


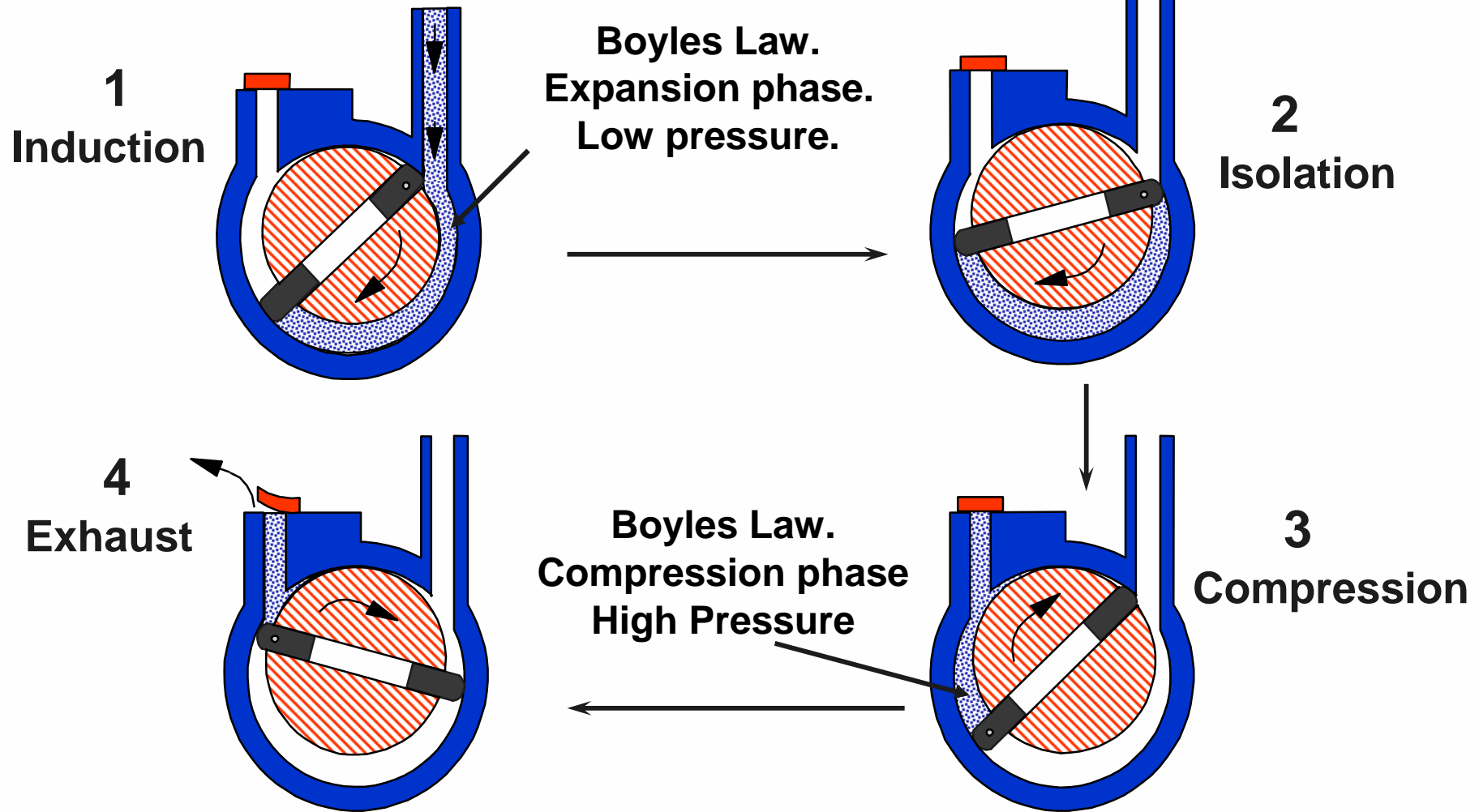


# Oil Sealed Rotary Pumps Understanding Gas Ballast

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# Rotary Vane Pump Sequence

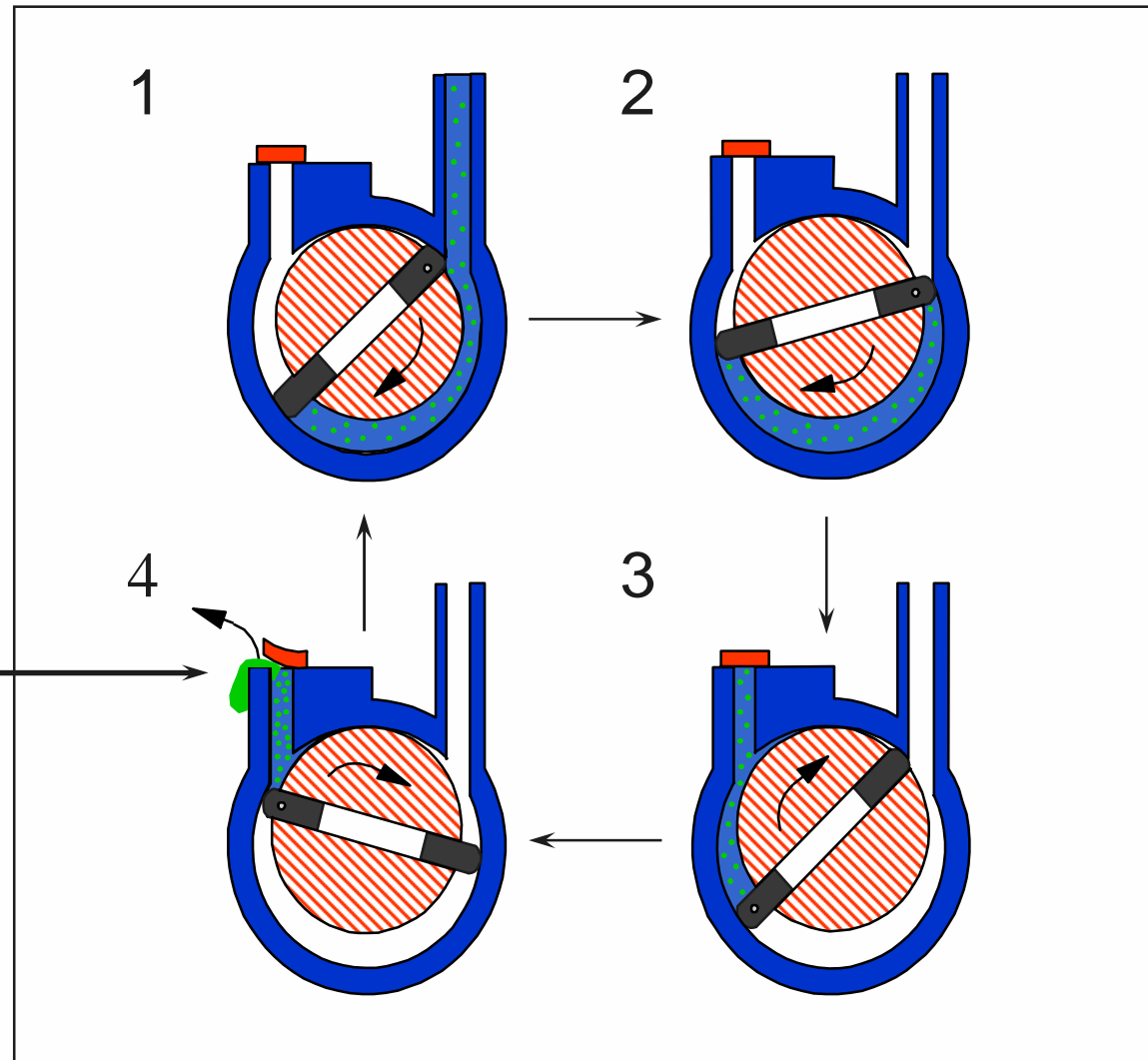


# Rotary Pump Gas Loads

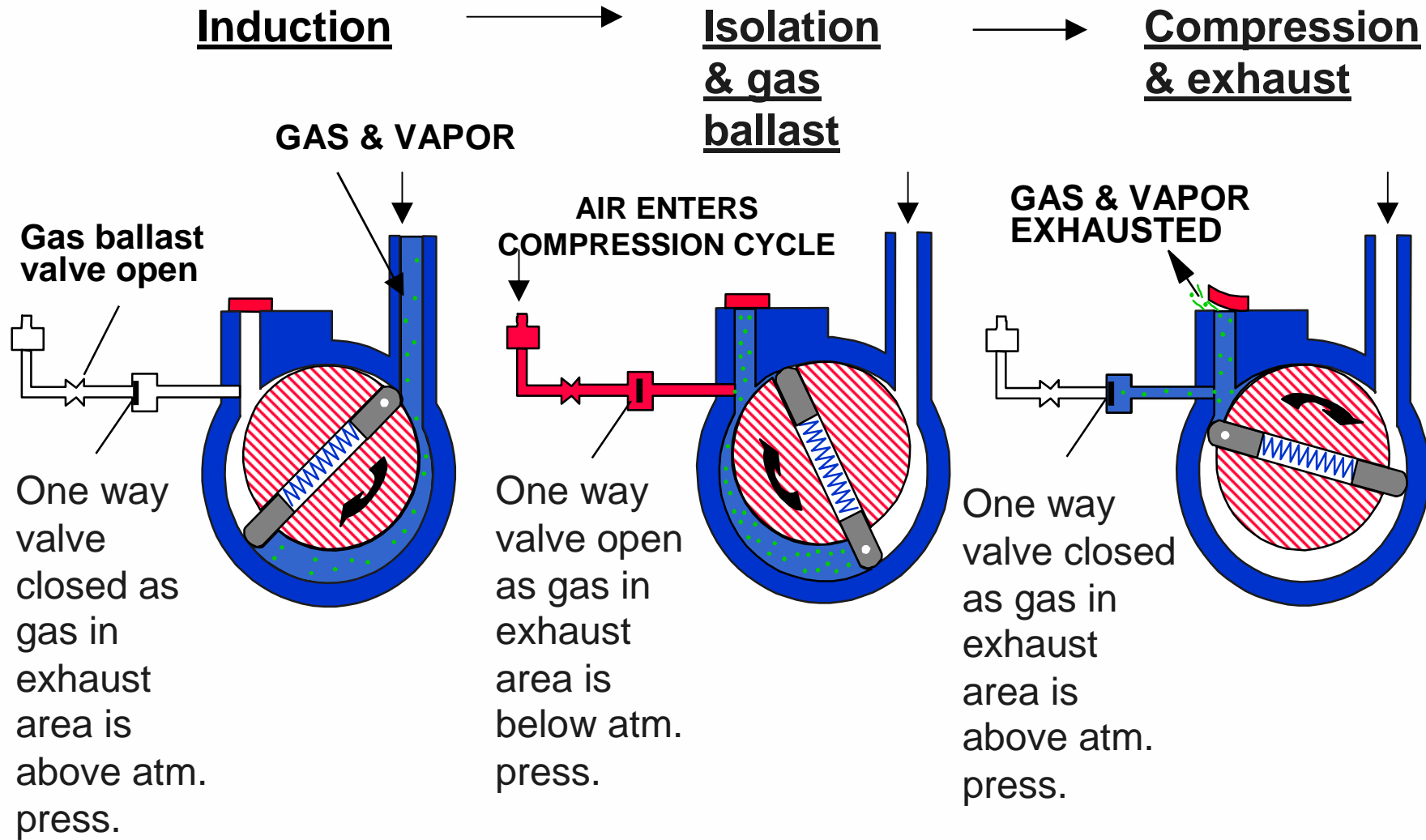
- Gas loads for Rotary Pumps may contain both permanent gas and vapors.
  - Vapors can condense (liquefy) in the compression cycle and mix with the pump oil to contaminate the oil and at worst, form an *emulsion*.
  - In many industrial applications the vapor is water vapor that condenses to water, but it can be other liquids too.
  - This mixture of oil and liquid contaminant circulates through the pump and causes :
    - Reduced vacuum performance
    - Loss of lubrication and sealing
    - Possible Pump corrosion
    - Possible Pump seizure
