

AMERICAN NATIONAL STANDARD

ANSI/ISA-92.04.01, Part I-2007 (R2013)

Formerly ISA-92.04.01, Part I-1996

**Performance Requirements for Instruments
Used to Detect Oxygen-Deficient/
Oxygen-Enriched Atmospheres**

Approved 31 January 2013

ANSI/ISA-92.04.01, Part I-2007 (R2013), Performance Requirements for Instruments Used To Detect Oxygen-Deficient/Oxygen-Enriched Atmospheres

ISBN: 978-1-937560-95-9

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ISA

67 Alexander Drive

P.O. Box 12277

Research Triangle Park, North Carolina 27709

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W. Weidman	Worley Parsons

J. Weiss
M. Widmeyer
M. Zielinski

Applied Control Solutions LLC
Consultant
Emerson Process Management

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Foreword

The following editorial change was made to the reaffirmation of ANSI/ISA-92.04.01, Part I-2007, subclause 7.9.2, in order to provide consistency.

ANSI/ISA-92.04.01, Part I-2007

7.9.2 For instruments having meters or output signals, the following test gases at one normal atmosphere shall be used to confirm the accuracy of the instrument:

0- 5percent

20-30percent

40-60percent

70-90percent of range

For instruments having selectable ranges, the instrument shall be tested on all ranges.

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40-60 percent of range

70-90 percent of range

For instruments having selectable ranges, the instrument shall be tested on all ranges.

1 Scope

1.1 This Standard addresses the details of construction, performance, and testing of portable, mobile, and stationary electrical instruments used to provide a warning of the presence of oxygen-deficient or oxygen-enriched atmospheres.

NOTE — Human physiology responds to oxygen pressure, not oxygen concentration; however, they are physiologically equivalent at one normal atmosphere. (See Clause 3, Normal atmosphere.) The normal atmosphere is composed approximately of 20.9 percent oxygen (21.2 kPa)(3.07 psia), 78.1 percent nitrogen (79.1 kPa)(11.5 psia), and 1 percent argon (1.01 kPa)(.146 psia) by volume with small amounts of other gases. Reference: National Institute for Occupational Safety and Health, (NIOSH), Pub. No. 80-106.

1.2 This Standard applies to mains-connected instruments rated at 250 V nominal or less, and to portable, mobile, and stationary battery-powered instruments.

1.3 This Standard applies to instruments suitable for use in an ambient temperature range of at least -10°C to 50°C (+14°F to +122°F).

1.4 This Standard applies to instruments providing at least one range that includes 15 to 20.9 (15.2 to 21.2 kPa)(2.20 to 3.07 psia) or 20.9 to 25.0 (21.2 to 25.3 kPa)(3.07 to 3.63 psia) volume percent oxygen at one normal atmosphere. Hereafter, the volume percentage of oxygen at one normal atmosphere will be expressed as "percent oxygen."

1.5 This Standard applies to instruments that provide at least one oxygen-deficient alarm that cannot be adjusted below 18 percent (18.2 kPa)(2.64 psia) oxygen or at least one oxygen-enrichment alarm that cannot be adjusted above 25 percent (25.3 kPa)(3.67 psia) oxygen.

1.6 For instruments with multiple ranges, this Standard does not apply to any range that does not include normal atmospheric oxygen pressure (20.9 percent oxygen or 21.2 kPa[3.07 psia] at one normal atmosphere).

1.7 This Standard does not apply to oxygen-monitoring instruments of the laboratory or scientific type, which are used for analysis or measurement in process control and process-monitoring applications or instruments with full-scale oxygen concentrations less than 15 percent (15.2 kPa)(2.20 psia) or greater than 30 percent (30.4 kPa)(4.41 psia) oxygen.

NOTE — The user should specify instrumentation that will provide a higher level of accuracy than the minimum tolerances of this Standard if required by the application risk.

1.8 The user should be aware of the effects of altitude and barometric pressure on both the instrument and the user. The effects are not intended to be evaluated by this performance Standard.

2 Purpose

2.1 This Standard provides minimum performance requirements of electrical instruments for the determination of oxygen (O₂) content in air in order to enhance the safety of personnel.

2.2 ISA-RP92.04.02, Part II, the companion recommended practice to this Standard, establishes user criteria for the installation, operation, and maintenance of oxygen-monitoring instrumentation.

3 Definitions and terminology

For the purposes of this Standard, the following definitions apply:

3.1 alarm: An audible, visual, or physical presentation designed to alert the instrument user that a specific level of oxygen has been detected.

3.2 alarm-only instrument: An instrument that provides an alarm(s) but does not have an integral display device indicating a specific oxygen level.

3.3 alarm setpoint: The selected oxygen level(s) at which an alarm(s) is activated.

3.4 ambient air: Air to which the sensing element is normally exposed.

3.5 calibration: The procedure to adjust the instrument for proper response (e.g., reference, normal level, span, or alarm).

3.6 calibration gas: A gas mixture with a known oxygen content, used to set the instrument span or alarm level(s), including, but not limited to, ambient air.

3.7 clean air: Air that is free of any substance that will adversely affect the operation or cause a response of the instrument.

3.8 consumables: Those materials or components that are depleted or require periodic replacement through normal use of the instrument.

3.9 control unit: That portion of a multi-part oxygen-monitoring instrument that is not directly responsive to oxygen, but responds to the electrical signal obtained from one or more detector heads to produce an indication, alarm, or other output function.

3.10 detector head: The oxygen-responsive portion of an oxygen-monitoring instrument located in the area where sensing the presence of oxygen is desired. Its location may be integral to or remote from its control unit.

NOTE — The detector head may incorporate the oxygen-sensing element and additional circuitry such as signal processing or amplifying components or circuits.