

LHC - Cold masses: HELIUM MASS SPECTROMETER LEAK TEST REPORT



Cold Mass Nr. 2041

Step Nr. 1

Volume / Volume to be tested CM -> Vacuum

Heat Exch -> Vacuum 4

CM -> Heat Exch. 3

Fuga calibrata / Calibrated leak parameter

Calibrated leak N°	4011007195	4011007225	4011007195
Data calibr. / calibration date	08/10/02	08/10/02	08/10/02
Temp. calibrations fuga / Calibration Temp.	23,0 °C	23,0 °C	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	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

T ambiente / Test temp.

Fuga calibrata con correz. T ed età / Size of calib. leak after corr. for ageing and T)

Segnale residuo prima delle misure di SFR / Residual signal prior SFR meas.

Segnale del LD / Signal given by the calibrated leak

Min. dev. segnale (-2x amp. segn. residuo) / Smallest read. signal dev. (= 2 x ampl. of RFR noise)

Tempo di attesa stabiliz. segnale / Time to achieve stabilised leak signal

C	1	1	1
T	18,0 °C	18,0 °C	18,0 °C
qFR	2,48E-08 mbar l s-1	2,72E-08 mbar l s-1	2,48E-08 mbar l s-1
RFR	8,59E-09 mbar l s-1	3,85E-10 mbar l s-1	8,59E-09 mbar l s-1
SFR	4,24E-08 mbar l s-1	2,78E-08 mbar l s-1	4,24E-08 mbar l s-1
Sm	2,00E-11 mbar l s-1	2,00E-12 mbar l s-1	2,00E-11 mbar l s-1
3t	1000 sec	700 sec	1000 sec
qGm	1,46E-11 mbar l s-1	1,99E-12 mbar l s-1	1,46E-11 mbar l s-1

SENSIBILITA' DEL TEST / Sensitivity of the leak test

$$= S_n \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$$

Condizioni del test / Leak test conditions

Pressione del sistema / System pressure

Segnale residuo dei cercatuglie ad inizio test / Residual signal prior to SF measurement

Segnale del LD a fine test / Signal given by the leak after 30 min. (>3t)

CALCOLO DELLA FUGA / Leak evaluation

$$= \frac{q_{FR}}{S_{FR} - R_{FR}} \left(\frac{S_F - R_F}{C} \right) \frac{1}{C}$$

P	1,00E-04 mbar	mbar	1,00E-04 mbar
Rf	8,45E-09 mbar l s-1	mbar l s-1	8,02E-09 mbar l s-1
Sf	8,12E-08 mbar l s-1	mbar l s-1	7,87E-08 mbar l s-1
qG	<1,0E-09 mbar l s-1	mbar l s-1	<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-05 mbar l s-1 at 26 bar	1,0E-09 mbar l s-1 at 5 bar
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CONFORMANCE 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): 780RM08442 rev.0

Strumentazione / Test equipment

Helium Mass Spectrometer type:

Pressure gauge type:

Pumping group:

on vessel	PFEIFFER HLT 260	on heat exchanger line	PFEIFFER HLT 260
full range compact PFEIFFER PKR 251 turbo pump LEYBOLD PT 360 l/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
on vessel	PFEIFFER HLT 260	on vessel	PFEIFFER HLT 260
full range compact PFEIFFER PKR 251 turbo pump LEYBOLD PT 360 l/s	rotary vane pump PFEIFFER DUO 65 m3/h	rotary vane pump PFEIFFER DUO 20 m3/h	rotary vane pump PFEIFFER DUO 65 m3/h

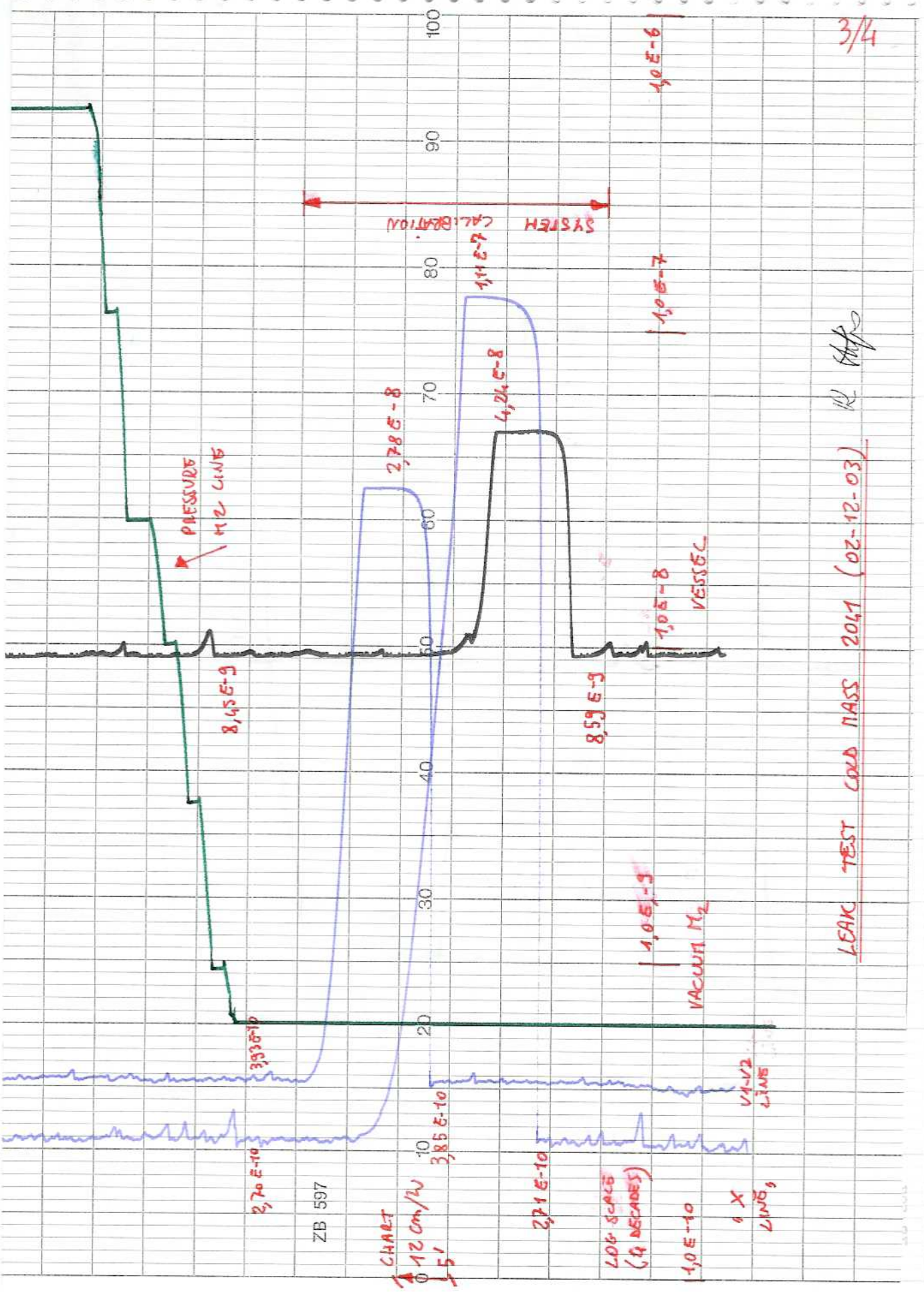
Note / Remarks

Test performed after welding of flange (Ø100) the capillary tube cold head, installed on the cold mass

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LEAK TEST COLD MASS 2017 (02-12-03) R. Hays

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