QUA 640

Ansaldo Superconduttori	RAPPORTO DI CONTROLLO *Test Report*	N° MA030515
	☐ IN APPROVVIGIONAMENTO *on purchasing* ☒ IN FABBRICAZIONE *on manufacturing*	Pag. : 1 di : 5+2

COMMESSA/*Job*	LOTTO/*Lot*	COMPONENTE/*Item code*	DISEGNO/*Drawing*	POS/*Item*	REV./*Rev.*	BOLLALAVORAZ./*Work note*
F10209EM - F10251EM	/	/	683RM08451	/		/

IMPIANTO./*Plant*	CLIENTE /*customer*	PEZZI A BOLLA-ORDINE/*total pieces-Order*	PEZZI CONTROLLATI/*Inspected pieces*
LHC 30 COLD MASSES	CERN	/	/

SPECIFICA/*Specification*	rev.	STAMPIGLIATURE/*Stamps*
780RM09442		HCMBBRA001-02000006

DESCRIZIONE PRODOTTO/*Item Description*	CONTROLLO / job :
LHC cold mass	Tests di tenuta a vuoto

He Leak Test

Esito :	**conforme** ☒	**non conforme** ☐	**R.N.C. n°**

COGNOME *Name*	CASERZA					
FIRMA *Signature*						
DATA *Date*	27.01.03					
ENTE *Department*	PRC					

Contractor: Ansaldo Superconduttori	HELIUM MASS SPECTROMETER LEAK TEST REPORT UNDER VACUUM METHOD	ITP number 22 - 23

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

CERN Part identifier ..... : HCMBBRA001-02000006

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

Volume to be tested ..... : cold mass ⇨⇨⇨ 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°.: 4011007195 Calibration (Date,Temp.) : 08/10/2002 23 °C

Test temperature : 17,0 °C Nominal value .....: $3.0\ 10^{-8}$ mbar l s^{-1}

q_{FR} (Size of the calibrated leak after correction for ageing and temperature).....: $2,8\ 10^{-8}$ mbar l s^{-1}

System Calibration

R_{FR} (Residual signal prior S_{FR} measurement) .....: $3.37\ 10^{-8}$ mbar l s^{-1}

S_{FR} (Signal given by the calibrated leak) .....: $5,80\ 10^{-8}$ mbar l s^{-1}

S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) .: $1,0\ 10^{-10}$ mbar l s^{-1}

q_{Gm} (Sensitivity of the leak test) $= S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$ .....: $1,15\ 10^{-10}$ mbar l s^{-1}

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

Leak test conditions

p (System Pressure) : $9.5\ 10^{-5}$ mbar

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

R_F (Residual signal prior to S_F measurement) .....: $3,38\ 10^{-8}$ mbar l s^{-1}

S_F (Signal given by the leak after : 30 minutes ≥ 3t) .....: $3,46\ 10^{-8}$ mbar l s^{-1}

Leak tightness requirements

≤ _____ Pa.m^3 s^{-1}

≤ 1.0 10^{-9} mbar l s^{-1} @ 26 bar

Leak evaluation

$q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C}$ = $9.2\ 10^{-10}$ mbar l s^{-1}

Conformance.....: (YES) NO

Remarks:

Contractor: Ansaldo Superconduttori	HELIUM MASS SPECTROMETER LEAK TEST REPORT UNDER VACUUM METHOD	ITP number 22 - 23

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

CERN Part identifier ..... : HCMBBRA001-02000006

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°.: 4011007195 Calibration (Date,Temp.) : 8/10/02 23 °C

Test temperature : 17,0 °C Nominal value .....: $3.0\ 10^{-8}$ mbar l s^{-1}

q_{FR} (Size of the calibrated leak after correction for ageing and temperature).....: $2.8\ 10^{-8}$ mbar l s^{-1}

System Calibration

R_{FR} (Residual signal prior S_{FR} measurement) .....: $2.3\ 10^{-10}$ mbar l s^{-1}

S_{FR} (Signal given by the calibrated leak) .....: $2.1\ 10^{-8}$ mbar l s^{-1}

S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) .: $1.0\ 10^{-11}$ mbar l s^{-1}

q_{Gm} (Sensitivity of the leak test) $= S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$ .....: $2.33\ 10^{-11}$ mbar l s^{-1}

3t (Time to achieve stabilised leak signal) .....: 480 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) .....: $2.0\ 10^{-10}$ mbar l s^{-1}

S_F (Signal given by the leak after : 30 minutes ≥ 3t) .....: $\sim 1,5\ 10^{-10}$ mbar l s^{-1}

