Reciprocating Compressor Seals
Role in Containing Fugitive Emissions: How Packing Works

Presented to
2004 EPA Star Conference

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Overview of Compressor
Engine and Compressor
Compressor Cylinder Cut Away
Standard Packing Case

Typical packing case
Pressure Activates Packing

Pressure holds rings against rod and cup face.

Side clearance allows rings to "float" within case if rod moves laterally.

End clearance allows rings to self adjust for wear.

All leak paths blocked by ring overlap.
Impediments to Proper Sealing

Leak paths
- Nose gasket
- Packing to rod
- Packing to cup
- Packing to packing
- Cup to cup

Performance inhibitors
- Dirt or foreign matter
- Worn rod
- Worn packing cups
- Packing cup out of tolerance
- Improper break-in
- Liquid (dilutes oil)
- Incorrect packing
- Incorrect surface finish
Leakage Rates

- Packing is designed to restrict leakage
- Fugitive natural gas emissions result in significant loss of revenue/greenhouse gas
- Average rod leak rate is 0.98 to 1.86 scfm based on Pipeline Research Committee
Here Is the Solution

- Low emission packing (LEP) overcomes low pressure to prevent leakage.
- The side load eliminates clearance and maintains positive seal on cup face.
- This design works in existing packing case.
- No modifications are required.
LEP Packing Configuration

P100 (Pressure Packing)

P210 (Double Tangent Pair)

P300 (Radial Tangent Pair with Backup Ring)

P303 (Low Emissions Packing)
Orientation in Cup

LEP: Low Emissions Packing
Orientation of P303 Rings
Reasons to Use LEP

- Upgrade is very inexpensive.
- Significant cost savings and reduction of greenhouse gas are major benefit.
- Most refining and petrochemical and air separation plants currently use this design to minimize fugitive emissions.
- Should the natural gas industry follow suit?
What’s in Your Packing Case?

- Consult with operations to verify your current packing case configuration.
- What are the current leak rates?
- Typical LEP conversion is around $100 and with gas at $7 MSCF, packing case leakage should be identified and fixed.
- Monitoring emissions reduces greenhouse gas release.
Summary

- Packing is a dynamic seal designed to restrict leakage.

- Verify with monitoring equipment your leakage rates.

- Low emission packing is an inexpensive option to reduce fugitive emissions.
Questions?

Thank you!