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RUPTURE DISC/RELIEF VALVE

PRACTICES MANUAL

VISTA POLYMERS INC.

ABERDEEN, MS

UPDATED SEPTEMBER 16, 1985

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I. INTRODUCTION

Section 61.65 (b)(4) of the National Emission Standards for Hazardous Air Pollutants requires that a rupture disc be installed underneath any relief valve in vinyl chloride service minimize leakage through the relief valve to the atmosphere. In accordance with this requirement, Vista Polymers Inc. has installed a large number of rupture discs in vinyl chloride service throughout the plant. In addition to preventing relief valve leakage, rupture discs also serve the vital function of protecting the relief valve from polymer buildup on the relief valve seat, which could hinder the proper functioning of the relief valve in an emergency. In either case, proper functioning of the rupture disc/relief valve combination is essential for plant safety.

This program has been developed because of the importance of maintaining the integrity of rupture discs during their handling and installation. Adherence to the procedures outlined in this manual will help to ensure that the chance of rupture disc/relief valve malfunctions will be minimized, and that thorough documentation will be available whenever such a malfunction does occur. This documentation may become extremely critical in the event of a VCM release caused by a premature rupture disc failure or other process upset conditions.

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II. RUPTURE DISC ORDERING AND PRE-INSTALLATION CHECKOUT

A. Specification of Rupture Discs

All rupture discs in VCM service are listed on Table 1. The following specifications should be noted on the purchase order when ordering these rupture discs.

1. Disc size (specify).
2. Type S-90.
3. Nickel material.
4. 0% Manufacturing range.
5. Burst pressure (specify).
6. Burst temperature.
7. Certification of performance.
8. ASME code stamped and certified.
9. Test each disc to 90% of rated burst pressure.
10. Replaces lot no. . . . (specify).
11. Serially number all discs in the lot.

B. Lot Inspection and Pre-Testing

All new rupture disc lots received at the plant receiving dock must be thoroughly inspected and tested before they are moved to the storeroom. The following procedures are to be used when new rupture disc lots are received at the Plant:

1. When a lot of rupture discs arrives at the receiving dock, care must be exercised when unloading the discs from the truck so as not to damage the discs.

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II. RUPTURE DISC ORDERING AND PRE-INSTALLATION CHECKOUT - Continued

B. Lot Inspection and Pre-Testing - continued

2. The receiver must notify Processing Engineering that there are new rupture discs at receiving, and a Process Engineer or other trained personnel will count the number of discs in the lot and inspect each individual disc for flaws.
3. A flaw in a disc is defined as follows:
 - a. Any scratch or indentation which can be felt on the opposite side of the disc.
 - b. Any irregularity in the shape of the domed portion of the disc that can be seen with the eye or felt.
 - c. A pinhole or scratch which could cause the disc to leak.
 - d. A disc without a tag.
 - e. A disc that will not fit the pins of a holder.
 - f. A disc that is labeled differently than the other discs in the same lot.
4. Flawed discs must be removed from the lot and returned to the manufacturer. Discs which pass inspection are initialed on the box by the inspector.
5. Rupture discs which are to be installed on vessels in VCM service must be approved by lot before they can be placed in the storeroom. One disc from each of these lots will be sent to the maintenance shop and burst using the procedures specified in the destructive testing section of this manual.

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II. RUPTURE DISC ORDERING AND PRE-INSTALLATION CHECKOUT - Continued

B. Lot Inspection and Pre-Testing - continued

6. If any rupture disc does not burst within 5% of its rated burst pressure, the entire lot from which the disc was taken must be returned to the manufacturer. Maintenance must notify receiving that these discs have either passed or failed this test.
7. Rupture discs which pass inspection and testing are ok'd for placement in the storeroom. Rupture disc boxes which have not been initialed are not to be placed in the storeroom.

C. Recordkeeping

Administrative Services must keep a record of rupture disc receiving and inspection data. An example logsheet is attached. This information must be stored in the plant for a period of at least two years.

III. RUPTURE DISC INSTALLATION

A qualified maintenance installation observer must be present during all phases of rupture disc installation (vinyl reactors only). The Mechanical Superintendent will keep an updated list of qualified maintenance installation observers.

