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**Nuclear Safety-Related
Instrument-Sensing Line Piping
and Tubing Standard for Use
in Nuclear Power Plants**

Approved 4 April 2014

ANSI/ISA–67.02.01–2014, Nuclear Safety-Related Instrument-Sensing Line Piping and Tubing Standard
for Use in Nuclear Power Plants

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Preface

This preface, as well as all footnotes and annexes, is included for information purposes only and is not part of the revised ANSI/ISA-67.02.01-2014. The 1999 revision incorporated ISA-S67.10, *Sample Line Piping and Tubing Standard for Use in Nuclear Power Plants*. Applicability of other standards or codes is as stated in the text. Where references are made to other standards, a particular paragraph reference is indicated for clarity where applicable. The 2013 revision made minor changes to the 1999 revision. The figures were redrafted to clarify sensing lines from governing ASME codes, and sensing line slopes requirements were clarified with respect to liquid and gas service. Two figures were added that are applicable to containment monitoring. The minimum slope recommendation for sensing lines was revised.

This revised document has been prepared as part of the service of ISA, the International Society for Automation, 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; Fax (919) 549-8288; E-mail: standards@isa.org.

ISA Committee SP67.02 formed in 1974, adopted its draft scope on 19 September 1974, and forwarded it to the ISA Standards and Practices Board for acceptance as part of the minutes of that meeting. On 9 December 1974, this committee received an approved Scope and Project, Charter N677, from the American National Standards Institute (ANSI).

It is the consensus of the committee that this document addresses those portions of the safety-related, instrument-sensing line and sampling tubing (piping) runs that are unique to the nuclear power plant, concentrating therefore on meeting nuclear safety considerations as legislated by 10 CFR 50 (Code of Federal Regulations), Appendix A General Design Criteria for Nuclear Power Plants. The separation of redundant sensing lines as contained in this document is predicated on the assumption that the equipment and instruments to which those sensing lines are connected are adequately separated.

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, recommended practices, and technical reports. The Department is further aware of the benefits to USA 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, recommended practices, and technical reports to the greatest extent possible. IEEE/ASTM SI 10, *American National Standard for Metric Practice*, and future revisions, will be the reference guide for definitions, symbols, abbreviations, and conversion factors.

Where the failure of instrument-sensing lines from nuclear safety-related processes to instruments that are not nuclear safety-related is demonstrated not to produce either unacceptable leakage of process fluid or unacceptable flooding, jet impingement forces or other failure-related hazards to nuclear safety-related equipment, this document does not apply.

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1 Scope

This Standard covers design, protection, and installation of nuclear safety-related instrument-sensing lines and sampling lines for nuclear power plants. The Standard covers the pressure boundary requirements for sensing lines up to and including one inch (25.4 mm) outside diameter or three-quarter inch nominal pipe 1.050 inch (26.67 mm) outside diameter. The boundaries of this Standard for instrument-sensing lines span from the root valve/piping class change up to but not including the manufacturer-supplied instrument connection. The boundaries of this Standard for sampling lines span from the process tap to the upstream side of the sample panel, bulkhead fitting, or analyzer shutoff valve, and include in-line sample probes.

2 Purpose

This Standard establishes the applicable code requirements and code boundaries for the design and installation of instrument-sensing lines interconnecting nuclear safety-related power plant processes with both nuclear safety-related and nonnuclear safety-related instrumentation. This Standard also establishes the applicable requirements and limits for the design and installation of sample lines interconnecting nuclear safety-related power plant processes with sampling instrumentation. This Standard addresses the pressure boundary integrity of an instrument-sensing line and sampling line in accordance with the appropriate parts of Section III, Boiler and Pressure Vessel Code, American Society of Mechanical Engineers (ASME) or ASME B31.1, as applicable, and the assurance that the safety function of the nuclear safety-related instruments and process sampling is available.

3 Definitions

3.1 accessible isolation valve:

the isolation valve nearest the measured process on an instrument-sensing line, which is available to personnel during normal plant operation. The root valve may or may not perform the function of the accessible isolation valve, depending on its location.

3.2 backflush:

the injection of a fluid from the instrument location toward the process connection to remove line fluid or obstructions.

3.3 flush:

the injection of a fluid into the line at an upstream point to remove line fluid from the downstream line.

3.4 grab-sample point:

the point in the sample line where the flow of sample fluid can be directed to a portable container. It may be referred to as "sample point."

3.5 inaccessible area:

an area for which the radiation level precludes personnel entry during power operations and other operational situations. These areas typically are indicated by "zones," which depict accessibility based on various plant evolutions.

3.6 instrument channel:

a collection of instrument loops, including their sensing lines, that may be treated or routed as a group while being separated from instrument loops assigned to other redundant groups.

3.7 instrument shutoff valve:

the valve or valve manifold nearest the instrument.