TerranearPMC Safety Share

Week of April 21, 2014 – The Use of Whip Checks

Recently, a concrete pump truck was pumping concrete into the walkway of a house while a worker held the end hose. The rubber hose was 20 feet long and had a coupling device attached at the end. The operator of the concrete pump truck saw that the concrete had stopped flowing out of the hose. He pushed the emergency stop button and the pumping stopped. However, compressed air trapped in the supply line behind a blockage forced the blockage to clear suddenly. Concrete burst out of the hose, causing the hose to whip out. The worker holding the hose fell backwards. He struck his head on a piece of scrap lumber and later died of his injuries.

Data shows that hose whipping accidents are quite common, particularly in cases of pumping concrete. Hose whipping is a source for some serious mishaps which sometimes can be fatal. Such occurrences, while being a potential cause of worker injuries, may also result in legal lawsuits, compensation procedures, and loss of manpower and work.

Working with high pressure lines; whether the contents are gases, liquids or in the above- referenced incident, slurries, is common at many work sites. In work areas where pressurized fluid or compressed air is delivered through hoses that connect with quick disconnect connectors; the connectors or the hoses themselves can become uncoupled. The resulting quick release of pressure causes a whipping action by the hose. A whipping hose is a substantial workplace hazard and should always be addressed prior to performing tasks that involve pressurized lines.

It is typical for persons that are assigned to work with high pressure lines to wear PPE such as safety glasses and even a full face shield. Various types of gloves are available to further control worker exposures while connecting and/or disconnecting high pressure lines. However, as we all have heard numerous times, PPE is the last resort of protection. Obviously the first line of defense from an out-of-control pressurized hose line is to prevent the incident from occurring. This requires rigorous inspections of the line itself, identifying damage and defects. When defective equipment and materials are identified, they need to be removed from service - immediately. This type of safety method is often referred to as a work practice or administrative control. Another control method; engineering controls, is considered to be the most effective control. This would include effective connections between either two hoses or a hose and a piece of equipment. Of course these connection points need to be inspected regularly (recommended prior to each work shift).

Another engineering control is the use of whip checks. Whip checks restrain the whiplashes of hoses that become inadvertently uncoupled. The attachment, comprised of hollow braid rope, has looped ends that may be engaged about the hoses. The loop, at the time of installation, may be increased in size to accommodate the coupling element of the hose. Once installed, the loops are adjusted to tightly engage the hose or an anchor element.

The Occupational Safety and Health Administration (OSHA) does not have any specific regulation for the installation of whip checks. OSHA 29 CFR 1926.302 (b) 1) (Subpart I –Tools: Hand and Power) states that "*Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.*" Of course it s not unusual for OSHA to fine and penalize organizations for not using whip checks or other safety devices through the General

Duty Clause; a section within the original Occupational Safety and Health Act of 1970, that states employers are required to establish and maintain a work environment that is free of all recognized safety and health hazards.

Typically, Whip checks are designed for use on air hoses at pressures of 200 PSI or less. Hydraulic oil is non-compressible and therefore, for the most part, does not induce hose whip during a coupling or hose failure (The real danger in these cases is high pressure oil being injected into a worker's skin or eyes. A suitable safety device for these applications is a solid guard between operators and connections). Whip checks are designed with a 5 to 1 safety margin at 200 PSI (meaning they have been tested at 1000 PSI). At 300 PSI that margin drops to 3 to 1. Manufacturers of whip checks have their specific recommendations for how to use their products including product limitations. Whip checks that do not have the appropriate safety factor for a particular pressure system should not be used.

To ensure that the correct whip checks are available for your specific project, some key information is needed.

- Know the specific size requirements: Typically, this means knowing the inside hose diameter (I.D.) as well as the outside diameter (O.D.) of both ends of the hose. Also it is important to know the overall length of the assembly required.
- What is the temperature range of the media (product) that is flowing through the hose assembly? It is also useful to having an understanding of the temperature range of the environment that surrounds the outside of the hose assembly.
- It is important to know how is the hose assembly is actually being used. Is it a pressure application? Is it a vacuum (suction) application? Is it a gravity flow application? Are there any special requirements that the hose assembly is expected to perform? Is the hose being used in a horizontal or vertical position? Are there any pulsations or vibrations acting on the hose assembly? Is the system a hose-to-hose connection or a hose-to-tool end configuration?
- What is the media/material that is flowing through the hose assembly? Being specific is critical. Check for: Abrasive materials, chemical compatibility, etc.
- What is the maximum pressure including surges (or, maximum vacuum) that this hose assembly will be subjected to? Always rate the maximum working pressure of your hose assembly by the lowest rated component in the system.
- Of course it is imperative to know the coupling system for the hose connections. Are they the proper fittings for the application and hose selected?

Whip checks come in a variety of materials ranging from natural fiber and synthetic materials (i.e. polypropylene) to stainless steel cables. Similar to all types of controls for worker safety, using the wrong type of equipment can be just as dangerous as if no controls were applied. A false sense of security may result in injury or death when persons reduce their level of caution as they believe they have effective safeguards.

Older Siblings; The only people who will make fun of you for their own entertainment, then beat up anyone else who tries.

Anonymous