Ansaldo Superconduttori

LHC - Cold masses: HELIUM MASS SPECTROMETER LEAK TEST REPORT

ITP Nr. 23 24

Cold Mass Nr. 2058

Step Nr. / Volume / *Volume to be tested*		1 CM -> Vacuum		2 CM -> cold bore tubes		3 CM -> Heat Exch.		4 Heat Exch -> Vacuum
Fuga calibrata / *Calibrated leak parameter*								
Calibrated leak N°.		4011007195		4011007225		FC03000505		4011007195
Data calibr. / *calibration date*		08/10/02		08/10/02		20/05/03		08/10/02
Temp. calibrazione fuga / *Calibration Temp.*	T	23,0 °C	T	23,0 °C	T	20,0 °C	T	23,0 °C
Valore nom. fuga calibrata / *Calibrated leak nom. value*		3,00E-08 mbar l s-1		3,30E-08 mbar l s-1		1,40E-07 mbar l s-1		3,00E-08 mbar l s-1
Calibrazione del sistema / *System calibration*								
Conc. He nelle linee di test (100%) / *Volumetric fraction of tracer gas in the injection envelope*	C	1	C	1	C	1	C	1
T ambiente / *Test temp.*	T	23,5 °C	T	23,5 °C	T	23,5 °C	T	23,5 °C
Fuga calibrata con correz. T ed età / *Size of calib. leak after corr. for ageing and T)*	q_{FR}	3,05E-08 mbar l s-1	q_{FR}	3,36E-08 mbar l s-1	q_{FR}	1,57E-07 mbar l s-1	q_{FR}	3,05E-08 mbar l s-1
Segnale residuo prima delle misure di SFR / *Residual signal prior SFR meas.*	R_{FR}	5,89E-09 mbar l s-1	R_{FR}	4,01E-10 mbar l s-1	R_{FR}	5,22E-10 mbar l s-1	R_{FR}	5,89E-09 mbar l s-1
Segnale del LD / *Signal given by the calibrated leak*	S_{FR}	3,07E-08 mbar l s-1	S_{FR}	3,15E-08 mbar l s-1	S_{FR}	3,04E-07 mbar l s-1	S_{FR}	3,07E-08 mbar l s-1
Min. dev. segnale (=2x amp. segn. residuo) / *Smallest read. signal dev. (= 2 x ampl. of RFR noise)*	S_m	2,00E-11 mbar l s-1	S_m	2,00E-12 mbar l s-1	S_m	2,00E-12 mbar l s-1	S_m	2,00E-11 mbar l s-1
Tempo di attesa stabiliz. segnale / *Time to achieve stabilised leak signal*	3t	700 sec	3t	700 sec	3t	1400 sec	3t	700 sec
SENSIBILITA' DEL TEST / *Sensitivity of the leak test* $= S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$	q_{Gm}	**2,46E-11** mbar l s-1	q_{Gm}	**2,16E-12** mbar l s-1	q_{Gm}	**1,04E-12** mbar l s-1	q_{Gm}	**2,46E-11** mbar l s-1
Condizioni del test / *Leak test conditions*								
Pressione del sistema / *System pressure*	P	4,10E-05 mbar	P	mbar	P	mbar	P	4,00E-05 mbar
Segnale residuo del cercafughe ad inizio test / *Residual signal prior to SF measurement*	R_F	5,87E-09 mbar l s-1	R_F	4,02E-10 mbar l s-1	R_F	5,06E-10 mbar l s-1	R_F	6,42E-09 mbar l s-1
Segnale del LD a fine test / *Signal given by the leak after 30 min. (>3t)*	S_F	5,73E-09 mbar l s-1	S_F	4,06E-10 mbar l s-1	S_F	5,03E-10 mbar l s-1	S_F	6,15E-09 mbar l s-1
CALCOLO DELLA FUGA / *Leak evaluation* $= \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C}$	q_G	**<1.0E-09** mbar l s-1	q_G	**4,32E-12** mbar l s-1	q_G	**<1.0E-09** mbar l s-1	q_G	**<1.0E-09** mbar l s-1
VALORE DI RIFERIMENTO / *REF. VALUE* (MAX)		1,0E-09 mbar l s-1 at 26 bar		1,0E-10 mbar l s-1 at 26 bar		1,0E-05 mbar l s-1 at 26 bar		1,0E-09 mbar l s-1 at 5 bar
CONFORMANCE		YES		YES		YES		YES

Doc. di riferimento / *Ref. documents*
CERN contract number: **F302/LHC/LHC**
CERN technical spec.: **LHC MMS-98-198 rev.2**
Leak test procedure (Ref. N°, Revision): **780RM09442 rev.0**

