Machinery Protection Systems

API STANDARD 670
FOURTH EDITION, DECEMBER 2000

American Petroleum Institute

Helping You Get The Job Done Right.SM

Machinery Protection Systems

Downstream Segment

API STANDARD 670
FOURTH EDITION, DECEMBER 2000

American Petroleum Institute

Helping You Get The Job Done Right.SM

SPECIAL NOTES

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

API is not undertaking to meet the duties of employers, manufacturers, or suppliers to warn and properly train and equip their employees, and others exposed, concerning health and safety risks and precautions, nor undertaking their obligations under local, state, or federal laws.

Information concerning safety and health risks and proper precautions with respect to particular materials and conditions should be obtained from the employer, the manufacturer or supplier of that material, or the material safety data sheet.

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. Sometimes a one-time extension of up to two years will be added to this review cycle. This publication will no longer be in effect five years after its publication date as an operative API standard or, where an extension has been granted, upon republication. Status of the publication can be ascertained from the API Downstream Segment [telephone (202) 682-8000]. A catalog of API publications and materials is published annually and updated quarterly by API, 1220 L Street, N.W., Washington, D.C. 20005.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this standard or comments and questions concerning the procedures under which this standard was developed should be directed in writing to the standardization manager, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the standardization manager.

API standards are published to facilitate the broad availability of proven, sound engineering and operating practices. These standards are not intended to obviate the need for applying sound engineering judgment regarding when and where these standards should be utilized. The formulation and publication of API standards is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

FOREWORD

This standard is based on the accumulated knowledge and experience of manufacturers and users of monitoring systems. The objective of the publication is to provide a purchase specification to facilitate the manufacture, procurement, installation, and testing of vibration, axial position, and bearing temperature monitoring systems for petroleum, chemical, and gas industry services.

The primary purpose of this standard is to establish minimum electromechanical requirements. This limitation in scope is one of charter as opposed to interest and concern. Energy conservation is of concern and has become increasingly important in all aspects of equipment design, application, and operation. Thus, innovative energy-conserving approaches should be aggressively pursued by the manufacturer and the user during these steps. Alternative approaches that may result in improved energy utilization should be thoroughly investigated and brought forth. This is especially true of new equipment proposals, since the evaluation of purchase options will be based increasingly on total life costs as opposed to acquisition cost alone. Equipment manufacturers, in particular, are encouraged to suggest alternatives to those specified when such approaches achieve improved energy effectiveness and reduced total life costs without sacrifice of safety or reliability.

This standard requires the purchaser to specify certain details and features. Although it is recognized that the purchaser may desire to modify, delete, or amplify sections of this standard, it is strongly recommended that such modifications, deletions, and amplifications be made by supplementing this standard, rather than by rewriting or by incorporating sections thereof into another complete standard.

API standards are published as an aid to procurement of standardized equipment and materials. These standards are not intended to inhibit purchasers or producers from purchasing or producing products made to specifications other than those of API.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions are invited and should be submitted to the standardization manager, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

IMPORTANT INFORMATION CONCERNING USE OF ASBESTOS OR ALTERNATIVE MATERIALS

Asbestos is specified or referenced for certain components of the equipment described in some API standards. It has been of extreme usefulness in minimizing fire hazards associated with petroleum processing. It has also been a universal sealing material, compatible with most refining fluid services.

Certain serious adverse health effects are associated with asbestos, among them the serious and often fatal diseases of lung cancer, asbestosis, and mesothelioma (a cancer of the chest and abdominal linings). The degree of exposure to asbestos varies with the product and the work practices involved.

Consult the most recent edition of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, Occupational Safety and Health Standard for Asbestos, Tremolite, Anthophyllite, and Actinolite, 29 *Code of Federal Regulations* Section 1910.1001; the U.S. Environmental Protection Agency, National Emission Standard for Asbestos, 40 *Code of Federal Regulations* Sections 61.140 through 61.156; and the U.S. Environmental Protection Agency (EPA) rule on labeling requirements and phased banning of asbestos products (Sections 763.160-179).

There are currently in use and under development a number of substitute materials to replace asbestos in certain applications. Manufacturers and users are encouraged to develop and use effective substitute materials that can meet the specifications for, and operating requirements of, the equipment to which they would apply.