Leak tightness requirements

≤ _____ Pa.m^3 s^{-1}

≤ $1.0\ 10^{-10}$ mbar l s^{-1} @ 26 bar

Leak evaluation

$q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C}$ = $< 1.\ 10^{-10}$ mbar l s^{-1}

Conformance.....: (YES) / NO

Remarks:

Contractor: Ansaldo Superconduttori	HELIUM MASS SPECTROMETER LEAK TEST REPORT UNDER VACUUM METHOD	ITP number 22 - 23

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

CERN Part identifier ..... : HCMBBRA001-02000006

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°.: 4011007225 **Calibration** (Date,Temp.) : 8/10/02 23 °C

Test temperature : 17 °C **Nominal value** ..... : $3.3\ 10^{-8}$ mbar l s^{-1}

q_{FR} (Size of the calibrated leak after correction for ageing and temperature) ..... : $3.1\ 10^{-8}$ mbar l s^{-1}

System Calibration

R_{FR} (Residual signal prior S_{FR} measurement) ..... : $1,70\ 10^{-7}$ mbar l s^{-1}

S_{FR} (Signal given by the calibrated leak) ..... : $1,93\ 10^{-7}$ mbar l s^{-1}

S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) .: $1.\ 10^{-9}$ mbar l s^{-1}

q_{Gm} (Sensitivity of the leak test) $= S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$ ..... : $1.35\ 10^{-9}$ mbar l s^{-1}

3t (Time to achieve stabilised leak signal) ..... : _____ sec

Leak test conditions

p (System Pressure) : no pressure gauge mbar

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

R_F (Residual signal prior to S_F measurement) ..... : $1,70\ 10^{-7}$ mbar l s^{-1}

S_F (Signal given by the leak after : 30 minutes ≥ 3t) ..... : $1,70\ 10^{-7}$ mbar l s^{-1}

Leak tightness requirements

≤ _____ Pa.m^3 s^{-1}

≤ 1.0 10^{-5} mbar l s^{-1} @ 26 bar

Leak evaluation

$q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C}$ = $< 1.\ 10^{-9}$ mbar l s^{-1}

Conformance.....: (YES) / NO

Remarks:

Contractor: Ansaldo Superconduttori	HELIUM MASS SPECTROMETER LEAK TEST REPORT UNDER VACUUM METHOD	ITP number 22 - 23

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

CERN Part identifier ..... : HCMBBRA001-02000006

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°.: Lo11007195 **Calibration** (Date,Temp.) : 8/10/02 23 °C

Test temperature : 17.0 °C **Nominal value** .....: $3.0\ 10^{-8}$ mbar l s^{-1}

q_{FR} (Size of the calibrated leak after correction for ageing and temperature)..... : $2.8\ 10^{-8}$ mbar l s^{-1}

System Calibration

R_{FR} (Residual signal prior S_{FR} measurement) ..... : $3,38\ 10^{-8}$ mbar l s^{-1}

S_{FR} (Signal given by the calibrated leak) ..... : $5,80\ 10^{-8}$ mbar l s^{-1}

S_m (Smallest readable signal deviation is equivalent to 2 x amplitude of R_{FR} noise) .: $1,0\ 10^{-10}$ mbar l s^{-1}

q_{Gm} (Sensitivity of the leak test) $= S_m \frac{q_{FR}}{S_{FR} - R_{FR}} \frac{1}{C}$ ..... : $1,15\ 10^{-10}$ mbar l s^{-1}

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

Leak test conditions

p (System Pressure) : $5.0\ 10^{-5}$ mbar

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

R_F (Residual signal prior to S_F measurement) ..... : $3.39\ 10^{-8}$ mbar l s^{-1}

S_F (Signal given by the leak after : 30 minutes ≥ 3t) ..... : $3.46\ 10^{-8}$ mbar l s^{-1}

Leak tightness requirements

≤ _____ Pa.m^3 s^{-1}

≤ $1.0\ 10^{-9}$ mbar l s^{-1} @ 5 bar

Leak evaluation

$q_G = \frac{q_{FR}(S_F - R_F)}{S_{FR} - R_{FR}} \frac{1}{C} = 8,1\ 10^{-10}$ mbar l s^{-1}

Conformance.....: (YES) / NO

Remarks:

Operator CASERZA B.	Checked by	Approved by
Date..: 27.01.03	Date..: 27/01/03	Date..:
Name:	Name:	Name:

