SQ1 – Valve Box, conditioning He circuits

**Sensors and actuators used:**

- Pressure: PT580

- Valve: FV090, FV091NO, FV092, FV600, FV601, FV602, FV640, FV641, FV642, FV643, Switch valves

- Control valve: CV600, CV601, CV602, CV603, CV580, CV590, CV-He-liquefier

- Purging system: vacuum pump P090

|  |  |
| --- | --- |
| **The user chooses:** | **Initial conditions:** |
| - Number of cleaning cycle: Nb cycle | - Sequences from 5 to 20 stopped |
| - Delay: tstarting, tvac1, tvac2, tp1, tp2 |  |
| - Mode: Vacuum, Liquid or Magnet |  |
| - Pressure: Pvac, PvacMax, P He, P He min |  |

PT580 < Pvac

Alarm validated

PT580 < PvacMax & t > tvac1

PT580 ≥ PvacMax & t < tvac1

Leak test at high pressure

Close FV092 & FV600

Delay tp1

PT580 > P He

PT580 > P He min

& t > tp1

& N ≥ Nb cycle

PT580 > P He min

& t > tp1

& N < Nb cycle

Alarm validated

t > tvac2 & PT580 > Pvac

t > tp2 & PT580<P He

High level vacuum alarm

P090 running

Alarm validated

No

Yes

“Do you want to stop the conditioning?“

“Do you want to keep lines under vacuum?“

Yes

Flushing with

GHe

Open FV092 & FV600

Delay tp2

t > tstarting & (CV-He-liquefier & CV590) closed

“Do you want to stop the conditioning?“

No

Yes

PT580 P He min & t < tp1

Alarm validated

Low level pressure alarm

FV600 closed

CV580 closed

Helium conditioning stopped

Close FV090, FV092, FV601, FV602 Close CV600, CV601, CV602, CV603, CV580, FV641, FV643

P090 stopped

Pump stopped

Stop P090

Open FV091NO

Open CV580, FV641, FV643,

Open CV601, CV602, CV603,

Close Switch Valves “Valve Box Circuit”

Close FV640, FV642

Open CV600, FV601, FV602

Close CV-He-liquefier, CV590

Start the Pumping

Close FV091NO

Open FV090

Start the Pump P090

Open FV600

Delay tvac2

Pumping

CV580, CV600, CV601, CV602, CV603 opened FV601, FV602, FV641, FV643 opened

CV580, CV600, CV601, CV602, CV603 opened FV090, FV601, FV602, FV641, FV643 opened

FV091NO closed, P090 running

Leak test at low pressure

Close FV090 & FV600 Delay tvac1

CV580, CV600, CV601, CV602, CV603 opened FV601, FV602, FV641, FV643 opened

FV091NO closed, P090 running

CV580, CV600, CV601, CV602, CV603 opened FV601, FV602, FV641, FV643 opened

FV091NO closed, P090 running

Valve Box circuits isolated

Close FV600

Start conditioning

Stop

Prepare for purging

No

Vacuum

Alarm

Close FV090

Flushing

with GHe

Open FV092 Open FV600

Delay tp2

PT580 > P He

t > tp2 & PT580<P He

Alarm validated

Close FV092

“Not possible to pressure the line”

Pressure

Alarm

Close FV092

Close FV090

FV090 closed