SOUTHWEST GAS CORPORATION

ENGINEERING STAFF

MATERIAL SPECIFICATION

Section No:	MS O-26
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Issue Date:	03/01/16
Superseded Date:	02/23/15

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MISCELLANEOUS

Flame Ionization Detectors-Combustible Gas Indicators

1. SCOPE

This specification covers equipment used to detect and measure natural gas concentrations in the air. Both the Flame Ionization Detectors (F.I.D.) and the Combustible Gas Indicators (C.G.I.) are specified. Remote Methane Leak Detector (RMLD) Detecto Pak-Infrared (DPIR).

2. APPLICABLE DOCUMENTS

2.1 ANSI (American National Standards Institute)/ISA-S12.13, Part I, "Combustible Gas Detectors."

2.2 United States Department of Transportation (DOT), Code of Federal Regulations (CFR), Title 49, Part 192, "Transportation of Natural and Other Gas by Pipeline; minimum Safety Standards."

NOTE: Unless otherwise specified, the editions of the above documents incorporated by DOT 49, CFR 192 are applicable. Documents not incorporated by DOT 49, CFR 192 will be the most recent edition.

3. TERMINOLOGY

3.1 General

3.1.1 "Southwest Gas," "Southwest" or "SWG" wherever used in this specification and other related documents will refer exclusively to Southwest Gas Corporation.

3.1.2 The terms "approved," "as approved," "satisfactory," "as directed," "or equal" or other similar terms wherever used in this specification and other related documents will mean "as determined by Southwest Gas," unless specifically stated otherwise.

3.1.3 "Product Information Package" or "PIP" wherever used in this specification and other related documents will mean the required information that a manufacturer must submit to Southwest Gas to determine if the product is suitable for use by Southwest Gas, unless specifically stated otherwise.

4. MATERIALS AND MANUFACTURE

All gas detection instruments shall meet the applicable minimum construction and test requirements contained in ANSI/ISA-12.13.

5. PERFORMANCE REQUIREMENTS

5.1 Flame Ionization Detectors

These instruments utilize the proven flame ionization principle. A specific amount of fuel gas is admitted to a detector cell, along with a drawn air sample. As the fuel and sample are consumed within the chamber ionization of any existing hydrocarbons occurs. The rate of ionization causes a corresponding electrical conductivity which is measured and converted to a visual indication of hydrocarbon level.

5.1.1 Sensitivity:

The instrument must be capable of detecting 1 part per million (ppm) natural gas in the air concentrations. A visual and audible indication shall be activated at no higher than 10 ppm natural gas in air concentrations at a minimum shall continue displaying a reading until gas concentrations reach a level of 1000 ppm gas in air concentrations.

5.1.2 Safety:

The instrument must contain a flame arresting feature and be suitable for use in Class I, Division 1 Hazardous locations.

5.2 Combustible Gas Indicators

Combustible Gas Indicators operate in two modes using different principles which correspond to two different ranges of sensitivity as follows:

5.2.1 Low Range (0-100%) Lower Explosive Limit (% L.E.L.) = 0-5% Natural Gas:

Detection in this range is accomplished by a principle of conductivity. Natural gas detection is accomplished by drawing a sample of gas across a hot platinum wire catalytic combustion element. As the gas is oxidized by the hot wire that is part of a wheatstone bridge, the change in the wire indication of natural gas level.

5. PERFORMANCE REQUIREMENTS (Cont'd)

5.2.2 High Range (5-100% Natural Gas):

Detection in this range is accomplished by combustible principle. Natural gas detection is based on the fact that thermal conductivity of natural gas differs from that of air. The process involves a sample that is aspirated onto a thermal conductivity cell. As gas concentration increases heat dissipation also increases. The resultant cooling effect changes the resistance of the coil in the thermal conductivity cell which is in turn transferred to a visual indication of gas concentration.

5.2.3 Sensitivity:

The instrument must have dual mode operation capable of detecting and indicating 0 to 100% natural gas in air concentrations in one mode with an additional indication of percent of the Lower Explosive Limit (% L.E.L.) in the other mode.

5.2.4 Safety:

The instrument must be suitable for use in Class I, Division 1 Hazardous locations.

5. PERFORMANCE REQUIREMENTS (Cont'd

PERCENT OF GAS-PARTS PER MILLION				
Parts Per Million	**% Gas**		**Gas Detector**	
1	.0001			F.I.
2	.0002			*
5	.0005			*
10	.001			*
20	.002			*
50	.005			*
100	.01			*
200	.02			*
500	.02			*
1000	.1			*
2,000	.2			*
2,500	.25			*
5,000	.5		C.G.I.	*
10,000	1.0		*	
20,000	2.0		*	
45,000	4.5	L.E.L.*	*	
100,000	10.0		*	
145,000	14.5	U.E.L.**	*	
200,000	20.0		*	
500,000	50.0		*	
1,000,000	100.00		*	
* L.E.L. = Lower Explosive Limit * U.E.L. = Upper Explosive Limit				

TABLE M-26.1

6. INSPECTION

6.1 Successful review of the Product Information Package (PIP), as well as any future reference by SWG to the Seller's part number or internal code number in any future contract or purchase, will mean only that no conflict with the specification was found, and will not relieve the Seller from meeting all the requirements of this specification.

6.2 SWG retains the option to inspect the manufacture and testing of any and all materials, products or systems supplied to SWG under this specification.

6.3 SWG will make appropriate inspections and tests of any and all materials, products or systems supplied to this specification. SWG will have the right, at their option, to reject any material which fails to conform to this specification. Any such rejection may take place at the manufacturer's facility; the supplier's warehouse or any subsequent delivery location, before or after SWG assumes possession. Notice of the rejection will be made promptly to the supplier by SWG. The defective product will be replaced or returned for credit at the manufacturer's expense.

6.4 Any changes in the manufacturing of previously approved products, described in this material specification for sale to SWG, must be approved by SWG's Engineering Staff. **Failure to obtain SWG's approval may be cause for rejection and disqualification as an approved supplier.**

7. CERTIFICATION

The manufacturer's or supplier's certification will be furnished to Southwest. This certification shall state that samples representing each lot have been manufactured, tested, and inspected in accordance with this specification and that all requirements have been met. When requested or specified in the purchase order or contract, a report of test results will be provided.

Upon the request of Southwest, the certification of an independent third party indicating conformance to the specification may be considered at Southwest's expense.

8. SAFETY DATA SHEETS

In accordance with law, the Seller will supply Safety Data Sheets for all applicable items supplied under this specification to the following:

1) The Receiving Location
2) Engineering Staff
3) Southwest Gas Corporation
   Corporate Safety
   Mail Station LVA-120
   P. O. Box 98510
   Las Vegas, NV 89193-8510

9. PRODUCT MARKING

All materials, products or systems sold to Southwest will be marked with the following:

- Manufacturer's name or trademark
- Manufacturer's part number (MPN)

10. PACKAGING AND PACKAGE MARKING

All products covered in this specification will be packaged in a manner to prevent damage during transportation and storage.

11. STOCK CLASSIFICATION DESCRIPTION

FLAME, ARRESTOR (DETECTO-PAK II)

FLAME, ARRESTOR, EXHAUST, 403+