

Engineering Procedure

SAEP-362

31 May 2005

Hand-Applied Tape Wrapping of Buried Pipe

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Saudi Aramco DeskTop Standards

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1 Scope

This Procedure gives the minimum mandatory requirements for the storage, handling, and application of hand-applied pipe wrapping tape described in [SAES-H-002](#), APCS-107, "Pressure-Sensitive, Hand-Applied Tape-wrap for Temperatures Up to 55°C" and in [SAES-H-002](#), APCS-109 "Pressure-sensitive, Hand-applied Tape-wrap for Elevated Temperature Service."

2 Conflicts and Deviations

- 2.1 Any conflicts between this procedure 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 procedure 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

All referenced standards, specifications, codes, forms, drawings, and similar material shall be of the latest issue (including all revisions, addenda, and supplements) unless stated otherwise.

Saudi Aramco References

Saudi Aramco Engineering Procedures

[SAEP-302](#)

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

[SAEP-316](#)

Performance Qualification of Coating Personnel

Saudi Aramco Engineering Standards

[SAES-H-001](#)

Selection Requirements for Industrial Coatings

[SAES-H-002](#)

*Internal and External Coatings for Steel Pipelines
and Piping*

[SAES-H-200](#)

*Storage, Handling, and Installation of Externally
Coated Pipe*

4 Definitions

RSA: Responsible Standardization Agency Representative. The Coating Engineer designated by the Manager, Consulting Services Department, to act on his behalf.

5 Material Storage and Handling

- 5.1 Tape, primer, and outer wrap shall be stored in their original factory packaging until required for use. As a minimum they shall be stored in ventilated sheds (or equivalent) in such a manner that they are not exposed to direct sunlight, temperatures in excess of outdoors ambient, blowing dust, or rain.
 - 5.1.1 Tape and outer wrap shall be stored in closed boxes.
 - 5.1.2 At the work site, storage of materials under direct exposure to sunlight is permitted as long as the storage time does not exceed one week and there is no visible damage to the materials. Materials shall remain in factory packaging during this time. If the one-week period is exceeded, the materials shall be placed in covered storage per paragraph 5.1.
- 5.2 Tape and/or primer that is known or suspected to be more than 2 years old shall be spot checked by means of the tape adhesion test in paragraph 12.3 prior to use to verify that it is still in acceptable condition.
- 5.3 Materials shall not be thrown, rolled, dropped, or otherwise handled in a manner that causes damage to them.

6 Surface Preparation

- 6.1 Surface cleanliness requirements are given in [SAES-H-002](#), APCS-107 and APCS-109.
- 6.2 If solvents are used they shall be a type that does not leave a greasy residue on the surface. Diesel fuel and/or kerosene shall not be used for this purpose unless the surface is subsequently cleaned with a non-greasy solvent.
- 6.3 Weld splatter, weld slag, sharp edges, burrs, snarls, and any other sharp surface discontinuities shall be removed prior to coating.
- 6.4 If the tape is to extend onto thick coatings such as extruded polyethylene (APCS-105), extruded polypropylene (APCS-114), or coal tar enamel (APCS-106) the thick coating shall be evenly feathered (chamfered) for a minimum distance of 50 mm back from the bare steel interface.

6.5 Where tape wrap overlaps FBE (APCS-104) or epoxy paints, the gloss shall be removed from these coatings by sanding, abrasive blasting, or similar means and the surface shall be wiped clean prior to taping.

6.5.1 For APCS-107, primer is not required in the overlap area.

6.5.2 For APCS-109, primer shall be used in the overlap area.

6.6 Where tape wrap overlaps polyethylene or polypropylene coatings, they shall either be mechanically roughened as in paragraph 6.5 or solvent cleaned as in paragraph 6.2 prior to taping.

