



# LHC - Cold masses: HELIUM MASS SPECTROMETER LEAK TEST REPORT

ITP Nr.  
23  
24

**Cold Mass Nr.** 2066

**Step Nr.** 1 **CM -> Vacuum**

**Volume / Volume to be tested** 2 **CM -> cold bore tubes**

**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. 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 stabilizz. segnale / Time to achieve stabilised leak signal

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

C	1	1	1
T	21,0 °C	21,0 °C	21,0 °C
qFR	2,79E-08 mbar l s-1	3,07E-08 mbar l s-1	1,45E-07 mbar l s-1
RFR	7,98E-09 mbar l s-1	3,62E-10 mbar l s-1	3,06E-10 mbar l s-1
SFR	4,75E-08 mbar l s-1	3,08E-08 mbar l s-1	1,23E-07 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
3t	700 sec	900 sec	1000 sec
qEm	1,41E-11 mbar l s-1	2,03E-12 mbar l s-1	2,36E-12 mbar l s-1

**Condizioni del test / Leak test conditions**

Pressione del sistema / System pressure

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

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

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

**CALCOLO DELLA FUGA / Leak evaluation**

P	9,80E-05 mbar	mbar	9,70E-05 mbar
Rf	7,61E-09 mbar l s-1	mbar l s-1	8,33E-09 mbar l s-1
Sf	8,22E-09 mbar l s-1	mbar l s-1	7,85E-09 mbar l s-1
qg	4,31E-10 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-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
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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): 760RM09442 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 DUO 65 m3/h

on vessel	PFEIFFER HLT 260	on heat exchanger line	PFEIFFER HLT 260
on c.b.t. lines	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

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**Note / Remarks**

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

**Prepared by: Name / Date**  
PIU S. - Caserza B. 07/02/2004

**Approved by: Name / Date**  
Terzi -07/02/2004

**Checked at CERN by / Signature / Date**  
P. Gagliardi -07/02/2004





LEAK TEST COLD MASS 20.66 (07-02-06) R. [Signature]

ZB 597  
2068 CALZ

1.5" 12 cm/W  
3.62E-10

1.0E-10 3.96E-10

"X" LINE  
"VACUUM LINE"

"VACUUM LINE"

1.0E-9

7.98E-9

1.0E-8

3.06E-8

4.75E-8

1.23E-7

1.0E-7

1.0E-6

SYSTEM (AZIBAFIOL)

"PRESSURE LINE"

7.98E-9

PUSH

1.65E-10

3.01E-10

0

30

40

50

60

70

80

90

100

