



RAPPORTO DI CONTROLLO
Test Report

N° MA
MA031269

Ansaldo Superconduttori s.p.a.

IN APPROVVIGIONAMENTO
on purchasing

IN FABBRICAZIONE
on manufacturing

Pag. / Pg: di / of
1 5

COMMESSA / Job 0209-0251 LHC cold masses		COMPONENTE / Component Cold Mass		DISEGNO / Drawing 620RM08451 LHCMB_A0001		POS./Item	REV./Rev L
IMPIANTO / Plant LHC		CLIENTE / Customer CERN		CERN Part Id. HCMBBRA001-02000008			
SPECIFICA / Specification 780RM09442 LHC-MMS / 98 - 198			REV. / Rev. 0 2.0	N. DI SERIE COMPONENTE / Component Serial Nr. 2008			
CONTROLLO / Check TEST DI TENUTA A VUOTO / He leak test							ITP No. 23-24

Annex

registrazione eventi / chart recorder (3 pages)

Note generali / General Remarks about this Test

- rispetto al test precedente (CM 2006) è stato installato un tubo diam.40mm per collegamento linea X interno alla camera a vuoto per aumentare la sensibilità del cercafughe / *with respect to the previous test (CM 2006) a 40 mm diameter tube has been installed on X-line connecting pipe, inside vacuum vesse, in order to increase LD sensitivity*
- nuovo cercafughe dedicato alle linee V1 & V2 / *a new LD has been installed on V1 & V2 lines*

Esito/Result: conforme/conforming non conforme/non-conforming NCR No.

COGNOME Name	B. Caserza				
FIRMA Signature					
DATA Date	20/03/2003				
ENTE Department	PRC				

CERN contract number: <u>F302/LHC/LHC</u>		CERN technical spec.: <u>LHC MMS-98-198 rev.2</u>	
CERN Part identifier		<u>HCMBBRA001-02000008</u>	
Leak test procedure (Ref. N°, Revision)		<u>780RM09442 rev.0</u>	
Volume to be tested		<u>cold mass ⇒⇒⇒ insulation vacuum</u>	
<u>Test equipment</u>			
Helium Mass Spectrometer type		<u>PFEIFFER HLT 260</u>	
Pressure gauge type		<u>PFEIFFER PKR 251</u>	
Turbo pump type		<u>LEYBOLD PT 360</u>	
<u>Helium calibrated leak data</u>			
Calibrated leak N°.: <u>4011007225</u>		Calibration (Date,Temp.) : <u>08/10/2002 - 23 °C</u>	
Test temperature : <u>22 °C</u>		Nominal value	
		<u>3.3 E-8 mbar l s⁻¹</u>	
q_{FR} (Size of the calibrated leak after correction for ageing and temperature)		<u>3.18 E-8 mbar l s⁻¹</u>	
<u>System Calibration</u>			
R_{FR} (Residual signal prior S_{FR} measurement)		<u>6.36 E-9 mbar l s⁻¹</u>	
S_{FR} (Signal given by the calibrated leak)		<u>4.47 E-8 mbar l s⁻¹</u>	
S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) ..		<u>2 E-11 mbar l s⁻¹</u>	
q_{Gm} (Sensitivity of the leak test) = $S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$		<u>1.66 E-11 mbar l s⁻¹</u>	
$3t$ (Time to achieve stabilised leak signal)		<u>180 sec</u>	
<u>Leak test conditions</u>			
p (System Pressure)		<u>7.3 E-5 mbar</u>	
C (Volumetric fraction of tracer gas in the injection envelope)		<u>1</u>	
R_F (Residual signal prior to S_F measurement)		<u>6.62 E-9 mbar l s⁻¹</u>	
S_F (Signal given by the leak after : <u>30</u> minutes $\geq 3t$)		<u>7.36 E-9 mbar l s⁻¹</u>	
Leak tightness requirements		Leak evaluation	
\leq _____ Pa.m ³ s ⁻¹		$q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C} = 6.14 E-10$ mbar l s ⁻¹	
\leq <u>1.0 10⁻⁹</u> mbar l s ⁻¹ @ 26 bar			
Conformance.....: YES		Remarks:	

