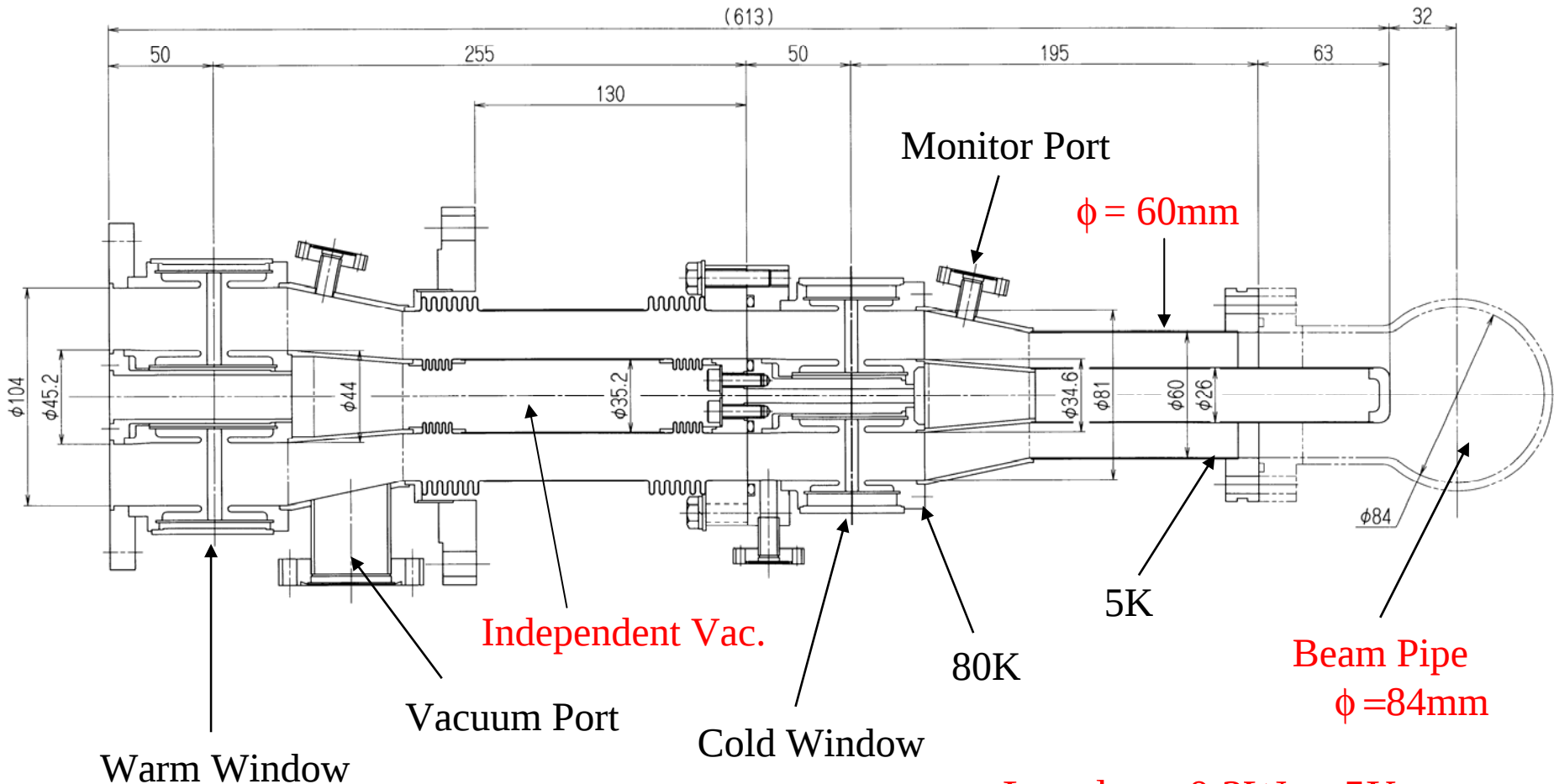


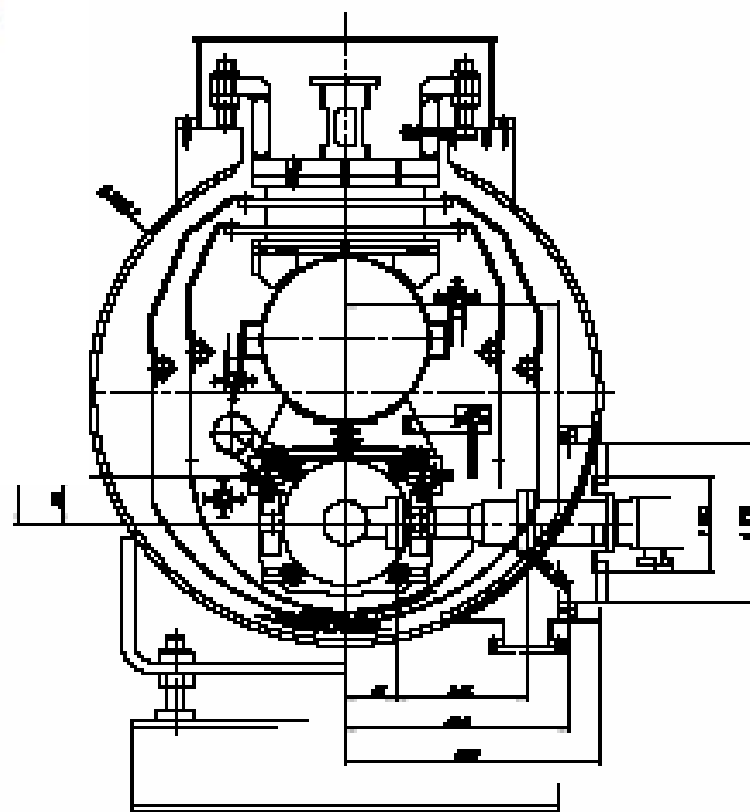
