Leak Detection for Valves

- In gas/vapor or light liquid service or in VHAP service: 500 ppm monthly/quarterly
- Difficult-to-monitor: 500 ppm annually (minimum)
- Unsafe-to-monitor: 500 ppm when safe to monitor

Difficult-to-Monitor Definition

- Access to valve is restricted
- Defined as valves that would require elevating the monitoring personnel more than two meters above any permanent available support surface

Unsafe-to-Monitor Definition

- Unsafe-to-monitor valves are defined as those that would, based on the judgement of the owner or operator, expose monitoring personnel to imminent hazards from temperature, pressure, or explosive process conditions (Example: Steam leaks or valves inside pressure units etc.)

Leak Detection for Valves

- Alternative Standards
  - Not more than 2 % leaking valves
  - Allow to skip period LDAR (Two Alternatives)

Alternative #1 For Valve Leak Detection Program

- Not more than 2 % leaking valves
  - Notify administrator 90 days before implementation
  - M21 test initially, annually, and when requested by administrator
  - All valves monitored within one week
  - Leaks repair first attempt 5 days/15 repaired

Alternative #2 For Valve Leak Detection Program

- Option 1: After consecutive quarters with < 2% leakers, skip to semiannual monitoring
- Option 2: After 5 consecutive quarters with < 2 % leakers, skip to annual monitoring

Monitoring Locations

- Valves
  - Seal between the stem and the housing
  - Place the probe where the stem exits the packing gland follower
  - Move around stem circumference.
  - Also placed at the packing gland take-up flange seat and moving along the periphery

Monitoring Locations

- Flanges and Connectors
  - The probe place at the outer edge of the flange/gasket interface
  - Move along the circumference of the flange
  - Area around each of the bolts should also be checked
  - Also screwed fittings, the treaded connector interface

Monitoring Locations

- Pumps and Compressors
  - Along the outer surface of the interface (circumferentially) along the outer surface of the interface between the shaft and the seal where the shaft exits the housing
  - If shaft rotating, then attach "Teflon" piece on the end of the monitor probe and check within 1 cm of the shaft/seal interface

Monitoring Locations

- Pressure Relief Devices
  - Instruments readings taken at the center of the exhaust area.
  - Pressure relief devices should not be monitored during likely upset conditions or at other times when they are likely to activate

Monitoring Locations

- Miscellaneous Sources
  - If regularly shaped opening (e.g., process drains, seal system degassing vents, and accumulator vents) which is < 1.0 " diameter, a single reading in the center of opening
  - Larger openings, traverse across the diameter or grid pattern for very large openings

First Attempt at Repair

- Valves
  - Tightening of bonnet bolts
  - Replacement of bonnet bolts
  - Tightening of packing gland nuts
  - Injection of lubricant into lubricated packing

Delays of Repairs

- Infeasible without process unit shutdown
  - Repair at next shutdown
- Isolated from process and does not remain in VOC or VHAP service
- Valves and pumps specific conditions

Specific Conditions for Delay in Repairs Beyond Next Shutdown (Valves)

- Purged material emissions from immediate repairs higher than emissions from delay
- Valve assembly replacement needed

Specific Conditions for Delay in Repairs Beyond Next Shutdown (Valves)

- Supplies depleted
- Repair at next shutdown

Leak Detection for Pumps

- Leak detection at 10,000 ppm
  - Monitoring frequency is monthly
  - Visual indication is weekly
- Unmanned plant sites to be visually inspected as often as practicable and at least monthly

Specific Conditions for Delay in Repairs Beyond Nest Shutdown (Pumps)

- If repair requires the use of a dual mechanical seal system that includes a barrier fluid system
- Repair within 6 months

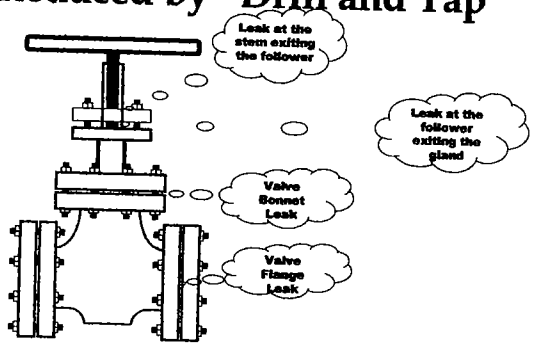
Standards for Pumps in Light Liquid Service (NSPS) or In VHAP Service (NESHAP)

- Equipment and performance standard
- LDAR Program established
- Dual mechanical seal system that includes a barrier fluid system

Standards for Pumps in Light Liquid Service (NSPS) or In VHAP Service (NESHAP)

- "No detectable emissions"
- Close vent system to control device

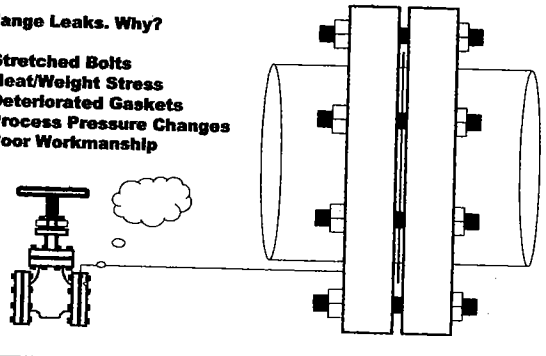
Common Valve Leaks Reduced by "Drill and Tap"



Valve Flange Leaks

Flange Leaks. Why?