SAFETY AND HEALTH INFORMATION WITH RESPECT TO PARTICULAR PRODUCTS OR MATERIALS CAN BE OBTAINED FROM THE EMPLOYER, THE MANUFACTURER OR SUPPLIER OF THAT PRODUCT OR MATERIAL, OR THE MATERIAL SAFETY DATA SHEET.

CONTENTS

Tables

Figures

Page

Machinery Protection Systems

1 General

1.1 SCOPE

This standard covers the minimum requirements for a machinery protection system measuring radial shaft vibration, casing vibration, shaft axial position, shaft rotational speed, piston rod drop, phase reference, overspeed, and critical machinery temperatures (such as bearing metal and motor windings). It covers requirements for hardware (transducer and monitor systems), installation, documentation, and testing.

Note: A bullet (●) at the beginning of a paragraph indicates that either a decision is required or further information is to be provided by the purchaser. This information should be indicated on the datasheets (see Appendix A); otherwise, it should be stated in the quotation request or in the order.

1.2 ALTERNATIVE DESIGNS

The machinery protection system vendor may offer alternative designs. Equivalent metric dimensions and fasteners may be substituted as mutually agreed upon by the purchaser and the vendor.

1.3 CONFLICTING REQUIREMENTS

In case of conflict between this standard and the inquiry or order, the information included in the order shall govern.

2 References

2.1 The editions of the following standards, codes, and specifications that are in effect at the time of publication of this standard shall, to the extent specified herein, form a part of this standard. The applicability of changes in standards, codes, and specifications that occur after the inquiry shall be mutually agreed upon by the purchaser and the machinery protection system vendor.

API

RP 552	*Signal Transmission Systems*
RP 554	*Process Instrumentation and Control, Section 3, Alarm and Protective Devices*
Std 610	*Centrifugal Pumps for Petroleum, Heavy Duty Chemical and Gas Industry Services*
Std 612	*Special Purpose Steam Turbines for Petroleum, Chemical, and Gas Industry Services*

ANSI[1]

MC96.1	*Temperature Measurement Thermocouples*

ASME[2]

Y14.2M	*Line Conventions and Lettering*
PTC 20.2-1965	*Overspeed Trip Systems for Steam Turbine-Generator Units*

CENELEC[3]

EN50082-2	*Electromagnetic Compatibility Generic Immunity Standard. Part 2: Industrial Environment*

DIN[4]

EN 50022	*Low voltage switchgear and controlgear for industrial use; mounting rails, top hat rails, 35 mm wide for snap-on mounting of equipment.*

IEC[5]

584-1	*Thermocouples, Part I: Reference Tables*

IPCEA[6]

S-61-402	*Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy*

ISA[7]

S12.1	*Definitions and Information Pertaining to Electrical Instruments in Hazardous (Classified) Locations*
S12.4	*Instrument Purging for Reduction of Hazardous Area Classification*
S84.01	*Application of Safety Instrumented Systems for the Process Industries*

Military Specifications[8]

MIL-C-39012-C	*Connectors, Coaxial, Radio Frequency, General Specification for*
MIL-C-39012/5F	*Connectors, Plug, Electrical, Coaxial, Radio Frequency, [Series N (Cabled) Right Angle, Pin Contact, Class 2]*

[1]American National Standards Institute, 11 West 42nd Street, New York, New York 10036.

[2]American Society of Mechanical Engineers, 22 Law Drive, Box 2300, Fairfield, New Jersey 07007-2300.

[3]European Committee for Electrotechnical Standardization, Rue de Stassart, 35, B - 1050 Brussels.

[4]Deutsches Institut Fuer Normung e.V., Burggrafenstrasse 6, Postfach 11 07, 10787 Berlin, Germany.

[5]International Electrotechnical Commission, 1 Rue de Varembe, Geneva, Switzerland.

[6]Insulated Power Cable Engineers Association, 283 Valley Road, Montclair, New Jersey 07042.

[7]Instrument Society of America, P.O. Box 12277, Research Triangle Park, North Carolina 27709.

[8]Available from Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.