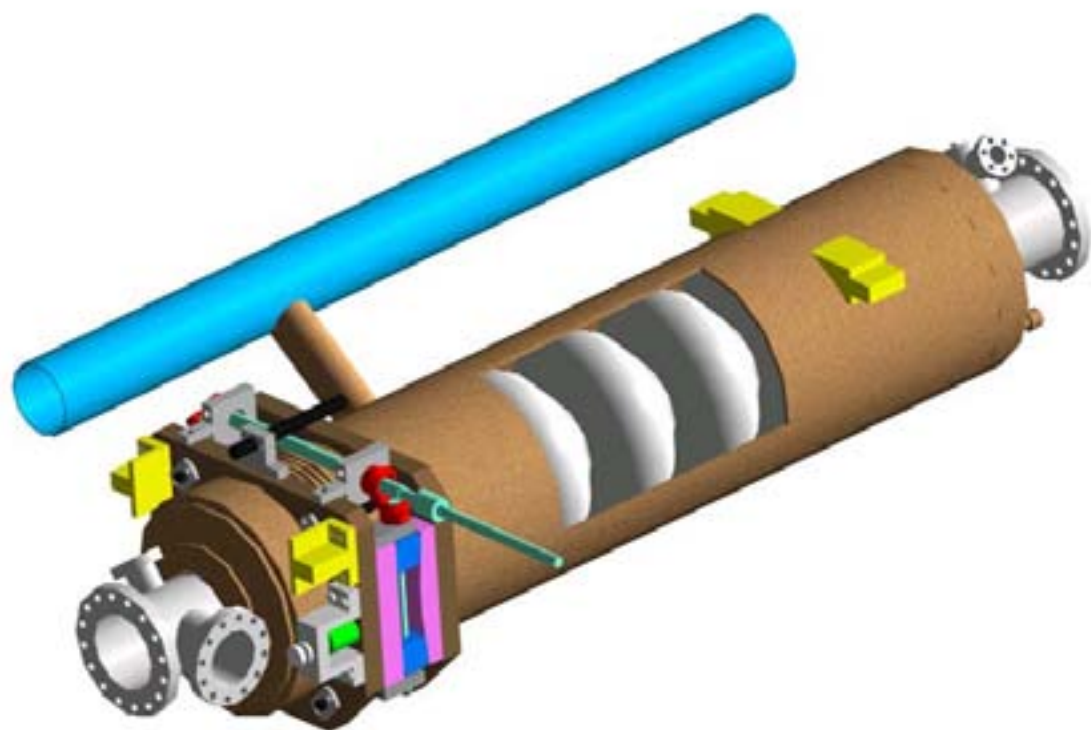
Input Coupler for STF Baseline Cavity

