



TRANE®

Installation, Operation, and Maintenance

RuptureGuard™ Pressure Relief System Option

X39641081020

June 2009

CTV-SVX06B-EN





Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in personal injury or death. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully.

 **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE: Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

WARNING **Contains Refrigerant!**

System contains oil and refrigerant and may be under positive pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.

Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.

Trademarks

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General Information

What is the Trane RuptureGuard?

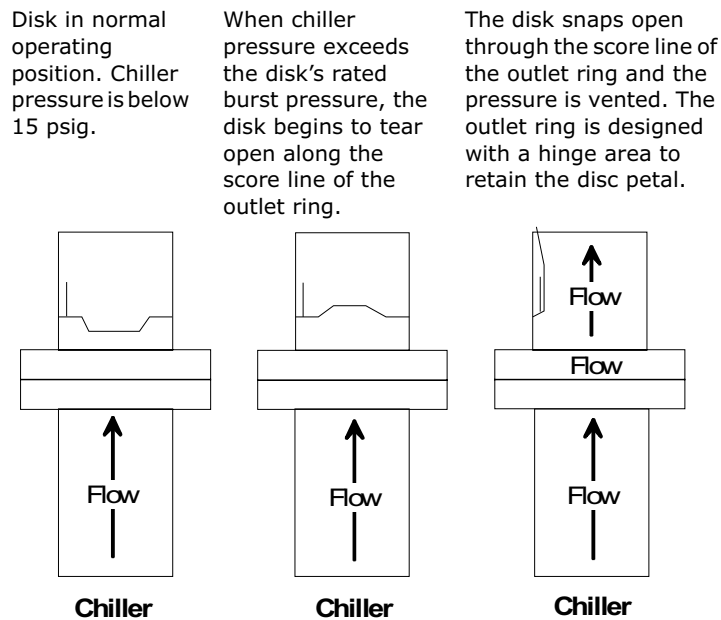
⚠ WARNING
Contains Refrigerant!

System contains oil and refrigerant and may be under positive pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.

Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.

The Trane RuptureGuard™ refrigerant containment system replaces the carbon rupture disk on new low pressure chillers utilizing HCFC-123. The RuptureGuard consists of a solid-metal, (non-fragmenting) reverse-buckling rupture disk, and automatically re-seating relief valve and selectable inlet and outlet adapter flanges. The relief valve and the rupture disk are rated at the chiller’s maximum working pressure level. If the chiller’s refrigerant pressure exceeds the rupture disk burst rating, the disk bursts, releasing pressure to the relief valve. The relief valve vents the pressure down to a safe level and then re-seats, thus minimizing the amount of refrigerant vented to the atmosphere. [Figure 1](#) illustrates the operation of a reverse buckling rupture disk. Refer to [“Operation,” p. 14](#) for more information on unit operation.

Figure 1. Reverse buckling rupture disk



Receiving

Upon receipt of the unit, inspect the shipping crate for signs of visible damage. Report any damage or shortage to the carrier and note it on the delivery receipt.

Unit must be stored in its original shipping crate in a dry, secure place prior to its installation and use.

Unpacking

NOTICE

Rupture Disk Damage!

The reverse buckling disk cassette comes installed in the relief valve body. This is a fragile, precision device. Extreme care must be taken when unpacking, handling and installing the RuptureGuard assembly. If any damage is visible, the disk **MUST** be replaced. Any damage to the domed portion of the disk will cause premature rupture of the disk.

Unpack the carton containing the RuptureGuard valve/disk assembly and optional inlet and outlet adapter flanges. Compare the parts received to the list and diagrams in [Figure 2, p. 6](#).

Important: *The surface of the rupture disk is extremely fragile and the domed portion of the disk should never be touched! Any dent, dimple, or imperfection is an indication that the disk is damaged and should be replaced.*

Preassembly

1. Place the flanged rupture/relief valve assembly in a horizontal position on a flat work surface capable of supporting the weight of the completed valve assembly (approximately 35 and 50 lb for the 3" and 4" valves, respectively).

Notes:

- *While assembling the valve, keep in mind the desired finished orientation of the ID plate, pressure gauge, excess flow valve, and pressure switch (optional).*
 - *When installing the 4" RuptureGuard, it is recommended to first connect the inlet adapter flange to the valve body as this provides added protection to the disk.*
2. **4" valve only** - Place a flange gasket on the inlet side of the relief valve assembly.
 3. **4" valve only** - Position the inlet adapter flange on top of the gasket, align the bolt holes with the holes in the valve body, insert the bolts with nuts, and tighten to specified torque.

