Safety Procedures

Refrigeration Hand Shut-Off Valves

Safety Bulletin RSBHV Rev. B

Introduction
This bulletin is a summary of safety procedures for the proper installation, use and maintenance of Refrigerating Specialties Division industrial refrigerant valves. Additional free copies are available and should be distributed to all concerned personnel. This bulletin is intended to help you protect your personnel, product and plant. Because of space limitations, this bulletin must be supplemented by accepted and known industry safety practices and local code requirements.

Refrigerating Specialties Division hand valves are designed and built to the highest standards of the refrigeration industry. However, for proper performance, the valves must be properly installed and maintained. Because safe operation is of primary concern, this bulletin emphasizes suggestions for the safe installation and maintenance of Refrigerating Specialties Valves. Read this information carefully before installing a valve or working on one already installed. It should also be used to review all previous installations.

All personnel working on valves must be qualified to work on refrigeration systems. Any person intending to service a valve should completely read this bulletin and the product bulletin describing the particular valve and its application and disposition before any work begins. If there are any questions, contact Refrigerating Specialties before proceeding with the work.

Receiving and Unpacking
All valves are packed for maximum protection. Unpack carefully. Check the carton to make sure all items are unpacked and in agreement with the packing slip. Save the enclosed instructions for the installer and eventual user. Do not remove the protective covering from the inlet and outlet of the valve until the valve is ready to be installed.

Caution: Do not, at any time, make any alteration or modifications to any Refrigerating Specialties Division valves without the express and written approval of this company. Threaded parts should not be subjected to excessive torque by use of an oversized wrench, wrench extension, or by impacting the wrench handle. Where specified in the individual bulletin, observe the torque requirements for bolts, screws and other threaded parts. Contact the factory for torque values not furnished in current literature.

Spare parts should be checked for corrosion before installation. In addition, part numbers should be checked against the latest assembly bulletin to be sure current parts are being used.

If a valve has failed under circumstances which caused, or could have caused, injury to personnel or damage to property, a replacement valve should not be installed until the reason for the previous failure is determined and corrected.

Liquid Expansion
In liquid lines or lines that might contain substantial amounts of liquid refrigerant, certain precautions must be taken to avoid damage due to liquid expansion when a section of line is isolated by positive shut off valves. This condition may occur whenever the ambient temperature could be higher than the fluid temperature. This could even occur in a refrigerant or oil line other than a “liquid” line.

Temperature increase in a section with trapped liquid can cause extremely high pressures due to the expanding liquid and possibly rupture a gasket, pipe, or valve. When low temperature liquid lines are used, as in a liquid overfeed (recirculation) system, and the lines may be exposed to warm ambient conditions, particular care must be taken. It should be noted that liquid expansion can occur very rapidly in a line.

Hand Valves
All hand valves that could trap liquid when closed must be marked with a warning against accidental closing. The liquid refrigerant must be removed before the hand valves are closed on both sides of a control valve or any other component. Also, liquid must be removed before a hand valve is closed at the inlet of a solenoid valve or a regulator with positive electric shut-off, or some outlet pressure regulators, or at the outlet of a check valve, unless these valves are manually open.

Caution: To protect personnel, product and plant, remove all liquid from the section to be isolated before hand valves are closed. Make sure the control valves are open when removing the liquid. See Service and Maintenance Instructions before attempting to take any valve apart.

Hand Valve Installation Requirements
Installation must be done according to all applicable Safety Codes and Standards, and by personnel qualified to install refrigeration systems. Refrigeration Specialties Division valves must be installed according to the manufacturer’s instructions, this bulletin, and the generally known safety practices in the industry.

Hand Valves should be installed such that seal caps, opening stems or hand wheels are accessible, that stem movement remains unrestricted, and with sufficient surrounding clearances that the incorporation into the pipeline is unchallenged. For the FPT-connected valves, this means full rotation of the valve plus sufficient clearance to permit a wrench to engage the hexagonal portions of the valve body for tightening to the desired orientation.

Welding procedures for all steel pipe and fittings need to conform to all requirements of the ASME (Section B31.5 and IX), API, and other applicable piping codes.

