# Positive Dispalcement Pumps—Rotary

API STANDARD 676
SECOND EDITION, DECEMBER 1994

REAFFIRMED: MARCH 2000



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**Manufacturing, Distribution and Marketing Department**

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## FOREWORD

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 incorporating sections thereof into another complete standard.

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Suggested revisions are invited and should be submitted to the director of the Manufacturing, Distribution and Marketing Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

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## SECTION 1—GENERAL

### 1.1 Scope

This standard covers the minimum requirements for rotary positive displacement pumps for use in the petroleum, chemical and gas industries. See API Standard 675 for controlled volume pumps and Standard 674 for reciprocating pumps.

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.

### 1.2 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 1.4.25.

**1.4.1** *Alarm point* is a preset value of a parameter at which an alarm is activated to warn of a condition that requires corrective action.

**1.4.2** The *displacement* of a rotary pump is the volume displaced per revolution of the rotor(s). In pumps incorporating two or more rotors operating at different speeds, the displacement is the volume displaced per revolution of the driving rotor. Displacement depends only on the physical dimensions of the pumping elements.

**1.4.3** *Gauge board* is an unenclosed bracket or plate used to support and display gages, switches, and other instruments.

**1.4.4** *Local* means mounted on, or in close proximity to, the equipment.

**1.4.5** *Maximum allowable speed* (in revolutions per minute) is the highest speed at which the manufacturer's design will permit continuous operation.

**1.4.6** *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 handling the specified fluid at the specified pressure.

**1.4.7** *Minimum allowable temperature* is the minimum continuous temperature for which the manufacturer has designed the equipment (or any part to which the term is referred).

**1.4.8** *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 handling the specified fluid at the specified temperature and capacity.

**1.4.9** *Minimum allowable speed* (in revolutions per minute) is the lowest speed at which the manufacturer's design will permit continuous operation.

**1.4.10** *Net positive suction head* (NPSH) is the total inlet pressure, in meters (feet), determined at the pump suction connection, minus the vapor pressure of the liquid in meters (feet).

Note: See Appendix F for a discussion of NPSH and Net Positive Inlet Pressure (NPIP).

**1.4.11** *Net positive suction head available* (NPSHA) is the NPSH, in meters (feet), determined by the purchaser for the pumping system with the fluid at the rated capacity and normal pumping temperature.

**1.4.12** *Net positive suction head required* (NPSHR) is the NPSH, in meters (feet), determined by vendor testing.

NPSHR is measured at the suction flange. NPSHR is the minimum NPSH at rated capacity required to prevent more than three percent capacity drop due to cavitation within the pump.

**1.4.13** *A panel* is an enclosure used to mount, display, and protect gauges, switches, and other instruments.

**1.4.14** *Pump efficiency* (also called pump overall efficiency) is the ratio of the pump output (hydraulic power) to the pump power input.

**1.4.15** *Rated capacity* of a rotary pump is the total volume of fluid actually delivered per unit of time at the stated operating conditions. Rated capacity includes liquid and any dissolved or entrained gases, and is based on suction conditions.

**1.4.16** *Rated differential pressure* is the difference between rated suction pressure and rated discharge pressure.

**1.4.17** *Rated discharge pressure* is the discharge pressure for the operating conditions specified.

**1.4.18** The *rated speed* of a rotary pump is the number of revolutions per minute of the rotor(s) required to meet the specified operating conditions. In pumps incorporating two or more rotating elements operating at different speeds, the rated speed is the speed of the driving rotor.

**1.4.19** *Rated suction pressure* is the suction pressure for the operating conditions specified.