of the protection technique evaluation.

(N) Optical System With Interlock "op sh." This protection technique shall be permitted for equipment in Class I or II, Division 1 or 2 locations for which the equipment is identified.

Informational Note: The identified class and division depends on the intended explosive atmosphere and the number of faults applied as part of the protection technique evaluation.

(O) Protection by Skin Effect Trace Heating "IEEE 844.1". This protection technique shall be permitted for skin