Engineering Standard

SAES-L-610 8 February 2009

Nonmetallic Piping in Oily Water Services

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1 Scope

1.1 This Standard covers requirements and limitations for the design, installation and testing of nonmetallic piping in oily water serivces.

1.2 This Standard supplements the requirements of ASME B31 Series, Code for Pressure Piping.

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 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, Consulting Services 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 references listed below, unless otherwise noted.

3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

SAEP-302	*Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirement*

Saudi Aramco Engineering Standards

SAES-B-017	*Fire Water System Design*
SAES-L-105	*Piping Material Specifications*
SAES-L-132	*Material Selection of Piping Systems*
SAES-L-620	*Design of Nonmetallic Piping in Hydrocarbon and Water Injection Systems*
SAES-L-650	*Construction of Nonmetallic Piping in Hydrocarbon and Water Injection Systems*

SAES-S-020	*Industrial Drainage and Sewers*
SAES-S-040	*Saudi Aramco Water Systems*
SAES-S-050	*Sprinkler and Standpipe Systems in Buildings*
SAES-S-060	*Plumbing Code*
SAES-S-070	*Installation of Utility Piping Systems*

Saudi Aramco Materials System Specifications

01-SAMSS-029	*Unrestrained Gasketed Joint RTR Sewer Pipe and Fittings*
01-SAMSS-034	*RTR (Fiberglass) Pressure Pipe and Fittings*

3.2 Industry Codes and Standards

American Society of Mechanical Engineers

ASME B31.3	*Chemical Plant and Petroleum Refinery Piping*

American Society for Testing and Materials

ASTM D1785	*Polyvinyl Chloride Plastic Pipe*
ASTM D4024	*Reinforced Thermosetting Resin (RTR) Flanges*

Uniform Plumbing Code

American Water Works Association

AWWA C950	*Fiberglass Pressure Pipe*

3.3 Other References

Saudi Arabian Standards Organization

SASO SSA/14	*Pipes of Unplasticized Plastic for Potable Water*

4 Limitations

4.1 Materials

4.1.1 The use of nonmetallic piping in hydrocarbon services shall be in accordance with SAES-L-620 and SAES-L-650.

Exceptions:

1. RTR (Fiberglass) piping for aviation refueling facilities shall be in accordance with 01-SAMSS-034 provided it is buried, its size is limited to maximum 4-inch nominal pipe size and the joints are adhesive

bonded. Additional protection shall be provided to ensure the integrity of the system against physical damage. As a minimum, red concrete slabs shall be laid midway between the pipe and grade, and markers indicating the location of the buried pipe shall be installed at intervals not exceeding 30 m.

2. RTR piping if accepted for oily water sewer services as per SAES-S-020, shall be in accordance with 01-SAMSS-034 utilizing epoxy resin with restrained joints as defined in AWWA C950, and buried. The use of nonmetallic pipe for oily water sewers, is prohibited on offshore structures.

3. RTR piping, if used for pressure sewer services as defined in SAES-S-020, shall be in accordance with 01-SAMSS-034 utilizing epoxy resin with restrained joints as defined in AWWA C950 and buried.

4. RTR (Fiberglass) piping for fuel gas blow down system shall be in accordance with 01-SAMSS-034 provided it is buried, and the joints are restrained type as defined in AWWA C950. The intended service shall conform to the RTR piping manufacturer's recommended temperature and pressure limits.

4.1.2 RTR piping is approved for use in fire water service. It shall be in accordance with 01-SAMSS-034 with restrained joints as defined in AWWA C950 and buried. Refer to SAES-B-017 for fire water system design.

4.1.3 RTR piping, if approved to be used for other than fire water services on offshore structures shall be in accordance with 01-SAMSS-034 with restrained joints as defined in AWWA C950.

4.1.4 PVC piping including PVC/uPVC and CPVC, if approved to be used in services not listed in any other Saudi Aramco Engineering Standards, shall be in accordance with ASTM D1785, Schedule 80 or SASO SSA/14, Class 5 for pressure service and ASTM D1785, Schedule 40 or SASO SSA/14, Class 3 for non pressure service. Refer to SAES-L-105 for pipe sizes limitations.

4.1.5 Plastic pipes, fittings, and plastic valves that do not have built-in protection from Ultraviolet (UV) light (exposed to sunlight) shall be shielded by painting with an exterior-grade, water-based emulsion, or tapewrap with UV resistant pressure sensitive tape utilizing adhesive that will not affect the plastic material.

4.1.6 The use of metal piping with an internal thermoplastic lining is limited to those specific services listed by Underwriters Laboratories (UL).

