Plug-compatibility interface for Input Coupler

LCWS13-AWG7-SCRF

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In TDR

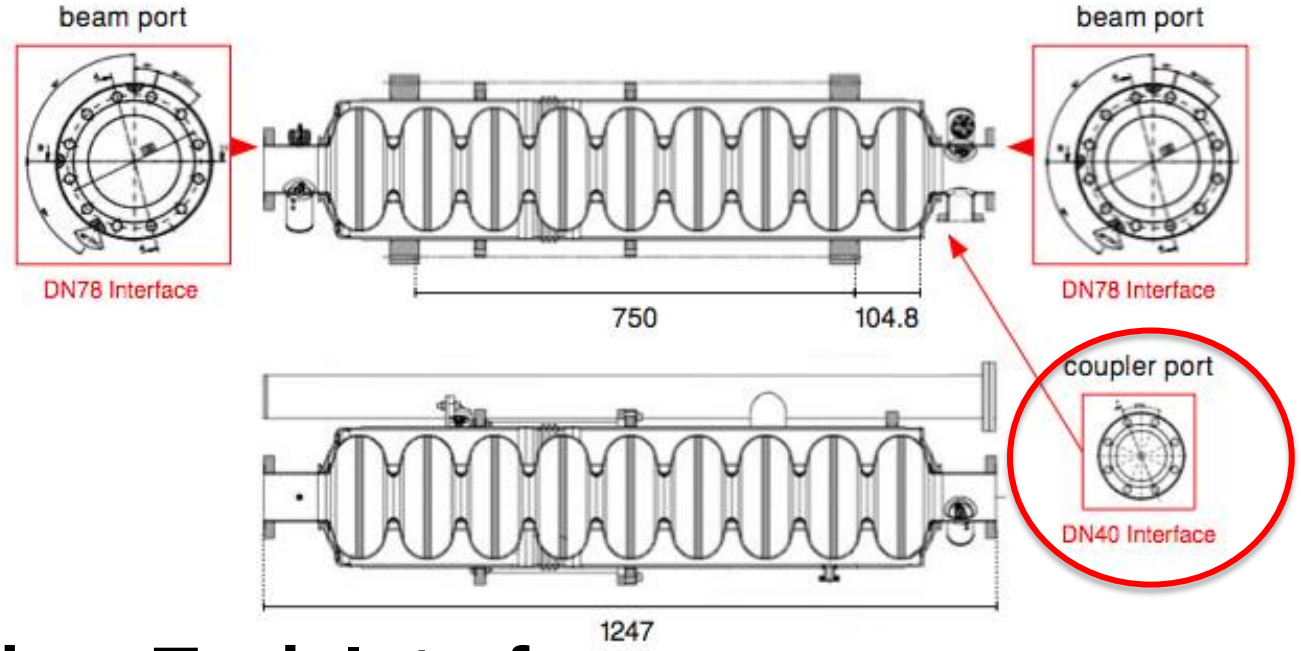
In order to allow various designs for sub-components to work together in the same cryomodule,

(1)Cavity Resonator interface,
(2)Helium tank interface,
(3)Fundamental-mode input coupler interface,

