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S1-Global Cryomodule and Cryogenic Group

* RF Cable Parameter Summary Table

The following table is the summary of the parameters for the RF cables which DESY and KEK are using in the cryomodules.

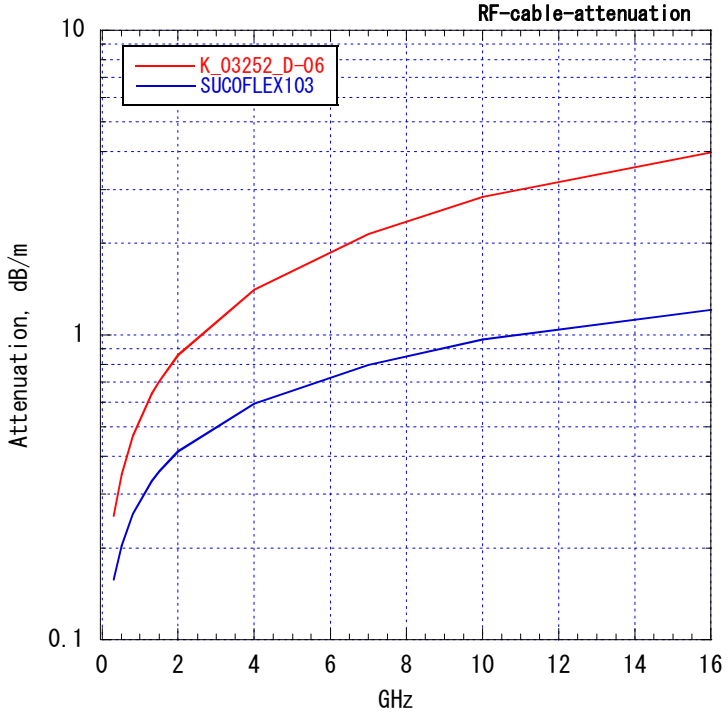
	HUBER+SUHNER K_03252_D-06		HUBER+SUHNER SUCOFLEX103	
Center conductor	0.95 mm	Steel, Copper+Silver plated (wire)	(1.1 mm)	Solid silver-plated copper wire (measured by N.O.)
Dielectric	2.95 mm	FEP	(3.1 mm)	Low density PTFE
1st outer conductor	3.4 mm	Steel, Copper+Silver plated (braid, 90%)	(3.6 mm)	Silver-plated copper tape, double wrapped (t=0.05 mm)
2nd outer conductor	3.85 mm	Steel, Copper+Silver plated (braid, 90%)	(4.1 mm)	Silver-plated copper brade(Dia.=0.095mm ~132 wires)
Jacket	4.35 mm	FEP	4.40 mm (4.5 mm)	FEP
Impedance	50 Ohm		50 Ohm	
Operating frequency	5 GHz	Maximum	33 GHz	
Capacitance	99 pF/m		87 pF/m	
Velocity of signal propagation	69%		77%	
Signal time delay	4.8 ns/m		4.3 ns/m	
Insulation resistance	≧100000000 MΩm			
Max. operating voltage	2.8 kV	at sea level		
Test voltage	5.7 kV	50Hz/1min		
Nominal attenuation coefficient a	0.3752		0.2836	
Nominal attenuation coefficient b	0.1652		0.0071	
Weight	5.1 kg/100m		5.3 kg/100m	
Min. bending radius (static)	30 mm		13 mm	
Min. bending radius (repeated)	50 mm		22 mm	
Temperature range	-100℃~ 200℃		-55℃~ 165℃	

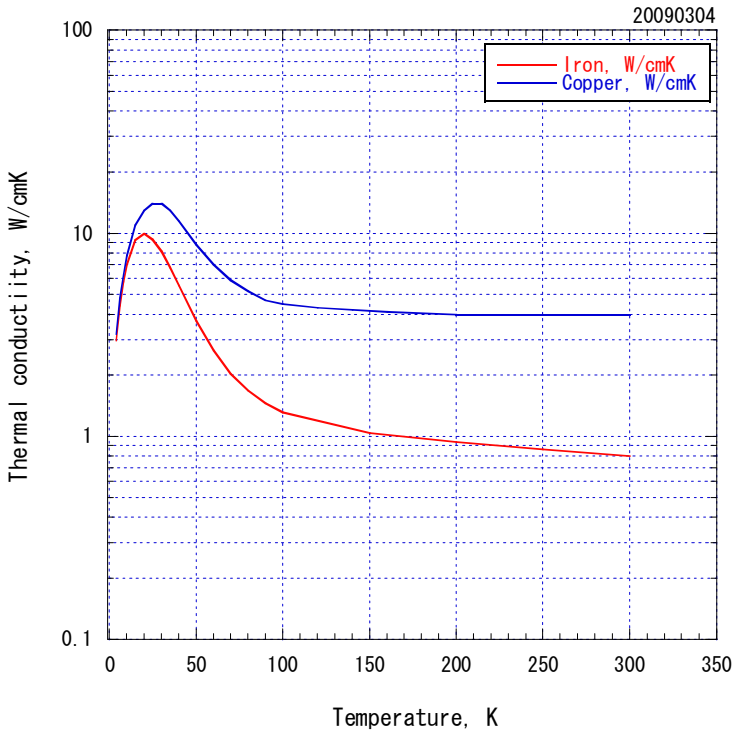
Attenuation calculation

atte. = a ×[√(f(GHz))] + b × f(GHz)

The heat conduction areas for K_03252_D-06 and SUCOFLEX103 are 5.04 mm^2 and 3.02 mm^2, respectively.
The area calculation of K_03252_D-06 was done by the data of the diameters and the occupations. The area should be calculated by the component diameters and the number of wires in the real cable.
The area of the SUCOFLEX cable was calculated after disassembling the cable.

The attenuations and the thermal conductivities of cables are shown in the following plots.
The attenuations are calculated by the parameters a and b in the previous table, and the thermal conductivities are of electrical tough pitch copper and well-annealed 99.998% pure iron, respectively.





The maximum CW powers for these two cables are shown as a function of frequency.
The phase change by temperature for the SUCOFLEX103 is shown in the following plot.