- 400 kW (35 MV/m)
- Double Windows TRISTAN Type
- No Tunability
- 50 Ω Coaxial

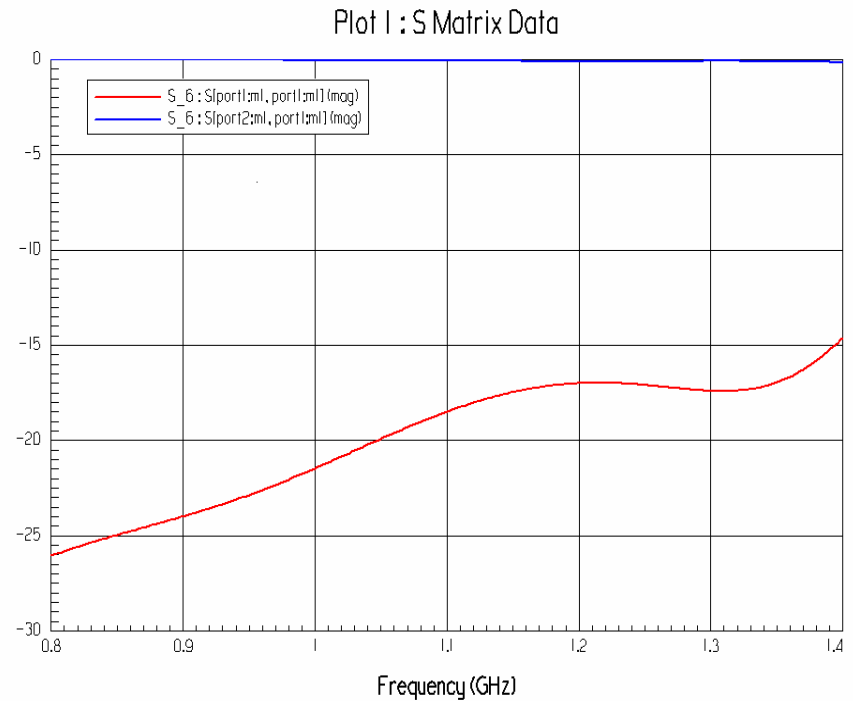
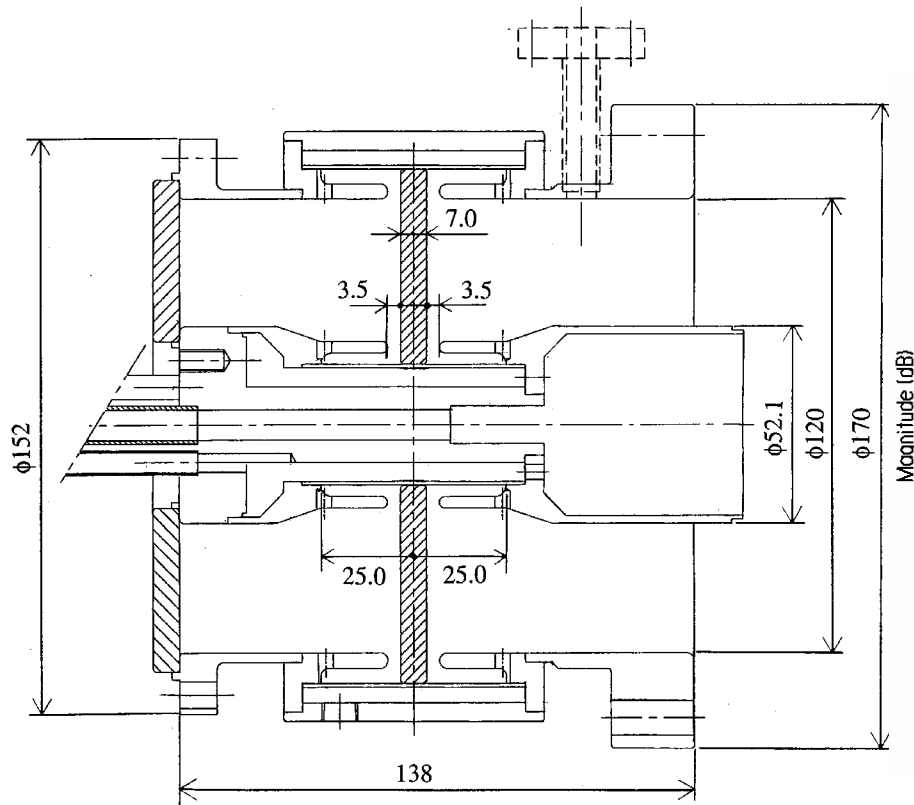
Input Coupler



