AIR LIQUIDE
GLOBAL E&C SOLUTIONS

Helium Operators Familiarization Program

Unit 324/325 – System Shutdown and Deriming

Dec 2012 I Vincent HELOIN

Course Agenda

- **System Shutdown**
- Liquefier Trip
- Warm up and Deriming

Shutdown Sequence

- When the Liquefier is shutdown, for maintenance or warming-up, all valves are closed except :
  - **Adsorbers By-Pass**: 324 HV 701 & 702 (maintain flow to Turbines
    Turbines are stopped after adsorbers are isolated MP: 5b
  - Adsorbers depressurization valves will be open
  - 324 XV 050 (Bearing supply) will be closed only after compressor shutdown.

Shutdown Sequence

- **G100-200 STOP PRODUCTION**

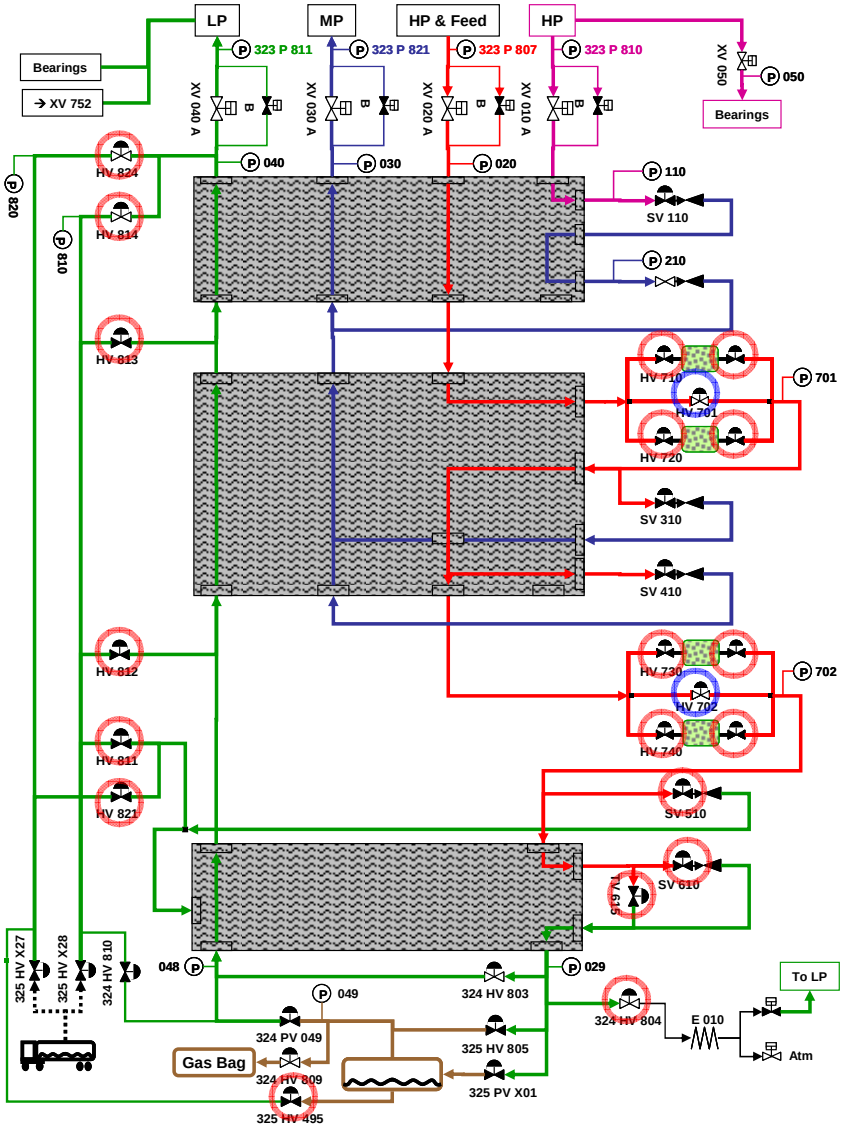
PSA, BAY, TURBINES T 5 & T 6

  - Turbine 6 Valve is closed with a ramp
  - TV615 (by pass T6), return valves (81x & 82x),HV804(cold end to atm) and 325HV495(loading line cooling) are closed.
  - Turbine 5 Valve is closed with a ramp.