Strumentazione / *Test equipment*	on vessel	on c.b.t. lines	on heat exchanger line	on vessel
Helium Mass Spectrometer type:	PFEIFFER HLT 260	PFEIFFER HLT 260	PFEIFFER HLT 260	PFEIFFER HLT 260
Pressure gauge type:	full range compact PFEIFFER PKR 251			full range compact PFEIFFER PKR 251
Pumping group:	turbo pump LEYBOLD PT 360 lt/s rotary vane pump PFEIFFER DUO 65 m3/h	rotary vane pump PFEIFFER DUO 20 m3/h	rotary vane pump PFEIFFER DUO 20 m3/h	turbo pump LEYBOLD PT 360 lt/s rotary vane pump PFEIFFER DUO 65 m3/h

Prepared by: Name / Date
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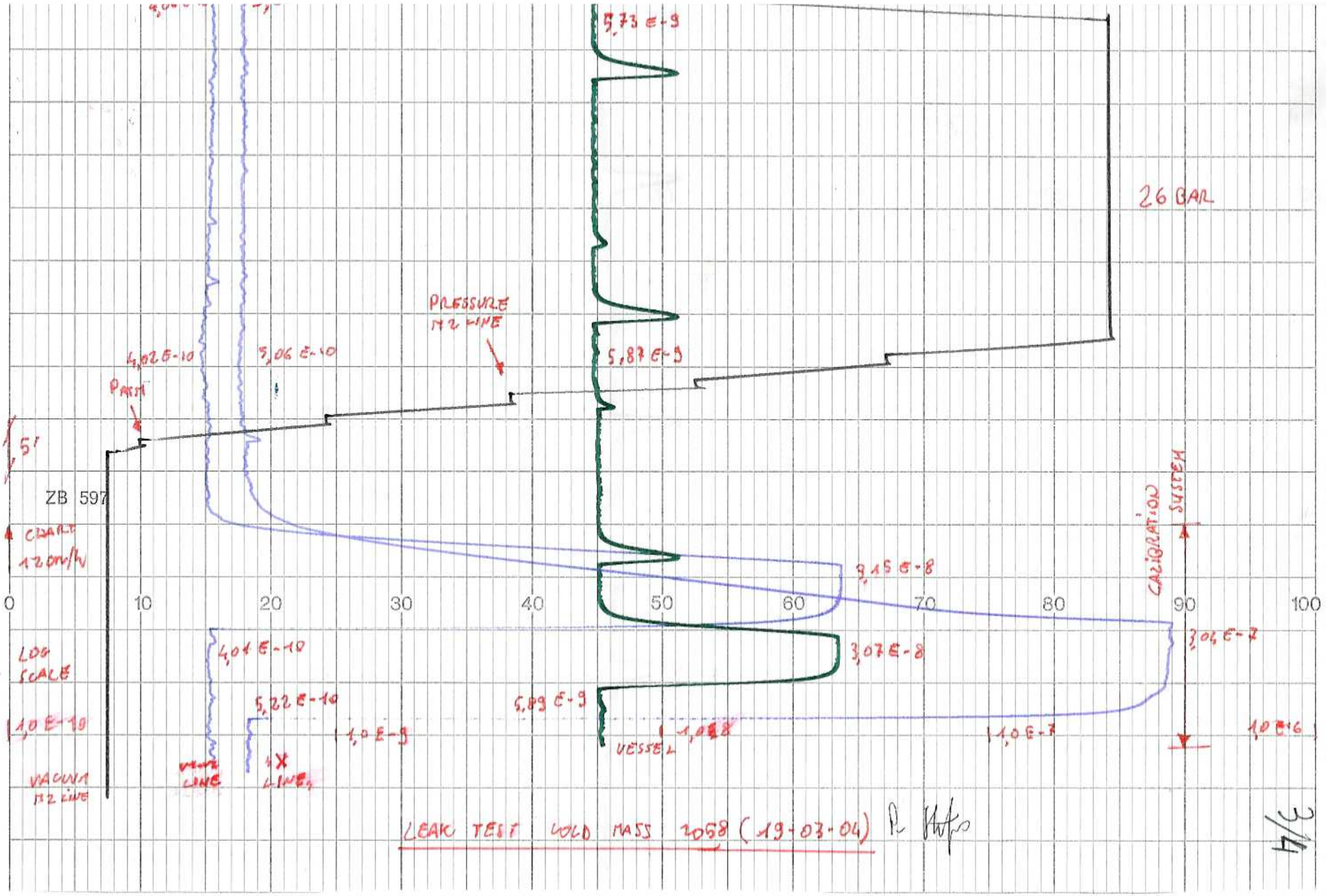
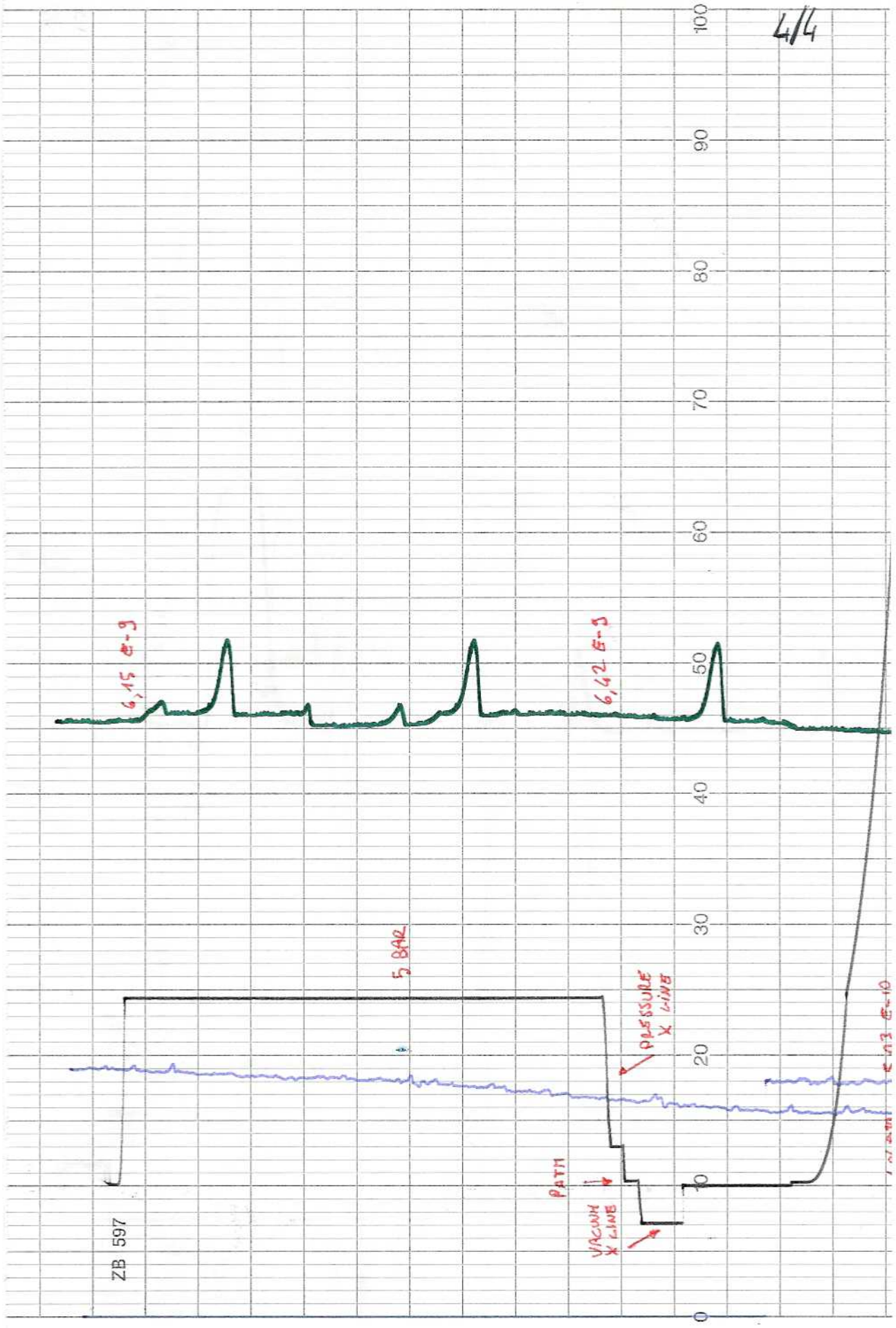
P. Gagliardi 19/03/2004

Checked at CERN by / Signature / Date

Note / *Remarks*


5,73 E-9
26 BAR
PRESSURE
H2 LINE
4,02 E-10
5,06 E-10
5,87 E-9
PASM
5'
ZB 597
CHART
120mm/h
0
10
20
30
40
50
60
70
80
90
100
CALIBRATION
SYSTEM
3,15 E-8
LOG
SCALE
4,04 E-10
3,07 E-8
3,04 E-7
5,22 E-10
5,89 E-9
1,0 E-10
1,0 E-9
1,0 E-7
1,0 E-6
VESSEL
VACUUM
H2 LINE
LINE
LINE
LEAK TEST COLD MASS 2058 (19-03-04)
3/4


100
90
80
70
60
50
40
30
20
10
0
6,15 E-9
6,42 E-9
5 BAR
PRESSURE X LINE
PATM
VACUUM X LINE
ZB 597