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

Presented to

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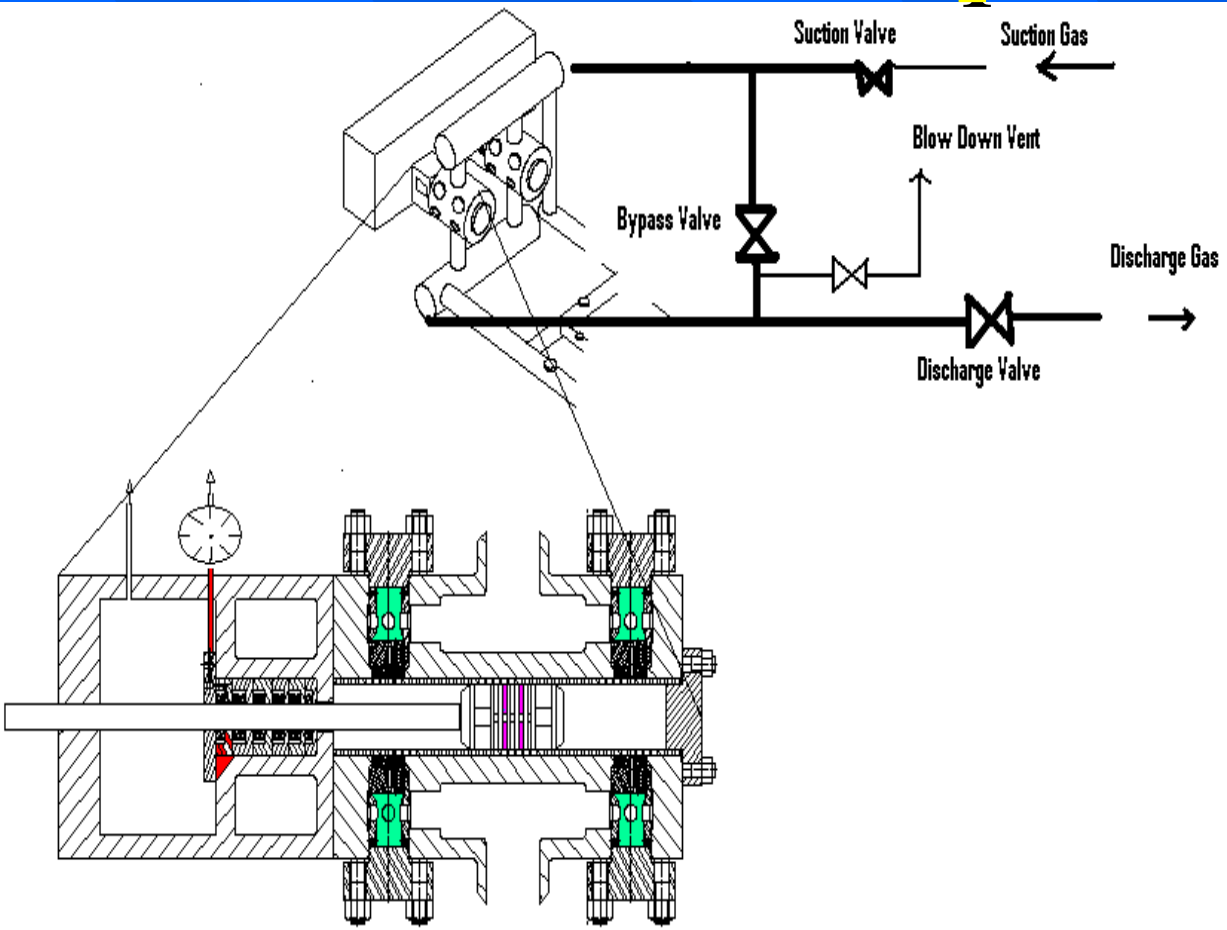
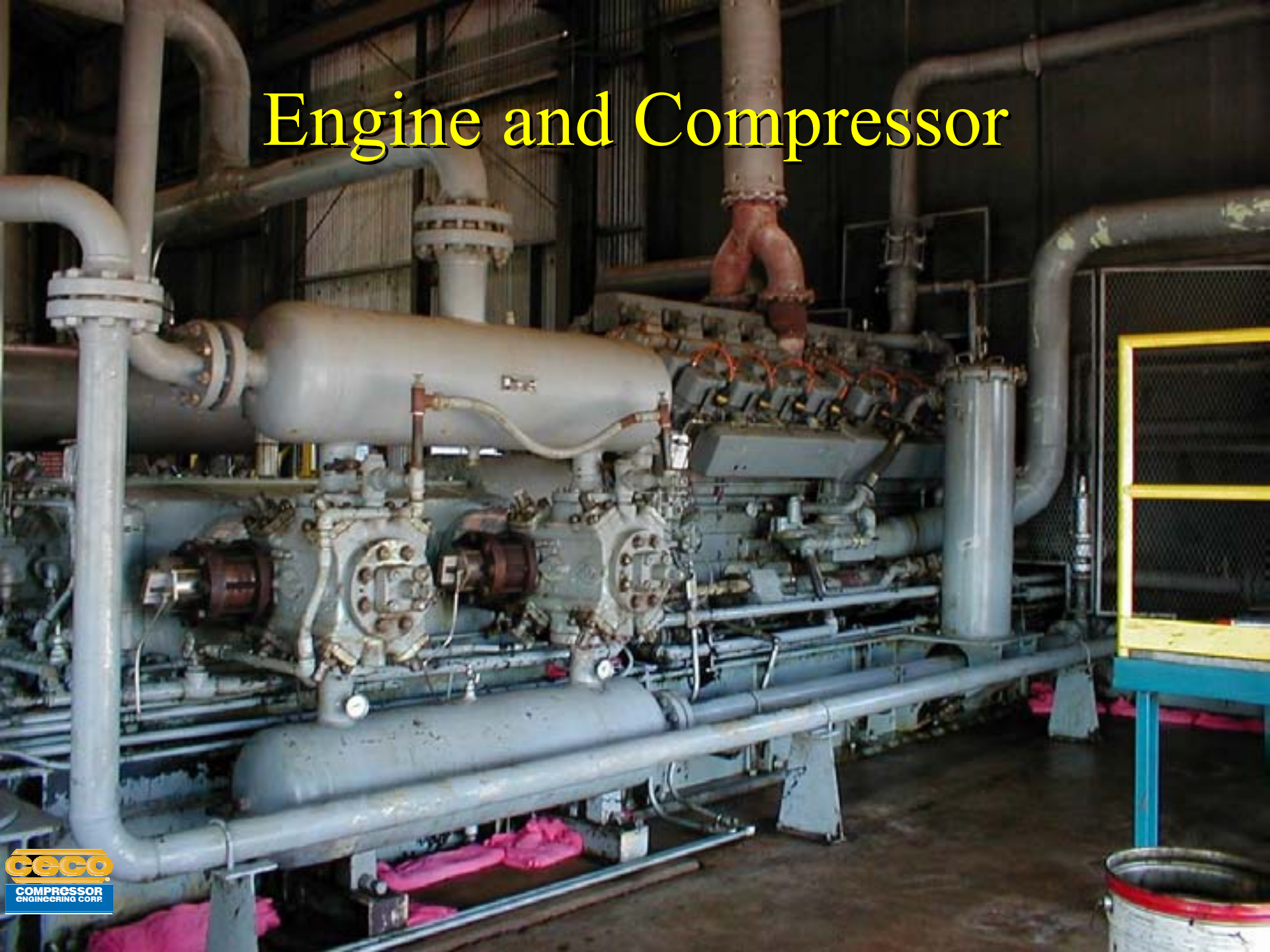
# Unit Valve

