

Engineering Standard

SAES-G-006

30 June, 2002

Positive Displacement Pumps – Controlled Volume

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Saudi Aramco DeskTop Standards

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1 Scope

This Standard defines the minimum mandatory requirements governing the design and installation of positive displacement pumps-controlled volume (chemical injection pumps). This Standard may not be attached to or made a part of purchase orders.

2 Conflicts and Deviations

- 2.1 Any conflicts between this Standard and other applicable Saudi Aramco Engineering Standards (SAESs), Materials System Specifications (SAMSSs), Standard Drawings (SASDs) or industry standards, codes and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Consulting Services Department, Saudi Aramco, Dhahran.
- 2.2 Direct all requests to deviate from this Standard in writing to the Company or Buyer Representative, who shall follow internal company procedure SAEP-302 and forward such requests to the Manager, Consulting Services Department, Saudi Aramco, Dhahran.

3 References

The selection of material and equipment and the design, construction, maintenance and repair of equipment and facilities covered by this Standard shall comply with the latest edition of the references listed below, unless otherwise noted.

Saudi Aramco References

Saudi Aramco Engineering Procedure

SAEP-302

*Instructions for Obtaining a Waiver of a
Mandatory Saudi Aramco Engineering
Requirement*

Saudi Aramco Materials System Specification

31-SAMSS-009

*Positive Displacement Pumps - Controlled
Volume*

4 Design

- 4.1 Pumps shall be designed in accordance with 31-SAMSS-009.
 - 4.2 The required pumping range from minimum to maximum required capacity or a nominal capacity, if applicable, shall be specified.
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- 4.3 The number of pumping elements per driver shall be specified if known (i.e., simplex, triplex, etc.). Otherwise, this shall be selected by the Vendor.
 - 4.4 Diaphragm pumps shall be used for discharge pressures up to 35 MPa absolute (5,000 psia) and temperatures up to 150°C.
 - 4.5 Packed plunger pumps, or diaphragm pumps shall be used for discharge pressures above 35 MPa absolute (5,000 psia). The design operating life of metal diaphragms shall be advised by the Vendor.
 - 4.6 Double Diaphragm Pumps
 - 4.6.1 Double diaphragm pumps are either sandwich type or the type using an intermediate chamber. The sandwich type is preferred.
 - 4.6.2 Double diaphragm pumps shall be used when:
 - a) Dilution of the product flow by hydraulic oil is not acceptable.
 - b) Pumped fluid is extremely hazardous and/or toxic. This is defined as a fluid which a brief intense exposure or repeated low level exposure to it could cause death or major injury. This includes carcinogens.
 - c) Process leakage to the atmosphere is unacceptable.
 - d) Process fluid must not come in contact with air.

Packed plunger pumps shall not be used under the above conditions.

 - 4.6.3 For double diaphragm pump applications with discharge pressures above 35 MPa absolute (5,000 psia), pumps shall be of the sandwich type.
 - 4.7 The NPSH available shall exceed the NPSH required by a minimum of 1 m liquid pumped equivalent in kPa (psi).
 - 4.8 The minimum differential pressure required to ensure the guaranteed accuracy shall be specified by the Vendor.
 - 4.9 When automatic control is required, electronic or pneumatic control shall be specified.
 - 4.10 Double diaphragm pumps shall be provided with a diaphragm rupture signaling system. A pressure detector shall be used for dry designs and a conductivity probe shall be used for pumps having an intermediate fluid between the diaphragms.
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- 4.11 Noise data shall not be required for units with a driver nameplate rating less than 10 kW (15 HP).

5 Inspection

Shop Inspection and Tests

The following guidelines shall be used when specifying the test requirements:

- a) Test certificates only are required for pump types with proven Saudi Aramco operating experience.
- b) Witnessed and certified tests are required for pump types or models without Saudi Aramco operating experience or when extreme operating conditions are specified, e.g., pumping temperatures above 120°C.
- c) A functional, witnessed test is required when automatic systems are specified and/or when a forced feed lubrication system is being provided.

Revision Summary

30 June, 2002

Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor changes.