



LHC - Cold masses: HELIUM MASS SPECTROMETER LEAK TEST REPORT

ITP Nr.  
23  
24

**Cold Mass Nr.** 2044

**Step Nr.** 1

**Volume / Volume to be tested** CM -> Vacuum

**CM -> Vacuum** 1

**CM -> Heat Exch.** 3

**CM -> cold bore tubes** 2

**Heat Exch -> Vacuum** 4

**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. calibrazione 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

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

C	1	1	1	1
T	18,5 °C	18,5 °C	18,5 °C	18,5 °C
qFR	2,59E-08 mbar l s-1	2,78E-08 mbar l s-1	1,33E-07 mbar l s-1	2,59E-08 mbar l s-1
RFR	8,42E-09 mbar l s-1	3,72E-10 mbar l s-1	2,25E-10 mbar l s-1	8,42E-09 mbar l s-1
SFR	4,15E-08 mbar l s-1	3,71E-08 mbar l s-1	1,02E-07 mbar l s-1	4,15E-08 mbar l s-1
Sm	2,00E-11 mbar l s-1	2,00E-12 mbar l s-1	2,00E-12 mbar l s-1	2,00E-11 mbar l s-1
3t	1000 sec	1200 sec	1000 sec	1000 sec
qGm	1,53E-11 mbar l s-1	1,51E-12 mbar l s-1	2,61E-12 mbar l s-1	1,53E-11 mbar l s-1

**SENSIBILITA' DEL TEST / Sensitivity of the leak test**

**Condizioni del test / Leak test conditions**

Pressione del sistema / System pressure

Segnale residuo del cercatughe ad inizio test / Residual signal prior to SF measurement

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

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

P	9,00E-05 mbar	mbar	mbar	8,60E-05 mbar
Rf	8,52E-09 mbar l s-1	3,60E-10 mbar l s-1	2,16E-10 mbar l s-1	8,31E-09 mbar l s-1
Sf	8,39E-09 mbar l s-1	3,57E-10 mbar l s-1	2,17E-10 mbar l s-1	8,19E-09 mbar l s-1
qG	<1,0E-09 mbar l s-1	<1,0E-10 mbar l s-1	1,30E-12 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-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 YES YES