Figure 2. RuptureGuard components

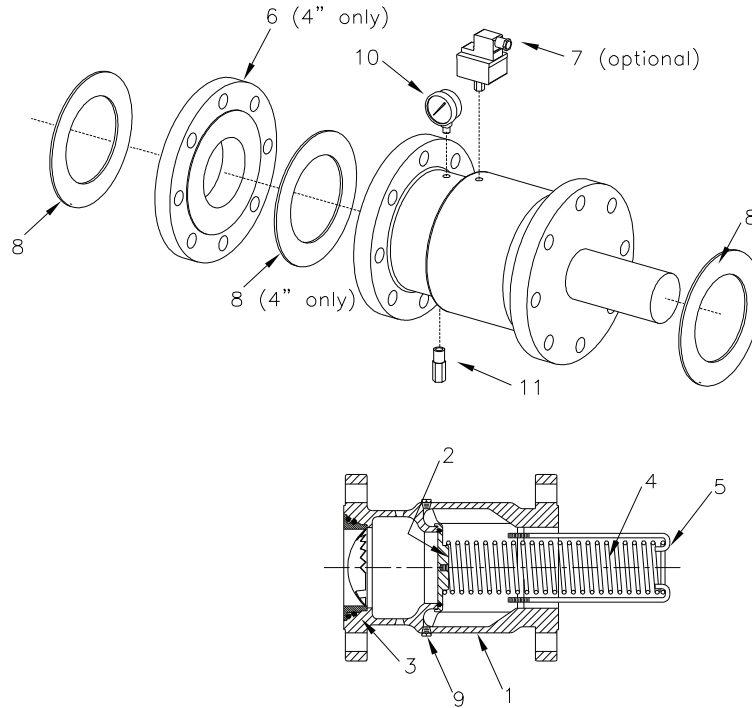
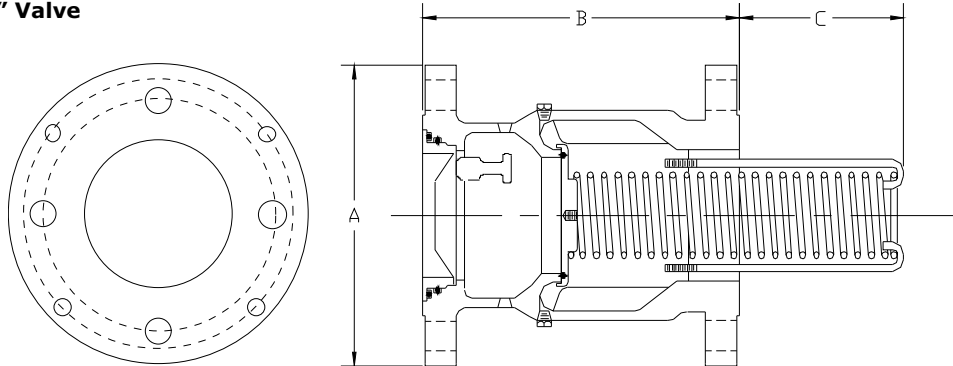


Table 1. RuptureGuard components

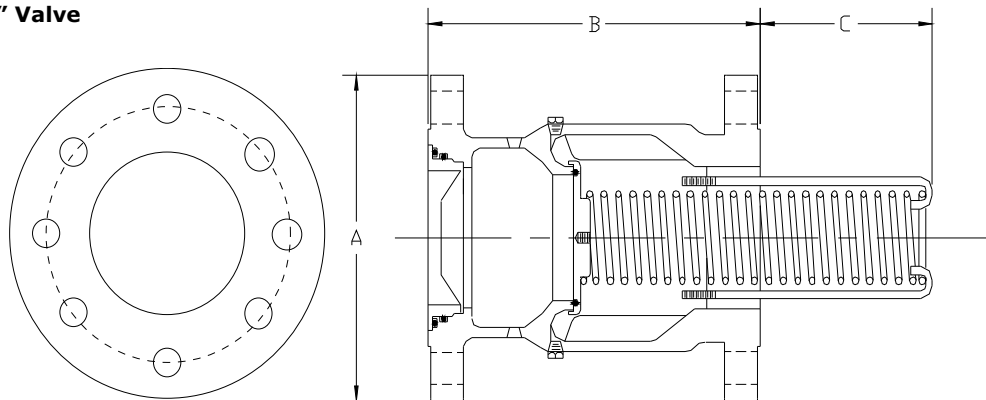
No	Qty	Item
1	1	Valve Body
2	1	Valve relief plug
3	1	Rupture Disk cassette
4	1	Valve relief spring
5	4	Spring hooks
6	1	Threaded inlet adapter (4" valve only) 4" ANSI x 3" NPT
7	1	Pressure switch (use optional)
8	2 (3)	Gasket (3 gaskets provided with a 4" valve)
9	3	Drain Plug
10	1	Pressure gauge
11	1	Excess flow valve
12	4	3/8-16 X 1-3/4 Grade 5 HHCS
13	4	3/8-16 Grade 5 nuts
14	4	5/8-11 X 4-1/2 full thread studs (4" only)
15	8	5/8-11 X nuts (4" only)

