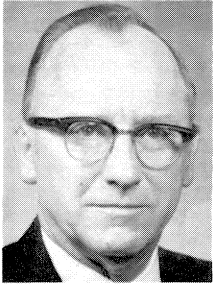


API ORGANIZATION AND MECHANICAL EQUIPMENT SPECIFICATIONS

by

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Mr. Housman received a B.S. degree in Mechanical Engineering in 1941 from Iowa State University, an M.S. degree in Engineering Mechanics in 1946 from Illinois Institute of Technology, and a diploma in management from Indiana University. He is a registered professional engineer in the State of Indiana. He has been active in API subcommittee work for over 32 years and has been chairman of the API Subcommittee on Mechanical Equipment for more than 25 years.

THE AMERICAN PETROLEUM INSTITUTE

The subject of this article is mechanical equipment specifications of the American Petroleum Institute, commonly called the API. A brief history of the API and how its specifications are developed and maintained will be explained in the following discussion.

The API was organized just after World War I by members of the former National Petroleum War Service Committee. Working with the Federal Government, this committee had been responsible for organizing the industry to meet the tremendous demand for petroleum during World War I. This wartime experience demonstrated that leaders of the oil industry could work together on many common problems affecting the industry and the nation and still compete vigorously with one another.

The API is a trade association of the petroleum industry, and it was incorporated in 1919 under the laws of the District of Columbia. Its objectives, set forth in the original charter, remain in effect today. They provide that the API should, in all lawful ways:

Afford a means of cooperation with the government in all matters of national concern.

Foster foreign and domestic trade in American petroleum products.

Promote in general the interests of the petroleum industry in all its branches.

Promote the mutual improvement of the members and the study of the arts and sciences connected with the petroleum industry.

The API is a non-profit corporation with a Board of Directors made up of individuals active in various phases of the oil industry operations. The API concerns itself with a wide variety of areas affecting the petroleum industry including virtually any topic that does not involve the competitive posture of member companies. These include exploration, production, refining, marketing, transportation, safety, and fire protection. Most of the API work is accomplished by committees and subcommittees. The General Committee in the Division of Refinery is comprised of nine active committees, the largest being the Committee on Refinery Equipment. Nine user subcommittees, including the Subcommittee on Mechanical Equipment, are directed by and report to the Committee on Refinery Equipment. The areas covered in addition to mechanical equipment include corrosion, electrical, instrumentation, pressure vessels and tanks, piping, pressure relieving systems, heat transfer, and inspection. In addition to the user subcommittees, numerous contractor and manufacturer subcommittees form an active part of this subcommittee work.

SUBCOMMITTEE ON MECHANICAL EQUIPMENT

At the present time, the Subcommittee on Mechanical Equipment has 29 members representing most major petroleum and petro-chemical companies. A Contractor's Subcommittee on Mechanical Equipment, with 21 members, works closely with the API user's subcommittee. In addition, 13 manufacturer subcommittees, with a combined membership of 108 (at present), work closely with the users and contractors to provide advice and guidance. Thus, a total enrolled membership of 158 is active in the work of the Subcommittee on Mechanical Equipment; this number is augmented by specialists and volunteers.

The primary function of the Subcommittee on Mechanical Equipment and its associated subcommittees is to prepare and maintain specifications covering mechanical equipment used in the refining segment of the petroleum industry. In addition, the subcommittee conducts periodic round-table discussions and provides assistance to other standards writing bodies.

MECHANICAL EQUIPMENT SPECIFICATIONS

The first mechanical equipment specification, API 610 — Centrifugal Pumps for General Refinery Services, was completed and published in 1954. Since publication, it has been revised and republished four times, the latest draft being 1971. Work is in progress at the present time to update this specification, and the 6th edition should be printed in 1980. In addition to API 610, the following mechanical equipment specifications have been prepared and published:

API 617 — Centrifugal Compressors for General Refinery Services (1958, 1963, 1973)

API 615 — Steam Turbines for General Refinery Services (1958) (Split into API 611 and 612 in 1969)

API 618 — Reciprocating Compressors for General Refinery Services (1964, 1974)

API 613 — Special Purpose Gears for Refinery Services (1968, 1977)

API 616 — Combustion Gas Turbines for General Refinery Services (1968, 1977)

API 611 — General Purpose Steam Turbines for Refinery Services (1969)

