Ansaldo Superconduttori

LHC - Cold masses: HELIUM MASS SPECTROMETER LEAK TEST REPORT

ITP Nr. 23 24

Cold Mass Nr. 2018

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		4011007195		4011007195
Data calibr. / *calibration date*		08/10/02		08/10/02		08/10/02		08/10/02
Temp. calibrazione fuga / *Calibration Temp.*	T	23,0 °C	T	23,0 °C	T	23,0 °C	T	23,0 °C
Valore nom. fuga calibrata / *Calibrated leak nom. value*	q_{FR}	3,00E-08 mbar l s-1	q_{FR}	3,30E-08 mbar l s-1	q_{FR}	3,00E-08 mbar l s-1	q_{FR}	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	29,5 °C	T	29,5 °C	T	29,5 °C	T	29,5 °C
Fuga calibrata con correz. T ed età / *Size of calib. leak after corr. for ageing and T)*	q_{FR}	3,68E-08 mbar l s-1	q_{FR}	4,05E-08 mbar l s-1	q_{FR}	3,68E-08 mbar l s-1	q_{FR}	3,68E-08 mbar l s-1
Segnale residuo prima delle misure di SFR / *Residual signal prior SFR meas.*	R_{FR}	8,37E-09 mbar l s-1	R_{FR}	6,06E-10 mbar l s-1	R_{FR}	3,72E-10 mbar l s-1	R_{FR}	8,37E-09 mbar l s-1
Segnale del LD / *Signal given by the calibrated leak*	S_{FR}	4,68E-08 mbar l s-1	S_{FR}	4,08E-08 mbar l s-1	S_{FR}	4,75E-08 mbar l s-1	S_{FR}	4,68E-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	180 sec	3t	180 sec	3t	180 sec	3t	180 sec
SENSIBILITA' DEL TEST / *Sensitivity of the leak test* $= S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$	q_{Gm}	**1,92E-11** mbar l s-1	q_{Gm}	**2,02E-12** mbar l s-1	q_{Gm}	**1,56E-12** mbar l s-1	q_{Gm}	**1,92E-11** mbar l s-1
Condizioni del test / *Leak test conditions*								
Pressione del sistema / *System pressure*	P	6,60E-05 mbar	P	6,60E-05 mbar	P	6,60E-05 mbar	P	6,60E-05 mbar
Segnale residuo del cercafughe ad inizio test / *Residual signal prior to SF measurement*	R_F	8,52E-09 mbar l s-1	R_F	5,49E-10 mbar l s-1	R_F	4,09E-10 mbar l s-1	R_F	8,74E-09 mbar l s-1
Segnale del LD a fine test / *Signal given by the leak after 30 min. (>3t)*	S_F	8,83E-09 mbar l s-1	S_F	5,46E-10 mbar l s-1	S_F	4,20E-10 mbar l s-1	S_F	8,91E-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	**2,97E-10** mbar l s-1	q_G	**<1.0E-10** mbar l s-1	q_G	**8,60E-12** mbar l s-1	q_G	**1,63E-10** 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-06 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			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	rotary vane pump PFEIFFER DUO 65 m3/h

