

# Safety Procedures

## Refrigeration Control Valves

### Safety Bulletin RSBCV

#### Introduction

This bulletin is a summary of safety procedures for the proper selection, installation, use and maintenance of Refrigerating Specialties Division industrial refrigerant control 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 control valves are designed and built to the highest standards of the refrigeration industry. However, for proper performance the valves must be correctly chosen, properly installed and periodically serviced. 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; also, use it 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 operation before any work begins. If there are any questions, contact Refrigerating Specialties before proceeding with the work.

#### Receiving and Unpacking

All control valves are packed for maximum protection. Unpack carefully. Flange bolts are packed in cotton bags and coils are packed loose. Check the carton to make sure all flanges and other 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 control 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 or regulators 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.

For extensive repairs on valves or regulators, especially those more than three years old, the valves or regulators should be returned to the factory for thorough inspection and rebuilding. 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 or regulator 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. Adequate protection should be taken to prevent both liquid shock and suction shock both upstream and downstream of the valve or regulator.

#### 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 liquid 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 or control valves may be exposed to warm ambient conditions, particular care must be taken; liquid expansion can occur very rapidly.

#### Check Valves

Check valves must never be installed at the inlet of either a solenoid valve, a regulator or a regulator with an electric solenoid pilot shut-off feature. Also, the check valve should not be installed at the inlet of an outlet pressure regulator in a system where liquid may be trapped between the two valves. If a check valve is needed, install it on the outlet side of such valves. Most solenoid valves and regulators will permit reverse flow if the outlet pressure is greater than inlet pressure. If at any time, such reverse pressure conditions are possible and reverse flow is unacceptable a check valve should be installed at the control valve outlet.

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.

#### Relief Devices

Relief devices or relief methods should be used in all parts of a refrigeration system where liquid can be trapped and liquid expansion could take place. Under no circumstances should R/S Pressure Regulators be used as a relief to the atmosphere, R/S Type H Safety Relief valves should be used instead.

#### Selection and Application

A control valve must be selected only by a person having adequate knowledge of the system and of the valve to be chosen. Any Refrigerating Specialties Division control valve must be used only as specifically stated in Refrigerating Specialties Division Catalogs or Bulletins for normal refrigeration applications unless otherwise approved in writing by Refrigerating Specialties Division.

The valves are designed to operate with ammonia and/or halocarbon refrigerants. Valves using flanges with copper connections must not be used with ammonia refrigerant. 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.

#### Installation

Installation must be done according to all applicable Safety Codes and Standards, and by personnel qualified to install refrigeration systems. Refrigerating Specialties Division control valves must be installed according to the manufacturer's instructions, this bulletin, and the generally known safety practices.

#### Mounting

ASTM A307 Grade A square headed bolts should be used to mount flanged body valves. They assure the maximum bolt surface and flange engagement. For all lug mounted valves, flange bolts should be inserted in a direction pointing toward the valve body. The bolt should pass first through the mounting flange before engaging the valve flange. Allow proper space for installing the valve. Do not use the valve to "stretch" or "align" the pipe. Using flange bolts to close a large gap can distort the valve or at least stress it unduly, and possibly cause it to malfunction, or the bolts may be damaged or stripped.

Verify that piping into which a valve or flange is to be installed is properly supported and aligned. Be certain that the mating surfaces of the gasketed joints are parallel, aligned and perpendicular to the pipe axis, in good condition and free of debris and corrosion. Use only undamaged gaskets suitable for service in an ammonia refrigerating system. Verify that all the nuts, bolts, cap screws and washers meet Parker's requirements for the application and tighten progressively in a diametrically staggered pattern. Leak test upon completing the installation. For more information please reference the IIAR 2-2008 Section 10.

When mounting weld-end valves: welding procedures for all steel pipe and fitting need to conform to all requirements of the ASME IX and other Pressure Pipe welding standards. In all cases where valves are installed without disassembly, they should be manually opened.