-

# Vapors Condensing In the Pump

**Vapors  
condense on  
compression  
forming liquids  
that mix with  
the oil**



# Gas ballast reduces vapor condensation



# Gas Ballast

- **By opening the Gas ballast valve on the rotary pump:**
    1. A small amount of air flows into the compression portion of the pump cycle.
    2. This additional air mixes with the gas/vapor being compressed.
    3. The gas/vapor mixture is now greatly diluted.  
There is more % of dry gas than % of vapors.
    4. There is now less tendency of vapors to condense.
  - **Gas ballast benefit:**

Vapors entering the pump tend to stay in the vapor state and exit the pump as a vapor.

Over time Pump oil can be purged of condensate.
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## Effect of Gas Ballast

- Spoils ultimate vacuum
  - Takes time, 2 hours or more
  - Increases pump operating temperature
  - Higher temperature improves vapor pumping capacity
  - Oil level is reduced due to oil misting through exhaust.
  - Vacuum pumps have limited capacity for vapor.  
(Consult pump manufacturer's catalog )
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## Vapor pumping suggestions

- Warm pump up before pumping vapors
  - Exhaust lines - Ensure exhaust condensate does not drip back into pump.
  - Use inlet vapor trap for large amounts of vapor.
  - Gas ballast before pump shutdown.
  - Air can be used for gas ballast in most school, laboratory, and industrial applications.
  - Dry nitrogen **must** be used in all semiconductor applications and others where reactive gases or vapors are present
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