

Engineering Standard

SAES-A-100

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Survey Coordinates and Datums

Document Responsibility: Project Support and Controls Dept.

Saudi Aramco DeskTop Standards

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1 Scope

This Standard establishes the responsibility of Saudi Aramco Surveying Services Division in providing the coordinate system and vertical datums that will be used in engineering, design, construction, surveying, mapping, charting, and drawings of all Saudi Aramco facilities.

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, Project Support and Controls Department of 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, Project Support and Controls Department of 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 reference(s) listed below, unless otherwise noted.

Saudi Aramco Reference

Saudi Aramco Engineering Procedure

SAEP-302

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

4 Coordinate System

- 4.1 The Universal Transverse Mercator Projection (UTM), International 1924 Ellipsoid, Ain (Ayn) Al Abd 1970 Datum¹, shall be the coordinate system used by Saudi Aramco with exception of navigation.

¹ All further reference's herein to UTM means International 1924 Ellipsoid Ain Al Abd 1970 Datum.

- 4.2 Navigation products such as navigation charts and maps, shall be referenced to the World Geodetic System 1984 (WGS84). See general note 8.6.
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- 4.3 All conversions between datums shall be based on Saudi Aramco Surveying Services Division conversion parameters. See general note 8.1.

5 Vertical Datums

- 5.1 The Saudi Aramco offshore Hydrographic Vertical Datum, shall be Lowest Astronomical Tide (LAT), (see cartography 7.3 & general note 8.2).
- 5.2 Mean Sea Level (MSL) shall be the vertical datum for all elevations on land (see general note 8.5).

6 Surveys

- 6.1 All surveying (land, photogrammetric, hydrographic) shall be the responsibility of Saudi Aramco Surveying Services Division.
- 6.2 Survey monuments shall bear definite identification for future reference. Type of survey monument shall be approved by the Chief-Surveying Services.
- 6.3 Projects and Plants shall have at least three (3) survey monuments. The minimum distance between any two monuments shall be fifty (50) meters. The location of each monument shall be referenced to UTM Coordinates and Mean Sea Level elevation.
- 6.4 Saudi Aramco Surveying Services Division shall be responsible for quality control and quality assurance surveys required on all Saudi Aramco projects.
- 6.5 "As-Built" surveys shall be based on actual field measurements referenced to the UTM or local (plant) Coordinate systems and MSL.

7 Cartography

- 7.1 All mapping and charting shall be the responsibility of Saudi Aramco Surveying Services Division.
 - 7.2 Data Base Mapping shall be part of Surveying Services Division's functional responsibility and as such they shall be the official source for this type of mapping.
 - 7.3 Engineering mapping and charting (excepting navigation charting) coordinates shall be based on UTM. Elevations shall be based on Mean Sea Level for land and Lowest Astronomical Tide for offshore. See general notes 8.5 & 8.6.
 - 7.4 Overall plant and facility drawings and maps shall show a minimum of three (3) survey monuments with UTM coordinates and MSL elevations.
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- 7.5 Route drawings for linear facilities shall show the UTM coordinates on beginning and ending points, and changes in direction. Stationing is defined as the accumulated horizontal ground distance, and shall be expressed in Kilometers plus meters (km + m).
- 7.6 All large scale site mapping for construction purposes shall be based on a local ground (plant) coordinate system and shall be referenced to the UTM coordinate system.
- 7.7 Engineering Drawings using surveying information shall reference the survey map or chart number used as a source. Original mapping shall not be modified in any way.

8 General Notes

- 8.1 Implementation of these standards by converting other coordinate systems, such as WGS84, shall be the responsibility of individual departments. All such conversions shall be based on Saudi Aramco Surveying Services Division conversion parameters.
 - 8.2 Saudi Aramco Tide Tables provide predicted tidal elevations referenced to Lowest Astronomical Tide (LAT).
 - 8.3 To obtain accurate horizontal ground distances obtained from UTM coordinates (or opposite), sea level factor and scale (projection) factor corrections (or a locally computed combined factor) shall be applied.
 - 8.4 The unit of distance measurement and elevation for engineering projects, mapping, and charting shall be meters. One meter equals 3.2808398950 international feet, or 3.2808333333 U.S. feet (Survey Feet). One international foot equals 0.3048 meter exactly.
 - 8.5 Mean Sea Level (MSL) is the "Saudi Aramco Vertical Datum of 1978" (SAVD 1978) based on the Benchmark "Monument B" located at the Dhahran Airport, having a preliminary elevation of 24.640 meters as established by the Saudi Arabian Government in 1978. SAVD 1978 approximates MSL at the Arabian Sea. SAVD 1978 elevations minus 0.79 meters equals the Jiddah 1969 datum (Ministry of Petroleum and Mineral Resources, Aerial Survey Dept.).
 - 8.6 Charts produced for navigational purposes shall be produced on the Mercator Projection to conform with International Charting Standards. Navigation products shall be based on WGS84 Ellipsoid to allow the plotting of positions obtained from satellite navigation systems. This also relates to online charting information systems, which by International Standards must be based on WGS84.
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Revision Summary

23 November 2005 Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with no other changes.