A. Installation in Holders

All rupture discs must be installed in the holders according to the manufacturer's specifications. These written specifications come with each rupture disc. The following steps outline the general procedure which is to be used when installing rupture discs in holders:

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III. RUPTURE DISC INSTALLATION (Continued)

A. Installation in Holders - continued

1. Before a disc is placed in the holder, the disc, the holder and the holder bolts must be inspected for flaws.
2. Flaws are defined as follows:
 - a. A disc that has any of the defects listed in Section II (B)(3).
 - b. A holder face that is covered with dirt or debris, or is deeply gouged such that it will leak when installed.
 - c. Set screws that are galled or cannot be screwed into the holder by hand.
 - d. A holder with a damaged bite ring. A holder is considered damaged if there are indentations or flat spots on the bite ring. This is determined from a visual inspection of the holder. Also, the height of the bite ring must be checked. This is done by the inspector running his fingernail around the bite ring. The bite ring has sufficient height to be reused if it holds the fingernail all the way around the circumference of the bite ring.
3. Flaw components must not be installed in the Plant.
4. Place the disc in the holder and hand install the holder bolts. Using a torque wrench, tighten the holder bolts to the torque specified by the manufacturer. This tightening must be performed in at least four passes; i.e. 25%, 50%, 75% and 100% of the final torque. A criss-cross tightening pattern must be used when torquing the bolts.

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III. RUPTURE DISC INSTALLATION - Continued

A. Installation in Holders - continued

5. When the installation of the disc in the holder is complete, visually inspect the disc again to see if it has been distorted or otherwise damaged.
6. Rupture discs must not be removed from the holders after installation, otherwise the rupture disc must be discarded.

B. Pressure Testing in the Shop

All reactor rupture discs are to be pressure tested in the maintenance shop to 90% of their rated burst pressure before being installed in the plant. The following testing procedure must be used when pressure testing rupture discs in the maintenance shop.

1. Clean the flanges of the test bench and the faces of the rupture disc holder where the two surfaces meet. Use an asbestos gasket between the flange and the holder.
2. Install the holder on the test bench and tighten the bolts in a criss-cross pattern, making several passes on each bolt.
3. Warn nearby personnel that a rupture disc is being pressure tested.
4. Using pressurized air, slowly open the test valve and pressurize the space underneath the rupture disc. Increase the pressure to 90% of the rupture disc burst pressure at 72°F.
5. Slowly depressurize the space underneath the rupture disc and remove the assembly from the test bench. If the disc appears to have been distorted or otherwise damaged during the test, do not install the disc in the plant.

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III. RUPTURE DISC INSTALLATION - Continued

B. Pressure Testing in the Shop - continued

6. If a rupture disc bursts prematurely (less than 90% of its rated burst pressure) or is damaged by the test, the disc must be given intact to Process Engineering.
7. The calibration of the test bench pressure gauge will be checked with a dead weight pressure gauge every six months.

C. Installation In The Plant

Rupture disc assemblies must be installed in the plant accordingly:

1. Before installing the holder assembly between the companion flanges, thoroughly clean the flange faces with a putty knife to remove any solid buildup or debris.
2. Check to see that the flange faces are not gouged or otherwise damaged. Place the rupture disc between the flanges, with the bulged-out side of the disc facing the process.
3. On reactors, use asbestos-type gaskets only. Flexatalik gaskets may be used elsewhere in the plant if desired.
4. When tightening the companion flanges, torque the bolts to the manufacturer's specification using a criss-cross tightening pattern. Make at least four passes on each bolt.

D. Pressure Checking After Installation on the Reactor

After a rupture disc has been installed on a reactor, the reactor will be pressure checked before it is charged. The reactors will be pressure checked to 90% of the pressure of the lowest rated rupture disc on the reactor or 170 #/in^2 , whichever pressure is lower.

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III. RUPTURE DISC INSTALLATION - Continued

D. Pressure Checking After Installation on the Reactor - continued

The pressure check must be witnessed by an approved pressure check observer. A list of approved pressure check observers is kept on the Vinyl Shift Supervisor's bulletin board.

The pressure checking consists of filling the reactor with water and then increasing the pressure in the reactor to the desired pressure per established procedures. The operators involved must be extremely careful during pressure check procedures not to burst or damage a rupture disc. Bursting a disc during the pressure check will cause reactor downtime to change the disc. A disc can be damaged by hydraulic shock if the reactor becomes liquid full during the pressure check. A damaged rupture disc may burst at lower than the rated pressure, causing leakage through the reactor relief valve. In addition, a damaged disc may not burst at the rated pressure, which could allow a reactor to overpressure. The pressure check observer must witness the pressure check from the field and must verify the final reactor pressure. The reason for the pressure check, the signature of the approved observer, the final reactor pressure, and other test findings will be noted in the reactor pressure check log kept in the Vinyl control room.

