

HSAC

Hydraulic Safety Authority
of Canada Inc.™

PROGRAM TOPICS

2 Levels of
Comprehensive Training

**THE MOST POWERFUL SAFETY TOOL IS
THE KNOWLEDGE RELATED TO THE
HAZARDS OF HYDRAULICS!**



HSAC EXPOSURE LEVEL

HSAC Exposure Level **Instructor Delivered - In Class - 5 hours** *(minimum class size requirement)*

The safety status of hydraulic equipment and components are always changing. What is safe today may not be safe tomorrow. Most occupations are exposed to hydraulics at many different levels. The exposure level topics will establish an awareness of hydraulic hazards in the workplace. Special attention is given to the most common misconceptions, including environmental health.

This program brings awareness to individuals who are exposed to hydraulic systems, and may not know it. Many hydraulic incidents and fatalities are a result of people working with hydraulic systems without understanding the related hazards.

HSAC HIGH RISK MAINTENANCE LEVEL

HSAC High Risk Maintenance Level **Instructor Delivered - In-Class - 2 days** *(minimum class size requirement)*

Maintenance personnel are engaged in procedures that expose them to the risk of injury and death. The maintenance level consists of the 13 topics. This program takes an in-depth comprehensive look at understanding and identifying hydraulic hazards encountered beyond the engineered safeguarding. An emphasis is put on the implementation of structured procedures and energy mitigation. This program incorporates video recreations of incidents, video and documents of actual in place procedures. Each participant will gain substantial knowledge through group interpretation and discussion. This level of training provides important information about how safety and reliability of hydraulic systems directly affect safety of personnel.

These programs and services are available through the Hydraulic Safety Authority of Canada Inc. as well as other licensed Occupational Health & Safety Providers in Canada therefore prices may vary.

HEALTH & EXPOSURE

- ▼ **What are Hydraulic Fluids?**
- ▼ **Exposure to Hydraulic Fluids**
- ▼ **Potential Hazards**
- ▼ **Personal Protective Equipment**

Hydraulic fluid used in high pressure hydraulic systems poses several health and safety hazards. Everyone exposed to high pressure hydraulic equipment must be made aware of the adherent hazards and appropriate safety precautions related to hydraulic fluid.



ETHICS & STANDARDS

- ▼ **Safety Standards & Qualifications**
- ▼ **Recognized Standards**
- ▼ **Your Role**
- ▼ **Hydraulic Incidents & Fatalities**

HSAC's awareness program is one of the only documented safety programs that brings awareness of hydraulic hazards in all areas of the discipline. Most fluid power literature is written for product information only. The sale of fluid power components in the North American market are in the billions. Product sales are what drive the fluid power industry. Safety knowledge and respect for the hazards is gained through experience and mentoring however; the practice of learn as you go is an unacceptable way to gain safety knowledge. Many occupations such as heavy equipment mechanics, equipment operators, electricians, pipefitters, loggers, farmers, fishermen, etc all work on hydraulic equipment and components.



HYDRAULIC HOSES

- ▼ **Types of Hoses & Construction**
- ▼ **Hydraulic Hose Applications**
- ▼ **Hydraulic Hose Assembly & Fabrication**
- ▼ **Specifications & Standards**
- ▼ **Potential Hazards**
- ▼ **Life Cycle**

Hydraulic hoses may be considered the most versatile component in a hydraulic system. Almost all hydraulic systems utilize hydraulic hoses for conducting fluid for energy transmission. Recognized as extremely durable and able to perform in extreme condition, the hydraulic hose is however extremely vulnerable. This safety topic developed by HSAC will bring an in depth awareness of hazards associated with hydraulic hoses, including an understanding of the construction and applications.



Hydraulic Energy Control STORED ENERGY

- ▼ **How Accumulators Work & Their Applications**
- ▼ **Testing & Discharging Accumulators**
- ▼ **Forms of Hazardous Energy**

Hydraulic systems are very complex and identifying stored energy locations in hydraulic systems can be difficult and dangerous. The energy of hydraulic fluid under pressure and the loads this energy supports is extremely hazardous. The accidental release of this energy has been the cause of many injuries and death throughout all industries. HSAC researchers have developed this safety topic to bring respect and understanding of fluids under pressure including an in depth study of hydraulic accumulators, their design, application and dangers.



