

LHC - Cold masses: HELIUM MASS SPECTROMETER LEAK TEST REPORT

ITP Nr.
23
24

Cold Mass Nr. 2043

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

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

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. 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	3,30E-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 obs. (= 2 x ampl. of RFR noise)

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

SENSIBILITA' DEL TEST / Sensitivity of the leak test

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

C	1	1	1
T	21,0 °C	21,0 °C	21,0 °C
q _{FR}	2,79E-08 mbar l s-1	3,07E-08 mbar l s-1	2,79E-08 mbar l s-1
R _{FR}	6,31E-09 mbar l s-1	3,88E-10 mbar l s-1	6,31E-09 mbar l s-1
S _{FR}	4,41E-08 mbar l s-1	3,08E-08 mbar l s-1	4,41E-08 mbar l s-1
S _m	2,00E-11 mbar l s-1	2,00E-12 mbar l s-1	2,00E-11 mbar l s-1
3t	900 sec	700 sec	900 sec
q _{gm}	1,48E-11 mbar l s-1	2,04E-12 mbar l s-1	1,48E-11 mbar l s-1

Condizioni del test / Leak test conditions

Pressione del sistema / System pressure

Segnale residuo del ceratughe 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

$$= \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{(S_p - R_p)}{C}$$

P	7,00E-05 mbar	mbar	6,80E-05 mbar
R _F	6,29E-09 mbar l s-1	mbar l s-1	5,22E-10 mbar l s-1
S _F	7,08E-09 mbar l s-1	mbar l s-1	5,53E-10 mbar l s-1
q _G	5,83E-10 mbar l s-1	mbar l s-1	3,50E-11 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): 780RM09442 rev.0

Strumentazione / Test equipment

Helium Mass Spectrometer type:

Pressure gauge type:

Pumping group:

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
on c.b.t. lines	PFEIFFER HLT 260	rotary vane pump PFEIFFER DUO 20 m3/h	rotary vane pump PFEIFFER DUO 20 m3/h
on heat exchanger line	PFEIFFER HLT 260	rotary vane pump PFEIFFER DUO 20 m3/h	rotary vane pump PFEIFFER DUO 65 m3/h
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

