



Initial pressure	1.200 bar A	Vent Pressure	
Temperature	4.407 K	Vent device set pressure	4.00 atm
		Factor	10%
Initial Heating	166 kW	Vent pressure	4.46 bar G
Total Quench Energy	16.0 MJ	Vent pressure	5.47 bar A

HEAT LOADS	Area m ²	Maximum Heat Flux W / m ²	Initial Heat Load kW	Temperatures	
				Max K	Min K
LOV - Intact MLI	30.28	0	0.0	63.0	4.4
LOV - No MLI	0.00	0	0.0	63.0	4.4
Magnet Quench - Assy	19.75	0	0.0	77.0	4.4
Magnet Quench - Coil	4.37	38000	166.1	83.0	4.4
Total	54.40		166.1		

INITIAL CONDITIONS							INITIAL VENTING 5.47 bar A
	Real Volume	Level	Working Volume	Helium Liquid	Helium Vapour		
CCR	92.2	100%	70%	92.2	64.6	27.7	litres
Chimney	61.5	100%	100%	61.5	61.5	0.0	litres
Magnet Cryostat	145.4	100%	100%	145.4	145.4	0.0	litres
Total volumes	299.1	90.8%	299.1	271.5	27.7		299.1 litres
Density			111.71	121.1	19.97		111.71 g / litre
Mass		98.3%	33.42	32.86	0.55		33.42 kg
Specific enthalpy			1.351	1.02	20.76		9.87 kJ / kg
Enthalpy			45.14	33.67	11.47		329.7 kJ
Specific internal energy			0.277	0.033	14.751		4.97 kJ / kg
Internal energy			9.24	1.09	8.15		166.0 kJ

MAXIMUM VENT FLOW RATE			TIME TO REDUCE INVENTORY		
Max flow rate	6.61 kg / s		Residual inventory	10%	
	23 787 kg / hr		Contents	3.34 kg	
At the maximum flow rate:	~ Time	2.29 seconds	~ Time	7.89 seconds	
	~ Temperature	6.58 K	~ Temperature	20.75 K	
	~ Energy absorption	0.37 MJ	~ Energy absorption	1.23 MJ	

Time Increments	Venting	Start	Finish	Increment
Contained Pressure Build		0.00	3.00	0.10 secs
Energy change	156.8 kJ	3.00	4.00	0.15 secs
Elapsed time	0.944 seconds	4.00	5.00	0.25 secs
Nodes	10	5.00	6.00	0.35 secs
Time increment	0.094	6.00		0.50 secs

JLab Dipole

Quench - Protection

