TDR Part 2:
3.7 Cavity and cryomodule test
(?? pages)

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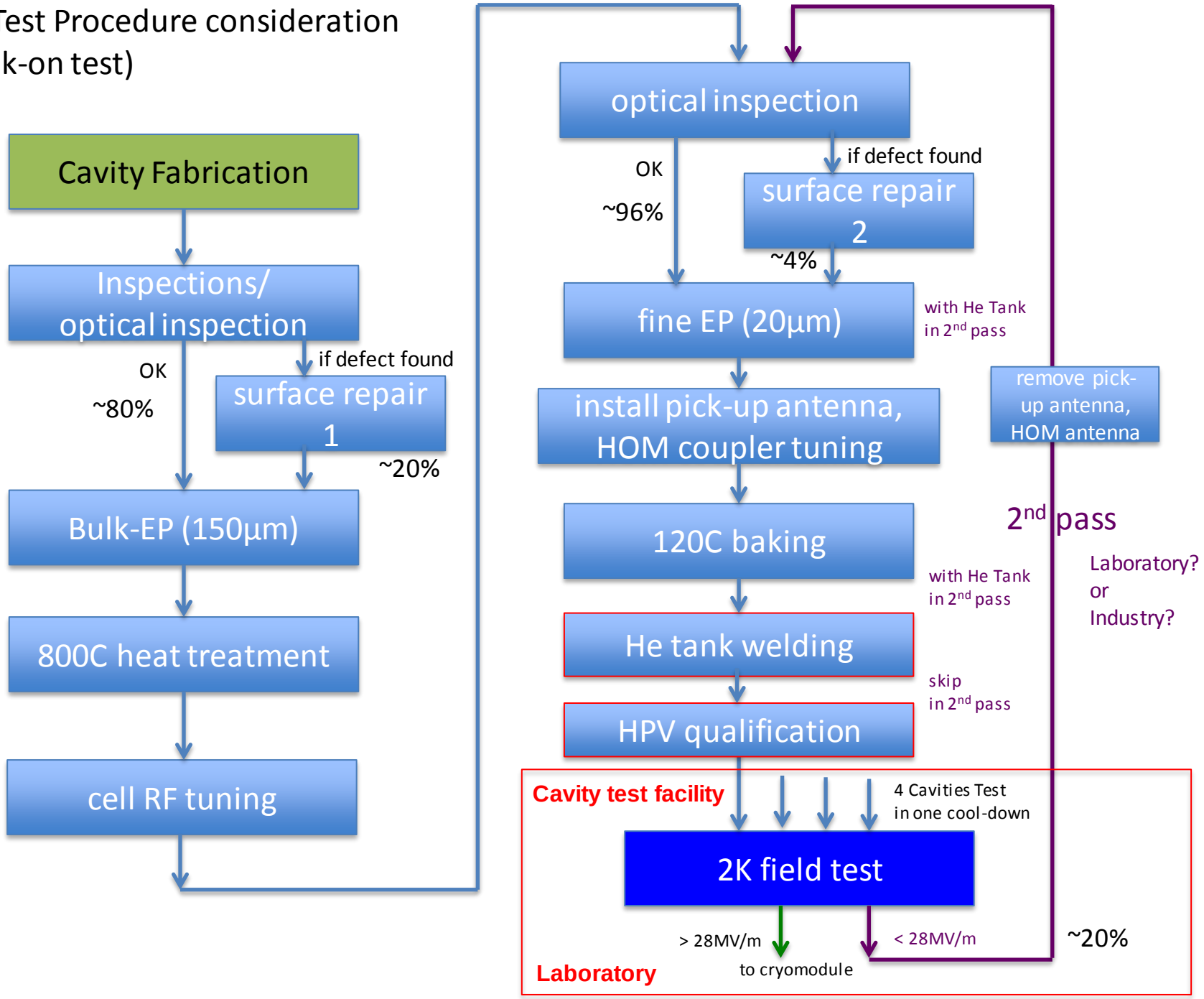
3.7 Cavity and Cryomodule test

3.7.1 Cavity test procedure

3.7.2 Cryomodule test procedure

Cavity Test Procedure consideration
(He tank-on test)



Cavity treatment change: proposal

(1) Include surface inspection and local repair, before and after bulk-EP

Visible, clear defects can be identified and easily removed before costly field test.
By automated inspection and repair-robotics, man-power cost reasonably low.

