

PRECAUTIONS FOR APPLICATION of LOW NOISE TRIM ANTI-SURGE RECYCLE AND BLOWOFF VALVES, and LOW-NOISE STATION RECYCLE VALVES



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When low-noise trim anti-surge valves are installed, special procedures must be followed to avoid malfunctioning of the recycle valve due to plugging or sticking by foreign material.

This malfunction can defeat the anti-surge system and result in surge damage to the compressor. The same cleaning procedures should be followed for station recycle valves, if low noise trim is installed.

To avoid plugging or sticking by trash, all associated piping and process equipment must be carefully cleaned of welding slag, sand, and other debris prior to placing the valve trim in service. Appropriate filters must be installed in scrubbers or upstream equipment to prevent additional material from entering the system.

Complete cleaning of the associated piping and process equipment may be very difficult to achieve: trash can lodge in coolers, pipe bends, headers and elsewhere. Heavy trash, such as metal droplets, may move only slowly through the system, when pushed by normal gas velocities.

Some procedures which help clean the system are:

- **High-velocity gas purge:**

Install temporary pipe spools bypassing compressor stages. Remove or bypass flow orifice plates, strainers, scrubber filters. Purge piping and equipment repeatedly at high velocity and low pressure.

- **Start-up valve trim:**

Install standard (not low-noise trim) in recycle valves for initial operation. When strainers remain completely clean, install low-noise trim. Standard trim may have to remain installed for several months.

- **No-trim recycle:**

Remove recycle valve trim cage, lift the plug fully, and operate the compressor in recycle at full power for at least two (2) hours, and until strainer remains clean.

- **Manual trash removal:**

During assembly, manually remove material from piping and process equipment. In particular, remove trash from scrubbers and from cooler header boxes.

Each of these procedures must be done with care by knowledgeable staff, to avoid danger to equipment or personnel.

After placing the valve in service, the operator must be alert for the possibility that additional material has entered the system and lodged in the valve. Some indications are:

- Debris in the compressor inlet strainer.
- Stickiness of valve action. That is, the valve moves in step increments instead of smoothly, and may cause overall oscillation of the system.
- Valve fails to move.

When foreign material is suspected, the valve must be disassembled and the valve trim carefully inspected. Even a small amount of trash lodged in the cage, where it rubs against the plug can defeat the anti-surge system, or cause destabilizing jerkiness in the action of

the recycle valve. Also, always inspect the inside of the pipe leading from the recycle valve to the compressor discharge, since normal compressor blowdown procedures can move debris from the valve toward compressor discharge.

It is recommended that the start-up valve sequencing procedure implemented by the unit control panel include a check of recycle valve movement. Prior to rolling the compressor, the valve should be commanded to close fully, and full-closed position verified. Allow time for closing ramps. The recycle valve should then be commanded to open fully (RUNUP position), and full open position verified.

Successful completion of this sequence should be a permissive for starting the compressor.

Hydrates can also interfere with anti-surge valve response and can be avoided by maintaining gas temperature into the recycle valve above a temperature which, on cooling by expansion through the valve, does not produce hydrates.

Petrotech's microprocessor-based anti-surge controller may be fitted with catalog item TRC recycle temperature controller to achieve this. This controller uses recycle flow/hot gas flow proportioning plus PID temperature control to modulate a valve bringing hot gas from upstream of the cooler directly into the recycle line.

Where occasional plugging of low-noise valves in normal operation is expected to be likely, or where enhanced protection is desired, several solutions to the problem are available:

- **Recycle transfer controller (Catalog item RTC):**

This controller, installed in a Petrotech microprocessor anti-surge controller, allows unit anti-surge recycle valves to be fitted with standard trim, and a single station recycle to be fitted with low-noise trim. The RTC controller "transfers" all continuous recycle to the station unit valve, but if the station valve malfunctions, the unit valve responds in the customary protective manner.

Where several compressors operate in parallel, this solution can also be considerably less costly than installing separate low-noise valves for each unit. Special cleaning must also be implemented to assure the success of this valve as well.

- **Parallel low-noise and standard trim valves:**

Using a split-range amplifier to open first a low-noise valve and then a standard trim valve increases protection, because if the low-noise valve malfunctions, the standard trim valve provides the required recycle. This solution is also attractive where very large total valve capacity is required, since the combination of the two (2) valves in parallel may be less costly and faster acting than a single large low-noise valve.

In any case, the responsibility for proper cleaning of the piping and process equipment during precommissioning is the owner's and NOT Petrotech's, and Petrotech takes no responsibility for consequences of stuck low-noise trim valves, or for their repair.

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