Commissioning of the Cryogenic System for SRF Test Facility of RAON

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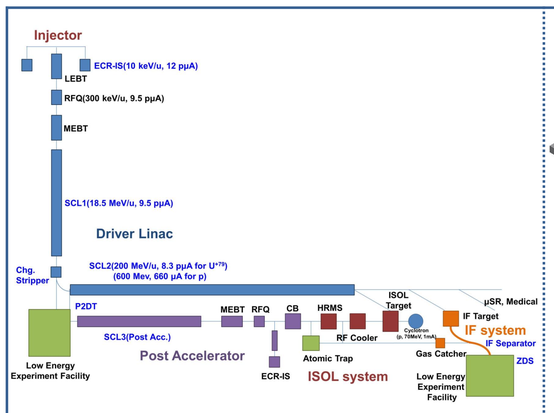
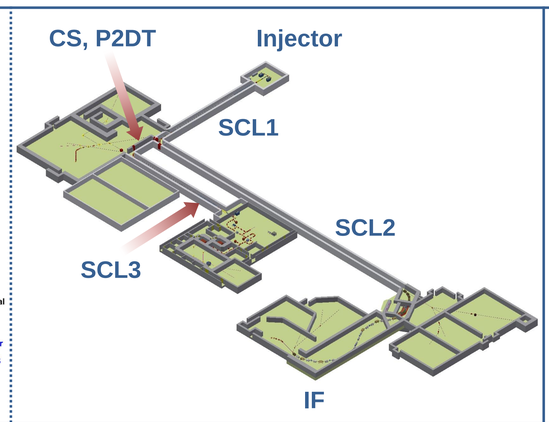
Purpose of SRF Test Facility Cryogenic System

Test of cold components of RAON

The RAON is designed to combine the IF and ISOL accelerator systems.

- Injector (ECR-IS)
- Cryomodule (SCL 1,2,3, CS, P2DT)
- IF System (Superconducting Magnets)





Conceptual Design of the RAON

Bird's-eye View of the RAON

Specification of SRF TFCS

System	Components	Spec	Remark
HRS	Coldbox	330 W, 140 L/h	
	Compressor	10 bar, 60 g/s	
	Dewar	3,000 L	
HDS	DB/VB	1.3 bar ~ 3 bar	LHe / She
Warm Pump	Warm pump	1125 m^3/h	4ea
	Flow meter	0.4 ~ 65 m^3/h 0.1 ~ 16 m^3/h	
	Heater	10 kW	
Recovery System	Gas bag	1bar, 50 m^3	2ea
	Compressor	230 bar, 64 m^3/h	2ea
	Impure tank	200bar, 9.1 m^3	
	Adsorber	200 bar, 70 bar(cryo)	
	Buffer tank	10 bar, 75 m^3	2ea
Test Benches	QWR	4 K test	LHe supply
	HWR	4 K / 2 K test	SHe supply
	SSR	4 K / 2 K test	LHe supply
	Vertical Stand	2 K / 4 K test	LHe supply

