Ansaldo Superconduttori

LHC - Cold masses: HELIUM MASS SPECTROMETER LEAK TEST REPORT

ITP Nr. 23 24

Cold Mass Nr.	2025			
Step Nr.	1	2	3	4
Volume / *Volume to be tested*	CM -> Vacuum	CM -> cold bore tubes	CM -> Heat Exch.	Heat Exch -> Vacuum
Fuga calibrata / *Calibrated leak parameter*				
Calibrated leak N°.	4011007195	4011007225	4011007195	4011007195
Data calibr. / *calibration date*	08/10/02	08/10/02	08/10/02	08/10/02
Temp. calibrazione fuga / *Calibration Temp.*	T 23.0 °C	T 23.0 °C	T 23.0 °C	T 23.0 °C
Valore nom. fuga calibrata / *Calibrated leak nom. value*	q_{FR} 3.00E-08 mbar l s-1	q_{FR} 3.30E-08 mbar l s-1	q_{FR} 3.30E-08 mbar l s-1	q_{FR} 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*	C 1	C 1	C 1	C 1
T ambiente / *Test temp.*	T 30.1 °C	T 30.1 °C	T 30.1 °C	T 30.1 °C
Fuga calibrata con correz. T ed età / *Size of calib. leak after corr. for ageing and T)*	q_{FR} 3.75E-08 mbar l s-1	q_{FR} 4.12E-08 mbar l s-1	q_{FR} 4.12E-08 mbar l s-1	q_{FR} 3.75E-08 mbar l s-1
Segnale residuo prima delle misure di SFR / *Residual signal prior SFR meas.*	R_{FR} 3.93E-09 mbar l s-1	R_{FR} 6.59E-10 mbar l s-1	R_{FR} 4.29E-10 mbar l s-1	R_{FR} 3.93E-09 mbar l s-1
Segnale del LD / *Signal given by the calibrated leak*	S_{FR} 4.48E-08 mbar l s-1	S_{FR} 4.33E-08 mbar l s-1	S_{FR} 4.93E-08 mbar l s-1	S_{FR} 4.48E-08 mbar l s-1
Min. dev. segnale (=2x amp. segn. residuo) / *Smallest read. signal dev. (= 2 x ampl. of RFR noise)*	S_m 2.00E-11 mbar l s-1	S_m 2.00E-12 mbar l s-1	S_m 2.00E-12 mbar l s-1	S_m 2.00E-11 mbar l s-1
Tempo di attesa stabiliz. segnale / *Time to achieve stabilised leak signal*	3t 180 sec	3t 180 sec	3t 180 sec	3t 180 sec
SENSIBILITA' DEL TEST / *Sensitivity of the leak test* $= S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$	q_{Gm} **1.83E-11** mbar l s-1	q_{Gm} **1.93E-12** mbar l s-1	q_{Gm} **1.69E-12** mbar l s-1	q_{Gm} **1.83E-11** mbar l s-1
Condizioni del test / *Leak test conditions*				
Pressione del sistema / *System pressure*	P 4.60E-05 mbar	P mbar	P mbar	P 4.60E-05 mbar
Segnale residuo del cercafughe ad inizio test / *Residual signal prior to SF measurement*	R_F 4.88E-09 mbar l s-1	R_F 6.09E-10 mbar l s-1	R_F 4.46E-10 mbar l s-1	R_F 5.85E-09 mbar l s-1
Segnale del LD a fine test / *Signal given by the leak after 30 min. (>3t)*	S_F 5.85E-09 mbar l s-1	S_F 6.19E-10 mbar l s-1	S_F 4.50E-10 mbar l s-1	S_F 5.90E-09 mbar l s-1
CALCOLO DELLA FUGA / *Leak evaluation* $= \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C}$	q_G **8.89E-10** mbar l s-1	q_G **9.66E-12** mbar l s-1	q_G **3.37E-12** mbar l s-1	q_G **4.58E-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-05 mbar l s-1 at 26 bar	1.0E-09 mbar l s-1 at 5 bar
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*	on vessel	on c.b.t. lines	on heat exchanger line	on vessel
Helium Mass Spectrometer type:	PFEIFFER HLT 260	PFEIFFER HLT 260	PFEIFFER HLT 260	PFEIFFER HLT 260
Pressure gauge type:	full range compact PFEIFFER PKR 251			full range compact PFEIFFER PKR 251
Pumping group:	turbo pump LEYBOLD PT 360 lt/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	turbo pump LEYBOLD PT 360 lt/s rotary vane pump PFEIFFER DUO 65 m3/h