6.6.1 For APCS-107, primer is not required in the overlap area.

6.6.2 For APCS-109, primer shall be used in the overlap area.

7 Primer Application

7.1 For APCS-107, the primer shall be completely dry prior to tape application.

7.2 For APCS-109, the primer shall either be tacky or shall not have been dry for longer than 30 minutes prior to tape application. If this time limit is exceeded, the area shall be re-primed.

7.3 The primer shall be thoroughly mixed before use until all settled materials are dispersed. The primer shall not be thinned unless the Manufacturer advises an acceptable thinning procedure in writing.

7.4 Primer thickness is not critical as long as the surface being primed is completely covered without visible holidays.

8 Tape Application

8.1 General Requirements

8.1.1 The width and overlap of the tape shall meet the requirements of Table 1.

Table 1 – Tape Wrap Requirements

Nominal Pipe Diameter (in)	Maximum Allowable Tape Width, mm	Minimum Allowable Overlap, mm
¼ to 2	(1)	(1)
2 to 4	50	13
4 to 10	100	25
10 +	150	25

Note: (1) Buried pipe with diameters less than 50 mm shall be coated with heat shrinkable tubing unless the RSA advises otherwise in writing.

8.1.1.1 On above ground portions of lines, the tape shall have a minimum of 50 mm overlap (25 mm for 50-mm wide tape) to allow for end shrinkage.

8.1.1.2 APCS-109 tape shall be double wrapped. An acceptable alternative is single wrap with a minimum 55% overlap. (See also paragraph 9.1).

8.1.2 Each new roll of tape shall overlap the end of the preceding roll by a minimum of 150 mm.

8.1.3 Only clean tape shall be applied. If sand or other contaminants become embedded in the adhesive they shall be removed by mechanical means or else the contaminated area shall be cut off and discarded. Solvents shall not be used.

8.1.4 If wrapped pipe is left exposed to construction traffic for longer than one day, it shall not be buried until the Inspector approves the condition of the coating again. Burial shall take place the same day as the inspection or the coating must be inspected again. All defective areas shall be repaired to the Inspector's satisfaction prior to burial.

8.1.5 The applied tape shall be in continuous contact with the pipe.

8.1.6 The tape wrap applicators and the Crew Supervisor shall be certified in accordance with [SAEP-316](#) in the "Pipeline coating" category.

8.2 Special Cases

8.2.1 Tape wrap in Conjunction with Other Coatings

8.2.1.1 Where tape-wrap is used in conjunction with other types of existing coatings, it shall overlap the existing coating by at least 100 mm beyond the junction.

8.2.1.2 Do not apply APCS-107 tape wrap over mastic paint unless the paint is more than 6 months old. At junctions between tape wrap and mastic paint less than 6 months old, coat the intersection by overlapping the mastic paint on top of the tape wrap for a distance of 50 to 100 mm. APCS-107 primer is not required.

8.2.1.3 APCS-107 tape wrap shall not be applied over air drying paints that are less than one month old. APCS-107 primer is not required.

8.2.2 Sand Stabilization

Tape shall be protected from oil spray during sand stabilization.

8.2.3 Road Crossings, Camel Crossings and Railroad Crossings

8.2.3.1 When tape wrap is used in any of these crossings, the system shall include a layer of outer wrap.

8.2.3.2 Tape wrap shall not be used on pipe or casing to be installed by thrust boring.

9 Outer-wrap Application

9.1 Outer-wrap for impact and/or abrasion resistance is not required for APCS-107 unless it is specified in the Scope of Work or other applicable, mandatory Saudi Aramco document. Outer-wrap is required for APCS-109 in all services.

9.2 Outer-wrap for sun shielding purposes shall be applied over the tape wrap on above ground portions of lines as follows:

9.2.1 APCS-107: Not required.

9.2.2 APCS-109: All services.

9.3 If outer wrap is applied, it shall be tight and free of wrinkles or voids. Outer-wrap used in conjunction with APCS-109 shall be applied immediately after taping in order to prevent thermal blistering of the tape.

