Recommended Practices for Hydraulic Hose Assemblies

Foreword — This SAE Recommended Practice is intended as a guide to consider when selecting, routing, fabricating, installing, replacing, maintaining and storing hose for fluid-power systems. It is subject to change to keep pace with experience and technical advances. For those new to hose use in fluid-power systems, this guide outlines practices to note during each phase of system design and use. Experienced designers and users skilled in achieving proper results, as well as the less experienced, can use this outline as a list of considerations to keep in mind.

Fluid power systems are complex and require extensive knowledge of both the system requirements and the various types of hose. Therefore, all-inclusive, detailed, step-by-step instructions are not practical and are beyond the scope of this document. Less experienced designers and user's who need more information can consult specialists such as hose suppliers and manufacturers. This guide can improve the communication process.

Safety Considerations — These recommended practices involve safety considerations; note these carefully during all phases of design and use of hose systems. Improper selection, fabrication, installation or maintenance of hose and hose assemblies for fluid-power systems may result in serious personal injury or property damage. These recommended practices can reduce the likelihood of component or system failure, thereby reducing the risk of injury or damage.

1. Scope – SAE J1273 provides guidelines for selection, routing, fabrication, installation, replacement, maintenance and storage of hose and hose assemblies for fluid-power systems. Many of these SAE Recommended Practices also may be suitable for other hose and systems.

2. References

2.1 Applicable Documents – The following publications form a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue of SAE publications shall apply.
SAE J343 – Test and Procedures for SAE 100 R Series Hydraulic Hose and Hose Assemblies.
SAE J514 – Hydraulic Tube Fittings
SAE J517 – Hydraulic Hose
SAE J1927 – Cumulative Damage Analysis for Hydraulic Hose Assemblies

2.1.2 ISO Publication – Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.
ISO 3457 – Earth Moving Machinery–Guards and Shields–Definitions and Specifications

3. Explanation of Terms – These explanations serve only to clarify this document and are not intended to stand alone. They are presented sequentially, with the former helping to explain the latter.

3.1 Fluid Power – Energy transmitted and controlled using pressurized hydraulic fluids or compressed air.

3.2 Hose – Flexible conductor. In this document, the term hose may also refer to a hose assembly with related accessories used in fluid power applications.

3.3 Hose Fitting or Fitting – Connector which can be attached to the end of a hose.

3.4 Hose Assembly – Hose with hose fittings attached.

3.5 Hose Failure – Occurrence in which a hose stops meeting system requirements.

3.6 Hose Service Life – Length of time a hose meets system requirements without needing replacement.

4. Safety Considerations – Listed in 4.1 to 4.7 are some potential conditions and situations that may lead to personal injury and/or property damage. The list is not necessarily all inclusive. Consider reasonable and feasible means, including those described in this section, to reduce the risk of injuries or property damage.

4.1 Fluid Injections – Fine streams of escaping pressurized fluid can penetrate skin and enter a human body. These fluid injections may cause severe tissue damage and loss of limb. Consider various means to reduce the risk of fluid injections, particularly in areas normally occupied by operators. Consider careful routing, adjacent components, warnings, guards, shields and training programs. Relieve pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Avoid contact with escaping fluids. Treat all leaks as though pressurized and hot enough to burn skin. Never use any part of your body to check for hose leaks. If a fluid-injection accident occurs, see a doctor immediately. **DO NOT DELAY OR TREAT AS A SIMPLE CUT!** Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should consult a knowledgeable medical source.

4.2 Whipping Hose – If a pressurized hose assembly blows apart, the fittings can be thrown off at high speed, and the loose hose can flail or whip with great force. This is especially true in compressible-fluid systems. When this risk exists, consider guards and restraints to protect against injury.

4.3 Burns from Conveyed Fluids – Fluid-power media may reach temperatures that can burn human skin. If there is risk of burns from escaping fluid, consider guards and shields to prevent injury, particularly in areas normally occupied by operators.

4.4 Fire and Explosion from Conveyed Fluids – Most fluid-power media, including fire-resistant hydraulic fluids, will burn under certain conditions. Fluids which escape from pressurized systems may form a mist or fine spray which can flash or explode upon contact with an ignition source. Consider selecting, guarding, and routing hose to minimize the risk of combustion. (See Section 5 and ISO 3457).

4.5 Fire and Explosions from Static-Electric Discharge – Fluid passing through hose can generate static electricity, resulting in static-electric discharge. This may create sparks that can ignite system fluids or gases in the surrounding atmosphere. When this potential exists, select hose specifically designed to carry the static-electric charge to ground.