Prepared by: Name / Date
Caserza - 23/06/03

Approved by: Name / Date
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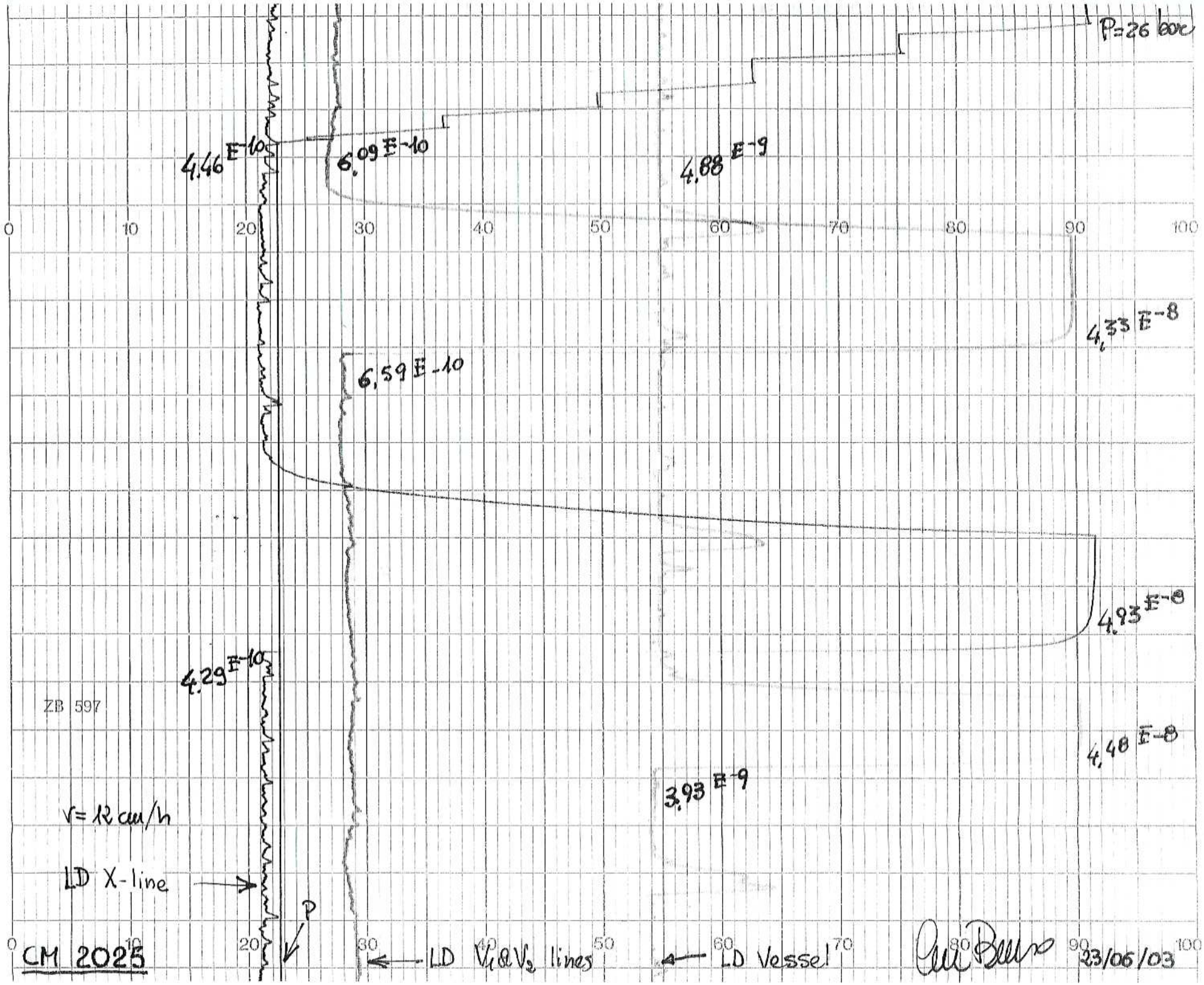
Checked by: Name / Date
Gagliardi - 23/06/03