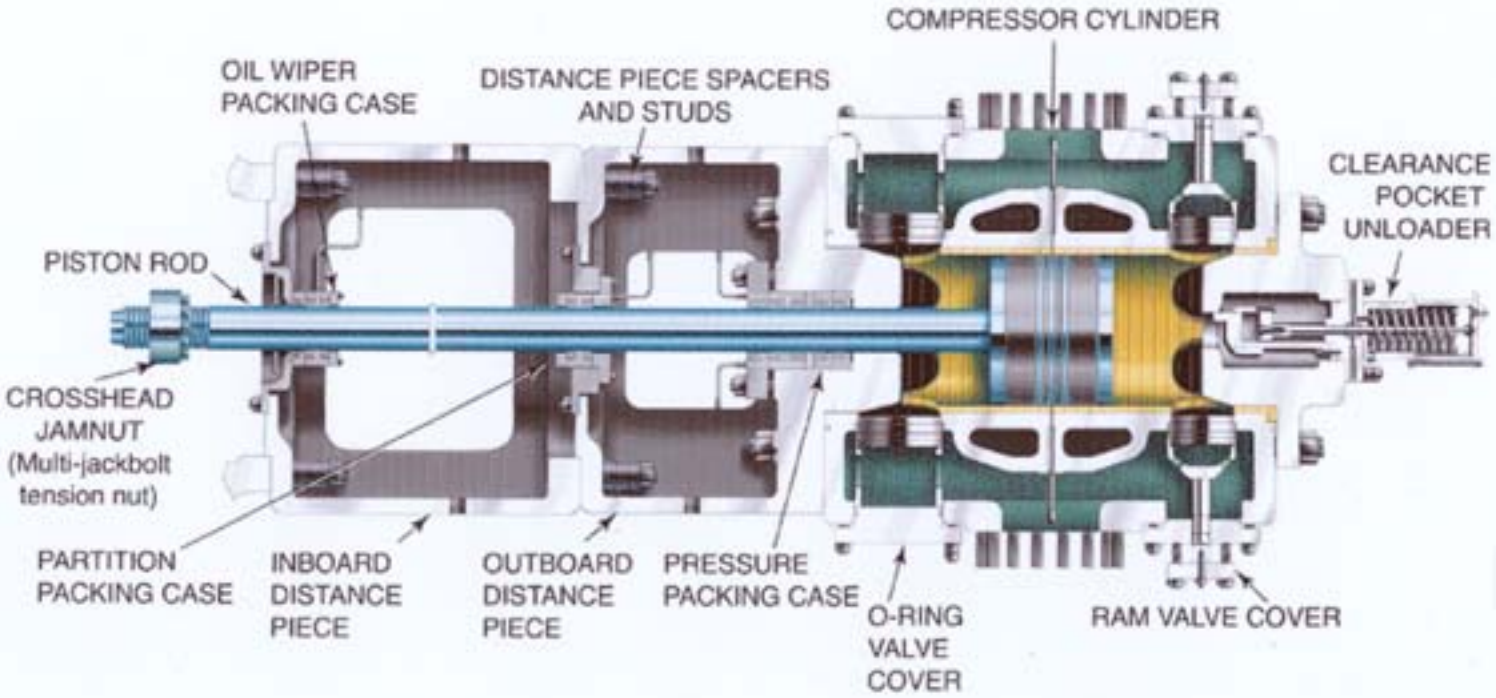
# Overview of Compressor



# Engine and Compressor



# Compressor Cylinder Cut Away