(2) Tank-on delivery, ready to do field test

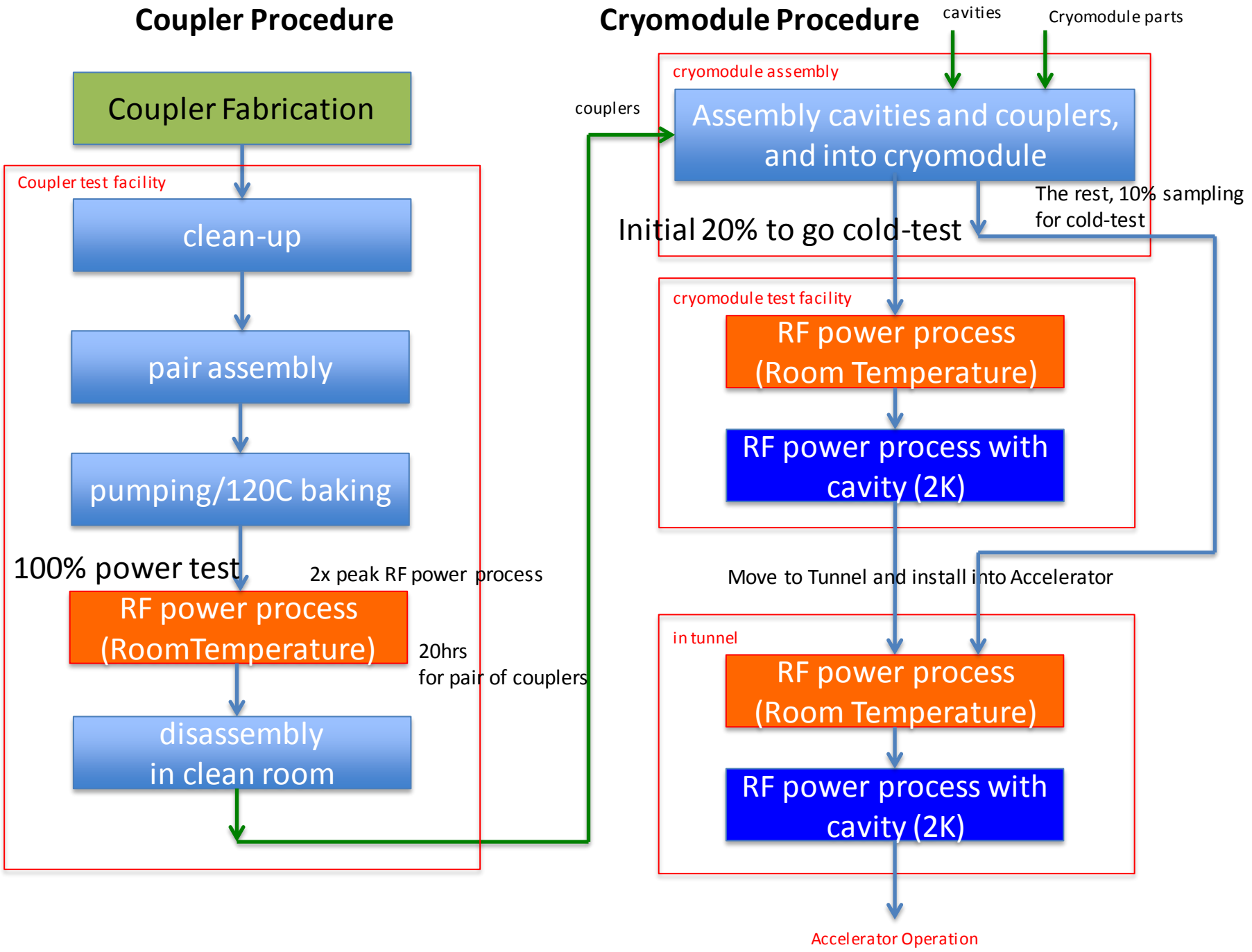
Follow XFEL procedure.
Give-up quench location identification assuming surface inspection effectively work.
Minimize industry/laboratory transportation.

(3) Apply 2-nd pass treatment, if the gradient less than 28MV/m, (no more 3-rd treatment)

Assuming 1-st pass ~80% yield extrapolated and expected from cavity gradient data-base,
Another >80% yield for 2-nd pass, makes >96% yield in total.

(4) Field Test Facility is the laboratory responsibility
Need to cost estimate for industry 2-nd pass or laboratory 2-nd pass

Existing Lab cryogenics has cost benefit for laboratory field test facility.