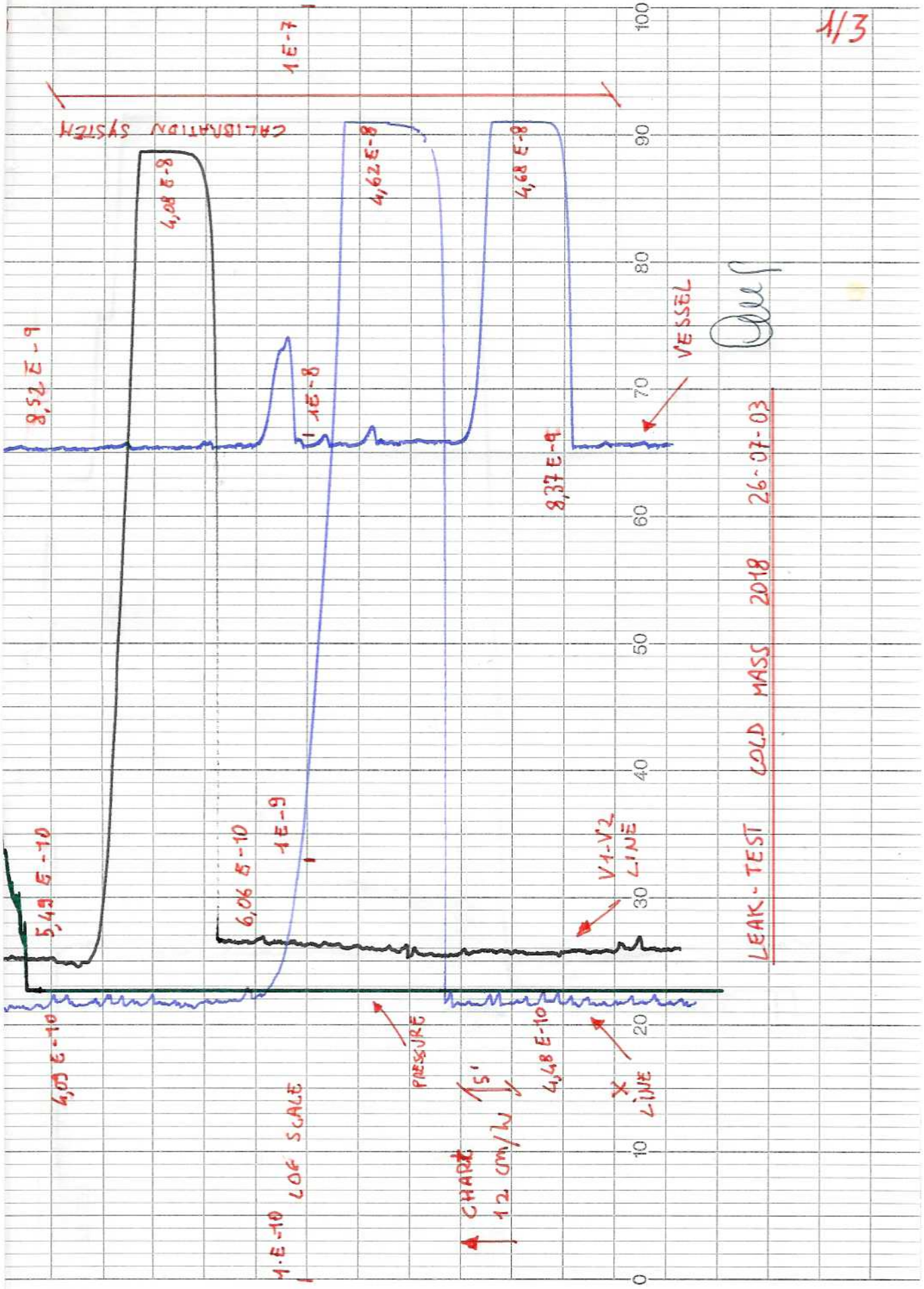
Prepared by: Name / Date
Caserza - 26/07/03

