

INTERNATIONAL
STANDARD

ISO
10436

First edition
1993-12-15

**Petroleum and natural gas industries —
General-purpose steam turbines for
refinery service**

iTeh STANDARD PREVIEW

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*Industries du pétrole et du gaz naturel — Turbines à vapeur tous usages
pour service en raffinerie*

ISO 10436:1993

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Reference number
ISO 10436:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10436 was prepared by the American Petroleum Institute (API) (as STD 611, 3rd edition) and was adopted, under a special "fast-track procedure", by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*, in parallel with its approval by the ISO member bodies.

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International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

International Standard ISO 10436:1993 reproduces the content of API Std 611, 3rd edition, 1988. ISO, in endorsing this API document, recognizes that in certain respects the latter does not comply with all current ISO rules on the presentation and content of an International Standard. Therefore, the relevant technical body, within ISO/TC 67, will review ISO 10436:1993 and reissue it, when practicable, in a form complying with these rules.

This standard is not intended to obviate the need for sound engineering judgement as to when and where this standard should be utilized and users of this standard should be aware that additional or differing requirements may be needed to meet the needs for the particular service intended.

Standards referenced herein may be replaced by other international or national standards that can be shown to meet or exceed the requirements of the referenced standards.

Appendices A to E form an integral part of the requirements of this standard.
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Petroleum and natural gas industries — General-purpose steam turbines for refinery service

1 Scope

This International Standard specifies the minimum requirements for general-purpose steam turbines for use in petroleum refinery service.

2 Requirements

Requirements are specified in:

"API Standard 611 (Std 611), Third Edition, August 1988, *General-Purpose Steam Turbines For Refinery Service*",

which is adopted as ISO 10436.

[ISO 10436:1993](https://standards.iteh.ai/catalog/standards/sist/a43ac7df-01f9-456e-87fb-632460d1a7/iso-10436-1993)

For the purposes of international standardization, however, modifications shall apply to specific clauses and paragraphs of publication API Std 611. These modifications are outlined below.

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Information contained in **Special Notes** is relevant to the API publication only.

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Subclause 1.5.1

The referenced standards indicated hereafter are available under the following ISO references:

API Std 612 as ISO 10437

API Std 614 as ISO 10438 (at present under study).

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General-Purpose Steam Turbines For Refinery Service

Refining Department

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FOREWORD

This standard is based on the accumulated knowledge and experience of manufacturers and users of steam turbines. The objective of this publication is to provide a purchase specification to facilitate the manufacture and procurement of general-purpose steam turbines for use in petroleum refinery service.

The primary purpose of API standards for mechanical equipment is to establish minimum mechanical 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 reduce 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 all modifications, deletions, and amplifications be made by supplementing this standard, rather than by rewriting or incorporating sections of this standard 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 director of the Refining Department, 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 great 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 proposed rule by the U.S. Environmental Protection Agency (EPA) proposing labeling requirements and phased banning of asbestos products, published at 51 *Federal Register* 3738–3759 (January 29, 1986; the most recent edition should be consulted).

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 which 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.

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General-Purpose Steam Turbines for Refinery Service

SECTION 1—GENERAL

1.1 Scope

1.1.1 This standard covers the minimum requirements for general-purpose steam turbines for refinery service. These requirements include basic design, materials, related lubrication systems, controls, auxiliary equipment, and accessories.

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 data sheets (see Appendix A); otherwise, it should be stated in the quotation request or in the order.

- **1.1.2** Steam turbines are classified as general- or special-purpose according to service requirements. The purchaser will specify the type of turbine that is best suited to his needs.

1.1.2.1 General-purpose turbines are horizontal or vertical turbines used to drive equipment that is usually spared, is relatively small in size (power), or is in noncritical service. They are generally used where steam conditions will not exceed a pressure of 700 pounds per square inch gauge (48 bar gauge) and a temperature of 750°F (400°C) or where speed will not exceed 6000 revolutions per minute.

1.1.2.2 Special-purpose turbines are horizontal turbines used to drive equipment that is usually not spared, is relatively large in size (power), or is in critical service. The use of special-purpose turbines is not limited by steam conditions or turbine speed. Requirements for special-purpose turbines are defined in API Standard 612.

1.2 Alternative Designs

The vendor may offer alternative designs. Equivalent metric dimensions, fasteners, and flanges 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.

1.4 Definition of Terms

Terms used in this standard are defined in 1.4.1 through 1.4.26.

1.4.1 *Axially split* refers to casing joints that are parallel to the shaft centerline.

1.4.2 A *circulating oil system* withdraws oil from the housing of bearings equipped with oil rings and cools it in an external oil cooler before it is returned to the bearing housing.

1.4.3 *Hydrodynamic bearings* are bearings that use the principles of hydrodynamic lubrication. Their surfaces are oriented so that relative motion forms an oil wedge to support the load without journal-to-bearing contact.

1.4.4 *Maximum allowable speed* (in revolutions per minute) is the highest speed at which the manufacturer's design will permit continuous operation (see note to 2.1.4, Item e).

1.4.5 *Maximum allowable temperature* is the maximum continuous temperature for which the manufacturer has designed the equipment (or any part to which the term is referred) when operating at the maximum allowable working pressure (see note to 2.1.4, Item e).

1.4.6 *Maximum allowable working pressure* is the maximum continuous pressure for which the manufacturer has designed the equipment (or any part to which the term is referred) when operating at the maximum allowable temperature (see note to 2.1.4, Item e).

1.4.7 *Maximum continuous speed* (in revolutions per minute) is the speed at least equal to 105 percent of the highest speed required by any of the specified operating conditions.

1.4.8 *Maximum exhaust pressure* is the highest exhaust steam pressure at which the turbine is required to operate continuously.

1.4.9 *Maximum exhaust casing pressure* is the highest exhaust steam pressure that the purchaser requires the casing to contain, with steam supplied at maximum inlet conditions.

1.4.10 *Maximum inlet pressure and temperature* refer to the highest inlet steam pressure and temperature conditions at which the turbine is required to operate continuously.