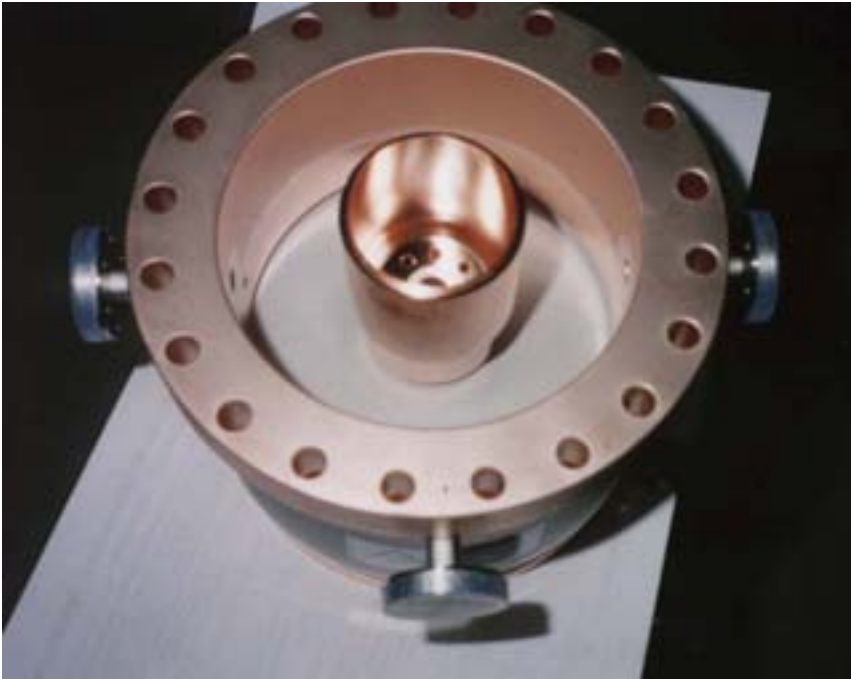
Low loss 0.2W to 5K
Higher Static loss 0.9W to 5K
No Tuning



TRISTAN Type Coaxial Window



TRISTAN Type Coaxial Window



TRISTAN Type Window

Accelerator	Frequency	Size	Operation mode	Operating Power	Maximum Power Tested	Number of Couplers
TRISTAN	0.5GHz	170mm	CW	60kW	0.8MW	36
KEK-B	0.5GHz	170mm	CW	350kW	1MW	8
SNS	0.8GHz	108mm	1.3msec. 60Hz	550kW	2MW	81
JPARC (ADS)	0.97GHz	136mm	0.6msec. 25Hz	500kW	2.2MW	4
This Design	1.3GHz	92mm(cold) 116mm(warm)	1.4msec. 5Hz	400kW	1MW	4

