Pulsation and Vibration Control for Positive Displacement Machinery Systems for Petroleum, Chemical, and Natural Gas Industry Services

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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 DATASHEET.

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Introduction

Users of this standard should be aware that further or differing requirements may be needed for individual applications. This standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This may be particularly appropriate where there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this standard and provide details.

Annex A contains informative descriptions of the work process for acoustical and mechanical analyses. It is focused on reciprocating compressors but is somewhat applicable to all positive displacement (PD) machinery.

Annex B contains information concerning stepless capacity control for reciprocating compressor cylinders.

Annex C contains the Design Approach 2 flowchart for API 618 machines.

Annex D contains the Design Approach 3 flowchart for API 618 machines.

Annex E contains information for forced mechanical response analyses of compressor systems and piping.

Annex F contains information for small-bore piping analysis and design.

Annex G contains pulsation considerations for flow metering equipment.

Annex H contains information for Vi and pressure ratio considerations for API 619 machines.

Annex I contains the design approach flowchart for PD pumps.

Annex J contains information concerning cavitation considerations for PD pump systems. In this standard, U.S. customary (USC) units are included in brackets for information.

Pulsation and Vibration Control for Positive Displacement Machinery Systems for Petroleum, Chemical, and Natural Gas Industry Services

1 Scope

This standard covers the minimum requirements for pulsation and vibration control for positive displacement (PD) machinery systems used in the petroleum, chemical, and natural gas industry services. The specific machinery addressed includes:

— reciprocating compressors (ref. API 618);

— rotary-type PD compressors (ref. API 619);

— PD pumps—reciprocating (ref. API 674);

— PD pumps—controlled volume (ref. API 675);

— PD pumps—rotary (ref. API 676).

2 Normative References

2.1 The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Standard 618, *Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Services*

API Standard 619, *Rotary-type Positive-displacement Compressors for Petroleum, Chemical, and Gas Industry Services*

API Standard 674, *Positive Displacement Pumps—Reciprocating*

API Standard 675, *Positive Displacement Pumps—Controlled Volume for Petroleum, Chemical, and Gas Industry Services*

API Standard 676, *Positive Displacement Pumps—Rotary*

ASME B31.3 [1], *Process Piping*

ASME B31.8, Gas Transmission and Distribution Piping Systems

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section III: Rules for Construction of Nuclear Power Plant Components; Division 2: Code for Concrete Reactor Vessels and Containments*

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section III, Appendix 1*, 2010 Edition

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section VIII: Rules for Construction of Pressure Vessels; Division 1: Rules for Construction of Pressure Vessels*

ASME *Boiler and Pressure Vessel Code (BPVC)*, *Section VIII: Rules for Construction of Pressure Vessels; Division 2: Alternative Rules*

[1] ASME International, 2 Park Avenue, New York, NY 10016-5990, www.asme.org.