Figure 3. RuptureGuard dimensions

3" Valve



4" Valve



Outlet same as inlet

Table 2. RuptureGuard dimensions

	A	B	C
3" Valve	7.5	8.5	4.0
4" Valve	9.0	10.0	5.0

Note: All dimensions are nominal



Installation

The installation of the Trane RuptureGuard refrigerant containment valve should be performed by qualified personnel familiar with the operation of centrifugal water chillers. All instructions should be read and understood before the installation is performed.

It is required that a suitable refrigerant grade pipe thread sealant be used on all threaded joints. Trane recommends using Loctite® 242 or Loctite® 277 on chillers charged with refrigerant R-123. Insure all threaded pipe joints are properly cleaned and prepared before assembly. An alternative the use of Loctite® is to thread and weld the Inlet Adapter to the pipe. Care must be taken to ensure that the flange mating surface remains flat. Do not weld on the Inlet Adapter flange while connected to the RuptureGuard™.

Preparing the Chiller

WARNING **Hazardous Voltage!**

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

WARNING **Contains Refrigerant!**

System contains oil and refrigerant and may be under positive pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.

Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.

Connection to the Chiller

Installation of the RuptureGuard requires opening the refrigerant side of the chiller to atmosphere. To prevent the release of refrigerant, the installation of the RuptureGuard should be done prior to unit evacuation or charging.

1. Move the RuptureGuard assembly to the vicinity of the chiller vent line.

WARNING **Improper Unit Lift!**

Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in death or serious injury or possible equipment or property-only damage.

On Trane model CVHE, CVHF, CVHG, CDHF, and CDHG chillers, the chiller will be prepared for one of two installation methods, depending upon what size valve is applied.

2. Attach the pre-assembled RuptureGuard to the chiller flange connection using one of the following two methods: [“3” RuptureGuard Method,” p. 9](#) or [“4” RuptureGuard Method,” p. 9](#). Be sure to provide adequate support for the valve.

Orientation of the RuptureGuard

It is recommended that the RuptureGuard be installed in a horizontal position.

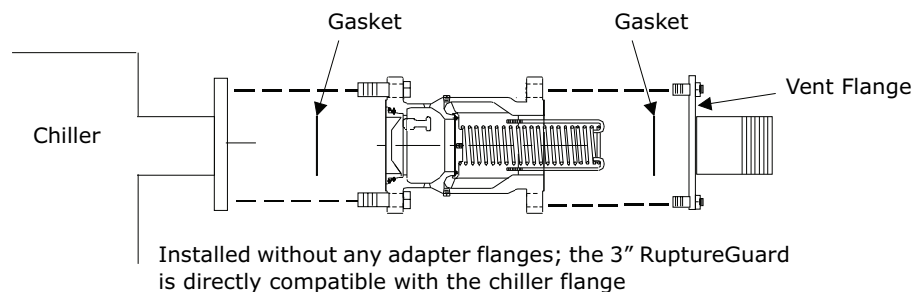
To prevent water, refrigerant and/or other debris such as rust from hindering the operation of the valve, a drip leg should be installed immediately after or downstream of the RuptureGuard (see [Figure 6, p. 10](#)).

3" RuptureGuard Method. Release the nitrogen holding charge from the chiller. Remove the factory installed vent flange. Remove and discard the carbon rupture disk, and gaskets.