CERN contract number: F302/LHC/LHC CERN technical spec.: LHC MMS-98-198 rev.2

CERN Part identifier : HCMBBRA001-02000008

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

Volume to be tested : cold mass ⇒⇒⇒ cold bore tubes

Test equipment

Helium Mass Spectrometer type : PFEIFFER HLT 260

Pressure gauge type : PFEIFFER PKR 251

Turbo pump type : LEYBOLD PT 360

Helium calibrated leak data

Calibrated leak N°.: 4011007225 Calibration (Date,Temp.) : 08/10/2002 - 23 °C

Test temperature : 22 °C Nominal value : 3.3 E-8 mbar l s⁻¹

q_{FR} (Size of the calibrated leak after correction for ageing and temperature)..... : 3.18 E-8 mbar l s⁻¹

System Calibration

R_{FR} (Residual signal prior S_{FR} measurement) : 3.03 E-10 mbar l s⁻¹

S_{FR} (Signal given by the calibrated leak) : 3.98 E-8 mbar l s⁻¹

S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) .. : 2 E-12 mbar l s⁻¹

q_{Gm} (Sensitivity of the leak test) = $S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$: 1.61 E-12 mbar l s⁻¹

$3t$ (Time to achieve stabilised leak signal) : 180 sec

Leak test conditions

p (System Pressure) : / mbar

C (Volumetric fraction of tracer gas in the injection envelope) : 1

R_F (Residual signal prior to S_F measurement) : 3.3 E-10 mbar l s⁻¹

S_F (Signal given by the leak after : 30 minutes $\geq 3t$) : 2.19 E-10 mbar l s⁻¹

Leak tightness requirements
 \leq Pa.m³ s⁻¹
 \leq 1.0 10⁻¹⁰ mbar l s⁻¹ @ 26 bar

Leak evaluation
 $q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C} < 1.0 E-10$ mbar l s⁻¹

Conformance.....: **YES**

Remarks:

CERN contract number: F302/LHC/LHC CERN technical spec.: LHC MMS-98-198 rev.2

CERN Part identifier : HCMBBRA001-02000008

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

Volume to be tested : cold mass ⇒⇒⇒ heat exchanger

Test equipment

Helium Mass Spectrometer type : PFEIFFER HLT 260

Pressure gauge type : PFEIFFER PKR 251

Turbo pump type : LEYBOLD PT 360

Helium calibrated leak data

Calibrated leak N°.: 4011007195 Calibration (Date,Temp.) : 08/10/2002 - 23 °C

Test temperature : 22 °C Nominal value : 3.0 E-8 mbar l s⁻¹

q_{FR} (Size of the calibrated leak after correction for ageing and temperature) : 2.89 E-8 mbar l s⁻¹

System Calibration

R_{FR} (Residual signal prior S_{FR} measurement) : 4.5 E-10 mbar l s⁻¹

S_{FR} (Signal given by the calibrated leak) : 3.0 E-8 mbar l s⁻¹

S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) : 2 E-12 mbar l s⁻¹

q_{Gm} (Sensitivity of the leak test) = $S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$: 1.96 E-12 mbar l s⁻¹

$3t$ (Time to achieve stabilised leak signal) : 180 sec

Leak test conditions

p (System Pressure) : / mbar

C (Volumetric fraction of tracer gas in the injection envelope) : 1

R_F (Residual signal prior to S_F measurement) : 4.3 E-10 mbar l s⁻¹

S_F (Signal given by the leak after 30 minutes $\geq 3t$) : 3.9 E-10 mbar l s⁻¹

Leak tightness requirements
 \leq _____ Pa.m³ s⁻¹
 \leq 1.0 10⁻⁵ mbar l s⁻¹ @ 26 bar

Leak evaluation
 $q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C} < 1.0 E-10$ mbar l s⁻¹

Conformance.....: **YES**

Remarks:

CERN contract number: F302/LHC/LHC CERN technical spec.: LHC MMS-98-198 rev.2

CERN Part identifier : HCMBBRA001-02000008

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

Volume to be tested : heat-exchanger ⇒⇒⇒ insulation vacuum

Test equipment

Helium Mass Spectrometer type : PFEIFFER HLT 260

Pressure gauge type : PFEIFFER PKR 251

Turbo pump type : LEYBOLD PT 360

Helium calibrated leak data

Calibrated leak N°.: 4011007225 Calibration (Date,Temp.) : 08/10/2002 - 23 °C

Test temperature : 19 °C Nominal value : 3.3 E-8 mbar l s⁻¹

q_{FR} (Size of the calibrated leak after correction for ageing and temperature)..... : 3.01 E-8 mbar l s⁻¹