4.1.7 Acrylonitrile-butadiene-styrene (ABS) and polybutylene (PB) piping shall not be used for new installations. These materials may be used for maintenance including replacement at existing ABS and PB installations.

4.1.8 Asbestos cement piping shall not be used.

4.2 Design

4.2.1 Allowable pressure/temperature ratings for RTR piping shall be in accordance with 01-SAMSS-029 and 01-SAMSS-034.

4.2.2 Threaded flanges shall not be used on nonmetallic piping systems.

4.2.3 Lap joint flanges may be used if one piece construction flanges are not available within the industry at the specified nominal pipe sizes. Prior approval from the Chairman of Plumbing and Utilities Standards is required.

4.2.4 For RTR piping system, pre-qualified jointing procedures and methods in accordance with 01-SAMSS-034, shall be used.

4.2.5 Threaded joints and unions may be used for thermoplastic piping except PVC pipes, (*see UPC Section 606.2.2*) 15 mm through 50 mm nominal pipe sizes only, provided they are factory made. Prior approval from the Chairman of Plumbing and Utilities Standards Committee is required for the use of factory made threaded joints and unions of larger nominal pipe sizes and alternate material types.

4.2.6 Branch connections to threaded metallic piping may only be used for RTR pipe up to and including 75 mm nominal pipe size, provided they are factory made.

4.2.7 Flexibility requirements of nonmetallic piping system shall be as follows:

a) Flexibility, support and anchoring requirements shall be in accordance with ASME B31.3 Chapter VII. This requirement also applies to off-plot applications.

b) Flexibility, if required, shall be provided by using bends, loops, offsets, bellows, expansion joints and slip joints.

c) Cold spring is not permitted in nonmetallic piping systems.

4.3 Additional Requirements

4.3.1 Flanged joints shall have the following requirements:

a) Flanged joints on nonmetallic piping system shall be made with flat face flanges and full-faced elastomeric gaskets.

b) Flanges shall have pressure rating equal to or greater than the nonmetallic piping pressure rating.

c) Bolt tightening procedures and maximum torque for bolting on nonmetallic flanges shall be in accordance with ASTM D4024.

d) Washers shall be used for bolting nonmetallic flanges.

4.3.2 Transition from nonmetallic to metallic piping shall be done in a manner that the weight of metallic piping shall not be transferred to nonmetallic piping *(PVC female threaded fittings are prohibited by UPC Section 6.2.2)*, and flexibility requirements shall be taken into account separately for both piping materials.

4.3.3 Transition from nonmetallic to metallic piping in firewater and oily water sewer services shall be made underground or in a buried valve box.

4.3.4 In pressurized systems, connections to metal valves, larger than 50 mm nominal pipe sizes, shall be by means of flanges.

4.3.5 Nonburied metal valves including metal valves in buried valve boxes, shall be supported independently of nonmetallic piping. In buried condition, metal valves 4 inch in size and larger shall be supported independently of nonmetalic piping.

4.3.6 Nonmetallic pipe shall be carried through a metallic sleeve in a valve box wall. Nonmetalic sleeve is acceptable provided the sleeve shall have mechanical characteristics and properties at least similar to that of the pipe passing through the sleeve. The space between the pipe and sleeve shall be sealed with approved flexible waterproof mastic sealant.

4.3.7 The distance between the valve box wall and the back of the nonmetallic flange, inside the valve box, shall be not less than 150 mm to permit work access.

4.3.8 Nonmetallic piping in water systems, covered within the scope of SAES-S-040, shall conform to the requirements of SAES-S-040 for aboveground applications.

4.3.9 Nonmetallic piping shall not be used aboveground outside buildings for firewater and fire extinguishing systems; neither shall it be used for firewater services on offshore structures. Refer to SAES-S-050 for nonmetallic piping in fire water systems inside buildings, and SAES-B-017 for fire water system design.

4.3.10 Nonmetallic piping joints shall be clear of concrete anchor blocks. Thrust block requirements on nonmetallic pipe shall be in accordance with SAES-S-070.

4.3.11 Refer to SAES-L-132 for the requirements and limitations regarding chemical, mechanical and dimensional properties including maximum allowable flow velocities in nonmetallic piping systems.

5 Installation, Testing and Inspection

This Standard adopts the requirements of SAES-S-070, "Installation of Utility Piping Systems."

Revision Summary

8 February 2009	Revised the "Next Planned Update." Reaffirmed the contents of the document, and reissued with editorial changes to limit the standard requirements to oily water system.