Coupler Procedure
Coupler Fabrication
Coupler test facility
clean-up
pair assembly
pumping/120C baking
100% power test
2x peak RF power process
RF power process (RoomTemperature)
20hrs
for pair of couplers
disassembly in clean room
couplers
Cryomodule Procedure
cavities
Cryomodule parts
cryomodule assembly
Assembly cavities and couplers, and into cryomodule
The rest, 10% sampling for cold-test
Initial 20% to go cold-test
cryomodule test facility
RF power process (Room Temperature)
RF power process with cavity (2K)
Move to Tunnel and install into Accelerator
in tunnel
RF power process (Room Temperature)
RF power process with cavity (2K)
Accelerator Operation

Coupler test, cryomodule test: proposal

(1) 100% coupler power test done by industry

High peak power process is strongly recommended
for ceramics window process, whisker process and out-gass process.
not good for in-situ process to avoid contamination into cavity.

120C baking is also required for surface water removal,
not good for in-situ baking to avoid contamination into cavity.

So that, automated Coupler Test Facility for 100% coupler process
should be considered.
To make fabrication feedback easy, industry should do rf process.

According to specification table, rf process should be;
>1200kW up to 400μs pulse width, >600kW for 400 ~ 1600μs
>600kW for 1600μs.

After process, cold part should be disassembled and packed in clean-room.

(2) Average 30% cryomodule cold test done by laboratory

Existing Lab cryogenics (Lab operated cryogenics) and Lab high power RF system has cost benefit for cryomodule test facility.

Laboratory should have responsibility for the final test of cryomodule, because of final check point of accelerator performance before tunnel installation.

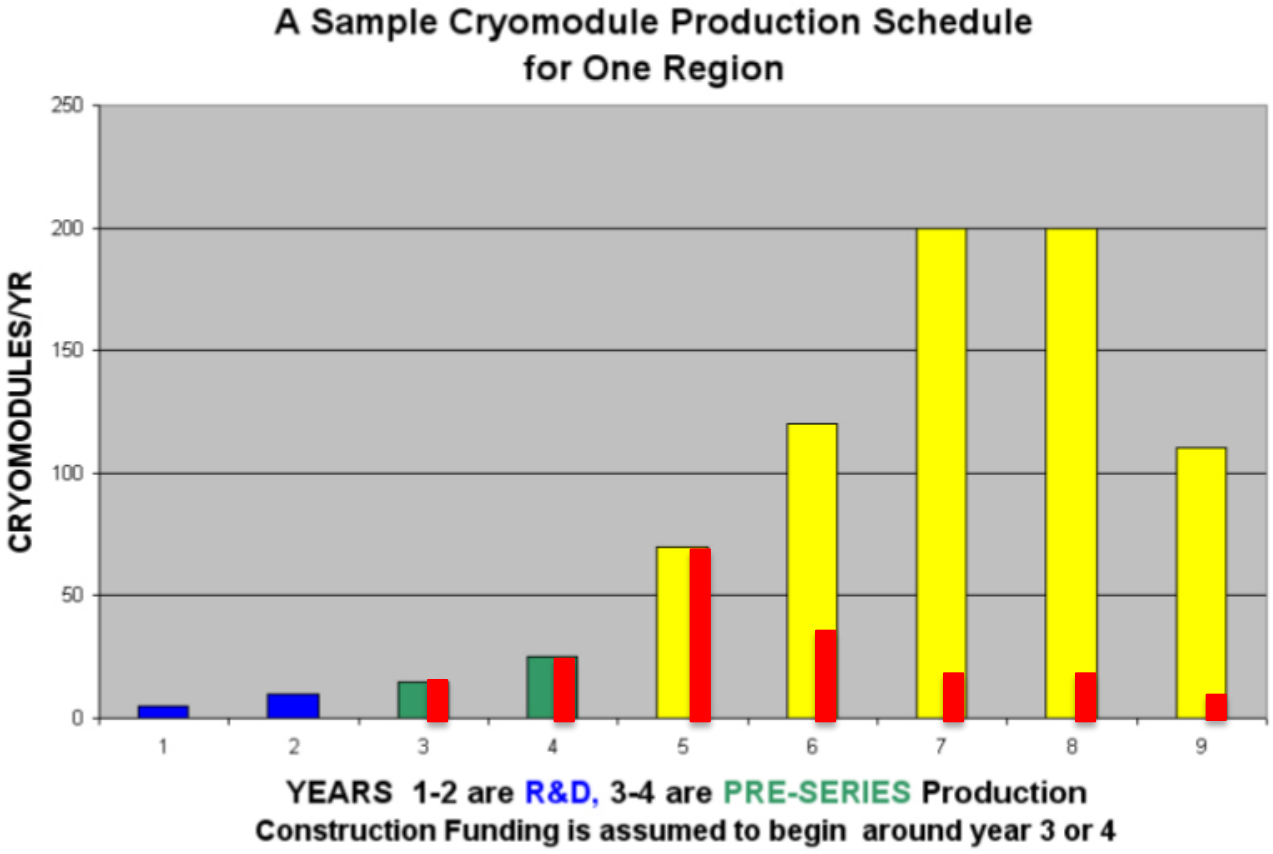
Only average 30% of 1824 cryomodule production
(~ 547 cryomodule -> 182 cryomodule/region) are tested.