#### Location

Valves must not be installed in locations where they can be damaged by material handling or other equipment. Control valves should be installed such



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that the inlet pipe is straight for a minimum of 6 pipe diameters. 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 control valves, the insulation must be applied to allow access for proper operation and maintenance of the valves. The manual opening and adjusting stems should be easily accessible at all times. In the case of solenoid valves the insulation must not extend to the coil housing or coil burnout may occur. Insulation should be constructed so that sections can be easily removed and replaced to allow the valve to be disassembled. Insulation applied to strainers should provide ready access for cleaning the strainer basket.

Since most maintenance problems caused by dirt occur at the start-up of a system, it is advisable to delay insulating the control valves and strainers until the system has operated for several days. During that time the strainers should be checked for dirt and cleaned as necessary. Cotton bags are available for 25mm-100mm (1" - 4") Type RSF Strainers to improve their ability to remove small particles of dirt during start-up.

#### Pump Out Means

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

#### Pressure Testing

Every segment of a refrigeration system, including control valves, should be field pressure tested before 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 CO<sub>2</sub> 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.

In pressure testing Range V, VA, A, B or D pressure regulators, test pressure in excess of 21. kg/cm<sup>2</sup> (300 psig) may cause setting shift and diaphragm may deform enough to require replacement after the test. If the above conditions exist, contact the factory for proper solution.

#### Electrical

Only properly qualified electricians should handle the electrical portions of control valves and their circuitry. All power supplies and wiring must be adequate to provide the proper voltage and current to the solenoid coils. The power supply must be capable of providing the proper in-rush current. Never energize the solenoid with the coil housing or plunger assembly removed.

Standard Encapsulated Coil (Volts/Hertz)	Inrush Current (Amps)	Holding current (Amps)	Fuse Size (Amps)
24/60 (Brown Leads)	6.70	2.98	4
120/60 (Blue Leads)	1.18	0.46	1
208/60 (Red Leads)	0.63	0.24	1
240/60 (Black Leads)	0.59	0.24	1
115/50 (Purple Leads)	1.22	0.21	1
230/50 (Yellow Leads)	0.65	0.26	1
Other	(Contact Factory)		

Encapsulated Coil Electrical Table

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Before working on any valve be sure the circuits are completely de-energized; just throwing a switch may not be sufficient. Failure to do this may result in personal injury or damage to solenoid coils or other components. Take care to see that the circuits cannot be energized accidentally. Never energize the solenoid with the coil housing or plunger assembly removed.

#### 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 to work on or all other precautions will be meaningless.

#### 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 refreshed to absorb all the ammonia; about one gallon of fresh water is needed for one pound of ammonia. To prevent pulling excessive air and moisture into a system, avoid opening the system when it is under vacuum.

**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 for added safety 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.

#### 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 valve pressure containment seals are released. A pressure gauge should be connected to the part of the system to be evacuated. Before removing the bonnet of pressure regulators, back out adjusting stem to prevent damage to the diaphragm.

#### Re-assembly

Be sure all parts are clean and free of moisture before reassembly. 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, ensure that initial refrigerant flow will be in the normal direction of valve flow; this will avoid backflow and possible damage to the strainer if one is used.

#### Dirt, Contamination, 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 appropriate refrigerant or suitable inert gas to avoid corrosion. Avoid exposure of R/S valves to halogenated solvents or similar reactive fluids. External corrosion over a long period of time must be controlled by painting and replacement of corroded parts.

#### Strainer Maintenance

Strainer inspection is of utmost importance, especially the first few hours, days or weeks after the start-up. Foreign material should be removed and the screens should be washed with proper solvent. Strainer inspection and cleaning should be continued until dirt accumulation ceases. Later, any time a valve pressure containment seal is released for service or maintenance, its companion strainer should also be inspected and cleaned. Filter bags are available for 25mm-100mm (1" - 4") Type RSF Strainers to improve their ability to remove small particles of dirt during start-up. If a strainer filter bag is used in the strainer basket, the cloth bag must be checked every few days depending upon the amount of system dirt collected. When the cloth bag no longer collects dirt, it must be discarded.

#### 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 Industrial Refrigerating Control Valve Catalog C12. If either fluid or ambient temperature is below a valves rated minimum, consult the factory. In addition, should fluid temperature exceed the rated maximum or should ambient temperatures exceed 125° F, consult the factory.

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