Checked at CERN by / Signature / Date

Note / *Remarks*


P=26 bar
4.46 E-10
6.09 E-10
4.88 E-9
0
10
20
30
40
50
60
70
80
90
100
4.33 E-8
6.59 E-10
4.93 E-8
4.29 E-10
ZB 597
4.48 E-8
3.93 E-9
v= 12 cm/h
LD X-line
P
CM 2025
LD V1 & V2 lines
LD Vessel
23/06/03

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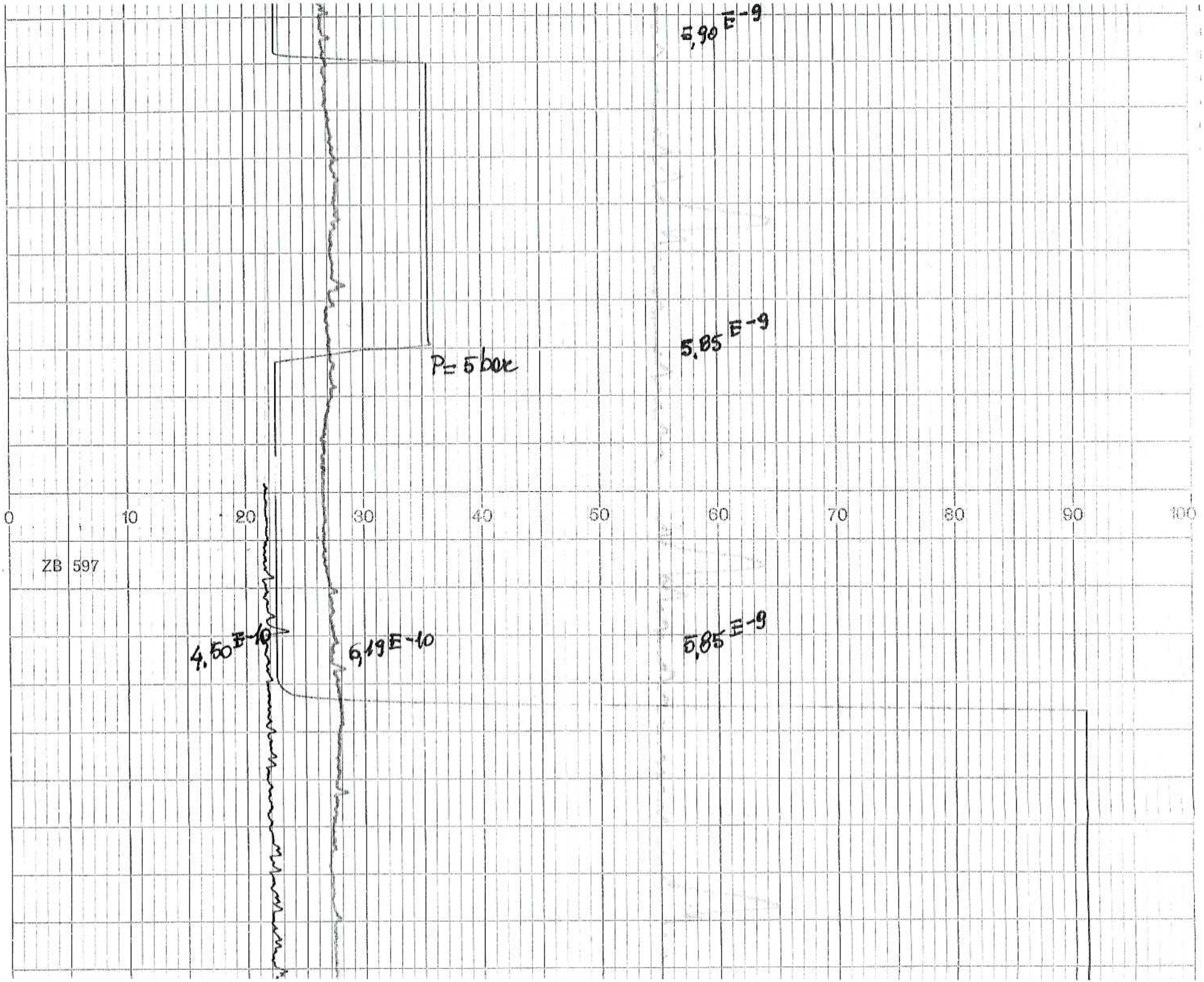
5,90 E-9
P= 5 bar
5,85 E-9
0
10
20
30
40
50
60
70
80
90
100
ZB 597
4,50 E-10
6,19 E-10
5,85 E-9

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