- **G100-300 Adsorbers Regeneration Circuit**
  - Blower stops, and Adsorber regen. valves are closed and circuit **open** to atm (XV751 is open)

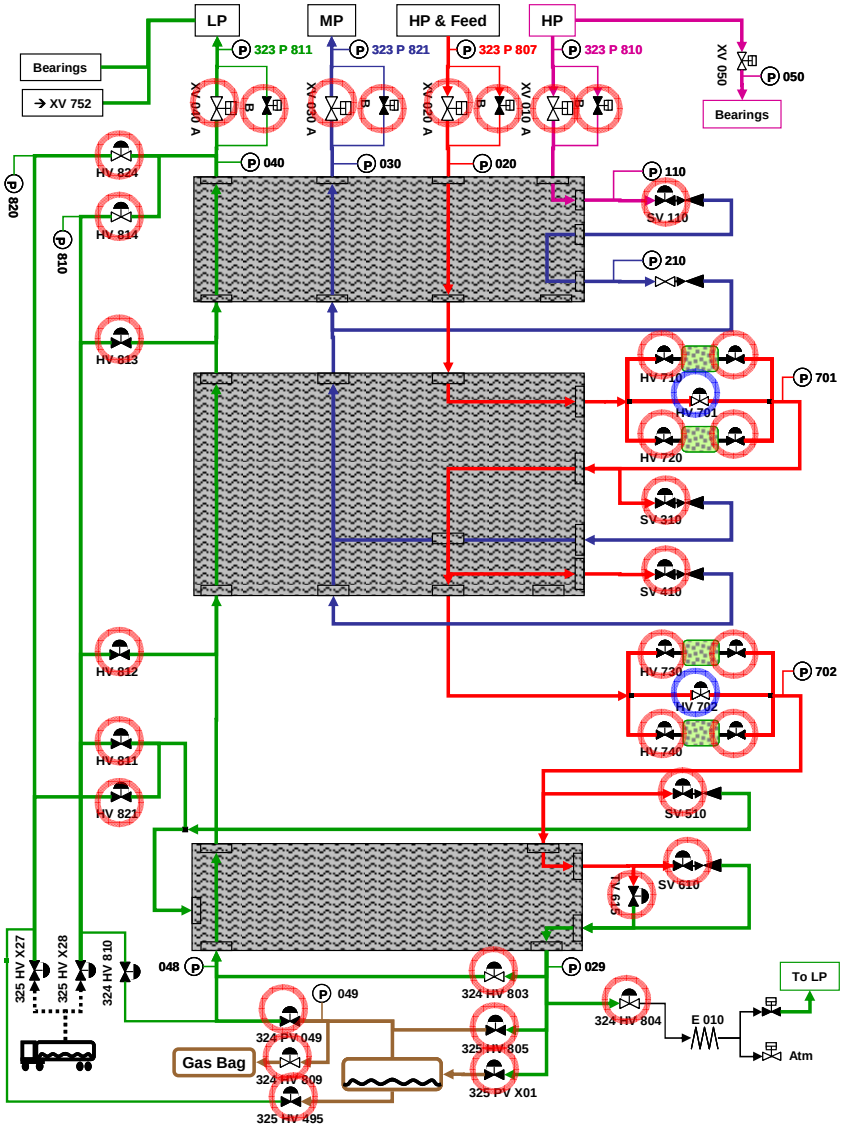
- **G100-310 Adsorber 20K**
  - Ads 20K by-pass is open **then** inlet/oulet valves are closed

- **G100-330 Adsorber 80K**
  - Ads 80K by-pass is open **then** inlet/oulet valves are closed
  - Starts G210 adsorbers depressurization (**open FV713,723,733,743**)



