

SAFETY GUIDE FOR SELECTING AND USING HOSE, FITTINGS, AND RELATED ACCESSORIES

DANGER: Failure or improper selection or improper use of hose, fittings, or related accessories can cause death, personal injury and property damage. Possible consequences of failure or improper selection or improper use of hose, fittings, or related accessories include but are not limited to:

- Fittings thrown off at high speed
- High velocity fluid discharge
- Explosion or burning of the conveyed fluid
- Electrocutation from high voltage electric power lines or other sources of electricity
- Contact with suddenly moving or falling objects that are to be held in position or moved by the conveyed fluid.
- Dangerously whipping hose
- Contact with conveyed fluid that may be hot, cold, toxic or otherwise injurious.
- Sparking or explosion caused by static electricity buildup
- Sparking or explosion while paint or flammable liquid spraying.

Before selecting or using any hose, fittings or related accessories, it is important that you read and follow the following instructions:

1.0 GENERAL INSTRUCTIONS

1.1 Scope: This safety guide provides instructions for selecting and using (including assembly, installing, and maintaining) hose (including all rubber and/or plastic products commonly called “hose” or “tubing”), fittings (including all products commonly called “fittings” or “couplings” for attachment to hose), and related accessories (including crimping and swaging machines and tooling).

1.2 Fail-Safe: Hose and hose assemblies can and do fail without warning for many reasons. Design all systems and equipment in a

fail-safe mode, so that failure of the hose or hose assembly will not endanger persons or property.

1.3 Distribution: Provide a copy of this safety guide to each person that is responsible for selecting or using hose and fitting products. Do not select or use hose and fittings without thoroughly reading and understanding this safety guide as well as the specific publications for the products considered or selected.

1.4: User Responsibility: Due to the wide variety of operating conditions and uses for hose and fittings, the distributors do not represent or warrant that any particular hose or fitting is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the hose and fitting.
- Assuring that the user's requirements are met and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the hose and fittings were used.

1.5 Additional Questions: Call the appropriate technical service department if you have any questions or require any additional information. See the specific publication for the product being considered or used, for telephone numbers of the appropriate technical service department.

2.0 HOSE AND FITTING SELECTION INSTRUCTIONS

2.1 Electrical Conductivity: Certain applications require that a hose be nonconductive to prevent electrical current flow. Other applications require the hose to be sufficiently conductive to drain off static electricity. Extreme care must be exercised when selecting hose and fittings for these or any other applications in which electrical conductivity or nonconductivity is a factor. For applications that require hose to be electrically nonconductive, including but not limited to applications near high voltage electric lines, only special nonconductive hose can be used. The

manufacturer of the equipment in which the non-conductive hose is to be used must be consulted to be certain that the hose and fittings that are selected are proper for the application. Do not use any hose or fitting for any such application requiring nonconductive hose, including but not limited to applications near high voltage electric lines, unless (i) the application is expressly approved in the technical publication for the product, (ii) the hose is both orange color and marked "nonconductive" and (iii) the manufacturer of the equipment on which the hose is to be used specifically approves the particular hose and fitting for such use.

The electrical conductivity or nonconductivity of hose and fittings is dependent upon many factors and may be susceptible to change. These factors include but are not limited to the various materials used to make the hose and the fittings, manufacturing method (including moisture control), how the fittings contact the hose, age and amount of deterioration or damage or other changes, moisture content of the hose at any particular time, and other factors.

2.2 Pressure: Hose selection must be made so that the published maximum recommended working pressure of the hose is equal to or greater than the maximum system pressure. Surge pressures in the system higher than the published maximum recommended working pressure will cause failure or shorten hose life. Do not confuse burst pressure or other pressure values with working pressure and do not use burst pressure or other pressure values for this purpose.

2.3 Suction: Hoses used for suction applications must be selected to insure that the hose will withstand the vacuum and pressure of the system. Improperly selected hose may collapse in suction application.

2.4 Temperature: Be certain that fluid and ambient temperatures, both steady and transient, do not exceed the limitations of the hose. Temperatures below and above the recommended limit can degrade hose to a point where a failure may occur and release fluid. Care must be taken when routing hose near hot objects (e.g. manifolds) to properly insulate and protect the hose.

2.5 Fluid Compatibility: Hose selection must assure compatibility of the hose tube, cover, reinforcement, and fittings with the fluid media used. See the fluid compatibility chart in the publication for the product being considered or used. This information is offered only as a guide. Actual service life can only be determined by the end user by testing under all extreme conditions and other analysis.

2.6 Permeation: Permeation (that is, seepage thorough the hose) will occur from inside the hose to outside when hose is used with gases, liquid and gas fuels, and refrigerants (including but not limited to such materials as helium, fuel oil, natural gas, or R-134a). This permeation may result in high concentrations of vapors which are potentially flammable, explosive, or toxic, and in loss of fluid. Dangerous explosions, fires, and other hazards can result when using the wrong hose for such applications. The system designer must take into account the fact that this permeation will take place and must not use hose if this permeation could be hazardous. The system designer must take into account all legal, government, insurance, or any other special regulations which govern the use of fuels and refrigerants. Never use a hose even though the fluid compatibility is acceptable without considering the potential hazardous effects that can results from permeation through the hose assembly.

