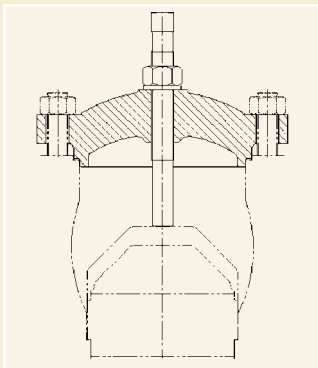


# HSR™ High-Security Compressor Valve Restraints

Multi-stud design provides stronger, more secure valve retention with less torque

*PROTECT VALVES, CAGES AND  
CYLINDERS WHILE IMPROVING  
SEALING EFFECTIVENESS WITH  
HSR HIGH-SECURITY  
VALVE RESTRAINTS.*

**HSR High-Security valve restraints are a reliable, economical solution to the problems of ordinary single-bolt (jack bolt) designs.**

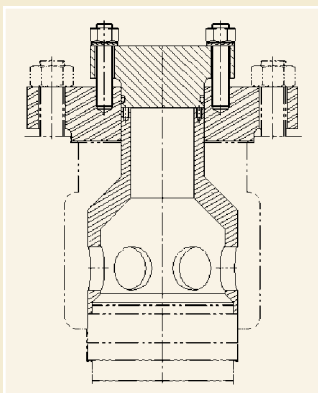


*Single-bolt (jack bolt)  
valve restraint*

Single-bolt restraints require extreme torque to install and often loosen during operation. This creates a dilemma: continuing to increase torque can distort the valve cover gasket, allowing gas leaks or causing damage to the valve cage or cylinder gasket shelf. However, continued operation with a loose assembly can also damage studs, cages, valves or cylinders. Even worse, debris from failed components can enter the cylinder, resulting in catastrophic cylinder component failures and serious safety issues.



## Multiple studs distribute load; improve sealing

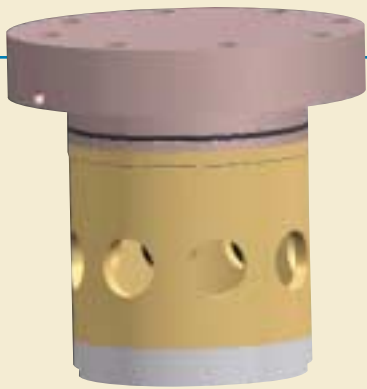


*HSR assembly*

HSR restraints distribute load over multiple studs for reliable, long-lasting valve retention. Each stud requires *less than half* the torque of single-bolt designs, so installation is easier and loading on valves is more accurate. Just as important, HSR restraints stay tight without the need for periodic tightening. HSR restraints have O-ring seals, which contain gases much better than thread seals, gaskets or obsolete lead washers. The O-ring seal design — combined with lower torque requirements — simplifies maintenance, drastically reduces fugitive emissions and all but eliminates safety concerns.

### ADVANTAGES

- MULTI-STUD DESIGN REDUCES TORQUE REQUIREMENTS BY 50% OR MORE
- ALLOWS EASY, ACCURATE LOADING OF CAGE AND VALVE
- REDUCES RISK OF DAMAGE TO VALVE, CAGE AND CYLINDER
- RELIABLE O-RING SEALS CONTROL EMISSIONS BETTER THAN GASKETS OR LEAD WASHERS
- EASY, ECONOMICAL FIELD RETROFIT TO MOST COMPRESSORS
- OPTIONAL CONFIGURATIONS OFFER FLEXIBILITY AND ECONOMY
- FLANGED RETAINER DESIGN IMPROVES SAFETY BY PREVENTING THE RETAINER FROM BACKING OUT UNDER PRESSURE
- AVAILABLE WITH PNEUMATIC UNLOADER ASSEMBLIES



### COMPLETE CONVERSION TO O-RING COVERS

Uses a direct-loading design in which an O-ring bore is machined in the cylinder. Cover studs seat the valve gasket and no other loading devices are required.

#### Advantages

- Completely eliminates the gasket seal
- Uses existing cylinder studs to seat the valve gasket
- Eliminates one of the two cover seals

#### Requirements

- Cylinder must be machined to achieve the concentricity and finish required to seal the O-ring
- Requires replacement of the cover and cage
- Cylinder studs often need to be redesigned to avoid damaging the valve shelf area

### Flexible, Economical Configurations

HSR restraints are quickly and economically field-retrofitted to most compressors without machining or cylinder modification. Optional configurations are available to adapt to your existing cage or cylinder cover for greater economy. For a complete engineering analysis and recommendations, contact Cook Manley.

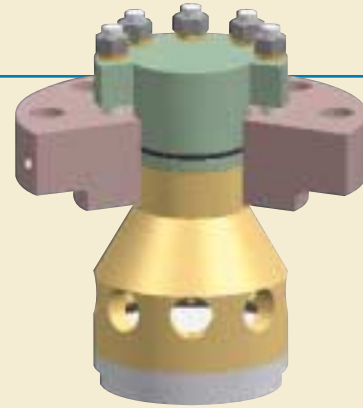
*To find out how HSR High-Security valve restraints will improve reliability and safety in your compressors, contact your local sales representative or Cook Manley.*



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### HSR DESIGN WITH NEW CAGE

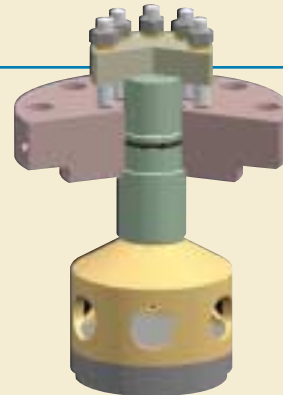
Uses a set of multiple studs and an O-ring seal in place of the jack bolt, but still seats the cover on the cylinder with the cover gasket remaining intact.

#### Advantages

- Requires no machining on the cylinder itself
- Dramatically reduces torque values needed for proper installation
- Assembly remains tight (similar to an O-ring cover), eliminating jack bolt loosening problems
- If existing cylinder covers are steel (not cast), they can be machined for reuse to further reduce costs

#### Requirements

- Requires new cover, cage, HSR cover and set of studs
- Retains existing cover gasket



### HSR DESIGN WITH EXISTING CAGE

Also uses a set of multiple studs and an O-ring seal in place of the jack bolt, but uses the existing cage. The cover seats on the cylinder with the cover gasket remaining intact.

#### Advantages

- Reduces costs by using the existing cage
- If existing cylinder covers are steel (not cast), they can be machined for reuse to further reduce costs

#### Requirements

- Requires new cover, HSR cover, ram and set of studs