

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

ITP Nr.  
23  
24

**Cold Mass Nr.** 2030

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

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

**Heat Exch -> Vacuum** 4

**Fuga calibrata / Calibrated leak parameter**

Calibrated leak N°	4011007195	4011007195	4011007195
Data calibr. / calibration date	08/10/02	08/10/02	08/10/02
Temp. calibr. / 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	3,00E-08 mbar l s-1	3,00E-08 mbar l s-1

**Calibrazione del sistema / System calibration**

Conc. He nella linea 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

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

C	1	1	1
T	23,5 °C	23,5 °C	23,5 °C
q <sub>FR</sub>	3,05E-08 mbar l s-1	3,36E-08 mbar l s-1	3,05E-08 mbar l s-1
R <sub>FR</sub>	4,32E-09 mbar l s-1	4,18E-10 mbar l s-1	3,37E-10 mbar l s-1
S <sub>FR</sub>	3,60E-08 mbar l s-1	3,28E-08 mbar l s-1	3,60E-08 mbar l s-1
S <sub>m</sub>	2,00E-11 mbar l s-1	2,00E-12 mbar l s-1	2,00E-11 mbar l s-1
3t	1200 sec	900 sec	1200 sec
q <sub>em</sub>	1,93E-11 mbar l s-1	2,07E-12 mbar l s-1	1,90E-12 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 cercatighe ad inizio test / Residual signal prior to SF measurement

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

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

P	1,10E-04 mbar	mbar	1,00E-04 mbar
R <sub>F</sub>	4,21E-09 mbar l s-1	3,88E-10 mbar l s-1	4,04E-09 mbar l s-1
S <sub>F</sub>	4,07E-09 mbar l s-1	4,18E-10 mbar l s-1	3,98E-09 mbar l s-1
q <sub>g</sub>	<1,0E-09 mbar l s-1	2,90E-11 mbar l s-1	<1,0E-09 mbar l s-1

**CALCOLO DELLA FUGA / Leak evaluation**

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): 780RM09442 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
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

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

**Prepared by: Name / Date** Caserza - 13/10/2003

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**Checked by: Name / Date** P. Gagliardi - 13/10/2003

**Checked at CERN by / Signature / Date**