Shutdown Sequence

- **G100-400 LHe Storage Disconnection**
  - Stop PCV029 / JT controls
  - Close PVx01 / JT valves
  - Close HV803 / Cold End By-Pass
  - Then Close PV049, HV809 and HV805
- **G100-500 Stop Turbines**
  - Stop G340 / Turbine 4
  - Stop G330 / Turbine 3
  - Stop G310 / Turbine 1 & 2
- **G100-600 Isolation**
  - Close XV010A&B / HP to T1 & T2
  - Close XV020A&B / HP to T3,T4,T5,T6
  - Close XV030A&B / MP from T1&T2, 3,4
  - Then Close XV040A&B / LP
  - Close HV 701 & 702 (Ads By-passes)
  - Exit G210 adsorber depressurization (close FV7x3 and XV751)
- **G100-700 Finalization**
  - **All valves are closed except**
    - **324 XV 050 : Stays in previous position**
    - **324 XV 1x4 (Bearing depressurization valves**
    - **Vacuum valves**



Course Agenda

- System Shutdown
- **Liquefier Trip**
- Warm up and Deriming

Trip Sequence

- Exit all sequences.
- Trip all turbines
- Trip Blower and purge group
- All valves are close except :
  - 324 XV 050 (Bearing supply) will be closed only after compressor shutdown.
  - Bearing Discharge Valves will remain active
  - Vacuum wil continue to work