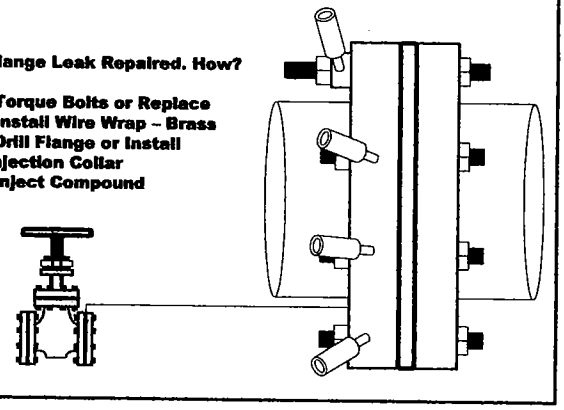
- Stretched Bolts
- Heat/Weight Stress
- Deteriorated Gaskets
- Process Pressure Changes
- Poor Workmanship



Valve Flange Repair

Flange Leak Repaired. How?

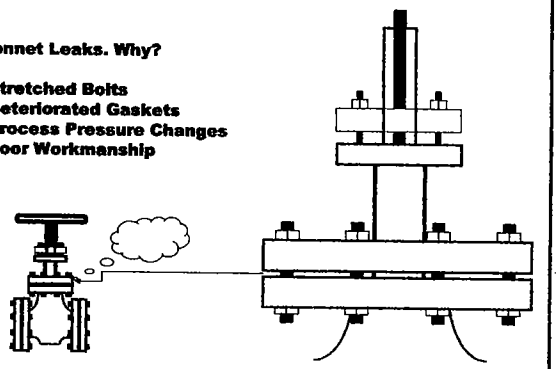
- Torque Bolts or Replace
- Install Wire Wrap – Brass
- Drill Flange or Install Injection Collar
- Inject Compound



Valve Bonnet Leaks

Bonnet Leaks. Why?

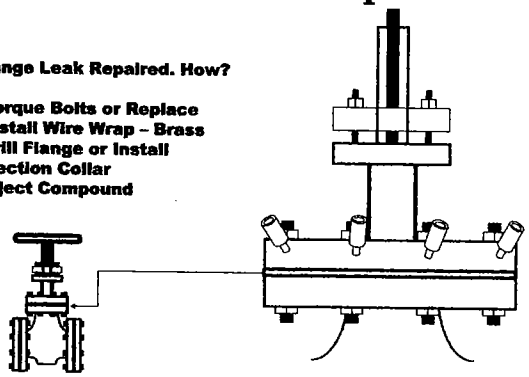
- Stretched Bolts
- Deteriorated Gaskets
- Process Pressure Changes
- Poor Workmanship



Valve Bonnet Repair

Flange Leak Repaired. How?

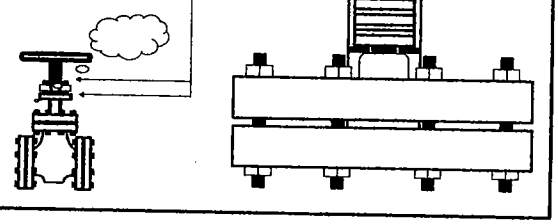
- Torque Bolts or Replace
- Install Wire Wrap – Brass
- Drill Flange or Install Injection Collar
- Inject Compound



Valve Packing Leaks

Packing Leak. Why?

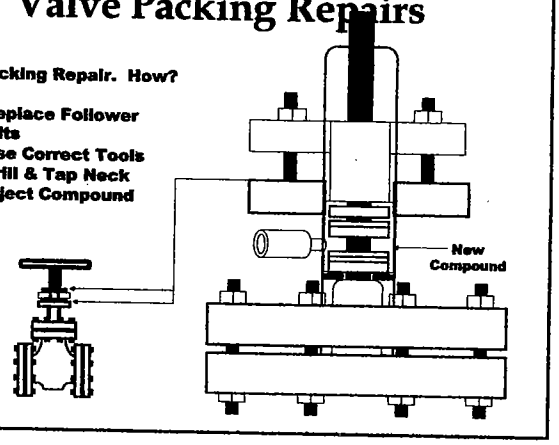
- Old Packing
- Pressure Change
- Poor Workmanship



Valve Packing Repairs

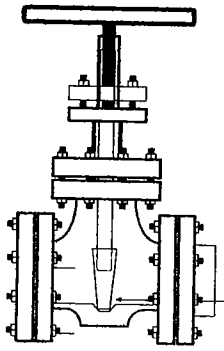
Packing Repair. How?

- Replace Follower Bolts
- Use Correct Tools
- Drill & Tap Neck
- Inject Compound



Valve Seat Leak

Need to shut down a piece of equipment but the valves are not holding?



Killing a Valve

Valve Seat Repair.
How?

- Block Valve Completely
- Drill and Tap the Seat
- Inject Compound