When it is installed, the 3" RuptureGuard will bolt directly to the chiller flange using a new gasket and new bolts provided. If desired, the original vent flange can be installed to the outlet of the RuptureGuard using a new gasket, 3/8-16 nuts provided, and the original vent flange bolts.

Note: *The original vent flange bolts are too long for installing the Rupture Guard to the chiller flange, so new bolts of the proper threaded length, size, and strength (grade 5 or better) are required.*

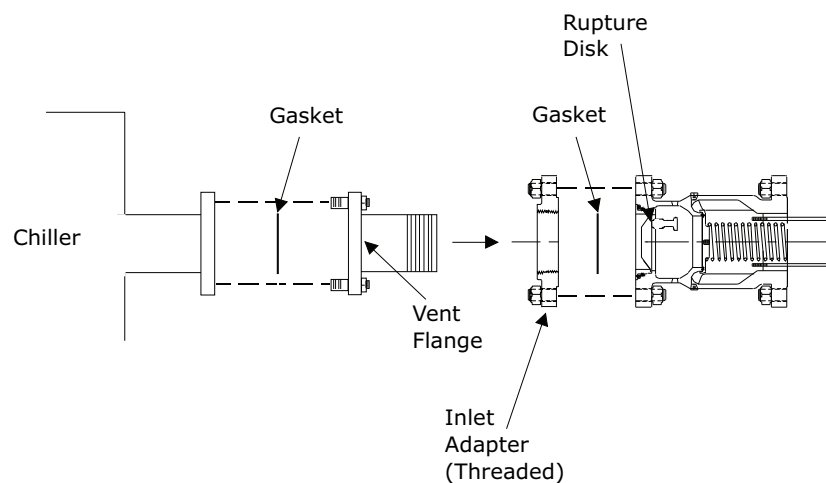
Figure 4. 3" RuptureGuard mounting



4" RuptureGuard Method. Release the nitrogen holding charge from the chiller. Remove the factory installed vent flange. Remove and discard the carbon rupture disk, gaskets, and bolts. Using a new gasket, reinstall the vent flange by bolting it directly onto the chiller flange.

Note: *The original flange bolts are too long, so new bolts of the proper threaded length, size, and strength (grade 5 or better) are required.*

Figure 5. RuptureGuard mounting



Connection to External Vent Line and Drip Leg

NOTICE

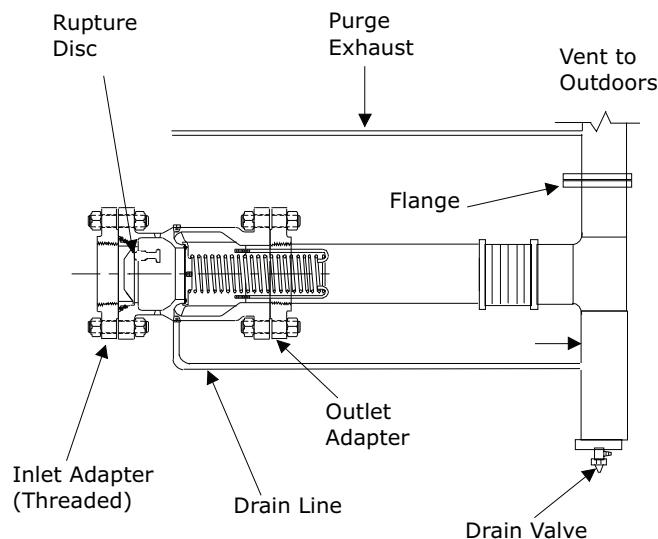
Equipment Damage!

All vent lines must be equipped with a drip leg of sufficient volume to hold the expected accumulation of water and/or refrigerant. The drip leg must be drained periodically to assure that it does not overflow and allow fluid to flow into the horizontal portion of the vent line. Trane assumes no responsibility for equipment damage caused by insufficient drainage of drip leg.

With RuptureGuard installed horizontally, the drain plug downstream of the valve relief plug and nearest to the bottom of the valve body should be piped to the drip leg in the vent line. This will allow the removal of any condensate formed within the valve body.

Provisions, such as installing a set of flanges (see Figure 6) or other disconnect means, must be made in the discharge vent piping. This will allow the piping downstream of the valve to be easily removed for an annual inspection, to replace the rupture disk, or for any other servicing need.