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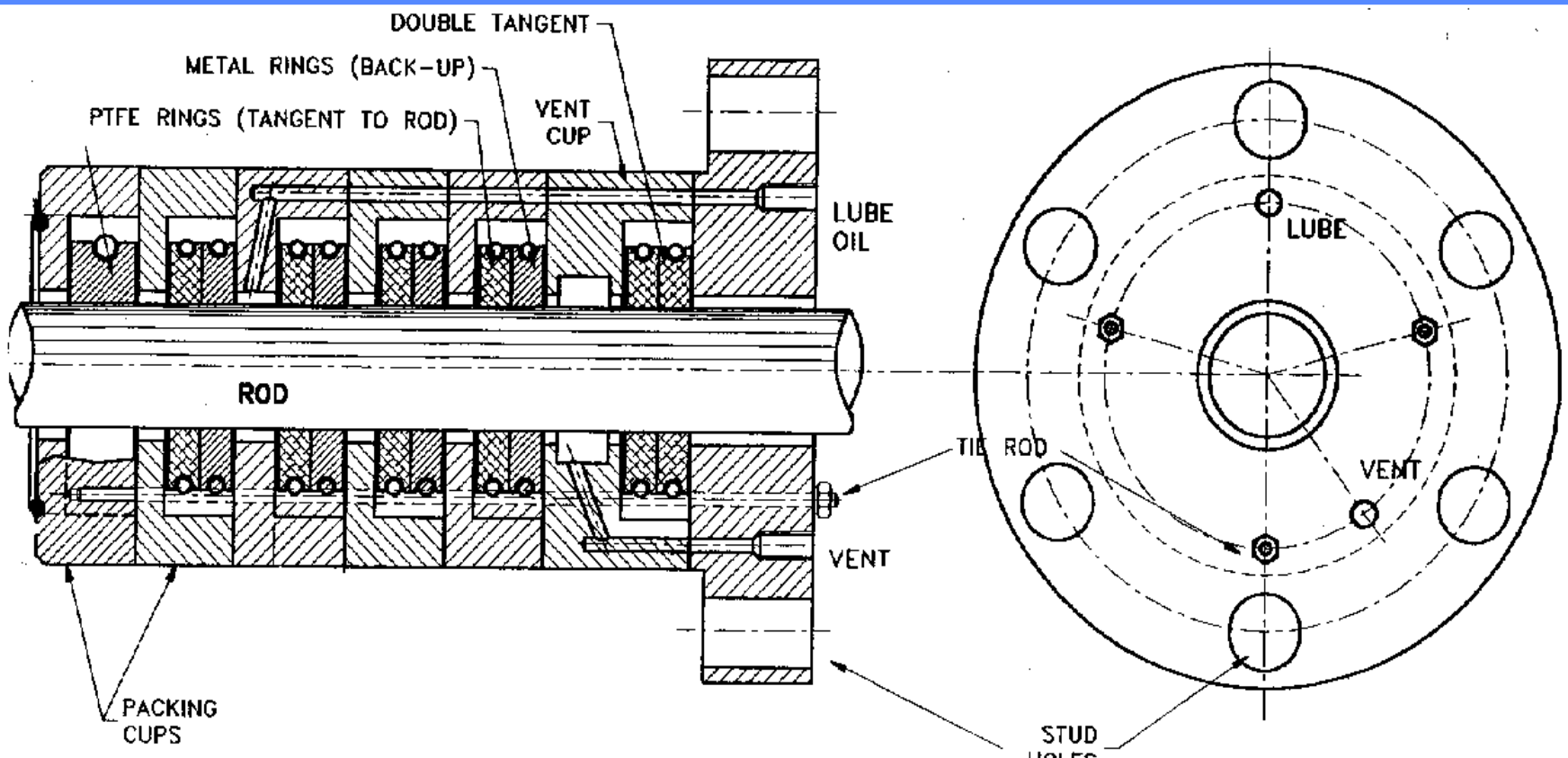
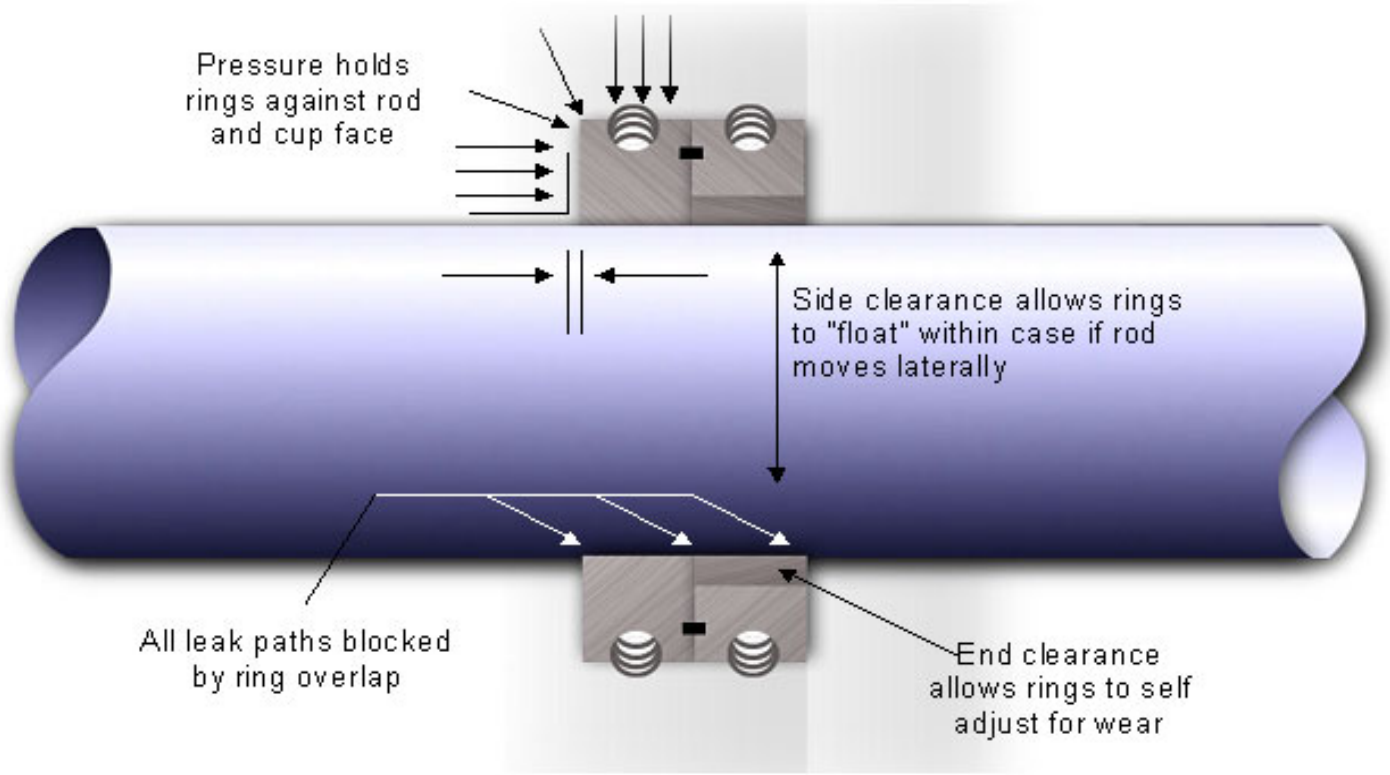
# Standard Packing Case