System Calibration

R_{FR} (Residual signal prior S_{FR} measurement) : 6.42 E-9 mbar l s⁻¹

S_{FR} (Signal given by the calibrated leak) : 3.06 E-8 mbar l s⁻¹

S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) : 2 E-11 mbar l s⁻¹

q_{Gm} (Sensitivity of the leak test) = $S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$: 2.49 E-11 mbar l s⁻¹

$3t$ (Time to achieve stabilised leak signal) : 180 sec

Leak test conditions

p (System Pressure) : 6.4 E-5 mbar

C (Volumetric fraction of tracer gas in the injection envelope) : 1

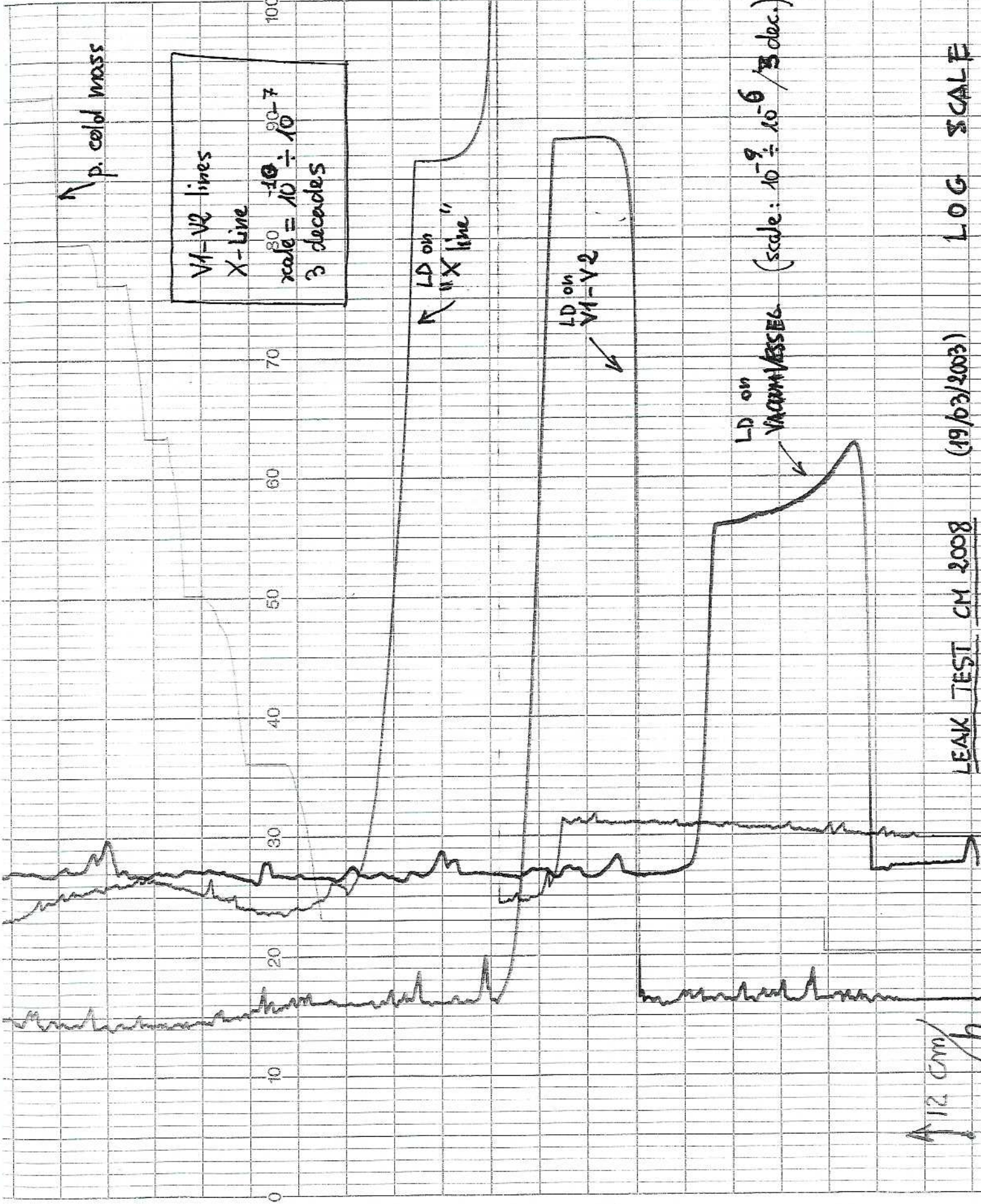
R_F (Residual signal prior to S_F measurement) : 6.27 E-9 mbar l s⁻¹