Figure 6. External vent line and drip leg (not provided)



1. Connect the discharge of the valve assembly to the vent line connected to the outdoors.

Note: The rated flow capacity of the RuptureGuard disk/valve assembly is based on having straight pipe extending past the spring mechanism downstream of the valve. Be sure there are no crosses*, elbows, tees or any other obstructions within the first 9 inches of valve discharge. See the chiller installation manual and ASHRAE Standard 15-1992 for additional requirements on piping rupture disk and relief valve vent lines.

Note: * A derate on the rated flow capacity for this configuration is published in RuptureGuard engineering bulletin, E/CTV-EB-10.

2. With the RuptureGuard installed horizontally, remove the drain plug downstream of the valve relief plug and nearest to the bottom of the valve body and pipe a drain line to the drip leg in the vent line (see Figure 6).

Install Pressure Gauge and Excess Flow Valve

1. Screw the 1/4-inch NPT pressure gauge and 1/4-inch NPT excess flow valve into the threaded ports located in the disk-valve interspace of the valve body.

Note: The excess flow valve must be installed to maintain the downstream side of the rupture disk at atmospheric pressure to assure proper operating conditions for the disk.

2. If required, screw the 1/4-inch NPT pressure switch in the remaining threaded port.

Note: It is required that a suitable refrigerant grade pipe thread sealant be used on all threaded joints. Trane recommends using Loctite[®] 242 or Loctite[®] 277 on chillers charged with refrigerant R-123. Ensure all threaded pipe joints are properly cleaned and prepared before assembly. An alternative the use of Loctite[®] is to thread and weld the Inlet Adapter to the pipe.

Pressure Switch

A calibrated pressure switch, used to signal a disk rupture, comes standard with each RuptureGuard (installation is optional). When a disk ruptures, the pressure inside the valve holder section increases to the chiller pressure. The increased pressure changes the position of the switch's SPDT contacts. See "Specifications," p. 16 for detailed switch ratings.

The use of the binary output signal from the switch is specific to each application. Some typical ways the switch output can be used are:

- provide the switching action to activate a local or remote audible or visual alarm.
- provide an alarm contact closure to a building management system, such as a Tracer[™].
- wired in series with other safety controls to shut down pumps, boilers or other ancillary system components that may be contributing to the high pressure condition.

Testing the Rupture Disk

NOTICE **Equipment Damage!**

Exceeding the recommended test pressure can result in rupture disk damage and/or loss of refrigerant. Trane is not responsible for equipment damage resulting from excess pressure on the rupture disk.

Note: Any dent, dimple or imperfection is an indication the disk is damaged and should be replaced.

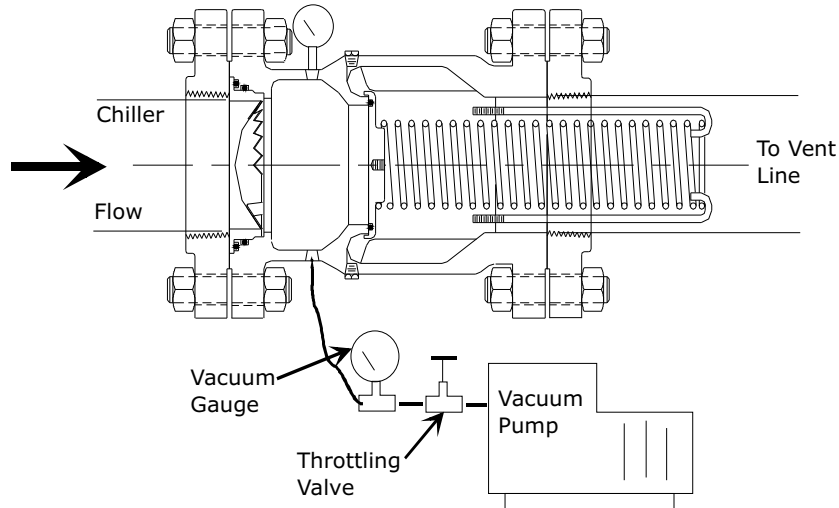
Note: The following test procedure is required only for the 4" Rupture Disk.

