Engineering Standard

SAES-G-116 30 July, 2003

Cleanliness Standard for
Lube/Seal Oil and Fluid Power Systems

Saudi Aramco DeskTop Standards

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1 Scope

This Standard specifies the minimum cleanliness requirements of shop and field fabricated and demothballed or existing Lube/Seal Oil and Fluid Power Systems. (Fluid power systems are defined as motor driven variable speed hydraulic couplings and driven equipment utilising a common fluid for lubrication and power transmission). Use applicable procedures listed in SAEP-1028 to accomplish and maintain the minimum acceptance standard of cleanliness specified herein for all lube, seal oil and fluid power systems.

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.

3.1 Saudi Aramco References

Saudi Aramco Engineering Procedures

SAEP-302	*Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirement*
SAEP-1028	*Chemical Cleaning and Flushing of Lube/Seal Oil and Fluid Power Systems*

3.2 Industry Codes and Standards

International Standard

ISO 3938	*Hydraulic Fluid Power-Contamination Analysis-Method for Reporting Analysis Data*

4 General

Shop fabricated lube, seal oil and fluid power systems' components may have been cleaned, inspected and tested prior to shipment to the field. However, shipping, storage, field inspection and installation usually result in contamination of the previously cleaned system. Therefore, it is necessary to carefully inspect these systems and clean to remove any contaminants.

5 Preparatory Inspection

5.1 Prior to commencing erection of field fabricated piping and components of lube, seal oil and fluid power systems, foreign objects such as weld slag, metal shavings, spatter, insoluble preservatives/compounds, icicles and burnt residue shall be removed by mechanical and chemical cleaning at grade level.

5.2 All systems piping, manways, removable headers, filters, coolers, temporary bypass piping, etc. shall be inspected for cleanliness prior to installation and bolting.

5.3 All accessible welds on pipes and fittings shall be inspected for the presence of weld slag. If slag is found, it shall be removed.

5.4 All surfaces in contact with oil shall have a uniform clean metallic color. The surfaces, when viewed without magnification, shall be free of visible rust, mill scale, welding slag, corrosion, oxides, paint or other foreign material.

5.5 All internal surfaces of component parts of field fabricated lube, seal oil and fluid power systems, shall be cleaned as described in SAEP-1028, prior to flushing with oil.

5.6 If the internal surfaces of any component parts of a shop fabricated lube, seal oil and fluid power systems do not meet the requirements of paragraph 5.4, the affected system shall be cleaned in accordance with SAEP-1028 before flushing with oil.

5.7 Field fabricated tie-in piping shall be isolated and cleaned independently of shop fabricated lube, seal oil and fluid power systems which comply with paragraph 5.4.

6 Cleaning Procedure

Cleaning and flushing shall be per applicable procedures of SAEP-1028.

7 Acceptance after Cleaning and Flushing

After a minimum of 24 hours continuous flushing, a final cleanliness check shall be made. The inspection screens shall be cleaned and reinstalled and the flushing oil shall be circulated for an additional period of 12 hours. The system is clean if:

7.1 No visible accumulation of dirt/foreign material is found on the screens after 12 hours of circulation.

7.2 Moisture cannot be detected using the Lube Oil Condition Monitoring Program Laboratories' hot plate crackle test method.

7.3 All surfaces in contact with oil shall have a uniform clean metallic color. Accessible surfaces, when viewed without magnification, shall be free of visible metal deposit, preservatives, welding slag, rust, corrosion, oxides, paint or other foreign material.

7.4 The cleanliness of the system is acceptable to the Saudi Aramco proponent organization's Operations personnel.

8 Acceptance for Service

8.1 After flushing is completed per SAEP-1028, fill the system with clean unused service oil.

8.2 Establish normal lube, seal oil and fluid power system flows in preparation for equipment start-up.

8.3 Circulate for two hours and collect a composite two liter sample from different drains. Send the sample to Southern Area Labs Division at Abqaiq for chemical and physical analysis. The system oil will be considered acceptable for service when its particle count in accordance with ISO 3938 is ISO 17/14 or less and moisture is not detected using the hot plate crackle test. The sample bottle must be clearly labeled "Final Fill Sample for the attention of the CSD Lubrication Engineers".

Revision Summary

30 July, 2003 Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor revision.