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IV. RUPTURE DISC REMOVAL

A. Rupture Disc Changeout

Rupture discs are to be removed from service and changed accordingly:

1. Any rupture disc which fails in service must be changed as soon as possible after it is discovered that the disc has failed.
2. Any rupture disc which is believed to be covered with resin or otherwise damaged must be changed as soon as possible.
3. All rupture discs on reactors will be changed at least once every twelve months.
4. When a reactor is taken out of service for condenser drilling, the condenser rupture disc(s) will be removed or guard(s) will be installed over the rupture disc nozzle(s) before the drilling operation is started.
5. Any rupture disc which fails in reactor service must be given to Process Engineering.

B. Destructive Testing

All rupture discs taken off of vinyl reactors must be burst in the maintenance shop when taken out of service permanently. The following procedures also apply to new rupture discs which are to be burst when they arrive at the Plant.

1. When removing the holder assembly from the reactor and when transporting the holder assembly to the maintenance shop, use caution so as not to damage the disc or the holder.

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IV. RUPTURE DISC REMOVAL - Continued

B. Destructive Testing - continued

2. When destructively testing a vinyl reactor rupture disc, a qualified maintenance installation observer must be present to observe the testing.
3. Install the holder assembly on the test bench and pressurize the disc with air until the disc bursts.
4. If a rupture disc bursts prematurely (less than 90% of its rated burst pressure), the disc must be given to Process Engineering. Use care so as not to damage these discs.

V. RECORDKEEPING

A record must be kept of all rupture disc installation and testing data. An example logsheet is attached. This information must be stored in the plant for a period of at least two years.

VI. TRAINING

All maintenance and engineering personnel involved in this program are to receive hands-on training in the installation and handling of rupture discs once each calendar year. Records of all personnel who attend these training sessions are to be kept for a period of at least two years.

VII. RELIEF VALVES

All relief valves in vinyl chloride service will be periodically checked to assure that they will operate properly in an emergency situation.

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VII. RELIEF VALVES - Continued

A. Reactor Relief Valves

The past practice of testing the relieving pressure of reactor relief valves in place can no longer be used due to the change in the setting of the blowdown ring. With the new settings, the quantity of nitrogen available to test the relief valves only results in "simmering" rather than "popping" of the valves. Thus a true relieving pressure cannot be determined with the relief valves in place on the reactors.

Current practice is to remove the relief valves from the reactors and to send them to a relief valve repair shop for testing, inspection and reworking. The rework includes disassembly, cleaning and replacing/refurbishing internal parts as required so that the relief valve meets the original manufacturers specifications.

Initially, all reactor relief valves will be sent to a relief valve repair shop on a scheduled basis. The valves will be disassembled, cleaned and refurbished as necessary. The set pressure on each of the relief valves will also be increased approximately 10 psi while at the repair shop.

After the initial testing and refurbishing, the valves will be re-installed on the reactors. The information obtained on valve condition versus period of time between the rework will be analyzed. From this data, a decision on the frequency of testing and refurbishing the valves will be established.

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VII. RELIEF VALVES - Continued

A. Reactor Relief Valves - continued

All new reactor relief valves purchased will be pretested by the manufacturer. Upon installation, the relief valves will be removed and tested at a relief valve shop per the frequency established above.

B. Other Relief Valves in Vinyl Chloride Service

Relief valves in the vinyl chloride service, except those on the reactors, will be tested and refurbished at either a relief valve repair shop or by the plant maintenance personnel. The frequency of testing and refurbishing will be established by the plant maintenance department.

C. Recordkeeping

The maintenance department shall keep a record of all tests and repairs made on the relief valves.

REACTOR

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RUPTURE DISCDisc Removed

Date Removed

Specific Location

Lot No.

Burst Pressure at 70°F

Burst Pressure at Higher Temp.

Disc Size

Destructive Test Burst Pressure

Holder No.

Individual(s) Removing Disc

Individual(s) Performing
Destructive Test

Reason for Removal

Disc Installed

Date Installed

Specific Location

Lot No.

Rated Burst Pressure at 70°F

Rated Burst Pressure at
Higher Temperature

Disc Size

Tested to 90°F By

Test Observed By

Installed on Reactor By

Installation on Reactor
Observed By

Holder No.

Stock No.

TABLE I

RUPTURE DISCS IN VCM SERVICEAVAILABLE AT THE PLANT