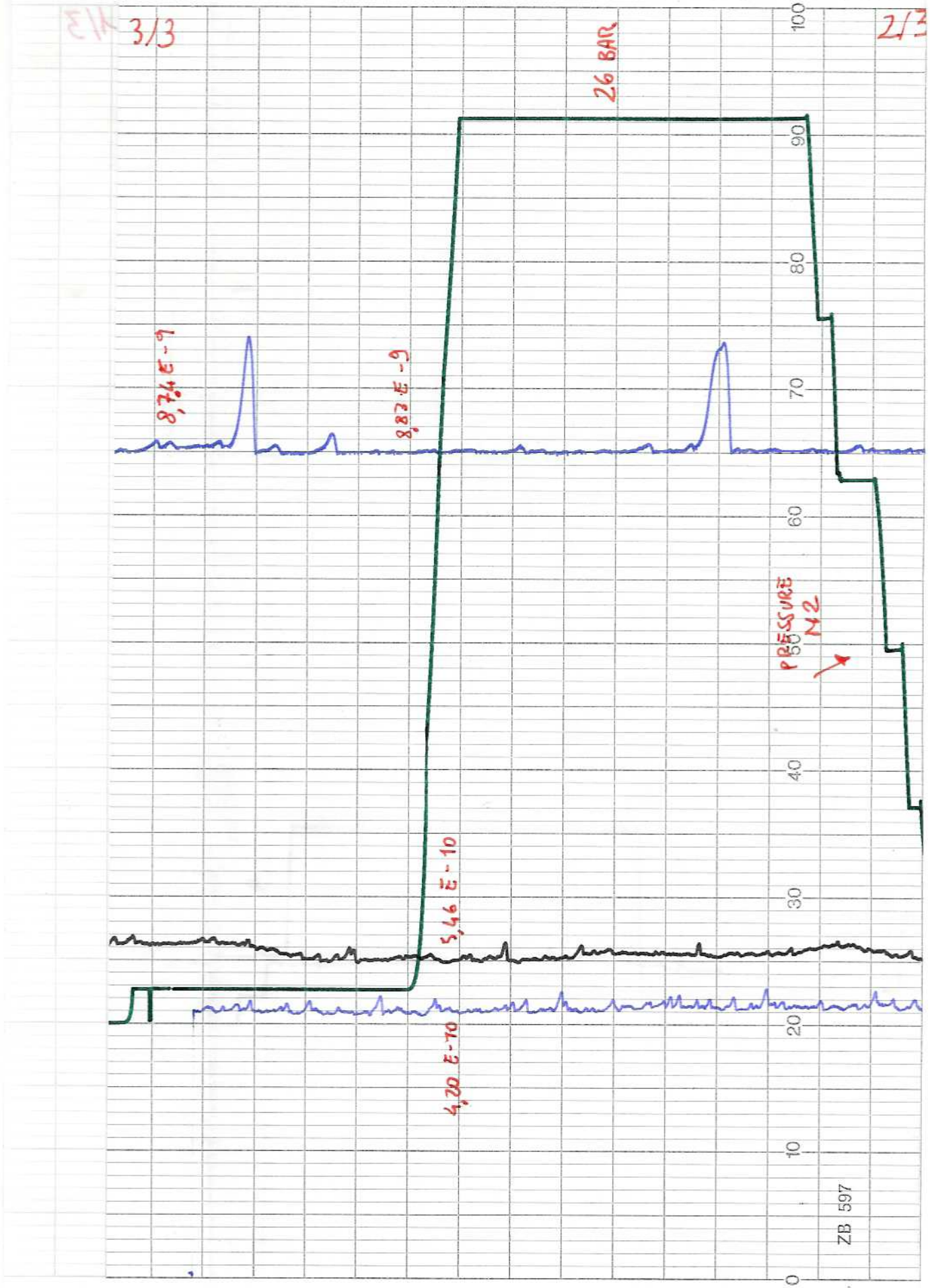
Approved by: Name / Date
Terzi - 26/07/03

