

Changes

Developing an Energy Control Plan for Manual Hand Valves in Ammonia Refrigeration Systems

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Element	Description
Overview of LOTO Devices (Chapter 2)	Chapter 2 summarizes LOTO devices commonly used on manual hand valves and provides guidance on selecting and implementing LOTO devices.
Energy Control Program (Chapter 3)	Chapter 3 describes a framework for incorporating manual hand valves into an energy control program. Valves are divided into three categories, each representing a different level of risk.
Common Scenarios Involving Manually Operated Hand Valves (Chapter 4)	Chapter 4 summarizes common scenarios involving manual hand valves and provides guidance on how to apply LOTO to each scenario.
Qualification Requirements (Chapter 5)	Personnel who operate manual hand valves in an ammonia refrigeration system must be qualified to do so. Chapter 5 provides guidance on qualification requirements.
Contractors (Chapter 6)	Many facilities utilize contractors for operation and maintenance tasks. Chapter 6 offers guidance for contractors who operate manual hand valves in an ammonia refrigeration system.

Table 1. Summary of LOTO Guideline chapters

Definitions

The following words and terms are used throughout this guideline:

- *Contractor:* An entity that assumes various contractual responsibilities for services such as installing, maintaining, or operating various components of a refrigeration system.
- Energy Control Program: A program consisting of energy control procedures, employee training, and periodic inspections to ensure that necessary precautions have been taken to control hazardous energy before any employee operates a manual hand valve.
- Exclusive Valve Control: A valve that has been or will be manually operated for minor servicing activities by a single person who maintains line of sight to the valve and a physical distance not exceeding 10 ft, such that another person could not operate the valve without the first person's knowledge. OSHA's LOTO standard uses the term "exclusive control" to exempt certain activities from §1910.147, namely, electrical equipment that is controlled by unplugging the equipment from the energy source, where the plug is under the exclusive control of the person performing service or maintenance. Exclusive valve control applies that principle to manual hand valves used in minor servicing activities to control hazardous energy. Such minor servicing activities employing the use of exclusive control should be described in approved standard operating procedures. The procedures should emphasize that: minor service will be accomplished during normal operating hours; shall include the use of appropriate personal protective equipment (PPE); and that the technician must lock and tag manual hand valves if he/she must leave the area before completing the task. Valves that can be easily opened by accident, such as quarter-turn hand valves, should not be considered eligible for exclusive control.
- *Hazardous Energy:* Chemical properties intrinsic to anhydrous ammonia that may be hazardous to humans, such as pressure, temperature, toxicity, and corrosivity.

3. Energy Control Program

Chapter 1 explains that LOTO programs apply when "unexpected energization or start up of the machines or equipment, or release of stored energy, could harm employees." Manual hand valves cannot unexpectedly open on their own accord, but if a person were to open the wrong valve in a machinery room, which resulted in a release in an adjacent area, from the perspective of persons in that area, "unexpected energization" and "release of stored energy" will have occurred.

Central to OSHA's LOTO standard is the development of an energy control program (LOTO program) to reduce the likelihood of unexpected energization. Relative to this guideline, the energy control program should reduce the likelihood that a manual hand valve will be adjusted inadvertently, thus leading to a system upset or ammonia release.

When developing an energy control program for manual hand valves, the owner should differentiate among three categories of valves, where each category represents a different level of risk:

- Category 1: A manual hand valve that if opened or closed would result in a direct release of ammonia to atmosphere.
- Category 2: A manual hand valve that has been adjusted from its normal position (e.g., a normally closed valve that has been opened), but would not result in a release when adjusted back to its normal position.
- Category 3: A manual hand valve in its normal position.

Category 1

Operation and maintenance of an ammonia refrigeration system periodically requires the use of Category 1 valves. These valves are used for tasks such as oil draining, ammonia charging, manual purge of non-condensable gas, and oil sampling. When not in use, Category 1 valves should adhere to the requirement of ANSI/IIAR 2 which requires that "Shut-off valves connecting ammonia-containing equipment or piping to atmosphere shall be capped, plugged, blanked, or locked closed during shipping, testing, operating, servicing, or standby conditions when they are not in use." Most often, compliance with this requirement is achieved by installing a pipe plug, cap, blank flange, or monitoring device (e.g., pressure gauge) at the valve outlet. When such a valve is properly configured, opening the valve would not result in an ammonia release, and therefore the valve is classified as Category 3. When the plug, cap, blank flange, or monitoring device is removed, the valve becomes Category 1 until the device is reinstalled. It is essential that exclusive valve control be maintained throughout the duration of the operation of a Category 1 valve. If at any time exclusive valve control cannot be maintained, the valve shall be locked out or tagged out to prevent inadvertent opening, leading to a release of hazardous energy.

In general, lockout is preferable to tagout when exclusive valve control cannot be maintained. This is especially important when valves can be easily opened by accident, as is the case for quarter-turn ball valves. Consideration should be given to environmental factors that may also affect Category 1 valves. For example, ambient temperature fluctuations can cause slight adjustments to manual hand

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valve operation from a qualified operator. Additionally, the trainee should demonstrate proficiency in manual hand valve operation under the supervision of a qualified operator.

To summarize, it is suggested that to become a qualified operator of a manual hand valve, the trainee shall

- Have access to and review the manual hand valve technical documentation provided by the valve manufacturer,
- Witness a demonstration from a qualified operator on the proper operation of a manual hand valve, and
- Demonstrate competency on proper operation of a manual hand valve under the supervision of a qualified operator.

Each category of training should be repeated as necessary for variations in manual hand valve configuration (e.g., globe, angle, etc.) that an operator will be exposed to and expected to operate safely. The training need not be repeated for minor valve variations, such as valve size.

Lockout/Tagout Program

In addition to manual hand valve operation, the operator shall also receive training on the facility's LOTO program. While all LOTO program training shall comply with Title 29 CFR §1910.147(c)(7), relative to manual hand valves in an ammonia refrigeration system, training should address

- Purpose and function of the manual hand valve energy control program;
- The categories of manual hand valves in Chapter 3;
- Facility LOTO procedures for Category 1 manual hand valves; and
- Training should emphasize the limitations of tags that are described in Chapter 2.

Training Frequency

Manual hand valve training should be provided to personnel prior to attempting to operate a valve. Refresher training should be provided as necessary to ensure that employees and contractors are proficient in operating manual valves. Employers should consult with their employees on the appropriate frequency of refresher training. LOTO program refresher training is required whenever a change in job assignments, a change in manual hand valves, or a change in energy control procedures occurs.