THREADS & PORTING

▼ Commonly Used Threads Connections in Hydraulics

▼ Pressure Ratings

Fluid systems are composed of many different components that are connected by hoses, fittings, piping and directly mounted. A fitting is a small device that is installed between components for the purpose of joining or terminating a conductor. The importance of having a complete understanding of threads and ports including their sealing design will, prevent harmful exposure to personnel and environment. Globalized trade has allowed standards in manufacturing and design to be carried word wide.

Equipment manufactured will most likely but not always have threads and porting common to their place of origin, Global standardization has greatly reduced the range of port and seal designs seen in the fluid power industry. Hydraulic systems transmit power by confining and controlling fluid. Miss identification has been a leading cause of incidents throughout industry. The numerous deaths and injuries associated with the miss match of interconnection have prompted HSAC to implement this safety topic. Recognizing the multitude of threads, porting and seal configuration on the world market will dramatically reduce exposure to hazardous hydraulic energy.



SEALS

- ▼ **Types of Seals & Applications**
- ▼ **Maintenance & Planning**
- ▼ **The Importance of Seals**

Running seals to failure is not an option for personnel and environment that depend on these components for safety. This HSAC safety topic has been developed to bring awareness of the extreme importance of seals in hydraulic systems.



SAFETY DEVICES

- ▼ **Guarding**
- ▼ **Valves**
- ▼ **System Considerations**
- ▼ **Devices**
- ▼ **Safety Through Engineering**

There are millions of safety devices available on the market, hydraulic safety devices like any other are designed either to protect people, protect machines or protect environment. Hydraulic systems are very complex, and the engineering principals come from the study of fluid mechanics. Engineered safeguards top the list in the area of occupational safety. This topic identifies the most common devices and describes their function in a hydraulic system.

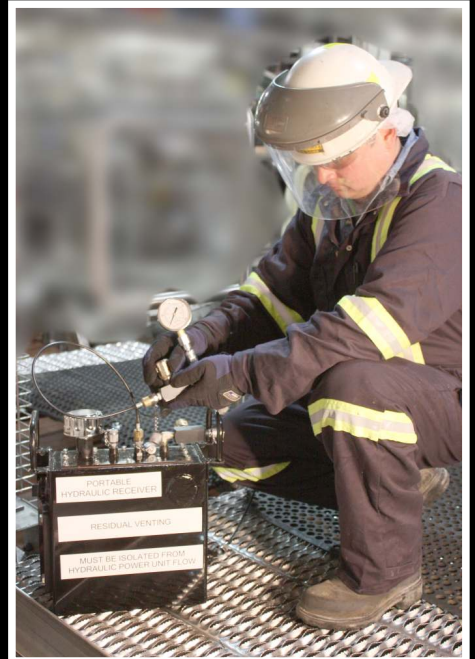
Factors such as effectiveness and reliability are what many of us depend on in our occupations. performing a safe elevated rescue would not be possible without the help of hydraulic safety devices. In recent years, the development and implementation of monitored control valves have added safety to hydraulic control systems in the area of controlling exposure to hazardous energy. The introduction and use is gaining popularity, however approvals and standards organizations including industry acceptance has progressed slowly.



Hydraulic Energy Control BLEED DOWN

- ▼ **Pressurized Grease**
- ▼ **Effects of Air in Hydraulics**
- ▼ **Bleed Down Tools**

For the most part, fluids under pressure are relatively safe, as long as they are confined and static. Flowing fluids under pressure and the transition from high pressure to low pressure without control is extremely hazardous. Maintaining control through bleed down will dramatically reduce injury to personnel and environment. Venting grease and hydraulic fluids to atmosphere is always frowned upon. Air has no place in a high pressure hydraulic system, a safe and effective procedure for the removal of air in each actuator in your facility must be established.



