

Engineering Standard

SAES-G-007

31 August 2005

Submersible Pumps and Motors for Water Well and Offshore Service

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Saudi Aramco DeskTop Standards

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1 Scope

- 1.1 This Standard defines the minimum mandatory requirements governing the design and installation of bowl type submersible pumps and motors for water well and offshore service. This Standard may not be attached to or made a part of purchase orders.
- 1.2 Submersible pumps and motors shall only be specified for offshore facilities when space limitations prohibit the use of vertical suspended lineshaft pumps.

2 Conflicts and Deviations

- 2.1 Any conflicts between this Standard and any 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.

3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

<i>SAEP-302</i>	<i>Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirement</i>
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Saudi Aramco Engineering Standard

<i>SAES-B-009</i>	<i>Fire Protection and Safety Requirements for Offshore Production Facilities</i>
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Saudi Aramco Materials System Specification

<i>31-SAMSS-010</i>	<i>Submersible Pumps and Motors for Water Well and Offshore Service</i>
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Saudi Aramco Forms & Data Sheets

6880-ENG & 6880-M-ENG *Data Sheet for Submersible Pumps and Motors*

Saudi Aramco Inspection Requirements

Form 175-310900 *Submersible Pumps and Motors for Water Well and Offshore Service*

3.2 Industry Codes and Standards

American Society for Testing and Materials

ASTM A216 *Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service*

ASTM A276 *Standard Specification for Stainless Steel Bars and Shapes*

ASTM A743 *Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application*

ASTM D4745 *Standard Specification for Filled Compounds of Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials*

National Fire Protection Association

NFPA 20 *Centrifugal Fire Pumps*

4 Design

4.1 General

4.1.1 Pumps, with the exception of those in utility water well service having a motor nameplate rating of 75 kW (100 HP) or less, and all motors, regardless of nameplate rating shall be designed in accordance with 31-SAMSS-010. Firewater pumps in offshore facilities shall also be in accordance with SAES-B-009.

4.1.2 In the final selection of pumps and motors, the availability of spare parts for identical equipment already in satisfactory operation shall be taken into account.

4.1.3 Unit responsibility for the complete pumpset shall be assigned to the pump manufacturer.

4.2 Operating Conditions

- 4.2.1 The Productivity Index of water wells, as advised by Petroleum Engineering, shall be used to determine the draw down level, the minimum acceptable water level and the pump setting depth.
- 4.2.2 For pumps in firewater service and installed in water wells, the submergence of the first stage impeller shall not be less than 3.5 m below the pumping level at 150% of the pump rated capacity.

4.3 Construction Data

The maximum allowable working pressure (MAWP) of the bowl, column and surface plate assemblies shall be at least equal to the maximum differential pressure developed by the bowl assembly at shut-off with maximum impeller diameter and at maximum speed.

5 Materials of Construction

The materials of construction of bowl type submersible pumps and submersible motors shall be in accordance with Table 1.

Table 1 – Materials of Construction for Bowl Type Submersible Pumps and Submersible Motors

Service	All Services
Bowls	ASTM A743 CF3M
Impellers	ASTM A743 CF3M
Bowl Wear Rings	Nitronic 60 (Note 1)
Impeller Wear Rings	Nitronic 50 (Note 2)
Shaft, Bowl Assembly	ASTM A276 XM19
Sleeves	Nitronic 50 (Note 2)
Bushings, Bowl Assembly	ASTM D4745 Type 8 (Note 3)
Fasteners	ASTM A276 XM19
Lock Collets	Type 316 S.S.
Coupling	ASTM A276 XM19
Motor Casing	ASTM A743 CF3M (Note 4)

Notes:

- 1) Nitronic 60 - ASTM A276 XM33 UNS S21800 (bar); ASTM A743 CF10SMnN (cast).
- 2) Nitronic 50 - ASTM A276 XM19 UNS S20910 (bar); ASTM A743 CG6MMN (cast).
- 3) For bowl assembly bushings, Graphalloy or Nitronic 60 may be substituted for ASTM D4745 Type 8, subject to approval.
- 4) For motors in water well (raw water) service, ASTM A216 WCB is acceptable.

General Notes:

- 1) Pumps in utility water well service having a motor nameplate rating of 75 kW (100 HP) or less may be of the Vendor's standard design. Non-cast components may be used but these must be manufactured from 316 stainless steel or better.
- 2) All austenitic stainless steel, including ASTM A743 CF3M, shall be solution annealed.
- 3) Substitute equivalent or superior materials proposed by the Vendor shall be submitted through the Company or Buyer Representative for review and approval by the Pumps' Standards Committee Chairman. For any requested materials substitution, sufficient data shall be provided by the Vendor to justify the substitution. This data shall include but shall not be limited to physical, mechanical and corrosion resistance properties.

6 Testing and Inspection

- 6.1 All tests shall be certified. For all makes and/or models of pump/motor combinations not already in service in a Saudi Aramco facility, the motor tests, pump hydrostatic test, performance test and mechanical running test shall be witnessed.
- 6.2 All pumps shall be tested at rated speed.
- 6.3 Pumps and/or motors shall be dismantled in the event of unsatisfactory performance or mechanical running tests.

Revision Summary

31 August 2005 Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor changes.