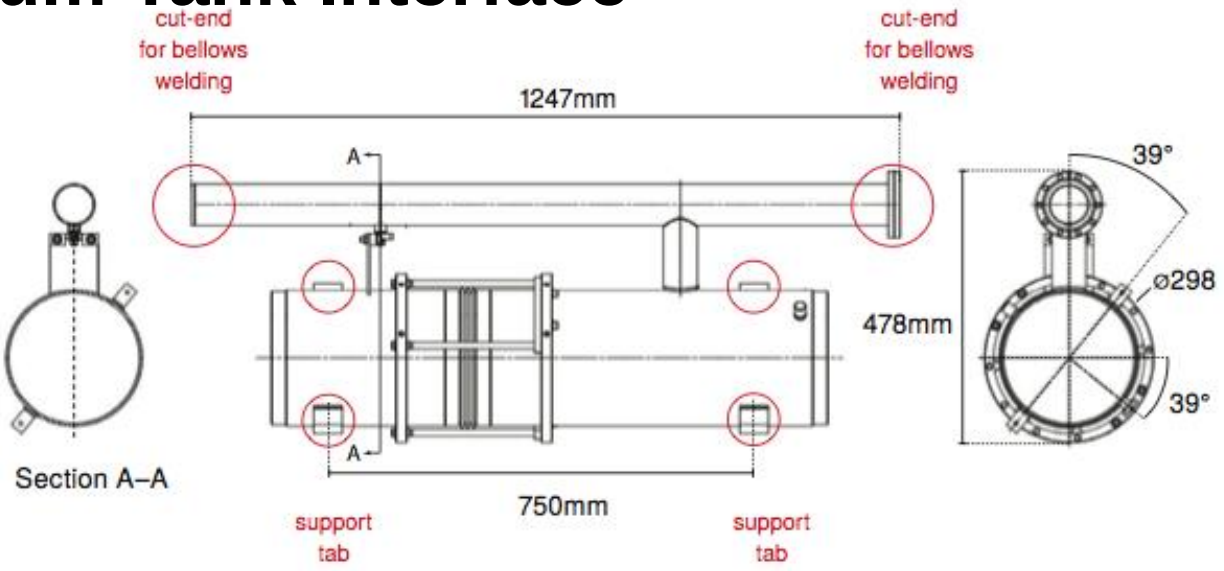
have been agreed upon.

Coupler interface are as follows;