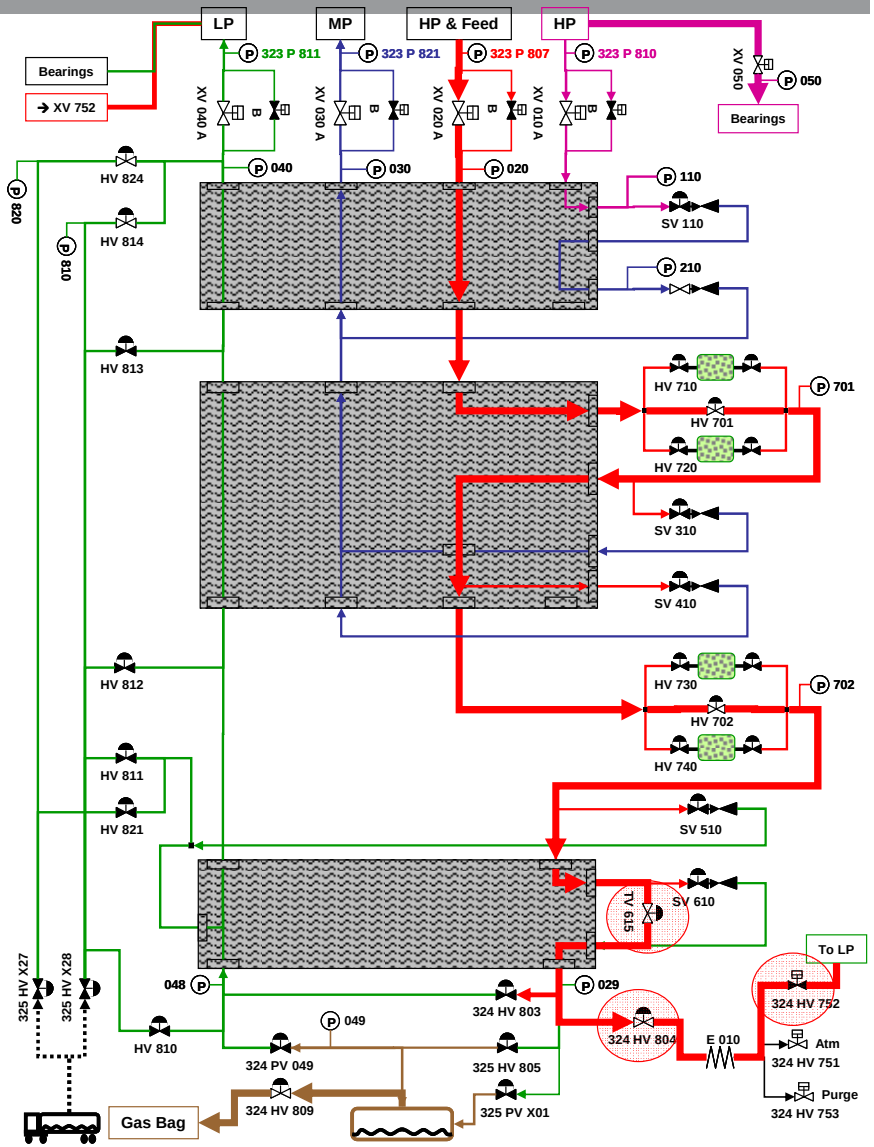
Course Agenda

- System Shutdown
- Liquefier Trip
- **Warm up and Deriming**

Warm-up

- **Warm-Up:**
  - Warm Gas is circulated through HP (324 XV 020).
  - The flow exits through 324HV804 and is warmed up by 324 E 010
  - The Flow is then returned to the LP compressor suction

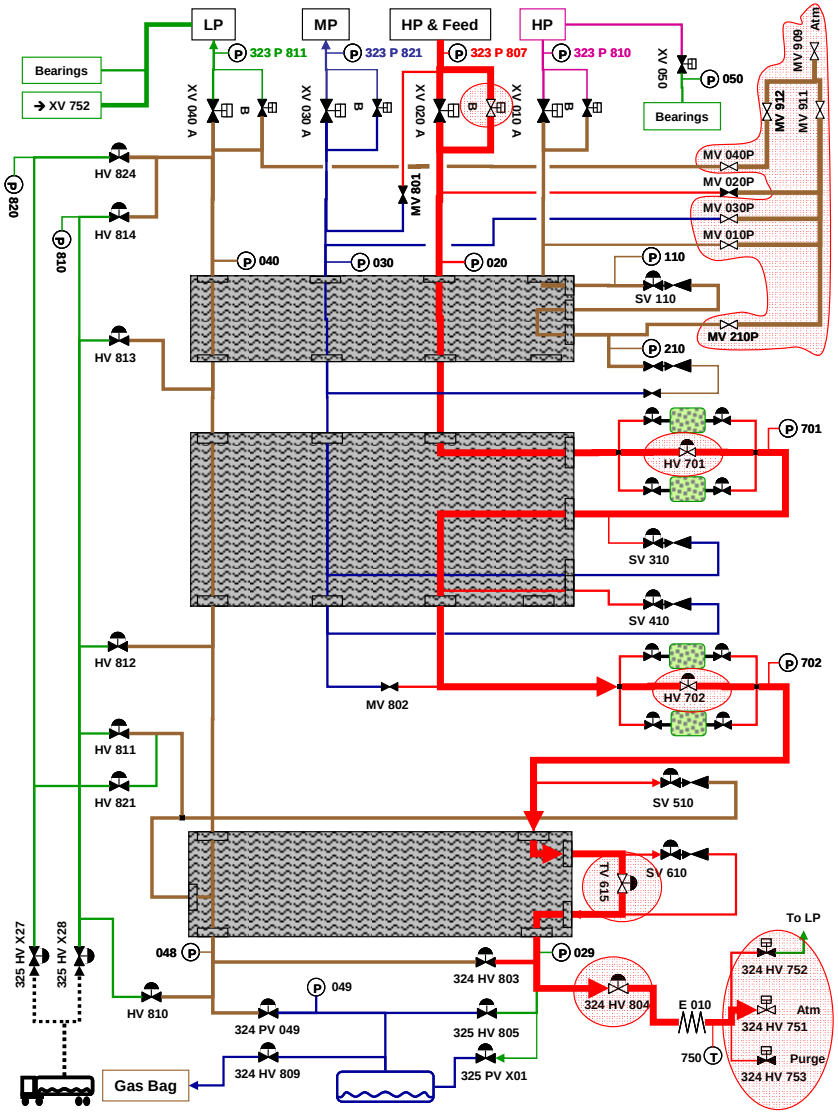
Note: WARM-UP does not remove Impurities from the cycle helium.