Typical packing case

# Pressure Activates Packing

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# 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

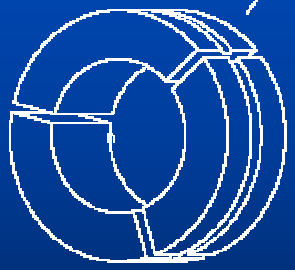
# Leakage Rates

- Packing is designed to *restrict* leakage
- Fugitive natural gas emissions result in significant loss of revenue/greenhouse gas
- Average rod leak rate is .98 to 1.86 scfm based on Pipeline Research Committee

# Here Is the Solution

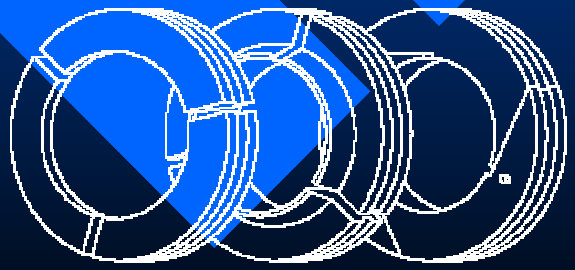
- Low emission packing (LEP) overcomes low pressure to prevent leakage.
- The side load eliminates clearance and maintains positive seal on cup face.
- This design works in existing packing case.
- No modifications are required.