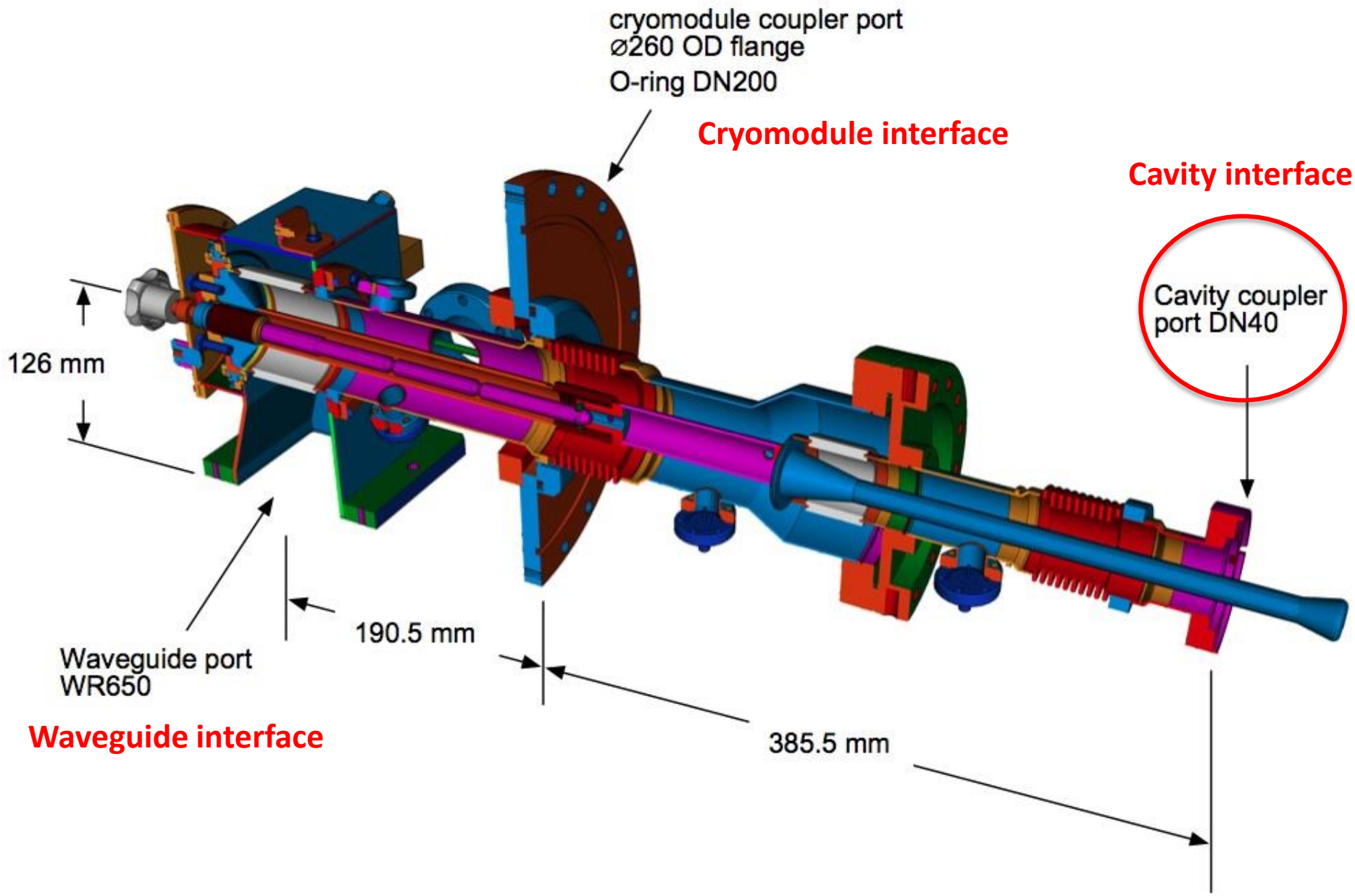
(1) Cavity Resonator Interface

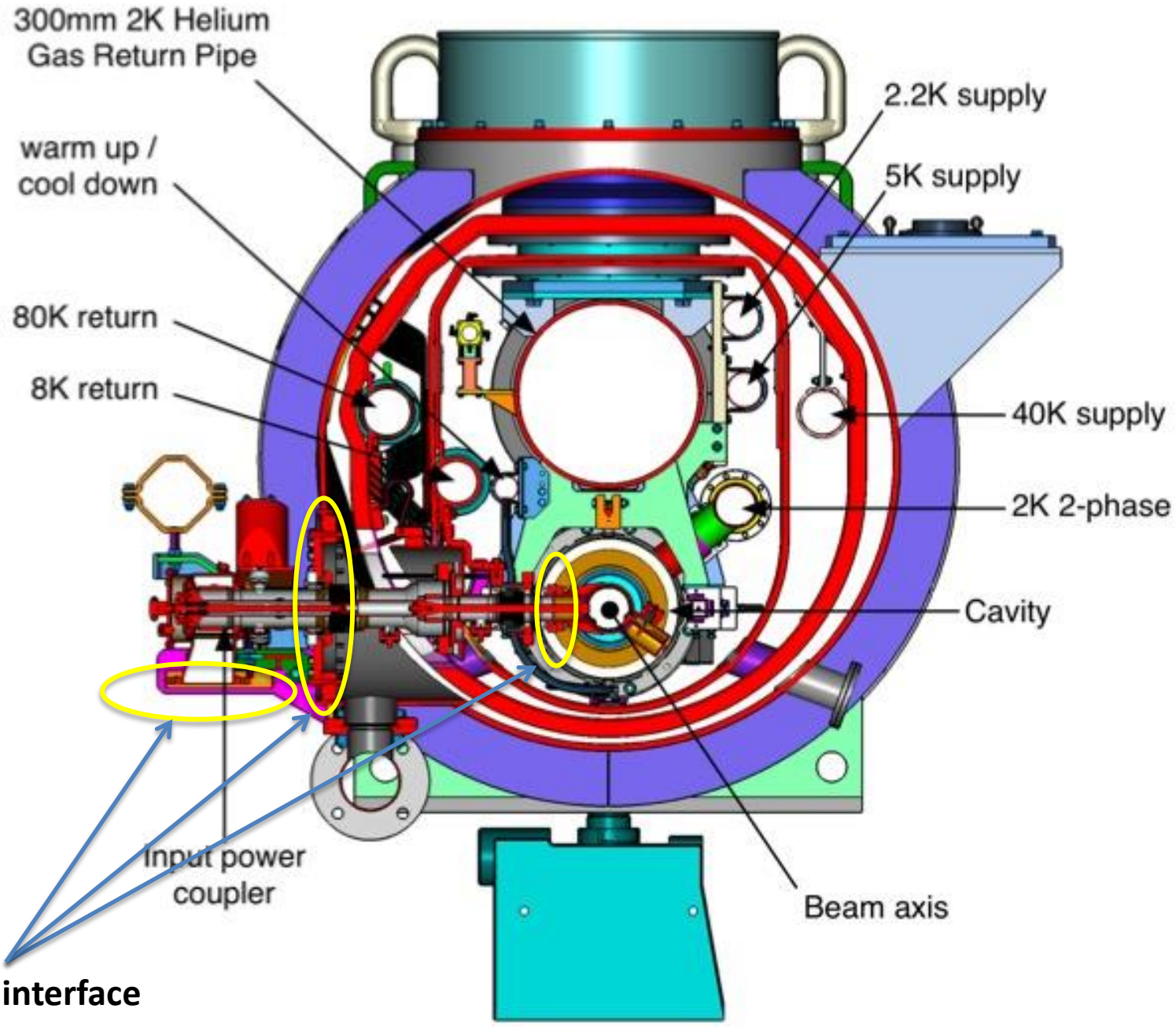


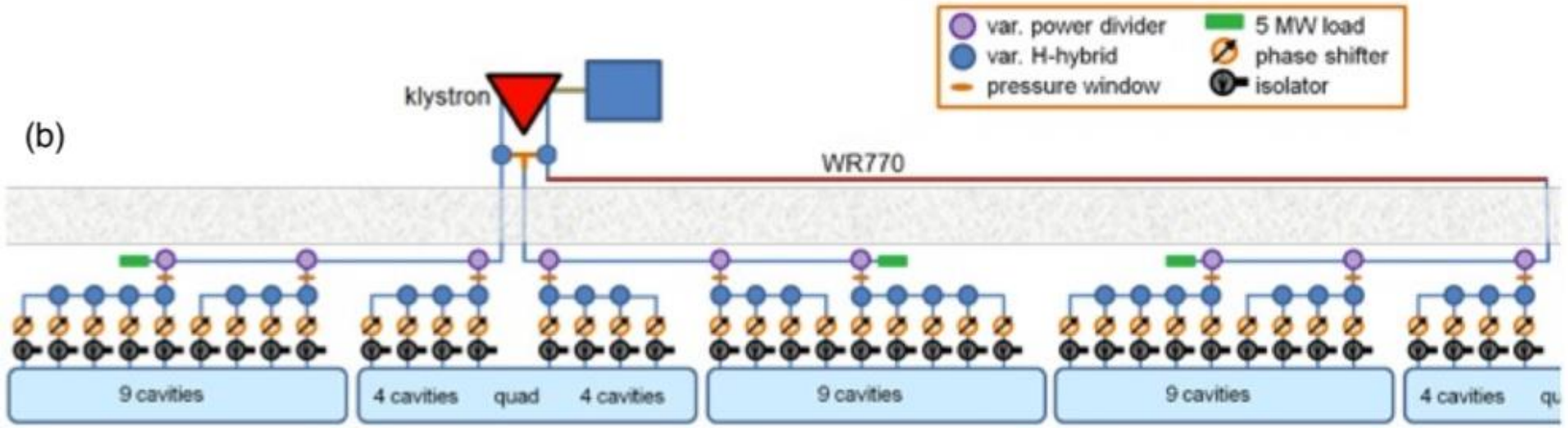
(2) Helium Tank Interface