The RuptureGuard utilizes a solid metal, reverse-buckling rupture disk that is rated at 15 psig (± 2 psig). Testing has determined that a damaged disk will reverse at less than 9 psig. Reversals at less than 9 psig however may not have sufficient energy to fully open the rupture disk. If the disk reverses and does not fully open, the pressure required to fully open the 4" disk may be above the disk rating, creating an unsafe condition. Experience has proven that this situation does not occur with 3" disks, but may occur with 4" disks. For this reason, a pressure test must be performed immediately following the installation of a 4" RuptureGuard. The test should be performed prior to chiller evacuation and charging. The test should be conducted as follows:

1. Remove the excess flow valve and connect a vacuum pump and gauge capable of reading to 30" of mercury to the 1/4-inch NPT port as shown in [Figure 7, p. 12](#).

Note: The accuracy of this pressure (vacuum) reading is very important. If there is any question as to the accuracy of the reading, connect another gauge to confirm the measurement.

Figure 7. RuptureGuard 4" disk test setup (Note: on 3" disk, test is not required)



2. The chiller should be at atmospheric pressure. If the chiller is not at atmospheric pressure, determine the actual pressure that is present in the chiller.
3. Refer to [Table 3, p. 13](#) with the chiller pressure reading and determine the vacuum necessary downstream of the disk to result in a 10 psid pressure differential across the disk.
4. Pull a vacuum in the disk-valve interspace to the level determined in [Step 3](#) above. Establish this vacuum level using the pressure gauge installed on the RuptureGuard.

Close the valve to the vacuum pump in order to isolate the section between the rupture disk and the valve seat. Maintain this isolation for a minimum of five minutes.

5. Monitor the RuptureGuard pressure gauge. If during this isolation time, the disk-valve interspace pressure moves within 1 psig of the chiller evaporator pressure, the disk has partially ruptured or has fully reversed.

The disk must be replaced BEFORE the RuptureGuard can be put into service on the chiller. A pressure differential of at least 8 psid maintained during this isolation time indicates the rupture disk is in good operating condition. If the pressure reading is in between these two conditions, repeat the test. If, after repeating the test, a deviant pressure reading is again obtained, there may be a valve plug O-ring seating problem. Refer to [Step 5](#) in "[Maintenance](#)," p. 15.

Table 3. Rupture disk test procedures

	Chiller Pressure	Vacuum Required in Valve Holder to Result in 10 psid
Pressure	10" Hg	29" Hg
	9" Hg	29" Hg
	8" Hg	28" Hg
	7" Hg	27" Hg
	6" Hg	26" Hg
	5" Hg	25" Hg
	4" Hg	24" Hg
	3" Hg	23" Hg
	2" Hg	22" Hg
	1" Hg	21" Hg

	Chiller Pressure	Vacuum Required in Valve Holder to Result in 10 psid
Pressure	0" PSIG	20" Hg
	1" PSIG	18" Hg
	2" PSIG	16" Hg
	3" PSIG	14" Hg
	4" PSIG	12" Hg
	5" PSIG	10" Hg
	6" PSIG	8" Hg
	7" PSIG	6" Hg
	8" PSIG	4" Hg
	9" PSIG	2" Hg
	10" PSIG	0" Hg



Operation

The rupture disk monitors the pressure inside the chiller. If the pressure exceeds the disk's burst setting, the disk ruptures allowing the chiller pressure to enter the valve holder compartment upstream of the relief valve. If the pressure is above the pressure setting of the relief valve, the valve will open allowing only the amount of refrigerant to escape to keep the pressure within safe operating limits.

The excess flow valve maintains the downstream side of the rupture disk at atmospheric pressure to assure proper operating conditions for the disk. When the disk bursts, the rapid pressure increase causes the excess flow valve to seal and the valve holder area becomes pressurized.

A disk rupture will be indicated by a pressure reading on the gauge and the pressure switch contacts will close. The pressure switch is an optional accessory (see [Figure 2, p. 6](#)).

It is recommended that the RuptureGuard be visually inspected and the relief valve pressure tested annually. See "[Relief Valve Pressure Test Procedure](#)," p. 15 in the "Maintenance" section of this manual. The test can be performed with the valve in place and the refrigerant in the chiller.

The vent line drip leg must be periodically checked for accumulation of water or refrigerant. Drain any accumulation that may be present into an evacuated, properly labeled vessel and dispose of in accordance with local, state and federal codes.