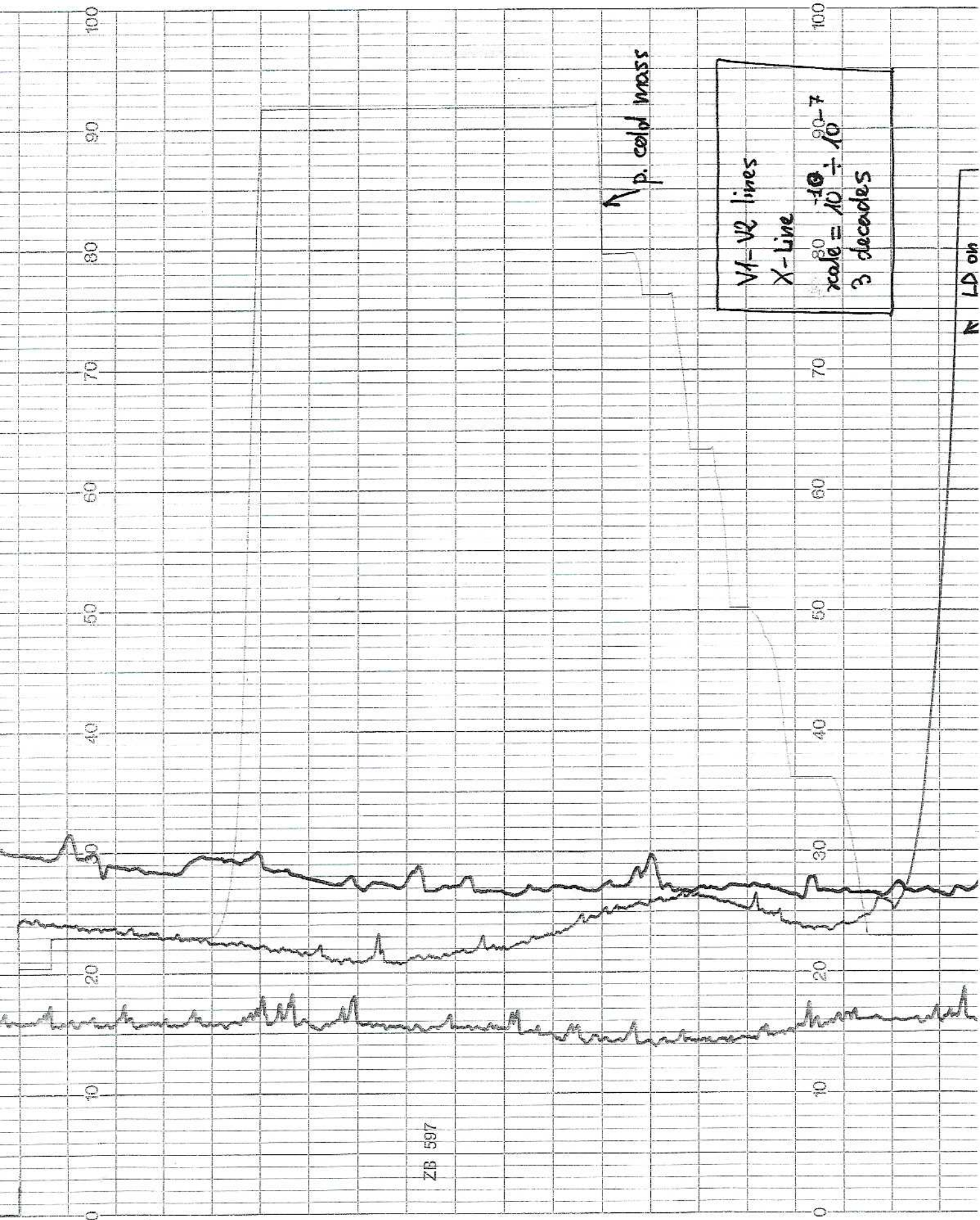
S_F (Signal given by the leak after : 30 minutes $\geq 3t$) : 6.17 E-9 mbar l s⁻¹

Leak tightness requirements \leq <u>Pa.m³ s⁻¹</u> \leq <u>1.0 10⁻⁹ mbar l s⁻¹ @ 5 bar</u>	Leak evaluation $q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C} < 1.0 E-9$ mbar l s ⁻¹
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Conformance.....: YES	Remarks: This test has been performed on 20/03/2003
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Operator Date: 20/03/2003 Name: B. Caserza	Checked by Date: 20/03/2003 Name: B. Caserza - F. Terzi	Approved by (CERN) Date: Name:
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