ISA-S37.10-1982 (R1995)

Approved September 29, 1995

Standard

Specifications and Tests for Piezoelectric Pressure and Sound-Pressure Transducers

ISA-S37.10 — Specifications and Tests for Piezoelectric Pressure and Sound-Pressure Transducers

ISBN 0-87664-382-9

ISA
67 Alexander Drive
P.O. Box 12277
Research Triangle Park, North Carolina 27709

Preface

This preface, as well as all footnotes and annexes, is included for informational purposes and is not part of ISA-S37.10.

This standard has been prepared as a part of the service of ISA, the international society for measurement and control, 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.

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. Towards this end, this Department will endeavor to introduce SI and 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. 268-1992, 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, recommended practices, and technical reports. 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 which ISA develops.

This Standard was originally prepared by the SP37.10 Committee which operated under the guidance of SP37.

The following individuals served on the original SP37.10 Subcommittee:

NAME	COMPANY
N. Keast, Chairman	Bolt, Beranek and Newman, Incorporated
G. T. Cozad	McDonnell Douglas Corporation
L. Horn	National Bureau of Standards
R. W. Lally	PCB Piezotronics
J. Rhodes	Endevco Corporation

The following individuals served on ISA Committee SP37, who reaffirmed ISA-S37.10 in 1995:

NAME	COMPANY
E. Icayan, Chairman	Westinghouse Hanford Co.
J. Weiss	Electric Power Research Inst.
P. Bliss, Deceased	Consultant
M. Brigham	The Supply System
D. Hayes	LA Dept. Water & Power
M. Kopp	Validyne Corp.
C. Landis	Weed Fiber Optics
J. Miller	Rosemount Inc.
A. Mobley	3M Co.
J. Mock	Consultant
D. Norton	McDermott Energy Svces Inc.
H. Norton	Consultant
M. Tavares	Boeing Defense & Space Group
R. Whittier	Endevco
J. Wilson	Consultant

This standard was reaffirmed by the ISA Standards and Practices Board on September 29, 1995.

NAME	COMPANY
M. Widmeyer, Vice President	Washington Public Power Supply System
H. Baumann	H. D. Baumann & Associates, Inc.
D. Bishop	Chevron USA Production Company
P. Brett	Honeywell, Inc.
W. Calder III	Foxboro Company
H. Dammeyer	Phoenix Industries, Inc.
R. Dieck	Pratt & Whitney
H. Hopkins	Utility Products of Arizona
A. Iverson	Lyondell Petrochemical Company
K. Lindner	Endress + Hauser GmbH + Company
T. McAvinew	Metro Wastewater Reclamation District
A. McCauley, Jr.	Chagrin Valley Controls, Inc.
G. McFarland	Honeywell Industrial Automation and Controls
J. Mock	Consultant
E. Montgomery	Fluor Daniel, Inc.
D. Rapley	Rapley Engineering Services
R. Reimer	Allen-Bradley Company
R. Webb	Pacific Gas & Electric Company
W. Weidman	Consultant
J. Weiss	Electric Power Research Institute

Contents

1 Scope

1.1 This standard covers piezoelectric (including ferro-electric) pressure transducers and piezo-electric sound pressure transducers. Pressure and sound-pressure types could be the same instrument differing only in the method of calibration and manner of specifying performance. With the exception of certain impedance and charge measurements, this standard is also applicable to piezoelectric transducers with built-in amplifiers.

Sound pressure transducers sense and measure the pressure oscillations within an elastic fluid medium experiencing stress-strain waves. When installed near the sound source or in the wall of a test object, the transducer behavior relates to its pressure response. When installed in a sound field, considerable interaction occurs at higher frequencies during the measuring transaction, changing the quantity being measured and relating transducer behavior to its free-field or diffuse-field response. Both aspects of transducer behavior are covered in this standard.

1.2 Included among the specific types of piezoelectric pressure transducers to which this standard is applicable are the following:

a) Piezoelectric pressure transducers for transient pressure measurements

b) Piezoelectric pressure transducers that, in conjunction with associated electronic equipment, have quasi-dc response to gage pressures

c) Piezoelectric transducers for sound pressure levels in excess of 100 dB overall re 20 μ Pa associated with fluid-borne noise

1.3 Terminology used in this document is defined in ISA-S37.1, except that additional definitions particularly applicable to piezoelectric pressure and piezoelectric sound-pressure transducers are defined in 4.3 of this document.

2 Purpose

This Standard establishes the following for piezoelectric pressure and piezoelectric sound-pressure transducers.

2.1 Uniform minimum general specifications for describing design and performance characteristics

2.2 Selected uniform acceptance and qualification test methods, including calibration techniques

2.3 Uniform procedures for the presentation of transducer test data

2.4 A drawing symbol for use on measurement system electrical schematics (See Note in Section 3.)