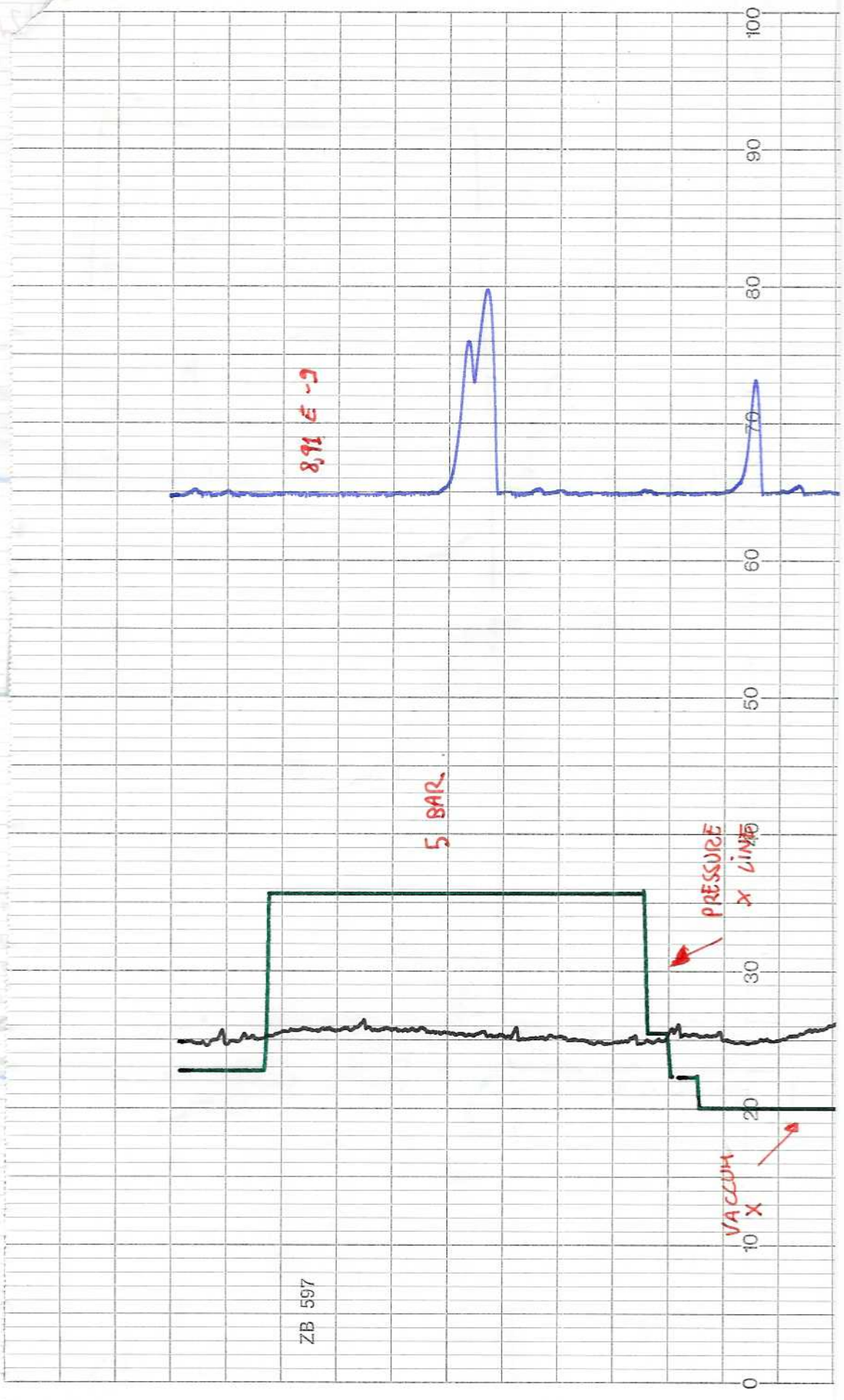
Checked by: Name / Date
P. Gagliardi - 26/07/2003

Checked at CERN by / Signature / Date

Note / *Remarks*
Test performed after welding of flange (Ø100) about the capillary tube cold head, installed on the top of the cold mass


1/3
LEAK-TEST COLD MASS 2018 26-07-03
CALIBRATION SYSTEM
1E-7
4,08 E-8
4,62E-8
4,68 E-8
8,52 E-9
1 1E-8
8,37 E-9
VESSEL
5,43 E-10
6,06 E-10
1E-9
V1-V2 LINE
4,03 E-10
1·E-10 LOF SCALE
PRESSURE
CHART 1'
12 cm/h
4,48 E-10
X LINE
100
90
80
70
60
50
40
30
20
10
0


3/3
2/3
26 BAR
8,74 E-9
8,83 E-9
5,46 E-10
4,20 E-10
PRESSURE M2
100
90
80
70
60
50
40
30
20
10
0
ZB 597


100
90
80
70
60
50
40
30
20
10
0
8,11 E -3
5 BAR
PRESSURE
X LINE
VACCUM
X
ZB 597