Deriming

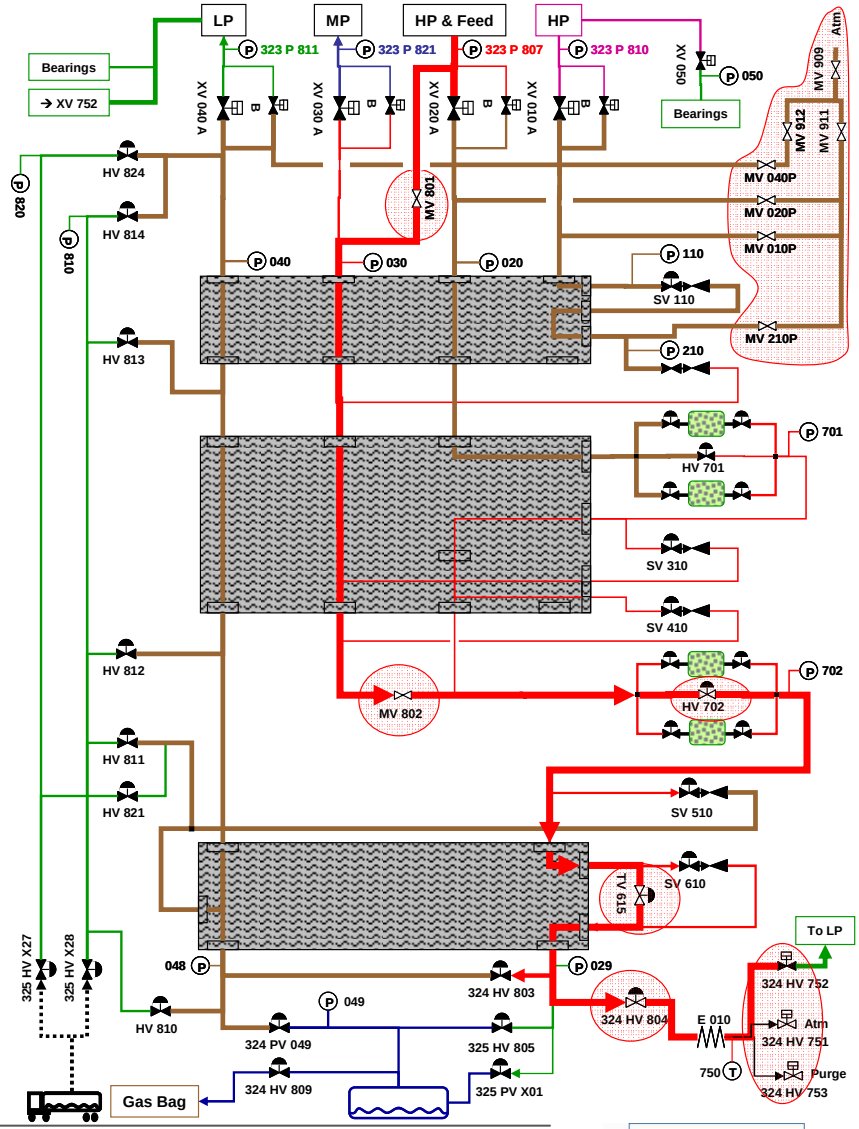
- **Deriming:**
  - Warm Gas is circulated through HP (324 XV 020).
  - The flow exits through 324HV804 and is warmed up by 324 E 010
  - The Flow is then vented.

Note: WARM-UP removes Impurities from the cycle helium.



Deriming without Helium losses

- **Deriming:**
  - Warm Gas is circulated counter flow through MP Line (324 HV 801 and 324 HV 802)
  - Flow does not mix with impurities which are directly vented to the atmosphere.
  - This flow will exit the cold box through 324 HV 804 and will be warm-up by 324 E 010
  - The Flow is then returned to the compressor station.
  - Meanwhile, LP and HP circuits are depressurized to avoid pressure increase during warm-up.



Deriming – When to perform it ?

When DP or DT though exchangers increase, this indicate the impurities are clogging it.

In that case a Deriming is necessary.

Impurities are mainly trapped in HX HP Line