API 612 — Special Purpose Steam Turbines for Refinery Services (1969, 1979)

API 614 — Lubrication, Shaft Sealing, and Control Oil Systems for Special Purpose Applications (1973)

API 615 — Sound Control of Mechanical Equipment for Refinery Services (1973)

API 619 — Rotary-Type Positive Displacement Compressors for General Refinery Services (1975)

API 670 — Noncontacting Vibration and Axial Position Monitoring Systems (1976)

API 671 — Special Purpose Couplings for General Refinery Services (1979)

API 672 — Packaged Integrally-Geared Centrifugal Plant and Instrument Air Compressors for Refinery Services (1979)

The following API specifications have been prepared and should be published in 1980:

API 673 — Special Purpose Fans for Refinery Services

API 674 — Reciprocating Pumps for Refinery Services

API 675 — Controlled Volume Pumps for Refinery Services

API 676 — Rotary Pumps for Refinery Services

Work has been started on two new API specifications, one for Jet Derivative Type Gas Turbines and one for General Purpose Gear Units. When these are published, a total of 19 API mechanical equipment specifications will be available.

PREPARATION AND REVISION PROCEDURE

The bulk of the work to prepare a new specification or to revise an existing specification is handled by a joint Task Force. A Task Force chairman is appointed plus two to four members each from the refiner, contractor, and manufacturer subcommittees. Generally, the Task Force chairman is a member of the refiner's subcommittee. The Task Force prepares a proposed draft, issues the draft to the membership of the refiner, contractor, and specific manufacturer subcommittees, and requests comments and suggestions. Usually this first draft is based on the composite content of available individual refiner and contractor specifications. After comments have been reviewed, the Task Force prepares a revised draft, including comments and suggestions that they consider advisable. The revised proposed draft is then sent to the membership of the subcommittees (refiners, contractors, and specific manufacturers). The draft is then reviewed in a joint meeting of the refiners', contractors', and manufacturers' subcommittees. This detailed review can require from one to five days.

After the joint subcommittee review is completed and agreement reached on the content, the draft is sent to the membership of the Committee on Refinery Equipment for ap-

proval for printing. Usually some comments and suggestions accompany the CRE ballots, and these are resolved on an individual basis by the Task Force. On occasion, a suggestion is made that would have a significant effect on the intent of the specification; these are referred back to the joint subcommittee membership for resolution. After resolving the comments and suggestions, the draft is sent to the API headquarters for printing. This entire process takes from two to five years to complete, depending on the complexity of the individual specification.

PHILOSOPHY OF API MECHANICAL EQUIPMENT SPECIFICATIONS

The basic philosophy used in developing API specifications is to:

1. Require high quality equipment, needing minimal and infrequent maintenance.
2. Obtain at least three years of continuous operation on special purpose equipment (generally unspared equipment).
3. Avoid field problems and failures that have been experienced by users in the past.
4. Provide the high degree of safety necessary on units processing petroleum compounds.
5. Achieve as high a degree of standardization as practical, including auxiliary systems.

All of the API mechanical equipment specifications are prepared for use as purchase specifications. However, many aspects of mechanical equipment require specific selections for each application; for example, the type of seal used in a centrifugal compressor varies with each application, or the type and make of coupling can vary with each user location. Thus, API specifications contain option areas to permit the user to mandate desired details. Further, since these are consensus specifications, individual company practices and requirements are not necessarily included. Thus, the usual and recommended procedure is that individual companies prepare a specification, incorporating the API specification and detailing additions, exceptions, and modifications indexed to specific paragraphs of the API specification.

USAGE OF API SPECIFICATIONS

API mechanical equipment specifications are used not only in this country but throughout the world. A number of these standards have been translated and printed in other languages. Approximately 80,000 copies of API mechanical equipment specifications have been printed since 1971; records are not available prior to 1971. The most widely used specification is API 610; approximately 17,000 copies of the 5th edition have been sold, all since 1971.

API PARTICIPATION

Any company, and individuals within those companies, with its principal office in the United States, Canada, or Mexico, engaged in the petroleum or an allied industry is eligible for membership in the API and consequently participation in API activities. The Subcommittee on Mechanical Equipment has an energetic and challenging future work schedule and would welcome additional members. API subcommittee work provides far greater returns to the individual than the individual can possibly contribute. For additional information, contact C. E. Deering of the API, any member of the Subcommittee on Mechanical Equipment, or the author of this paper.