STF Baseline Cavity Specification			Input Coupler		
Frequency	f	1.3 GHz	Double TRISTAN Type Coaxial Disk Window + Door knob		
Number of cells		9			
Shape		Elliptical	Over Coupling Factor		1.57
Effective Length	L _{eff}	1038 mm	Coupler Q-Value	Q _{in}	2.2 x 10 ⁶ <± 10 %
Iris Aperture		70 mm	Max. Beam Power	35 MV x 10 mA	350 kW
Beam Pipe Diameter		84 mm	Max. Input Power		368 kW
Geometrical Impeadance	R / Q	1016 Ω	Pulse Length	1 msec. Beam	1.51 msec.
Geometrical Factor	G	277 Ω	Repetition Rate		5 Hz
Cell to Cell Coupling	k	2.00%			
Surface Peak Electric Field Ratio	E _{sp} / E _{acc}	2.17			
Surface Peak Magnetic Field Ratio	H _{sp} / E _{acc}	4.10 mT / (MV/m)	Cold Coupler	Window Size	φ92 mm(22) x t6.2
				Coaxial Line Outer Diameter	60 mm --> 82 mm
Operating Voltage	V _{acc}	35 MV			
Q _O at Operating Gradient	Q _O	> 5 x 10 ⁹			
Matched Q		3.45 x 10 ⁶	Warm Coupler	Window Size	φ116 mm(30) x t6.6
Coupler Q	Q _{in}	2.2 x 10 ⁶		Coaxial Line Outer Diameter	82 mm --> 104 mm
Half Band Width		295 Hz			
Filling Time	T _f	0.538 msec.	Diagnostics	Electron x 3	
RF Loss per Pulse (1.51msec.)		0.357 J		Arc Sensor x 1	
Frequency Tuning Sensitibity		440 kHz/mm	4k Load	Static 0.9 W	Dynamic 0.2 W
Stiffness		3020 N/mm	80k Load	Static 5 W	Dynamic 2.5 W
		145 Hz/N			

Tuner / Jacket			HOM Coupler			
Place		Jacket Flange	One TESLA Type on each Beam Pipe			
Lorentz Force at 35 MV / m		42 N	Filter			
Single Cell Mode Detuning		457 Hz	20 dB Frequency			1.6 GHz
Stationary Detuning		682 Hz	1.3 GHz Band Width		40 dB	30 MHz
Realistic Detuning	1.5msec. Pulse End	~ 600 Hz			50 dB	10 MHz
				Frequency	R / Q	Q _{ext}
Coarse Tuner	Sliding Wedge x 2		Acc. Mode	1300	1016 Ω	> 2 x 10 ¹⁰
	Stroke	3.5 mm	TM ₀₁₁			
	Resolution	< 1 μm	1 / 9 – π	2395	97 Ω	< 2 x 10 ⁴
	Drive	Stepping Motor x 1	2 / 9 – π	2388	188 Ω	< 1 x 10 ⁴
			3 / 9 – π	2378	38 Ω	< 5 x 10 ⁴
Fine Tuner	Piezo Transducer x 1		TM ₀₁₂			
	Stroke	> 4 μm	π	3764.6	40 Ω	< 5 x 10 ⁴
	Resolution	< 0.05 μm	8 / 9 – π	3764.3	22 Ω	< 1 x 10 ⁵
	Diameter	35 mm	TE ₁₁₁			
	Length	60 mm	6 / 9 – π	1688	549 Ω / m	< 5 x 10 ⁴
	Max. Load	3.5 x 10 ⁴ N	7 / 9 – π	1717	2100 Ω / m	< 2 x 10 ⁴
	Stiffness	4.5 x 10 ⁵ N/mm	8 / 9 – π	1748	793 Ω / m	< 5 x 10 ⁴
			TM ₁₁₀			
Jacket (Titanium)	Stiffness	1.2 x 10 ⁵ N/mm	6 / 9 – π	1864	864 Ω / m	< 5 x 10 ⁴
	Base Plate Thickness	15 mm	5 / 9 – π	1875	1270 Ω / m	< 3 x 10 ⁴
	Cylinder Thickness	5 mm	4 / 9 – π	1884	394 Ω / m	< 5 x 10 ⁴
			TM ₁₁₁			
			1 / 9 – π	2536	2070 Ω / m	< 2 x 10 ⁴