Initial every ~120 cryomodule (20%) are tested, then only 10% of the production are tested by sampling.

In start-up 3 years, cavity performance degradation issue should be addressed and solved before production.

~1.5 months/cryomodule assembly term makes 24 cycles assembly, then 24 times feedback process is enough to address vaious issues to solve.

Cryomodule production in RDR



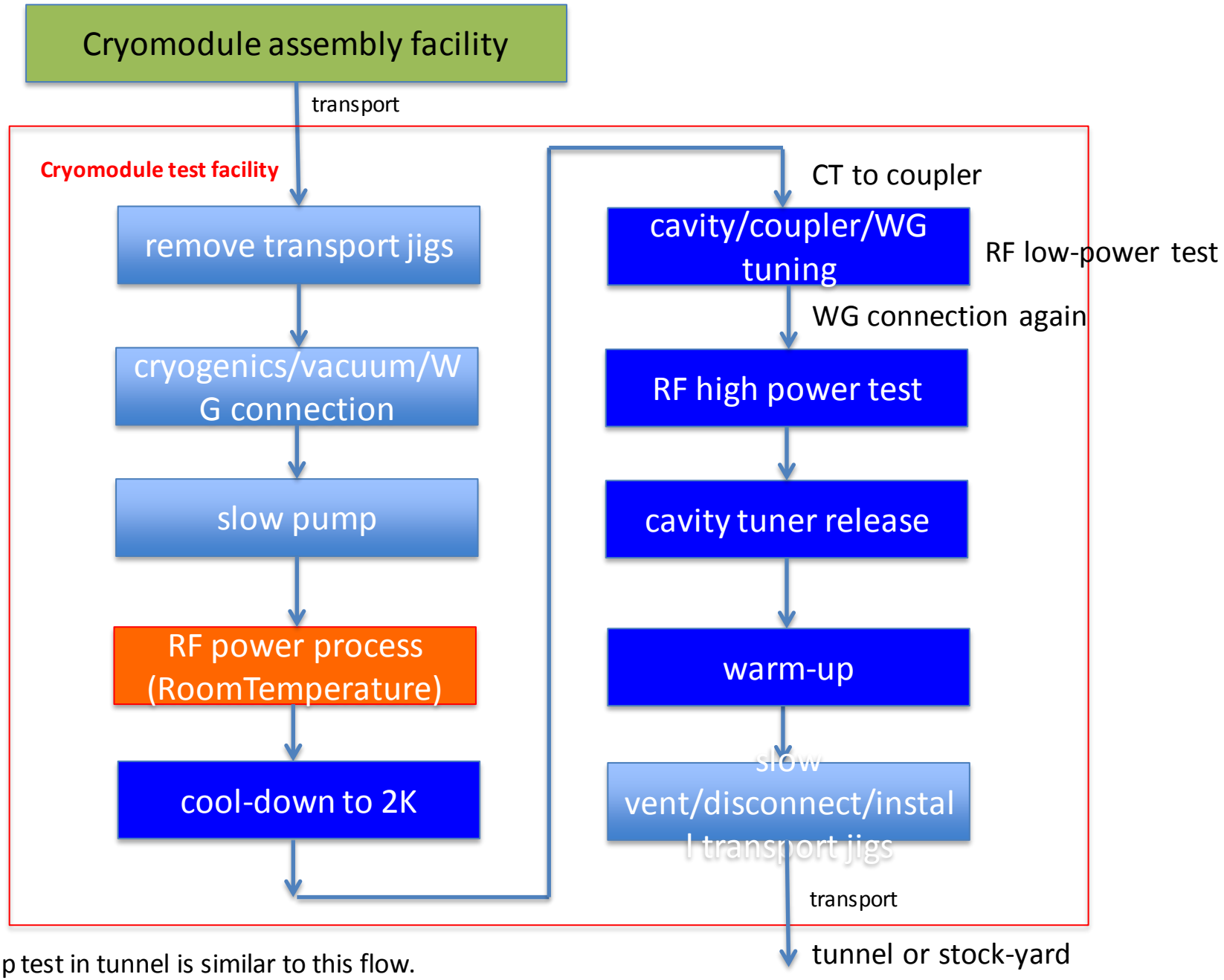
red bar shows
30% cold test

Average 30% cryomodule cold-test

Initial 20% cold-test

10% sampling for the rest

Cryomodule Test flow



*start-up test in tunnel is similar to this flow.