

SAFETY GUIDELINES FOR REFRIGERATION VALVES

Introduction

Refrigeration valves and component parts manufactured by H.A. PHILLIPS & Co. (PHILLIPS) are designed for use in industrial refrigeration systems and are suitable for use with ammonia, R22 and other industrial refrigerants approved by PHILLIPS. Proper selection, installation, service and maintenance must be done to ensure effective and safe operation of PHILLIPS valve products and the system in which they are used. The information contained in this Bulletin is intended to assist you and your personnel in developing safety procedures for installing, servicing and maintaining PHILLIPS refrigeration valve products.

Important Notice: This Bulletin is not intended to be an exhaustive summary of every safety procedure applicable to the installation, maintenance and service of refrigeration valves. In certain situations, more stringent safety procedures may be necessary because of the operating specification of the system involved. The reader should supplement the information contained in this Bulletin with applicable local codes, ordinances and regulations and accepted industry safety practices. Information about safety practices for industrial refrigeration systems can also be obtained from the organizations and publications listed at the end of this Bulletin.

WARNING: Industrial refrigerants can be hazardous to human health if not handled in a safe manner. Every person who performs work on an industrial refrigeration system should be thoroughly familiar with the protective eyewear, clothing and other equipment that should be used to avoid injury that can be caused from handling refrigerants. At the very minimum, eyes should always be protected by a safety face shield or safety glasses and exposed skin areas should be covered. Each person who is allowed to perform work on a refrigeration system should also be completely familiar with the operation specifications of the system and the safety procedures that should be followed when performing installation and maintenance work or dealing with refrigerant spills.

Hydrostatic Pressure

When any part of a system containing liquid refrigerant becomes isolated, the entrapped refrigerant will normally expand if warmed by the outside temperature. This expansion, which is called Hydrostatic Pressure, can lead to extremely high pressures. Hydrostatic Pressure can cause gaskets, pipes, valves, or other components to rupture and other serious system failures to occur. Expansion of liquid refrigerant can occur very suddenly and rapidly. Therefore, it is extremely important to have protective devices installed in the piping system for immediate pressure relief, especially in the case of a power failure.

Hydraulic Shock

Refrigeration systems must be designed and operated to avoid hydraulic shock to valves and other components in the system. Hydraulic shock can occur in the form of Liquid Hammer, Condensation-induced Shock or Vapor-propelled Slugging.

General Safety Management

Only persons who have training and experience with the system and its standard operating procedures should be allowed to perform installation, maintenance and repair work on the system and its parts. All industrial refrigeration systems and their component parts require regularly scheduled maintenance and service. All operating procedures must clearly identify the operational limits of the system and the specific safety procedures to be followed when performing work or service on a refrigeration system.

Never attempt to replace a valve until the reason for the original problem has been fully identified and corrected.

Installation

Valves must be installed in accordance with all applicable safety codes, standards and accepted industry practices. Never install a valve that has become damaged in shipment or by any other means.

1. Keep the inside of each valve free from dirt during installation.
2. Install each control valve with the arrow on the body of the valve facing in the direction of the flow.
3. Allow proper spacing, support and alignment in the line to avoid excessive stress or distortion that may cause the valve to malfunction. Be sure that flanges are properly aligned, gaskets are lightly oiled and all bolts are tightened evenly with proper torque.
4. Station each control valve with isolation valves to allow safe pumping out and purging of refrigerant during maintenance and service of the valve.
5. Use suitable relief valves where refrigerant may be trapped to avoid excessive pressure produced by liquid expansion.

Pump Out and Discharge of Refrigerant

Before starting service or maintenance on any part that contains or can potentially trap refrigerant, it is very important to first pump out and discharge all refrigerant from that part. The following steps should always be taken when pumping out and discharging refrigerant from individual valves and valve stations. Again, more stringent safety procedures may have to be utilized if the particular design and operational procedures of the system so requires.

1. Manually open each valve to avoid trapping refrigerant in any part of the valve. Be especially cautious with strainers and other sections of piping where liquid refrigerant can become trapped.
2. **NEVER DISCHARGE REFRIGERANT DIRECTLY INTO THE ATMOSPHERE.**
3. Any refrigerant remaining after pumping out is performed must be discharged into a protected container containing cold water. The discharge rate must be safely controlled and a quick shutoff valve should be readily accessible.
4. Discharge refrigerant only in an area that is well ventilated.

WARNING: Oil is a common ingredient in industrial refrigerants. This oil can form a flammable mist when allowed to evaporate into air. To prevent the occurrence of a sudden fire or explosion, DO NOT DISCHARGE REFRIGERANT IN ANY AREA WHERE AN OPEN FLAME OR ELECTRIC SPARK IS PRESENT.

IMPORTANT: Discharge of any refrigerant into the atmosphere should minimum. Discharge beyond certain levels must be reported to the proper authorities.

Preventative Maintenance and Service

In order to maintain optimal system performance and product integrity, periodic preventative maintenance must be performed on all PHILLIPS valves and component parts. Only factory-original replacement parts should be used with PHILLIPS valves.

CAUTION: Never attempt to work on any part of a refrigeration system alone. Another qualified and experienced person should always be present to observe the work being performed and to provide back-up assistance when necessary.

1. Use only qualified and experienced persons to perform preventative maintenance work.
2. Read all applicable PHILLIPS service bulletins prior to performing any maintenance and service work.
3. Follow all procedures for pumping out and discharging refrigerant as described in this Bulletin and as are required by local codes, ordinances and regulations.
4. **DO NOT** begin disassembly of any valve component until its internal pressure is confirmed to be at or below zero pounds per square inch gauge.
5. Purge all air from the section being serviced before opening that section to the main system.
6. Follow all manufacturers' disassembly and assembly instructions and procedures.

Suggested Resources for Additional Safety Information About Industrial Refrigeration Systems and Handling of Industrial Refrigerant

Organizations To Contact:

Refrigerating Engineers and Technicians Association (RETA):
4700 W. Lake Ave.
Glenview, IL 60025
Telephone: (847) 375-4828

International Institute of Ammonia Refrigeration (IIAR):
1110 North Glebe Road, Suite 250
Arlington, VA 22201
Web Site: www.iiar.org
Telephone: (703) 312-4200

American National Standards Institute (ANSI):
11 West 42nd Street
New York, NY 10036
Web Site: www.ansi.org
Telephone: (212) 642-4900

ANSI Standards:

- ANSI/IIAR Standard 2
- ANSI/ASHRAE Standard 15

IIAR Handbooks and Bulletins:

- Ammonia Refrigeration Piping Practices Handbook
- B105 Guidelines for: Application and Maintenance of Safety Relief Valves for Ammonia Refrigerating Systems
- B106 Guidelines for: Prevention, Preparation, Response and Cleanup of Ammonia Releases
- B107 Guidelines for: Suggested Safety and Operating Procedures When Making Refrigeration Plant Tie-Ins
- B108 Guidelines for: Water Contamination in Ammonia Refrigeration Systems
- B109 Guidelines for: IIAR Minimum Safety Criteria for a Safe Ammonia Refrigeration System
- B110 Guidelines for: Start-up, Inspection and Maintenance of Ammonia Mechanical Refrigerating Systems
- B111 Guidelines for: Ammonia Machinery Room Ventilation
- B114 Guidelines for: Identification of Ammonia Refrigeration Piping and System Components
- B116 Guidelines for: Avoiding Component Failure in Industrial Refrigeration Systems Caused by Abnormal Pressure or Shock

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