

# **ANSI/ISA-S82.03-1988**

Approved February 18, 1988  
(Partial Revision and Redesignation of ANSI C 39.5-1974)

American National Standard

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# **Safety Standard for Electrical and Electronic Test, Measuring, Controlling, and Related Equipment**

ELECTRICAL AND ELECTRONIC PROCESS MEASUREMENT  
AND CONTROL EQUIPMENT



ANSI/ISA-S82.03 — Safety Standard for Electrical and Electronic Test, Measuring, Controlling,  
and Related Equipment

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## Preface

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This preface is included for information purposes and is not part of ANSI/ISA-S82.03.

This standard has been prepared as part of the service of ISA toward a goal of uniformity in the field of instrumentation. To be of real value, this document should not be static, but should be subject to periodic review. Toward this end, the Society welcomes all comments and criticisms, and asks that they be addressed to the Secretary, Standards and Practices Board, ISA, 67 Alexander Drive, P.O. Box 12277, Research Triangle Park, NC 27709, telephone (919) 549-8411, e-mail: standards@isa.org.

The ISA Standards and Practices Department is aware of the growing need for attention to the metric system of units in general, and the International System of Units (SI) in particular, in the preparation of instrumentation standards. The Department is further aware of the benefits to U.S.A. users of ISA standards of incorporating suitable references to the SI (and the metric system) in their business and professional dealings with other countries. Toward this end, this Department will endeavor to introduce SI-acceptable metric units in all new and revised standards to the greatest extent possible. *The Metric Practice Guide*, which has been published by the Institute of Electrical and Electronics Engineers as ANSI/IEEE Std. 268-1982, and future revisions will be the reference guide for definitions, symbols, abbreviations, and conversion factors.

It is the policy of ISA to encourage and welcome the participation of all concerned individuals and interests in the development of ISA standards. Participation in the ISA standards-making process by an individual in no way constitutes endorsement by the employer of that individual, of ISA, or of any of the standards that ISA develops.

The information contained in the preface, footnotes, and appendices is included for information only and is not a part of the standard.

The development of this standard dates back to 1958. The need for the standard arose from requests that recording instruments meet the requirement of the American National Standard, the National Electrical Code. At that time there was also the beginning of the need for examination of measuring instruments by testing laboratories. The initial version of this standard was approved in 1964 after several years of careful development, review, and trial use.

Work began on safety requirements for electrical measuring instruments at the international level at about the same time. While consideration of specific safety requirements for measuring apparatus was begun in 1965, resulting first editions of IEC Publications 348 and 414 became available in 1971 and 1973, respectively.

American National Standard C39.5-1964 was reaffirmed in 1969 and revised in 1974. In 1982, responsibility for C39.5-1964 was transferred to the ISA and the document was renumbered ISA-S82.01.

This 1988 edition reflects four major considerations:

- The scope has been expanded to include more equipment types. The scope and organization now readily allow future inclusion of more types of related equipment.
- A major goal was harmonization — to the extent possible — with worldwide standards, especially North American and IEC Standards. Not only were the IEC clause and multi-

part formats adopted, but also many of the IEC requirements; many requirements were further defined and developed from the work of IEC Subcommittee 66E.

- Digital and microelectronic innovations have narrowed the one-time separation between digital and analog technologies and prompted commonality of safety requirements.
- Significant technical contributions were made by industry organizations and independent certifying laboratories.

The following are significant features incorporated in this ongoing edition:

- Constructional requirements.
- Measurement of conformance to requirements is through the use of specific compliance statements. This allows the user of the standard to determine product compliance and to better understand the nature and intent of the requirements.
- Expansion of requirements for protection against fire and personal injury.

The following people served as members of ISA Subcommittee SP82.03, which prepared this standard:

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This standard was approved for publication by the ISA Standards and Practices Board in January 1988.