MECHANICS & GEOMETRY

- ▼ **Fluid Power Calculations**
- ▼ **Gravity**
- ▼ **Overhanging & Runaway Hazards**

Fluid power systems are considered the “muscles” of industry because of their ability to exert tremendous pressure with little effort. There are very few industrial processes that do not involve fluid power in some form. Hydraulic power is the movement and control of pressurized fluid. Hydraulic power is useful because of the advantage it provides. Force multiplication provides increased mechanical power that is ultimately used to perform work. Not understanding the range of motion of hydraulic equipment has been the cause of many fatalities.



WELDING & MODIFICATIONS

- ▼ **Effects of Modifications to Hydraulic Components**
- ▼ **Hazards of Welding Hydraulic Components**

If modifying equipment is later involved in an accident, attention is always and immediately focused on the modification. Manufacturers, inspectors, investigators, etc., most often lean towards any modifications as the cause of failure, and proving otherwise may be difficult. Repairing and machining should only be performed by qualified personnel and facilities. This topic exposes the extreme hazards of atomized hydraulic fluids around ignition sources.



HAZARD ASSESSMENT

- ▼ Purpose of Hazard Assessment
- ▼ General Responsibilities
- ▼ Before Work Begins
- ▼ Potential Hazards
- ▼ Inspections

Creating a safe and healthy environment requires a continuous search for hazards, which are not always obvious to us. One of the learning methods is to understand previous occurrences, such as near misses, and incidents causing injury and death. Hydraulic components and equipment pass through many life cycle stages, you must determine at what stage of the life cycle you are exposed to. Step by step details become very important. In a workplace perspective, eliminating hazards is necessary to ensure the safest environment.



Hydraulic Energy Control BEYOND LOCKOUT

- ▼ What is Lockout?
- ▼ Zero Energy State
- ▼ Importance of Sequence

Hydraulics is all about the transmission of energy to perform work. Energy is not always obvious, through your sense of hearing, smell, taste, and sight; energy can elude all of our senses.

Lockout is a recognized systematic approach to controlling all forms of energy that may harm workers.

The energy used in machines to perform work is relatively safe to personnel as long as there are safe guards. At some point personnel have to interact with machine on an up close and personal level, for such things as maintenance, it is at this time. uncontrolled energy becomes extremely hazardous to workers,

This program is a brief overview of lockout and emphasizes the difficulties found in the energy isolation and control in hydraulic systems.

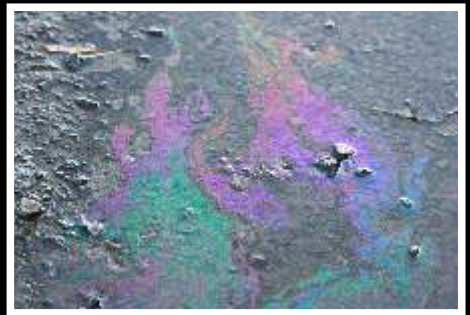
The machine lockout video in this program is an actual in place procedure that meets the requirements of an effective energy control program.



ENVIRONMENT

- ▼ **Hydraulic Fluids and The Environment**
- ▼ **Spill Preparedness**
- ▼ **Acceptable Disposal Practices**
- ▼ **Biodegradable Hydraulic Fluids**
- ▼ **Absorbents**

Public interest in protecting nature and our own personal health has become essential, and the effects of hydraulic fluids are naturally included amongst the many products that ignite a direct interest. Hydraulic fluids are utilized in relatively large volumes in machines such as excavating machines, bulldozers, mobile cranes and other equipment for outdoor operations. The danger of leakage is always at hand and a sudden rupture of a hydraulic hose under pressure or a seal failure may, in seconds, result in considerable pollution of the surroundings and ground water. When hydraulic fluid is lost from a system such as an industrial plant or machine, or from a container, such as a drum or hydraulic reservoir, it enters the environment.



Your due diligence has spurred a growing recognition for the implementation of safety based knowledge. This knowledge has been proven to dramatically reduce injury.

Thank you for bringing hydraulic safety awareness training to your workplace!



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