# LEP Packing Configuration

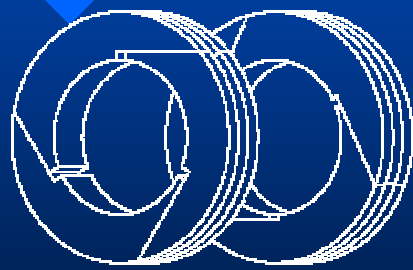


P100
(Pressure Packing)

P300
(Radial Tangent Pair
with Backup Ring)



P303
(Low Emissions
Packing)



P210
(Double
Tangent Pair)

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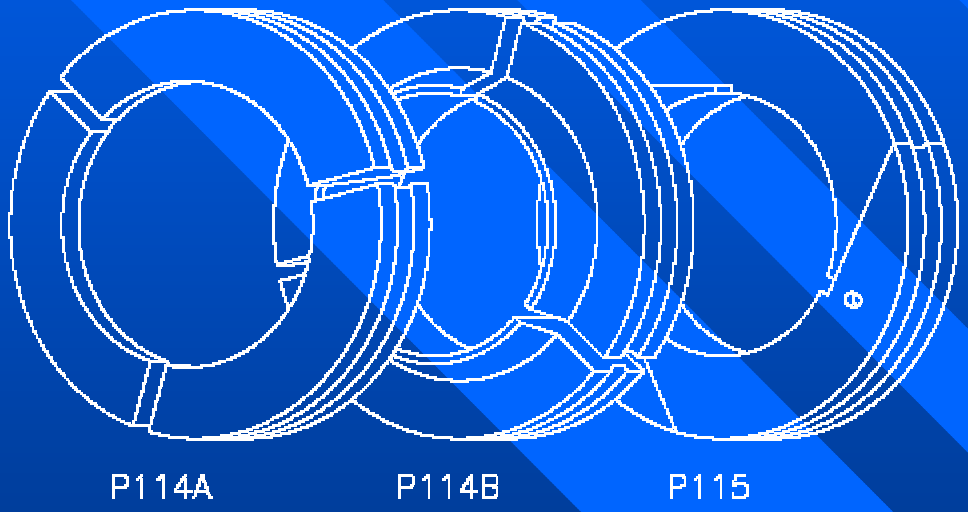
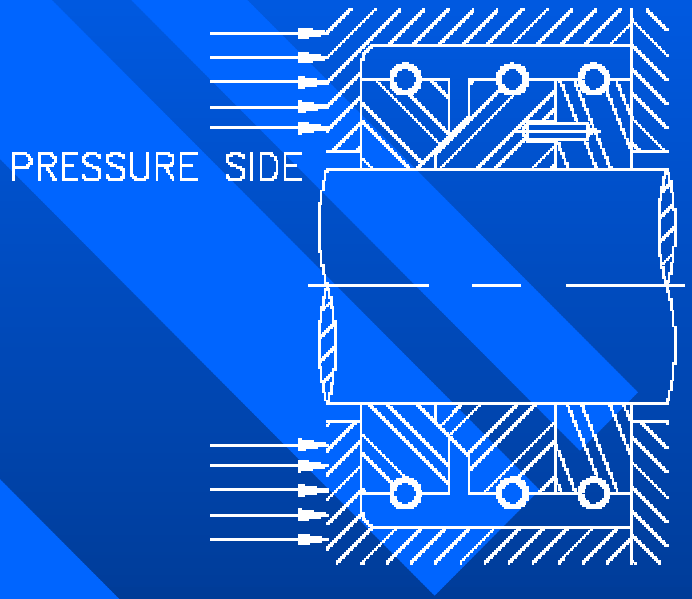
# Orientation in Cup




LEP: Low Emissions Packing
Orientation of P303 Rings

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# 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?