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Honeywell, Inc.  
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\*Director Emeritus

### - SPECIFIC CLAUSE TREATMENTS -

The **SCOPE** includes environmental conditions envisioned for the equipment. **DEFINITIONS** have extensive additions to reduce misinterpretations. **MARKINGS** are expanded and clarified by inclusion of internationally recognized symbols. X-radiation considerations are added while several other **EMANATIONS** are identified as "under consideration" due to lack of recognized limits and standardized measurements. The clause for **PROTECTION FROM ELECTRIC SHOCK** deletes requirements for resistance tests, clarifies leakage current measurement procedures, details dielectric tests and includes requirements for measuring terminals and routine tests. **TESTING UNDER FAULT CONDITIONS** is new. **PROTECTION FROM FIRE** is an approach to measuring the likelihood of spread of fire. **EXTRA LOW VOLTAGE AND POWER LIMITED CIRCUITS** defines the circuits which could cause electric shock or the likelihood of fire and for which protection requirements of the standard apply.

Understanding the Appendix material of ISA-S82.01 under Clause 9 is also necessary for this edition.





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## Contents

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<b>1 General</b>	<b>11</b>
<b>2 Definitions</b>	<b>13</b>
<b>3 General information</b>	<b>14</b>
<b>4 General test requirements</b>	<b>14</b>
<b>5 Marking</b>	<b>14</b>
<b>6 Equipment emanations</b>	<b>15</b>
<b>7 Heating</b>	<b>15</b>
<b>8 Protection from implosion and explosion</b>	<b>15</b>
<b>9 Protection from electrical shock</b>	<b>16</b>
<b>10 Testing under fault conditions</b>	<b>18</b>
<b>11 Mechanical requirements</b>	<b>18</b>
<b>12 Protection from fire</b>	<b>18</b>
<b>13 Component requirements and applications</b>	<b>18</b>
<b>14 Extra-low voltage and power-limited circuits</b>	<b>19</b>
<b>15 Terminal devices</b>	<b>19</b>
<b>16 External cords</b>	<b>20</b>
<b>17 Equipment instructions</b>	<b>20</b>
<b>18 Pressure-actuated equipment</b>	<b>21</b>
<b>19 Equipment enclosures for use in extended environmental conditions</b>	<b>24</b>
 <b>Appendix A — Comparison between NEMA enclosure type numbers and IEC enclosure classification designations</b>	 <b>25</b>



## IN THIS STANDARD

Requirements proper are printed in normal helvetica type.

Explanatory matter regarding the requirements is printed in smaller helvetica type.

Test specifications are printed in *italic type*.

Explanatory matter regarding the test specifications is printed in *smaller italic type*.

Further explanatory matter regarding the requirements or specific subject marked by an asterisk can be found in the Appendix.

## CAUTION

MANY TESTS REQUIRED BY THIS STANDARD ARE INHERENTLY HAZARDOUS. ADEQUATE SAFEGUARDS FOR PERSONNEL AND PROPERTY SHOULD BE EMPLOYED IN CONDUCTING SUCH TESTS.

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# 1 General

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## 1.1 Scope

This standard applies to electrical, electronic (analog/digital) and electromechanical process measurement and control equipment which:

- 1) measures and controls directly or indirectly an industrial process through a final control element (or elements)
- 2) is intended to be connected to supply circuits which do not exceed 250 volts rms, single phase, or dc
- 3) is rated for use in either indoor, outdoor or sheltered locations

This equipment includes but is not necessarily restricted to:

- indicating, integrating or recording equipment with or without a control function
- transmitters
- transducers
- analyzers
- supervisory or telemetry equipment
- accessories used with any of the above equipment

## 1.2 Environment

**1.2.1 Indoor locations.** Equipment according to this standard is intended for use where air temperature is controlled within specified limits.

Exception: where specified otherwise.

The basic climatic conditions for heated and/or cooled locations at an atmospheric pressure of 86 to 106 kPa (12.5 to 15.4 psi) are according to [Table 1-1](#).