Maintenance

Relief Valve Pressure Test Procedure

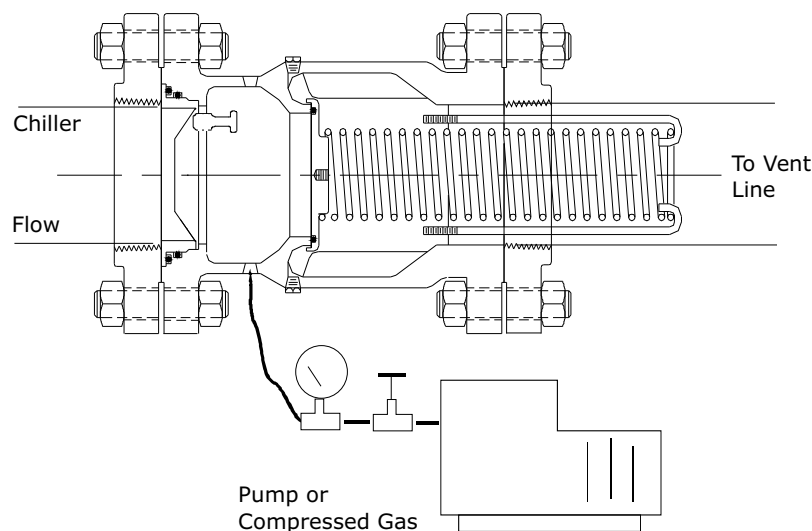
NOTICE **Equipment Damage!**

Do not attempt to re-calibrate the valve in the field. The calibration of the valve must be factory set. Failure to follow this suggestion may result in equipment-only damage.

1. Remove the excess flow valve from the 1/4" NPT port. At this time the excess flow valve can also be tested. Shake the valve back and forth. The ball inside the assembly should rattle. If no rattling occurs, the ball is sticking which indicates it should be replaced to insure proper operation.
2. Connect a REGULATED pressure source capable of at least 16 psig to the 1/4-inch NPT. This can either be a pump or a compressed gas cylinder however it **MUST** have a regulator to assure the pressure does not exceed 16 psig at any time (see [Figure 8](#)).
3. The valve is rated to open at 15 psig (± 1 psig). **SLOWLY** increase the pressure in the valve holder until the valve opens OR you reach 17 psig. If the valve has not opened by 17 psig, slowly release the pressure and re-pressurize.
4. If the valve does not open by 17 psig after repeating the test, remove the downstream piping and visually inspect the spring for any debris or obstructions.
5. The valve should be completely re-seated by 13 psig. A leakage rate of greater than one psig drop per minute indicates a re-seating problem and must be repaired. The valve relief plug will need to be removed in order to examine the valve plug O-ring. The O-ring seat should also be examined at this time. Contact CenTraVac Technical Service if more information is needed.
6. In addition to confirming the proper relief pressure of the valve and its ability to re-seat, the pressure switch operation can also be checked if it is installed. The switch should trip at 11 psig and reset at 8 psig (± 1 psig). Replace the switch if it operates outside of this range.

No periodic lubrication is required on the RuptureGuard.

Figure 8. Relief valve test setup



Rupture Disk Replacement

The easiest way to remove the disk from the valve assembly is to carefully pierce the dome with a screwdriver. Gently pull the disk out of the body of the valve by using the hinge area on the other side of the disk's dome. Avoid scratching the interior of the valve body.

Specifications

Relief Valve

- Rating at 15 PSIG (\pm 5%)
- Bubble tight reseal at 13 psig
- Stainless steel valve body
- Stainless steel valve spring, spring hooks and valve plug
- O-rings compatible with CFC-11, CFC-113, HCFC-123
- Valve body flange connections
 - 3" valve
 - 3" Trane flange
 - 3" 150# ANSI flange, (\varnothing 0.75 (4x) @6.00" B.C.)
 - 4" valve
 - 4" 150# ANSI flange, (\varnothing 0.75 (8x) @7.50" B.C.)

Rupture Disk

- Burst rating of 15 psig (\pm 2 psig) at 115°F
- Nickel disk construction with stainless steel cassette body

Weight

- 3" Valve Only - 28 lb.
- 4" Valve Only - 40 lb.

Pressure Switch

Trip at 11 psig, Reset at 8 psig, SPDT Contacts rated at 5 A at 220 V



www.trane.com

For more information, contact your local Trane office or e-mail us at comfort@trane.com

Literature Order Number	CTV-SVX06B-EN
Date	June 2009
Supersedes	CTV-SVX06A-EN (June 2007)

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice. Only qualified technicians should perform the installation and servicing of equipment referred to in this literature.