**Doc. di riferimento / Ref. documents**

CERN contract number: F302LHC/LHC

CERN technical spec.: LHC MMS-98-198 rev.2

Leak test procedure (Ref. N°, Revision): 780RM09442 rev.0

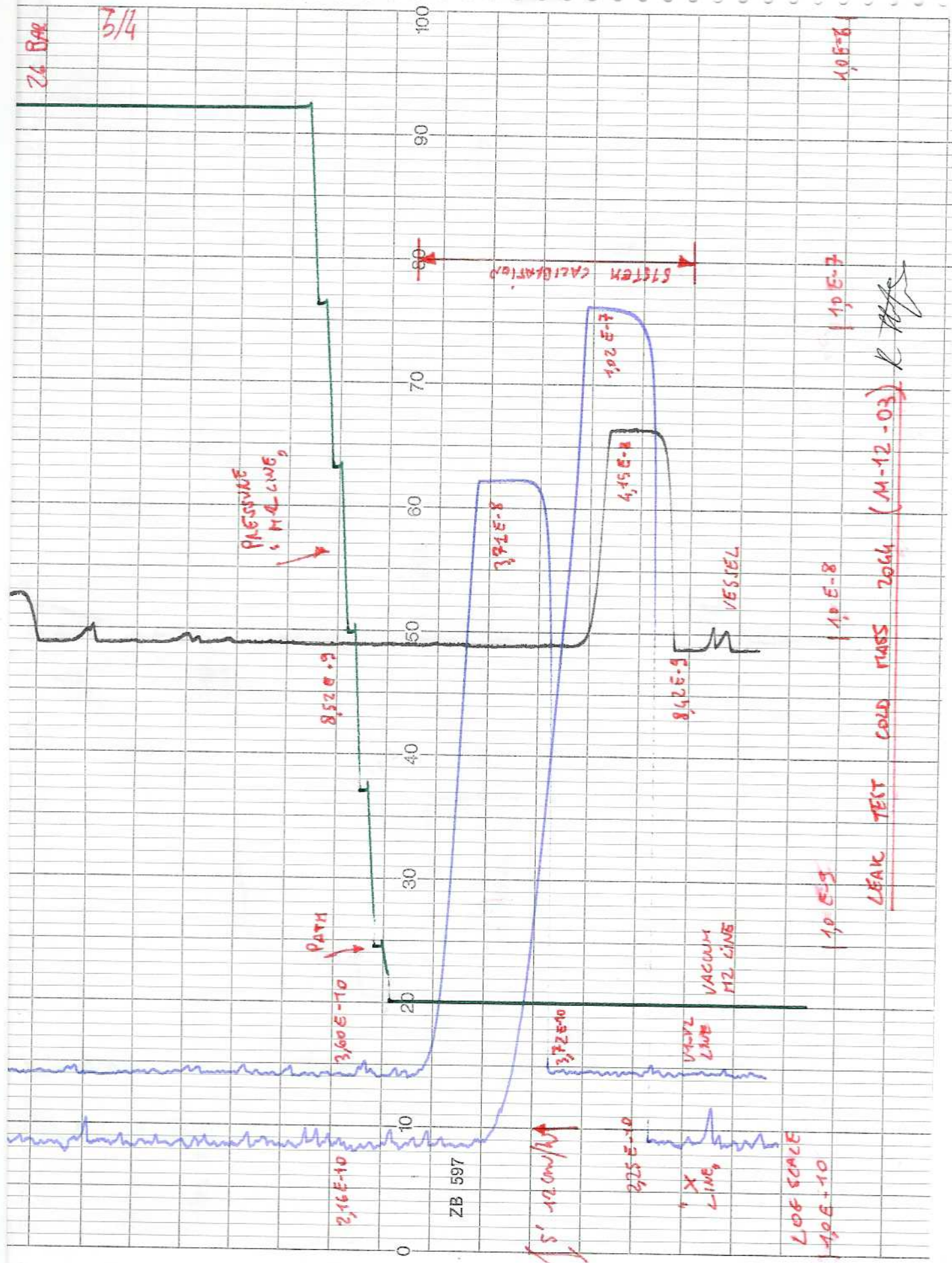
**Strumentazione / Test equipment**

Helium Mass Spectrometer type: PFEIFFER HLT 260

Pressure gauge type: full range compact PFEIFFER PKR 251 turbo pump LEYBOLD PT 360 l/s

Pumping group: rotary vane pump PFEIFFER DUQ 65 m3/h

<b>on vessel</b>	PFEIFFER HLT 260 full range compact PFEIFFER PKR 251 turbo pump LEYBOLD PT 360 l/s	<b>on c.b.f. lines</b>	PFEIFFER HLT 260	<b>on heat exchanger line</b>	PFEIFFER HLT 260	<b>on vessel</b>	PFEIFFER HLT 260 full range compact PFEIFFER PKR 251 turbo pump LEYBOLD PT 360 l/s rotary vane pump PFEIFFER DUQ 65 m3/h
<b>Note / Remarks</b>							
Test performed after welding of flange (Ø100) the capillary tube cold head, installed on the cold mass							
<b>Prepared by: Name / Date</b>	PIU S. - Caserza B. 11/12/2003						
<b>Approved by: Name / Date</b>	Teizi - 11/12/2003						
<b>Checked at CERN by / Signature / Date</b>	P. Gagliardi - 11/12/2003						



LEAK TEST COLD FLASK 2064 (M-12-03)

26 BAR  
 3/4

PRESSURE  
 (MPa)

SYSTEM CALIBRATION

VESSEL

VACUUM  
 FL. LINE

VAPOR  
 LINE

X  
 LINE

LOG SCALE  
 1.0E-10

ZB 597

$5 \times 10^{-10} \text{ m}^3/\text{s}$

1.0E-9

1.0E-8

1.0E-7

1.0E-6

4/4