R/S recommends against the use of compressed air for leak testing. While many successful installations have employed compressed air, the effects of moisture and oxygen, both short and long term, on system interior condition, integrity, and performance are too significant to make it preferable to a dry nitrogen test. It has been established by investigation of failure modes, that certain chemicals will infiltrate the discontinuities in a chilled weld and reside there, setting up corrosion products. Oxygen entrapped in such notch sites, combined with the presence of ammonia, will promote stress corrosion cracking in a relatively short period. R/S recommends that leak testing be applied with dry nitrogen and that the elevated pressure be reduced to near-atmospheric only shortly before the evacuation process is started. The segment should subsequently be evacuated to no more than 750 Micron and the refrigerant then be introduced promptly to a pressure well above atmospheric. Repeated cycles of breaking the vacuum with Dry Nitrogen and re-establishing it, is highly recommended.

R/S’s Hand Valve offerings incorporate high-temperature Carbon Extended PTFE as seat disc. This material has a stability temperature over 420 Deg. F. and therefore, under most circumstances, permits the installer to weld a valve into the pipeline without first removing the bonnet. Removing pipe debris and the spatter consequence of the welding becomes more difficult when installing a valve in this way, so the incorporation of backing rings or the employment of socket weld valves is encouraged. Even with that, installation processes and procedures need to address the intent to remove all possible debris from the piping section.

In all cases where valves are installed without disassembly, the Valve disc should be in a mid stroke position while welding. This precludes contact and limits the heat conducted from the body to the seat ring on the disc and avoids any arcs between the beveled seat of the body and the disc assembly. Actual body temperatures achieved during welding cannot be predicted precisely because they vary with welding current and technique, length of adjacent piping, the sequence in which joints are made, the energy input from any adjacent components, the application and flow of any purging gas, and so on. In the absence of a cooling purge gas stream, R/S recommends that the bonnet be removed from a valve should the length of pipe to be connected to the valve be less than 5-times the pipe diameter. All such temperature profiles change considerably should either side of the adjacent piping be insulated or otherwise restrained from freely

conducting away the heat from welding.

The potential for interference with material and components yet to be installed such as insulation, electrical equipment, and structural additions for maintenance access or equipment protection, need to be considered. The completed construction overall should be arranged to preclude the potential for contact with moving part machinery, material handling equipment, and similar conditions. Valves on cold lines will often accumulate frost and /or drip moisture. The location and orientation of service valves should consider all these potential conditions.

Stem Seal Design
Along with the temperature tolerant Seal Ring material, R/S's Hand Valves are furnished with Dual O-Ring Stem Seals. This arrangement minimizes frictional force on the stem, and rotational torque is very low. Combined with the wiping and forming action of the conical seat bead, the overall result is a very low hand wheel or actuator force required for complete sealing. This also reduces the effect of creep or shrink. In most cases, this precludes any need to retighten the valve.

A packing on the wetted side of the O-Ring Gland wipes the stem free of dirt or debris from the system side. It also provides a final safety margin such that should the O-Rings be contaminated in any fashion, the packing nut can be tightened down to engage this packing and renew the stem seal. This results in a valve that requires considerably different user inputs to actuate particularly as compared to other valves remaining entirely intact, and should not be considered an acceptable long-term condition. Repair and renewal should be affected as soon as possible.

Whether specified with the Hand Wheel or Seal Cap arrangement, the torque required to seat the valve is minimal and should never be applied in excess of the maximum values listed in the attached table. Back seating torque is also minimized by employing a knife edge against a beveled portion of the stem; the diameter of the seat is just greater than that of the stem threads, which prevents extraction of the stem even in the case of mechanical failure.

Mounting
Allow proper space for installing the valve. Where necessary, support the valves by brackets or hangers to avoid overstressing the pipe or valve.

Location
Valves must not be installed in locations where they can be damaged by material handling or other equipment. Trapped ice build-up must be avoided at or between valves and other equipment. Provide reasonable access to all control valves for maintenance purposes.

Insulation
When it is necessary to insulate the valves, the insulation must be applied to allow proper operation and maintenance of the valves. The actuator stems should be easily accessible at all times. Insulation should be constructed so that sections can be easily removed and replaced to allow the valve to be disassembled. Since most maintenance problems caused by dirt occur at the start-up of a system, it is advisable to delay insulating the valves until the system has operated for several days.

Pump Out Means
Individual valves or control stations should be provided with means for pumping out or safely purging the refrigerant.