(3) Fundamental mode input coupler interface

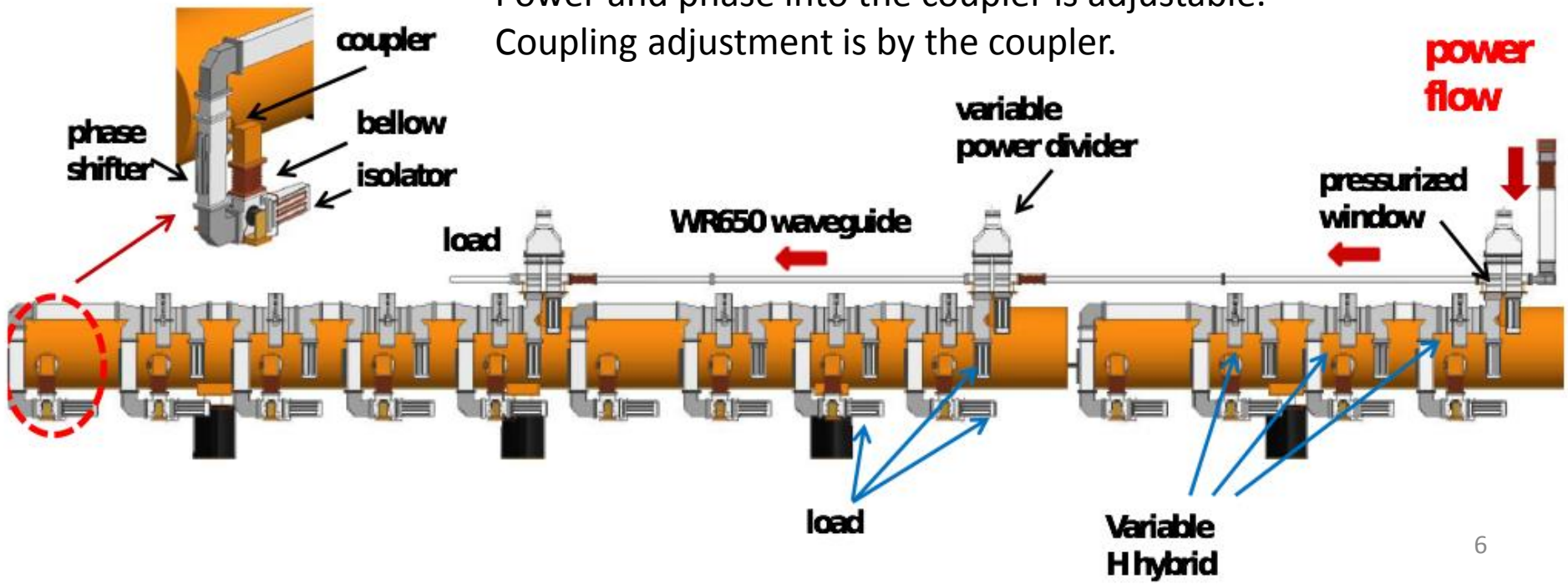



300mm 2K Helium
Gas Return Pipe
warm up /
cool down
80K return
8K return
2.2K supply
5K supply
40K supply
2K 2-phase
Cavity
Input power
coupler
Beam axis
Coupler interface



Interface to power distribution waveguide

Power and phase into the coupler is adjustable.
Coupling adjustment is by the coupler.