9.4 Outer-wraps for impact and/or abrasion resistance shall be at least 18-kg asbestos felt or equivalent.

9.5 If non adhesive outer wraps are used, the free ends shall be secured by taping such that the ends are held in place until the pipe is in the ditch and backfilled. The outer wrap shall not sag or loosen on the pipe prior to back filling. The use of metal banding or wire to hold the ends in place is prohibited.

9.6 Plastic non adhesive outer wraps shall not be used unless approved in writing by the RSA.

10 Safety Requirements

- 10.1 Smoking, hot work, and open flames shall not be permitted within 15 m of the job site or the primer storage area.
- 10.2 Dry chemical fire extinguishers shall be available at the job site.
- 10.3 Adequate cleanup facilities shall be available on site, including sufficient fresh water to allow flushing eyes in the event of primer splashing.

11 Repairs

- 11.1 Repairs shall be made to areas where the tape is broken or disbonded.
- 11.2 Defective areas shall be cut back to smooth adherent tape.
 - 11.2.1 Blisters due to air entrapment may be repaired by expelling the entrapped air with rollers (or equivalent) and pressing the tape flat.
 - 11.2.2 Any exposed metal shall meet the surface preparation requirements of paragraph 6.
 - 11.2.2.1 Primer is not required with APCS-107 tape.
 - 11.2.2.2 Primer shall be used with APCS-109 tape.
 - 11.2.3 For cases in which there are two or more layers of tape and/or outer wrap, and the damage is restricted to the outer layer(s), the inner, undamaged layer(s) shall not be cut out. It is sufficient to smooth or remove the damaged outer layer(s) and apply a patch repair.
 - 11.2.3.1 Primer shall not be used with APCS-107 tape.
 - 11.2.3.2 Primer shall be used with APCS-109 tape.
- 11.3 The repair coating shall overlap the repair area by at least 100 mm in all directions.

12 Inspection

- 12.1 The Inspector shall approve the pipe surface preparation immediately prior to priming.
 - 12.2 The Inspector shall approve the primer condition immediately prior to wrapping.
 - 12.3 Inspection of the Applied Tape (and outer wrap, if used)
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- 12.3.1 The Inspector shall inspect visually over 100% of the wrapped area.
- 12.3.2 The Inspector shall use a window-type patch test of the tape to pipe adhesion.
 - 12.3.2.1 Frequency of the test shall be at the Inspector's discretion.
 - 12.3.2.2 The test shall not be made sooner than 30 minutes after the tape has been applied.

The test is acceptable if the plastic outer wrap peels off and the adhesive covers the pipe, or if strings of adhesive expose as the tape peels while the pipe shows all areas covered with adhesion.
 - 12.3.2.4 In the event of a failure, additional window tests shall be made until bonding is acceptable. All the defective areas shall be cleaned to bare steel and rewrapped.
- 12.3.3 Holiday tests are not required unless specified in the Scope of Work or other mandatory document.
- 12.4 The Inspector shall clearly mark locations of defective coating and shall verify that they have been satisfactorily repaired prior to pipeline backfilling.
- 12.5 The Contractor shall be responsible for all quality control checking required by this section. The Contractor shall keep records of the results of all such inspections in a form suitable to the Saudi Aramco Inspector.

13 Handling Coated Pipe

- 13.1 Pipe wrapped off site and then transported to site shall be stored, handled, and transported according to the requirements of [SAES-H-200](#).
- 13.2 Coated pipe shall be handled in a manner that does not damage the coating or the pipe.
 - 13.2.1 Lifting shall be done with properly rated web slings or equivalent. Steel cables and unpadded steel lifting equipment shall not be used.
 - 13.2.2 Stringing shall be done on rock-free sand, sandbags, rubber tires or similar supports. Wood cribbing and similar sharp-edged supports shall not be used unless they are rubber padded.