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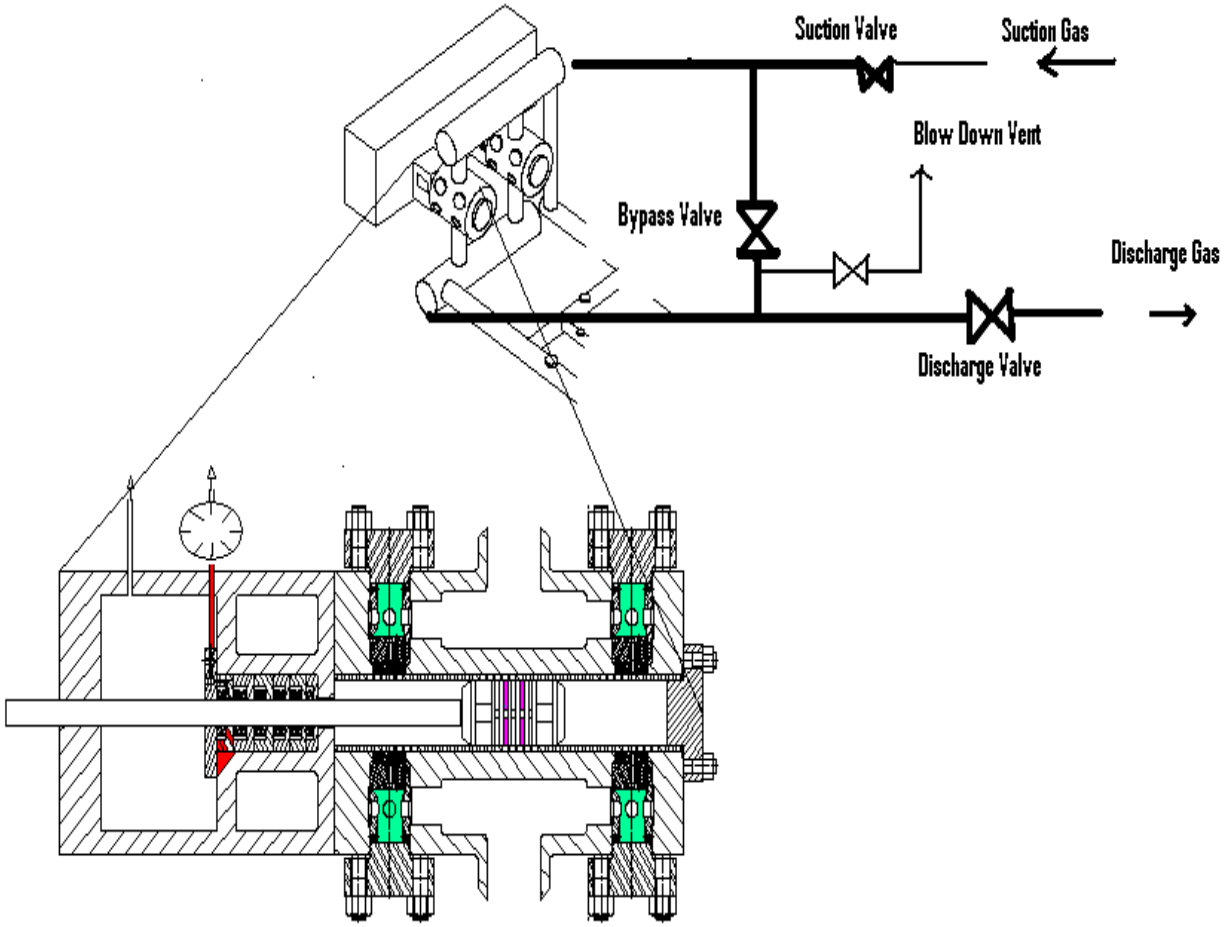
# What's in Your Packing Case?

- 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.


Suction Valve
Suction Gas
Blow Down Vent
Bypass Valve
Discharge Gas
Discharge Valve

# 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!**