Prepared by: Name / Date

PIU S. - Caserza B. 04/02/2004

Approved by: Name / Date

Terzi 04/02/2004

Checked at CERN by / Signature / Date

P. Gagliardi 04/02/2004

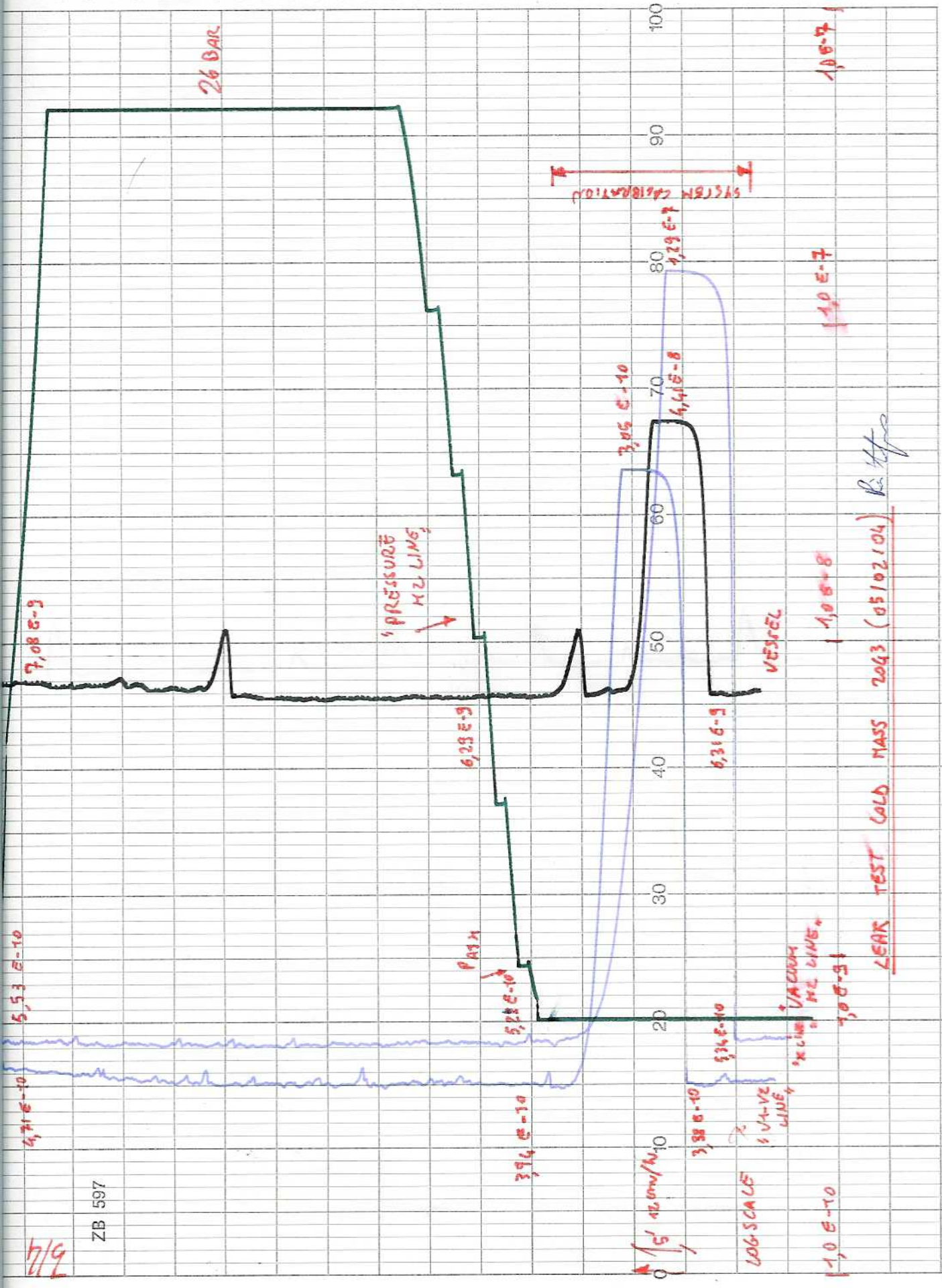
Note / Remarks

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

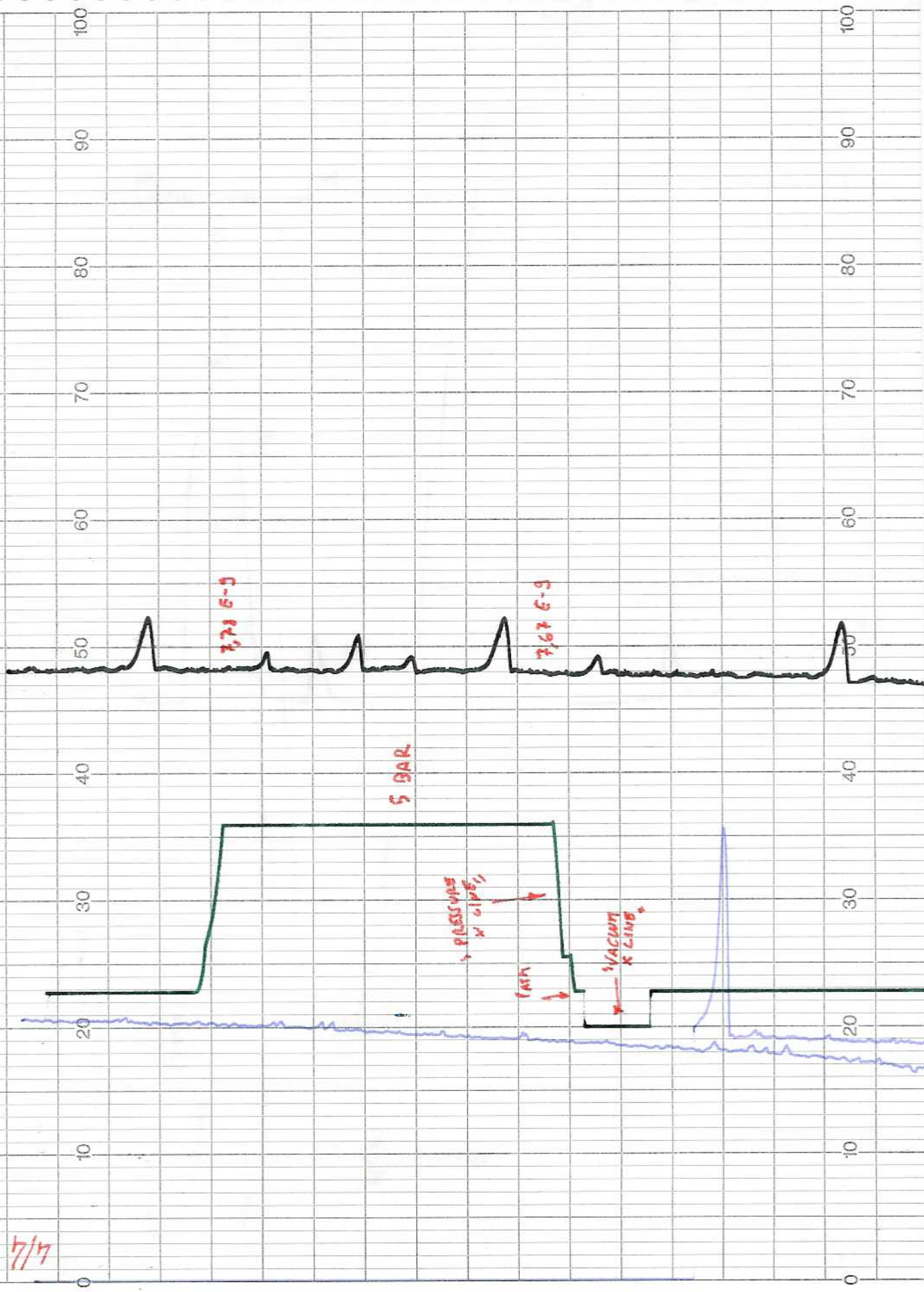
X-line internal bellow changed (ref. to NC CERN 163 / rns 040112b)

6/19

ZB 597



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5 BAR

728 6-9

767 6-9

PRESSURE
X LINE

DATA

VACUUM
X LINE