Design and Layout of the SRF Test Facility Cryogenic System

The cryogenic system for SRF test facility

① : Helium Liquefying System

② : Helium Distribution System & Test Benches

③ : Warm Pumping System

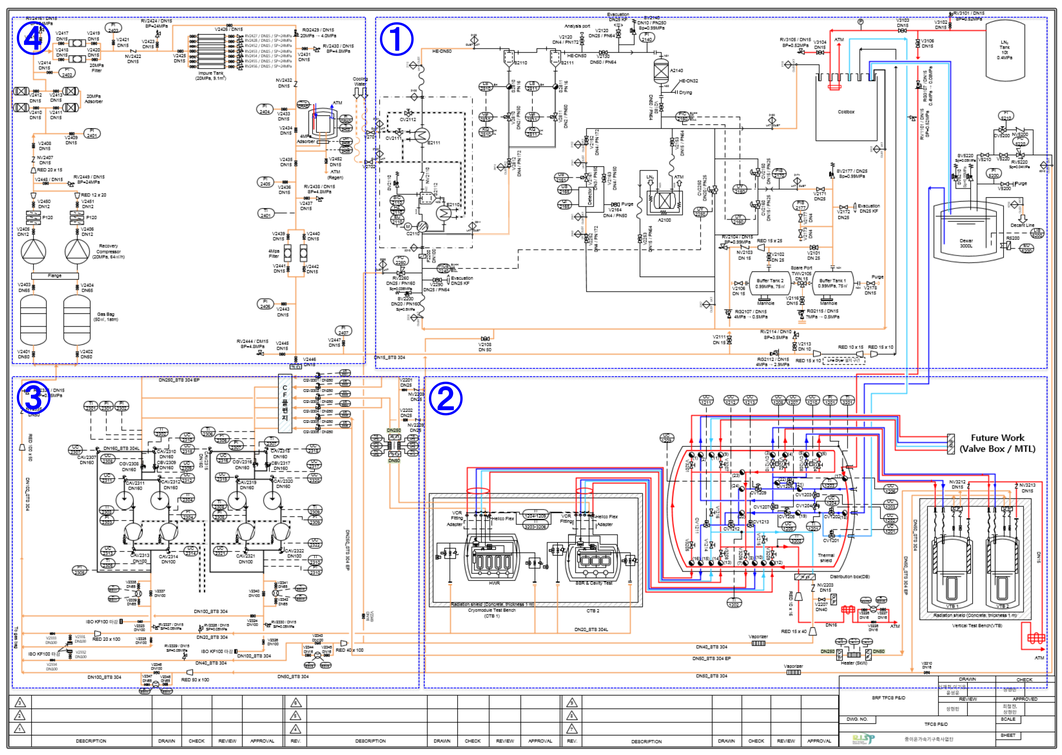
④ : Helium Recovery System

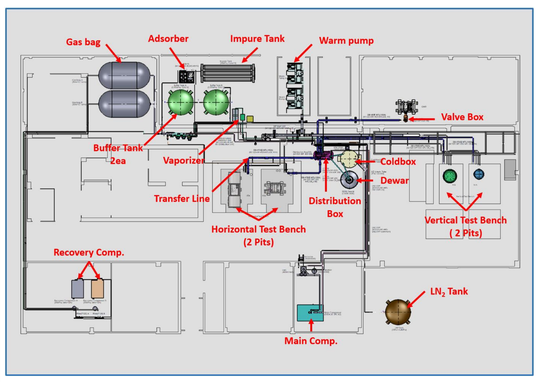
Test Categories

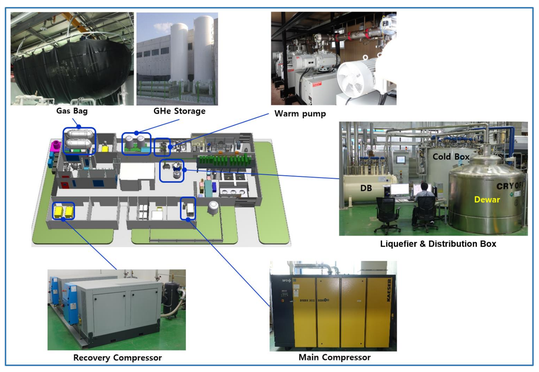
- Vertical cryostat test → For a single bare & dressed cavity
- Cryomodule test → QWR, HWR1, HWR2

Horizontal and vertical test benches for cryomodule and cavity at 4 K and 2 K

Returned gas helium : To be recovered and purified using helium recovery system







Results of Commissioning

We successfully performed the acceptance test of coldbox. The liquefaction rate of the coldbox is as as follows.

Liquefaction Rate	Guarantee	Test
Constant Level	120 L/h 330 W	168 L/h 368 W

We also carried out the performance test of helium transfer line using supercritical helium. The results of heat load are as follows.

	SHe supply	GHe return	LN2 shield
Simulation	0.093 W/m	0.086 W/m	0.101 W/m
Test	0.095 W/m	0.127 W/m	0.077 W/m

Additionally, we could check the performance of the TFCS through the tests of cryomodule, cavity and superconducting magnet.

We are making an effort to optimize the TFCS by continuous operation of the cryogenic system.

Rare isotope Accelerator complex for ON-line experiments

ibs 기초과학연구원 Institute for Basic Science

RISP Rare Isotope Science Project