UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

SECTION 28 33 00.00 40

FUEL-GAS DETECTION AND ALARM

02/17

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USACE / NAVFAC / AFCEC / NASA | **UFGS-28 33 00.00 40 (February 2017)**

Preparing Activity: NASA | **Superseding UFGS-28 33 00.00 40 (February 2014)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

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SECTION 28 33 00.00 40

FUEL-GAS DETECTION AND ALARM
02/17

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NOTE: This guide specification covers the requirements for equipment, performance, and testing of stationary electrical instruments used for sensing the presence of combustible gases, or the deficiency of oxygen, in ambient air.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature

to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

COMPRESSED GAS ASSOCIATION (CGA)

CGA P-39	(2015) Oxygen-Rich Atmospheres; 2nd Edition

ELECTRONIC COMPONENTS INDUSTRY ASSOCIATION (ECIA)

ECIA EIA/ECA 310-E	(2005) Cabinets, Racks, Panels, and Associated Equipment

INTERNATIONAL SOCIETY OF AUTOMATION (ISA)

ANSI/ISA 60079-29-1	(2013) Gas Detectors-Performance Requirements of Detectors for Flammable Gases

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 72	(2019; TIA 19-1; ERTA 1 2019) National Fire Alarm and Signaling Code
NFPA 110	(2016) Standard for Emergency and Standby Power Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-461	(2015; Rev G) Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Preinstallation Meetings

Within [30] [_____] days of Contract Award submit the following to the Contracting Officer for review:

a. Material, equipment, and fixture lists

b. List of product installations

c. Manufacturer's sample warranty

d. Manufacturer's catalog data

e. Connection diagrams

f. Spare parts data

When submitting the list of product installations for combustible-gas detection systems, include identification of at least five units, similar to those proposed for use, that have been in successful service for a minimum period of 5 years. Also include such data as the number of false alarms and malfunctions experienced while in service over a period of [_____] [2] years.

1.3 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists; G[, [____]]

Sample Warranty; G[, [____]]

SD-02 Shop Drawings

Connection Diagrams; G[, [____]]

SD-03 Product Data

Manufacturer's Catalog Data; G[, [____]]

Spare Parts Data; G[, [____]]

[SD-04 Samples

Samples; G[, [____]]

]

SD-07 Certificates

List of Product Installations; G[, [____]]

SD-10 Operation and Maintenance Data

Operation and Maintenance Manual; G[, [____]]

SD-11 Closeout Submittals

Warranty; G[, [____]]

Record Drawings; G[, [____]]

1.4 WARRANTY

Submit a sample warranty for approval by the Contracting Officer.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

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NOTE: Local policies may dictate more elaborate procedures for qualification or approval of detector samples.

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2.1.1 Design Requirements

2.1.1.1 Schematics

Submit schematic drawings showing the specific equipment to be furnished; no "typicals."

2.1.1.2 Combustible-Gas Environments

Provide a system with electrically supervised detection and [_____] [noncoded] alarm of combustible gas in Class I, Division 1, Group [_____] [C and D] locations, conforming to the applicable requirements of NFPA 70,

NFPA 72[, and [_____]].

2.1.1.3 Oxygen-Deficient Atmospheres

Provide a system with electrically supervised detection and [_____] [noncoded] alarm of oxygen-deficient atmospheres[, conforming to the applicable requirements of [_____]].

2.1.2 Performance Requirements

Provide a system with performance conforming to the requirements of FM Approval Standard for Combustible Gas Detectors (Class Number 6310 and 6320), and [_____] [ANSI/ISA 60079-29-1]. Ensure that the operation of any detection device automatically activates control unit relays [remote alarms] [, and lights].

Ensure that the name of the manufacturer and the serial numbers appear on all major components. Submit the following:

a. Connection diagrams showing a complete conduit and wiring layout for the equipment to be furnished, including AWG size and type of wire, and the number of conductors and connections to the equipment.

b. Manufacturer's catalog data for the [combustible-gas] [oxygen-deficient-atmosphere] detection systems, including special tools necessary for the maintenance of the equipment.

c. Material, equipment, and fixture lists including manufacturer's style or catalog numbers, specification and drawing reference numbers, reports from independent testing laboratories, and related descriptive matter on the devices to be installed.

2.1.3 Electromagnetic-Compatibility Requirements

Ensure that electrical and electronic systems operate without causing electromagnetic interference to, or malfunctioning due to electromagnetic interference from, other systems or equipment, and in accordance with applicable requirements of [ANSI/ISA 60079-29-1] [_____] [MIL-STD-461].

2.2 EQUIPMENT

Furnish fuses of each type and size required, and a [_____] [hydrogen] gas calibration kit.

2.3 COMPONENTS

2.3.1 Control Unit

Provide a [_____] [dual] channel control unit, operating over a temperature range of [_____] [0 to 51] degrees C [32 to 125] degrees F, capable of monitoring [_____] [two] detectors.

Provide a control unit housed in a [_____] [weatherproof] cabinet suitable for [_____] [wall] mounting [in a Class I, Division 1, Group [_____] location] with [_____] [solid-state] [plug-in]-type relays and solid-state rectifiers.