TDR coupler specification table

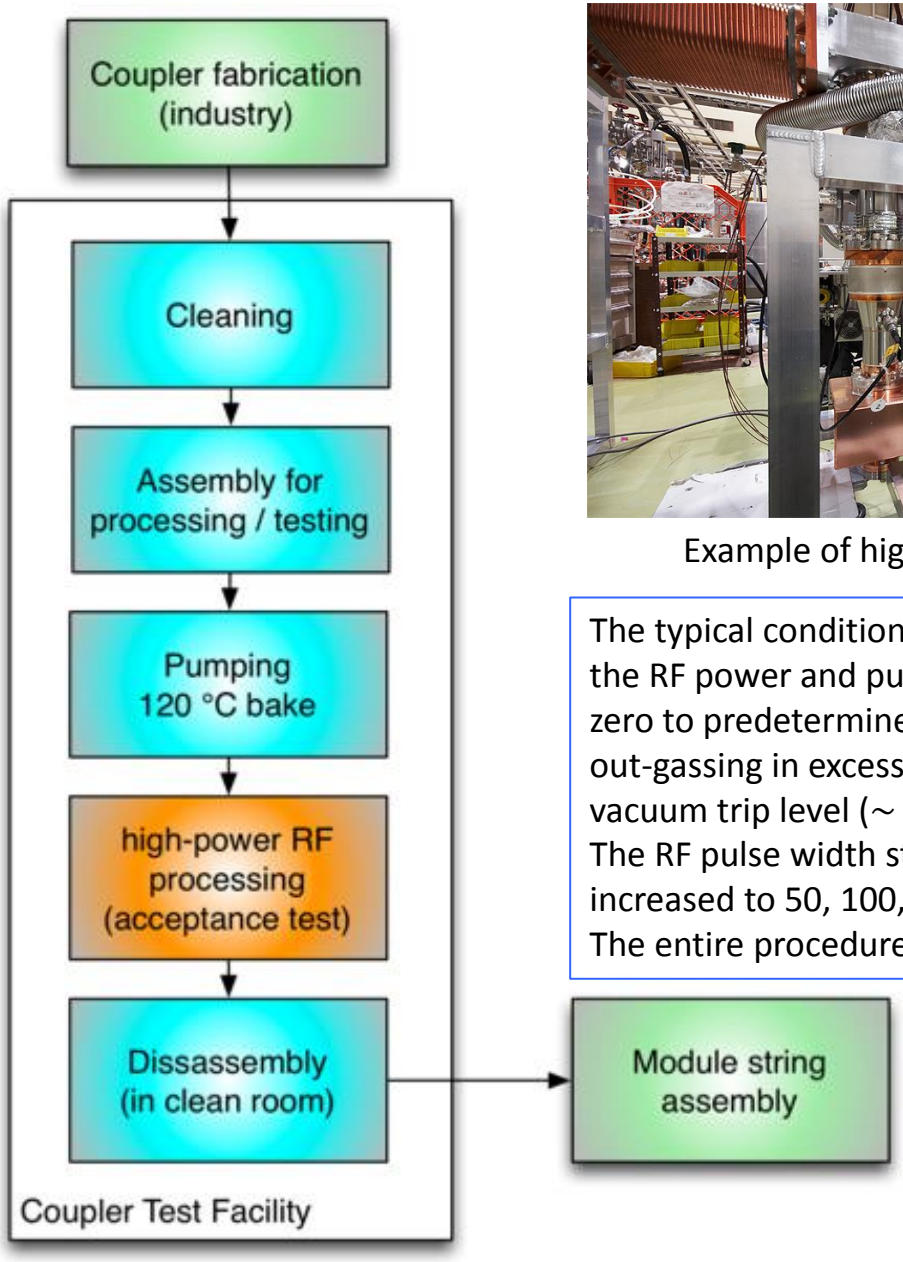
Parameter	Specifications
Frequency	1.3 GHz
Operation pulse width	1.65 ms
Operation Repetition rate	5 Hz / 10 Hz
Maximum beam current	8.8 mA
Accelerating gradient of cavity	31.5 MV/m ± 20%
Required RF power in operation	~ 400 kW
Range of external Q value	$(1.0 \sim 10.0) \times 10^6$ (tunable)
RF process in cryomodule	> 1200 kW for ≤ 400 μs pulse width
	> 500 kW for > 400 μs pulse width
RF process with reflection mode in test stand.	> 600 kW for 1.6 ms pulse width
RF process time	< 50 hours in warm state
	< 20 hours in cold state
Approximate heat loads	< 0.01 mW (2K static)
	0.07 W (5K static)
	0.6 W (40K static)
	< 0.02 W (2K dynamic)
	0.12 W (5K dynamic)
	1.6 W (40K dynamic)
Number of windows	2
Bias voltage capability	Required

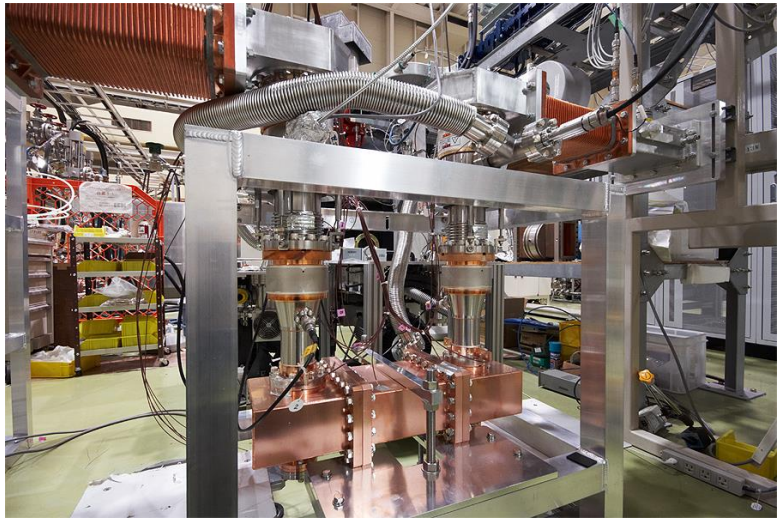
+/-10mm antenna penetration, by remote actuator

Need to check (big difference from my description)

Al2O3 with TiN coated in vacuum side

TDR coupler process flow





Example of high-power process stand

The typical conditioning procedure is to raise the RF power and pulse width in steps from near zero to predetermined maximums, avoiding out-gassing in excess of a prescribed vacuum trip level (~ 2 × 10−7 mbar).
The RF pulse width starts from 20 μs, and is then increased to 50, 100, 200, 400, 800, 1300, and 1500 μs.
The entire procedure is automated.

End of slide