Dirt and Corrosion
Protect the valves from foreign material during storage and installation. The protective plugs on the valve openings should remain in place until the valves are ready to be installed. Once a section of a system is installed, and before it is put into operation, it is advisable to charge it with proper refrigerant or suitable inert gas to avoid corrosion. External corrosion over a long period of time must be controlled by painting and replacement of corroded parts.

Pressure Testing
Every segment of a refrigeration system should be field pressure tested before the system is insulated and put in use. Make sure that correct high and low side test pressures are used. Use proper refrigerant or gas for pressure testing; that is do not use halocarbons or C02 to test an ammonia system, nor use ammonia to test halocarbon system. Never use the compressor in a system to build up pressure for testing.

Service and Maintenance
All systems require maintenance and service. The personnel doing the work must be qualified and completely familiar with the system they are working on or all other precautions will be meaningless.

Caution: Do not attempt to work on any part of a refrigeration system without having help nearby and observing. Use safety glasses or a safety face shield to protect the eyes. Protective equipment should be readily available and all personnel involved should be thoroughly trained in its use. Personnel should be especially protected against falling because they may be startled by escaping refrigerant. Always make sure that there is a way out and that everyone can leave the area fast. When seal caps cover manual opening or adjusting stems, the caps must be removed with caution because liquid refrigerant could accumulate under such a cap. Avoid contact with any liquid refrigerant.

Pump Out
For the protection of personnel, product, and plant, all refrigerant possible must be removed from a valve or any other component of the system, before any refrigerant retaining part is loosened. Before opening a valve, make sure all refrigerant liquid has been removed. In particular, beware of strainers and other sections of piping which may trap liquid refrigerant which will require a considerable length of time to remove. Pump out as much refrigerant as possible before discharging remaining refrigerant in a properly protected manner. During pump out, make sure control valves are opened manually to avoid trapping refrigerant .All type RSF and RSW Strainers are provided with 3/8" FPT connection to assist in pump out.

At times, it may be necessary to discharge some small amount of refrigerant from the isolated section. When this becomes necessary, certain precautions must be observed. Make sure control of discharge rate can be easily maintained and that a quick shut-off is available.

Refrigerant should be discharged into and disposed of in a proper container accepted by applicable safety codes and standards. Discharge of refrigerant to atmosphere should be avoided. Never discharge any refrigerant into an area without sufficient ventilation, or into an area where open flame or electrical spark is present. Any oil in the refrigerant may cause a mist that could cause a fire or explosion.

Halocarbon refrigerant should not be discharged into areas where open flame is present, since toxic gases may form. Ammonia should not be discharged into occupied areas, or areas containing product affected by ammonia. In the case of ammonia, discharge any vapor left into a container of cold water, making sure that the discharge hose remains submerged at all times. (Be sure that no pressure reversals can occur that may pull water into the system.) Water may have to be changed to absorb all the ammonia; about one gallon of fresh water is needed for one pound of ammonia.

To prevent ingress of excessive air and moisture into a system, avoid opening the system when it is under vacuum.

Disassembly
Be sure that any person working on a valve is familiar with its construction and operation by referring to the proper bulletin. Make sure the pressure in the system to be opened is reduced to, and remains, at atmospheric pressure before opening the valve. A pressure gauge should be connected to the section of the system to be evacuated.

Re-Assembly
Be sure all parts are clean and free of moisture before re-assembly. Damaged parts and gaskets should be replaced. It is advisable to purge the section of air before opening it to the rest of the system. When opening hand valves, always open the valve to the inlet of the control valve first; this will avoid back flow and possible damage to the strainer if one is used.

General Specifications
Refrigerating Specialties refrigerant containing valves and strainers are designed for a Maximum Rated Pressure of 27.6 bar (400 psig) except where shown otherwise on the nameplate. They are suitable for use under most temperature conditions encountered in refrigeration systems. Maximum and minimum fluid temperatures for each valve are published in R/S Condensed Catalog CC I I c. If either fluid or ambient temperature is below a valve's rated minimum, consult the factory. In addition, should fluid temperature exceed the rated maximum or ambient temperatures exceed 125° F., please consult factory.

The valves are designed to operate with ammonia and/or halocarbon refrigerants. Unless authorized by the factory, Refrigerating Specialties valves should not be used for refrigerants or fluids not mentioned on the nameplate or in the pertinent bulletin.

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