2.3.1.1 Control Circuits

Provide the control unit with plug-in-type circuit boards, in a housing [conforming to ECIA EIA/ECA 310-E,] suitable for [Class 1, Group [_____]] [nonhazardous] locations.

2.3.1.2 Power Supply Component

Provide [a control unit with transformer, rectifier, resistors, charger, batteries, and other required power supply components incorporated][a separate power supply unit as approved for the application].

2.3.1.3 Indicator Light and Reset

Provide the control unit with [buttons for test, and] indicator lights for Power, [Malfunction,] and Alarm. Color-code indicator lamps as follows: Power (green), [Malfunction [(yellow)] [[_____],] and Alarm [[_____]] [[red]]]. Zero the alarm with adjustable calibration settings.

2.3.1.4 Malfunction Circuits

Ensure that sensing circuits are monitored by individual malfunction circuits. Ensure that an open circuit will activate a malfunction light and operate relays for a [remote] warning signal [and lights].

2.3.1.5 Alarm

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NOTE: Exercise care to ensure that the options selected properly satisfy project requirements.
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Arrange the unit to operate alarm relays, activating audible and visible alarms, and to continue operation until [[reset by a keyed switch] [silenced by a switch] [in] [on] the unit cabinet] [or] [the atmosphere returns to set conditions].

[Ensure that the reset key cannot be removed until conditions have returned to normal.] [Ensure that the cabinet is locked by the same key used to reset the alarm relays.] [Ensure that operation of the silencing switch illuminates an indicator lamp, which is plainly visible when the cabinet is closed.]

Provide an audible alarm and a [_____] [red] rotating alarm beacon [as indicated].

Provide an alarm system that can transmit individual alarms [to the basewide fire reporting system] [to security] and [to the basewide utility monitoring system].

2.3.2 Detectors

If detectors have not been previously qualified and approved for installation at this project location, submit samples of detectors for approval by the Contracting Officer.

2.3.2.1 Circuit Design

Ensure that the detector circuit design is suitable for the types and

numbers of detectors, as approved, and that the detector circuit current does not exceed ratings of the individual detectors and associated relays.

Electrically supervise the circuits to the detectors for [grounds] [opens] and [shorts].

2.3.2.2 Combustible-Gas Detector (CGD)

Provide a [_____] [diffusion] [sample draw]-type CGD [with a [_____] [catalytic] sensor] [meeting the requirements of ANSI/ISA 60079-29-1,] in a housing suitable for the environment, and intrinsically safe for use in Class I, Division 1, Group [_____] locations.

Provide a CGD that detects combustible vapors that are produced from flammable liquids such as gasoline or ethanol.

Provide a CGD with [_____] [4 to 20 mA] output signal, with an operating range of [_____] [minus 40 to 74] degrees C [minus 40 to 165] degrees F.

Provide a CGD with a visible and audible alarm that actuates at [_____] percent of lower explosive limit (LEL). [Provide a CGD that includes a prealarm that actuates at [_____] percent.]

2.3.2.3 Oxygen Detector (OD)

Provide [_____] [a paramagnetic] [an electrochemical] cell OD [meeting the requirements of CGA P-39], with a minimum shelf life of [_____] [6] months, and the following characteristics:

a. Output signal: [_____] [4 to 20 mA]

b. Operating range: [_____] [4 to 33] degrees C [40 to 90] degrees F, [_____] [10 to 100] percent relative humidity

c. Measurement: adjustable through a range of [_____] [0 to 25] percent oxygen-in-air

d. Actuation level: set at 19.5 percent oxygen

2.3.3 Power Supply

Provide a [_____] [120]-volt, 60 Hz source power supply, and an alternate source of power, arranged to become energized automatically within at least [10] [_____] seconds upon loss of normal power, in accordance with NFPA 110.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Combustible-Gas Systems

Ensure that the installation of combustible-gas detection and alarm systems complies with NFPA 70 and applicable requirements of NFPA 72 [, and [_____]].

3.1.2 Oxygen Deficiency Systems

Ensure that the installation of oxygen detection and alarm systems

complies with NFPA 70[and [_____]].

3.1.3 Grounding

Install grounding in accordance with NFPA 70.

3.2 FIELD QUALITY CONTROL

Conduct performance tests in accordance with ANSI/ISA 60079-29-1 [_____].

Test operation of the entire system in operational and alarm modes. Activate each detector by [_____] [a hydrogen gas bottle representing the adjusted Lower Flammable Limit (LFL)]. Test the malfunction feature for each control unit.

3.3 CLOSEOUT ACTIVITIES

3.3.1 Operation And Maintenance Manual

Submit [_____] [four] copies of an operation and maintenance manual, giving complete instructions for the operation, inspection, testing, and maintenance of the system, including wiring diagrams and equipment malfunction checklist.

3.3.2 Warranty

Submit [3] [_____] signed original warranties to the Contracting Officer.

3.3.3 Record drawings

Provide record drawings that include deviations, amendments, and concealed and visible changes in the work. When spot-type detectors are used, show by number the detectors in the exact sequence in which they are installed in the circuit.

-- End of Section --