Permeation of moisture from outside the hose to inside the hose will also occur in hose assemblies, regardless of internal pressure. If this moisture permeation would have detrimental effects (particularly but not limited to refrigeration and air conditioning systems), incorporation of sufficient drying capacity in the system or other appropriate system safeguards should be selected and used.

2.7 Size: Transmission of power by means of pressurized 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 due to heat generation or excessive fluid velocity.

2.8 Routing: Attention must be given to optimum routing to minimize inherent problems (kinking or flow restriction due to hose collapse).

2.9 Environment: Care must be taken to insure that the hose and fittings are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals, and air pollutants can cause degradation and premature failure.

2.10 Mechanical Loads: External forces can significantly reduce hose life or cause failure. Mechanical loads which must be considered include excessive flexing, twist, linking, tensile or side loads, bend radius, and vibration. Use of swivel type fittings or adapters may be required to insure no twist is put into the hose. Unusual applications may require special testing prior to hose selection.

2.11 Physical Damage: Care must be taken to protect hose from wear, snagging and cutting, which can cause premature hose failure.

2.12 Proper End Fitting: See instructions 3.2 through 3.5 below. These recommendations may be sustained by testing to industry standards such as SAE J517.

2.13 Length: When establishing a proper hose length, motion absorption, hose length changes due to pressure, and hose and machine tolerances must be considered.

2.14 Specifications and Standards: When selecting hose and fittings, government, industry, and manufacturer specifications and recommendations must be reviewed and followed as applicable.

2.15 Hose Cleanliness: Hose components may vary in cleanliness levels. Care must be taken to insure that the assembly selected has an adequate level of cleanliness for the application.

2.16 Fire Resistant Fluids: Some fire resistant fluids require the same hose as petroleum oil. Some use a special hose, while a few fluids will not work with any hose at all. See instructions 2.5 and 1.5. The wrong hose may fail after a very short service. In addition, all liquids but pure water may burn fiercely under certain conditions, and even pure water leakage may be hazardous.

2.17 Radiant Heat: Hose can be heated to destruction without contact by such nearby items as hot manifolds or molten metal. The same heat source may then initiate a fire. This can occur despite the presence of cool air around the hose.

2.18 Welding and Brazing: Heating of plated parts, including hose fittings and adapters, above 450 degrees Fahrenheit such as during welding, brazing, or soldering may emit deadly gases.

2.19 Atomic Radiation: Atomic radiation affects all materials used in hose assemblies. Since the long term effects may be unknown, do not expose hose assemblies to atomic radiation.

3.0 HOSE AND FITTING ASSEMBLY AND INSTALLATION INSTRUCTIONS

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, catalog numbers, and length. In addition, the hose must be examined for cleanliness, obstructions, blisters, cover looseness, or any other visible defects.

3.2 Hose and Fitting Assembly: Do not assemble a fitting on a hose that is not specifically listed for that fitting unless authorized in writing by the chief engineer of the appropriate division. Do not assemble a manufacturer's fitting on another manufacturer's hose or a manufacturer's hose on another manufacturer's fitting unless (i) the chief engineer of the appropriate division approves the assembly in writing, and (ii) the user verifies the assembly and the application through analysis and testing. See instruction 1.4 above.

3.3 Related Accessories: Do not crimp or swage any hose or fitting with anything but the proper listed swage or crimp machine and dies and in accordance with published instructions. Do not crimp or swage another manufacturer's hose fitting with a manufacturer's crimp or swage die unless authorized in writing by the chief engineer of the appropriate division.

3.4 Parts: Do not use any hose fitting part (including but not limited to socket, shell, nipple or insert) except with the correct mating parts, in accordance with published instructions, unless authorized in writing by the chief engineer of the appropriate division.

3.5 Reusable/Permanent: Do not reuse any reusable hose product that has blown or pulled off a hose. Do not reuse a permanent (that is, crimped or swaged) hose fitting or any part thereof.

3.6 Minimum Bend Radius: Installation of a hose at less than the minimum listed bend radius may significantly reduce the hose life. Particular attentions must be given to preclude sharp bending at the hose/fitting juncture.

3.7 Twist Angle and Orientation: Hose installations must be such that relative motion of machine components does not produce twisting.

3.8 Securement: In many applications, it may be necessary to restrain, protect, 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.

3.9 Proper Connection of Ports: Proper physical installation of the hose requires a correctly installed port connection insuring that no twist or torque is transferred to the hose.

3.10 External Damage: Proper installation is not complete without insuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage, or damage to sealing surfaces are corrected or eliminate. See instruction 2.10.

3.11 System Checkout: All air entrapment must be eliminated and the system pressurized to the maximum system pressure and checked for proper function and freedom from leaks. Personnel must stay out of potential hazardous areas while testing and using the system.



CENTURY FUEL PRODUCTS

PHONE: (734) 728-0300 FAX: (734) 728-0303

WWW.CENTURYFUELPRODUCTS.COM



www.facebook.com/centuryfuelproducts

www.twitter.com/CenturyFuel