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⚠ CAUTION!

Failure to properly use, maintain, test, and inspect steam hose assemblies can result in injury to personnel or damage to property.

Due to the application of steam hose assemblies, hose and couplings may be hot. Use caution to avoid burns. Hot water, low pressure steam, and high-pressure steam can cause severe scalding or fatal burns.

Do not exceed the manufacturer's recommended working pressure and temperature ratings.

Operators should be trained using this guide in the proper use and care of steam hose assemblies.

⚠ WARNING!

Because coupling attachment is important to the use and performance of steam hose assemblies, only use hose/coupling combinations recommended by the hose manufacturer.

1. Foreword

The purpose of this guide is to provide information regarding the proper use, maintenance, testing, and inspection of steam hose. As noted, failure to follow the procedures outlined in this guide could result in injury to personnel or damage to property.

Units of Measurements: When a value for measurement is followed by a value in other units in parentheses, the first stated unit is the requirement. All pressure values are gage pressures.

2. Scope

This guide is intended for hose assemblies used in steam service applications involving working pressures up to a maximum of 1.7 MPa (250 psi) and temperatures up to a maximum of 232 °C (450 °F). It covers hose having an inside diameter of up to 51 mm (2 inch).

Note: Under saturated steam conditions, the temperature of 1.7 MPa (250 psi) steam will be 208 °C (406 °F). Higher temperatures are possible under super-heated steam conditions which can occur with a sudden pressure drop such as when a steam valve opens. However, this temperature rise would be short-lived.

DISCUSSION

3. Storage

3.1 Procedures for proper storage of hose prior to use and between use are outlined in the ARPM Hose Handbook, Chapter 9, "Care, Maintenance, and Storage of Hose". These procedures should be carefully followed.

3.2 In addition, condensation should be drained from steam hose assemblies prior to storage. This will help extend the service life of the assembly.

4. Use

4.1 Steam hose is intended to transfer saturated and superheated steam. In special cases such as noted in the Scope, superheated steam is possible. Additionally, steam hose is often used to transfer hot water; however, the same hose should not be used with steam due to moisture absorption of the tube material which when heated to steam temperatures can cause a reduction in service life.

4.2 Coupling recommendations should be obtained from the hose manufacturer. In general, interlocking clamp type couplings and crimped couplings can be used for steam hose applications. Refer to ARPM Hose Handbook, Chapter 5, "Couplings" for general information.

4.3 Interlocking clamp type couplings can be tightened during use in order to compensate for rubber flow and compression set. All clamp bolts should be tightened evenly to prevent cocking. When the clamp halves touch after constant tightening and retightening, the hose should be removed from service.

4.4 Crimped couplings cannot be recrimped, nor can the hose be recoupled. The hose should be removed from service if there is any distortion or misalignment at the coupling/hose connection.

4.5 Always check hose couplings before placing the assembly into service and at least once every 24 hours during long periods of continuous steaming.

5. Frequency of Inspection and Pressure Testing

5.1 New Assemblies – All new steam hose assemblies should be tested prior to use to determine if they have been damaged in storage or shipment, in accordance with the recommendations for use in Section 4 and the inspection and testing procedures in Section 7.

5.2 Normal Use – When steam hose is subjected to ordinary use, the frequency of test should be once every ninety days the first year and once a month thereafter, in accordance with the recommendations for use in Section 4 and the inspection and testing procedures in Section 7.

5.3 Severe Usage – Steam hose subjected to severe usage, i.e. dragging over abrasive surfaces or being sharply bent or continually exposed to weather, will deteriorate more rapidly than carefully handled hose. Hose subjected to severe usage should be visually inspected daily and tested monthly, in accordance with the recommendations for use in Section 4 and the inspection and testing procedures in Section 7.

5.4 Abnormal Usage – Steam hose assemblies subjected to abnormal abuse such as severe end pull, flattening or crushing by vehicles, or kinking should immediately be removed from service and tested in accordance with the recommendations for use in Section 4 and the inspection and testing procedures in Section 7.

6. Testing

All physical testing should be performed with the hose at room temperature 21 ± 7 °C (70 ± 10 °F). An inspection record should be maintained for each hose which notes the hose, hose manufacturer, date received, purchase order number, date of installation, and inspection test results.

7. Inspection and Testing Procedure

7.1 Visual Inspection – Inspect the outside cover of the hose for blistering, excessive abrasion or cuts, and coupling slippage. This inspection should be made when the hose is not under pressure.

7.2 Cuts in the hose cover which expose or damage the reinforcement are cause for replacement. Small cuts, nicks, or gouges in the cover which do not go completely through the cover will not be cause for replacement of the hose. Hose strength is largely controlled by the plies of reinforcement and, for this reason, damage in this area cannot be tolerated.

Note: Pricking of the cover in the manufacture of this type of hose is common and good practice; consequently, the uniformly pricked cover should not be viewed with alarm.

7.3 Damage to the textile or wire reinforcement through abrasion is cause for hose replacement.

7.4 Cracking of the cover from long term steam service/heat aging, blistering or loose cover is cause for hose replacement.

7.5 Examine couplings for slippage. Slippage is evidenced by the misalignment of the hose and/or the scored or exposed area where slippage has occurred. Any evidence of slippage is cause for hose replacement or recoupling and retesting (interlocking clamp type couplings only).

7.6 Pressure Testing – Pressure testing should be conducted with the operator using a full face shield to protect against unexpected release of pressure. After visual inspection, connect the hose to a suitable test pump. Tighten all fittings and, if applicable, clamp bolts evenly and securely before proof testing. Fit the opposite end with a quick opening valve.

Introduce water into the hose with the outlet valve open and the end elevated to bleed off air. When all the air has been expelled, close the valve and proceed with the test.

7.7 Place hose in a straight line and raise the pressure to 200% of the maximum working pressure recommended by the hose manufacturer and hold the pressure for 5 minutes during which time the following inspection tests should be performed.

7.8 Examine the hose for leaks, especially near the couplings. Also look for any noticeable bulging or swollen areas. Any hose with bulging spots should be replaced or the affected area cut off and the hose recoupled and retested (interlocking clamp type couplings only).

7.9 If a leak develops between the hose tube and interlocking clamp type couplings, the pressure should be released, the clamp bolts tightened, and the pressure reapplied. If leakage is no longer evident and inspection indicates the hose assembly is otherwise sound, the hose length may be returned to service.

7.10 If a leak develops when testing crimped assemblies and inspection indicates the hose assembly is otherwise sound, contact the hose manufacturer for specific recommendations for further testing to ensure hose/coupling integrity.

7.11 Test – Where dissipation of static electricity is required, the following test should be made after the completion of pressure testing. The hose should be tested on a non-conductive surface using an ohmmeter to measure the electrical resistance of the hose between the couplings. A similar test procedure is outlined in the ARPM Hose Handbook, Chapter 6, “Hose Test Methods, Methods for Measuring Electrical Resistance of Hose – Method 1 - Plug Method”. The maximum allowable resistance shall be 20,000 ohms per foot of hose.