

SELECTION, INSTALLATION AND MAINTENANCE OF HOSE AND HOSE ASSEMBLIES

SCOPE:

1. Many factors affect the selection, making, installation and maintenance of hose assemblies. This catalogue, RYCO hydraulics, and The Society of Automotive Engineers recommended practice SAE J1273, have useful information about selecting, making, installing and servicing hydraulic hose assemblies. For further information, please contact your local RYCO representative.

RYCO recommends hose and coupling combinations in the catalogue only after completing extensive testing. Evaluation of a hose and coupling combination requires considerable impulse testing and cannot be determined by a simple burst or pressure hold test. RYCO disclaims all liability for any hose assembly made in violation of RYCO recommendations, procedures and current crimp data. Crimp data is updated from time to time.

The consumer's exclusive remedy with respect to any claim shall be a refund of the purchase price or replacement of the product at the option of RYCO. In no event shall RYCO be liable for any incidental or consequential damages whatsoever.

WARNING: IMPROPER SELECTION, INSTALLATION, OR MAINTENANCE MAY RESULT IN PREMATURE FAILURES, BODILY INJURY, PROPERTY DAMAGE.

SELECTION:

2. The following is a list of factors which must be considered before final hose selection can be made:
 - 2.1 **Pressure** – After determining the system pressure, hose selection must be made so that the recommended maximum operating pressure is equal to or greater than the system pressure. Surge pressures higher than the maximum operating pressure will shorten hose life and must be taken into account by the hydraulic engineer.
 - 2.2 **Suction** – Hose used for suction applications must be selected to ensure the hose will withstand the negative pressure of the system.
 - 2.3 **Temperature** – Care must be taken to ensure that fluid and ambient temperatures, both static and transient, do not exceed the limitations of the hose. Special care must be taken when routing near hot objects such as manifolds.
 - 2.4 **Fluid Compatibility** – Hose selection must assure compatibility of the hose tube, cover, and fittings with the fluid used. Additional caution must be observed in hose selection for gaseous applications.
 - 2.5 **Size** – Transmission of power by means of pressurised fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage to the hose due to heat generation or excessive turbulence.
 - 2.6 **Routing** – Attention must be given to optimum routing to minimise inherent problems.
 - 2.7 **Environment** – Care must be taken to ensure that the hose and fittings are either compatible with or protected from the environment to which they are exposed. Environmental conditions such as ultraviolet light, ozone, salt water, chemicals and air pollutants can cause degradation and premature failure and, therefore, must be considered.
 - 2.8 **Mechanical Loads** – External forces can significantly reduce hose life. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type fittings or adaptors may be required to ensure no twist is put into the hose. Unusual applications may require special testing prior to hose selection.
 - 2.9 **Abrasion** – While a hose is designed with a reasonable level of abrasion resistance, care must be taken to protect the hose from excessive abrasion which can result in erosion, snagging, and cutting of the hose cover. Exposure of the reinforcement will significantly accelerate hose failure.
 - 2.10 **Proper End Fitting** – Care must be taken to ensure proper compatibility exists between the hose and coupling selected based on the manufacturer's recommendations substantiated by testing to industry standards such as SAE J517.
 - 2.11 **Length** – When establishing proper hose length; motion absorption, hose length changes due to pressure, as well as hose and machine tolerances must be considered.
 - 2.12 **Specifications and Standards** – When selecting hose; government, industry, and manufacturer's specifications and recommendations must be reviewed as applicable.
 - 2.13 **Hose Cleanliness** – Hose components vary in cleanliness levels. Care must be taken to ensure that the assemblies selected have an adequate level of cleanliness for the application.
 - 2.14 **Electrical Conductivity** – Certain applications require that hose be non-conductive to prevent electrical current flow. Other applications require the hose to be sufficiently conductive to drain off static electricity. Hose and fittings must be chosen with these needs in mind.
 - 2.15 **High Pressure Gas** – Do not use hydraulic hose to transmit high pressure gases.

INSTALLATION:

3. After selection of proper hose, the following factors must be considered by the installer:
 - 3.1 **Pre-installation Inspection** – Prior to installation, a careful examination of the hose must be performed. All components must be checked for correct style, size and length. In addition, the hose must be examined for cleanliness, I.D. obstructions, blisters, loose cover, or any other visible defects.
 - 3.2 **Follow Manufacturer's Assembly Instructions.**
 - 3.3 **Minimum Bend Radius** – Installation at less than minimum bend radius may significantly reduce hose life. Particular attention must be given to preclude sharp bending at the hose/fittings juncture.
 - 3.4 **Twist Angle and Orientation** – Hose installations must be such that relative motion of machine components produces bending of the hose rather than twisting.
 - 3.5 **Securement** – In many applications, it may be necessary to restrain, or guide the hose to protect it from damage by unnecessary flexing, pressure surges, and contact with other mechanical components. Care must be taken to ensure such restraints do not introduce additional stress or wear points.
 - 3.6 **Proper Connection of Ports** – Proper physical installation of the hose requires a correctly installed port connection while ensuring that no twist or torque is transferred to the hose.
 - 3.7 **Avoid External Damage** – Proper installation is not complete without ensuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage, or damage to sealing surfaces are corrected or eliminated.
 - 3.8 **System Check out** – After completing the installation, all air entrapment must be eliminated and the system pressurised to the maximum system pressure and checked for proper function and freedom from leaks.

NOTE: Avoid potential hazardous areas while testing.

MAINTENANCE:

4. Even with proper selection and installation, hose life may be significantly reduced without continuing maintenance program. Frequency should be determined by the severity of the application and risk potential. A maintenance program should include the following as a minimum.
 - 4.1 **Hose Storage** – Hose products in storage can be affected adversely by temperatures, humidity, ozone, sunlight, oils, solvents, corrosive liquids and fumes, insects, rodents, and radioactive materials. Storage areas should be relatively cool and dark and free of dust, dirt, dampness and mildew.
 - 4.2 **Visual Inspection** – Any of the following conditions requires replacement of the hose.:
 - a) Leaks at fittings or in hose. (Leaking fluid is a fire hazard.)
 - b) Damaged, cut, or abraded cover. (Any reinforcement exposed.)
 - c) Kinked, crushed, flattened, or twisted hose.
 - d) Hard, stiff, heat cracked, or charred hose.
 - e) Blistered, soft, degraded, or loose cover.
 - f) Cracked, damaged, or badly corroded fittings.
 - g) Fittings slippage on hose.
 - 4.3 **Visual Inspection** – The following items must be tightened, repaired or replaced as required.
 - a) Leaking port conditions.
 - b) Clamps, guards, shields.
 - c) Remove excessive dirt build-up.
 - d) System fluid level, fluid type, and any air entrapment.
 - 4.4 **Functional Test** – Operate the system at maximum operating pressure and check for possible malfunctions and freedom from leaks.

NOTE: Avoid potential hazardous areas while testing.
 - 4.5 **Replacement Intervals** – Specific replacement intervals must be considered based on previous service life, government or industry recommendations, or when failures could result in unacceptable down time, damage, or injury risk.