SQ3 – Supercritical helium, He conditioning circuits

**Sensors and actuators used:**

- Pressure: PT381

- Valve: FV090, FV091NO, FV092, FV380, FV381, FV382, FV383

- Control valve: CV380

- Purging system: vacuum pump P090, He gas

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

PT381 < Pvac

Alarm validated

PT381 < PvacMax & t > tvac1

Start conditioning

PT381 ≥ PvacMax & t < tvac1

PT381 > P He

PT381 > P He min

& t > tp1

& N ≥ Nb cycle

PT381 > P He min

& t > tp1

& N < Nb cycle

Alarm validated

t > tvac2 & PT381 > Pvac

t > tp2 & PT381<P He

High level vacuum alarm

P090 running

Alarm validated

Flushing with

GHe

Open FV092 & FV380

Delay tp2

Stop

t > tstarting & FV383 closed

PT381 P He min & t < tp1

Alarm validated

Low level pressure alarm

FV380 closed

(FV090&FV092) closed

P090 stopped

Pump stopped

Stop P090

Open FV091NO

Prepare for purging

Open CV380

Open FV381, FV382

Close FV383

Start the Pumping

Close FV091NO

Open FV090

Start the Pump P090

Open FV380

Delay tvac2

Pumping

CV380 opened

FV381, FV382 opened

CV380 opened

FV090, FV381, FV382 opened

FV091NO closed, P090 running

Leak test at low pressure

Close FV090 & FV380 Delay tvac1

CV380 opened

FV381, FV382 opened

FV091NO closed, P090 running

CV380 opened

FV381, FV382 opened

FV091NO closed, P090 running

SHe circuits isolated

Close FV380, FV381, FV382

Close CV380

No

Yes

“Do you want to keep lines under vacuum?“

Yes

Leak test at high pressure

Close FV092 & FV380

Delay tp1

Helium conditioning stopped

Close FV090, FV092

No

Yes

“Do you want to stop the conditioning?“

Vacuum

Alarm

Close FV090

“Do you want to stop the conditioning?“

Pressure

Alarm

Close FV092

No

PT381 > P He

t > tp2 & PT381<P He

Alarm validated

Flushing

with *GHe*

Open FV092 Open FV380

Delay tp2

Close FV092

“Not possible to pressure the line”

FV090 closed

Close FV090