ANSALDO SUPERCONDUTTORI

CM n HCMBBR_A001
-02000006

$3{,}46 \cdot 10^{-8}$ — FINE

TEST

$P_{in} = 5 \cdot 10^{-5}$ mbar

LINEA

$T°C = 17°$

A 11.07

5 bar

$3{,}38 \cdot 10^{-8}$

ZB 597

27/01/03

$3{,}46 \cdot 10^{-8}$ mbar l/s

SCARICO / exhaust

$T°C = 17°$

$3{,}38 \cdot 10^{-8}$ mbar l/s

26 bar

4 bar He

$5{,}80 \cdot 10^{-8}$

11.07 He IN

CLOSED

5 minuti

ZB 597

OPEN FUGA / CALIBR. LEAK

$P_{in} = 9{,}5 \cdot 10^{-5}$ mbar

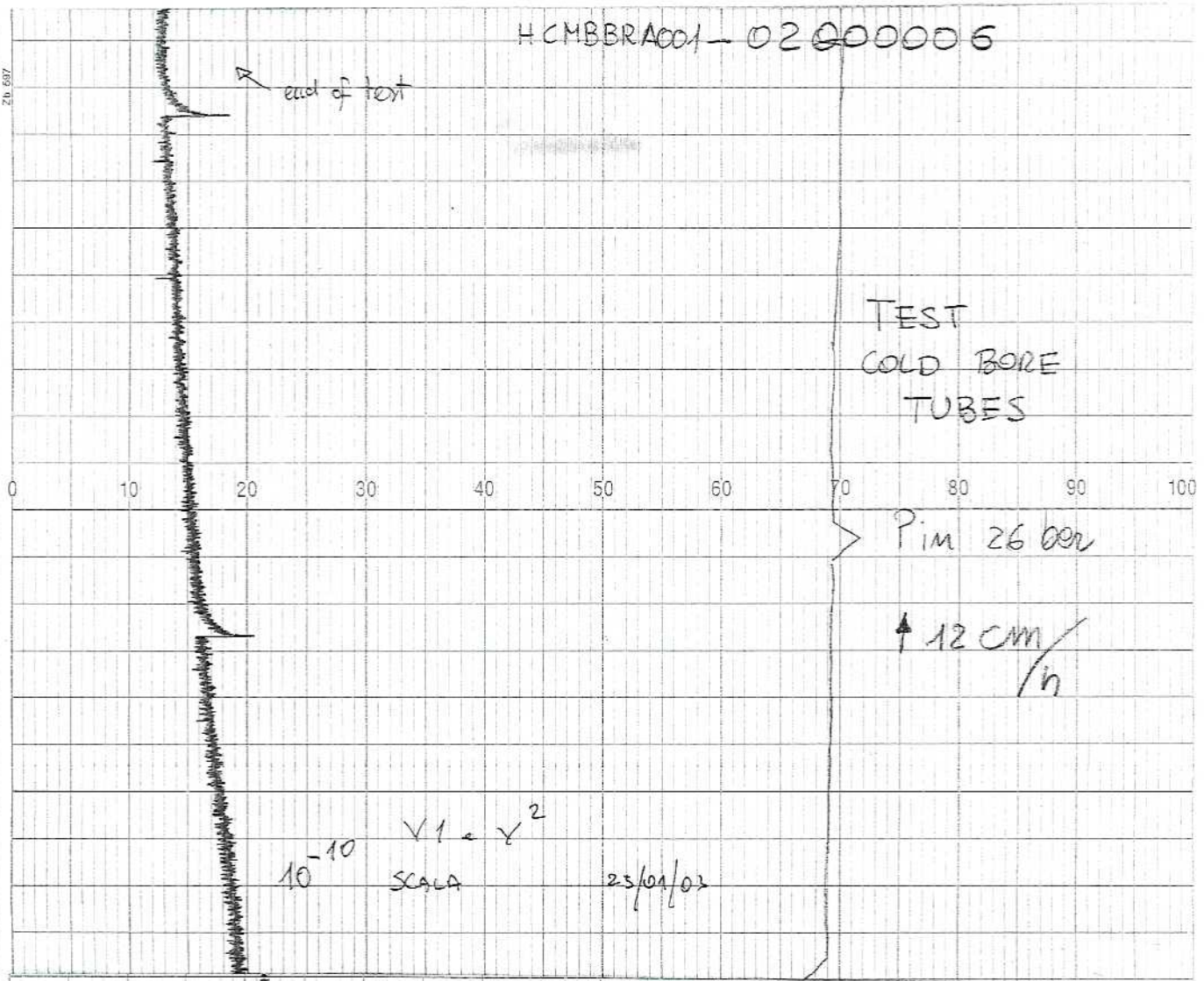
$1{,}7 \cdot 10^{-7}$

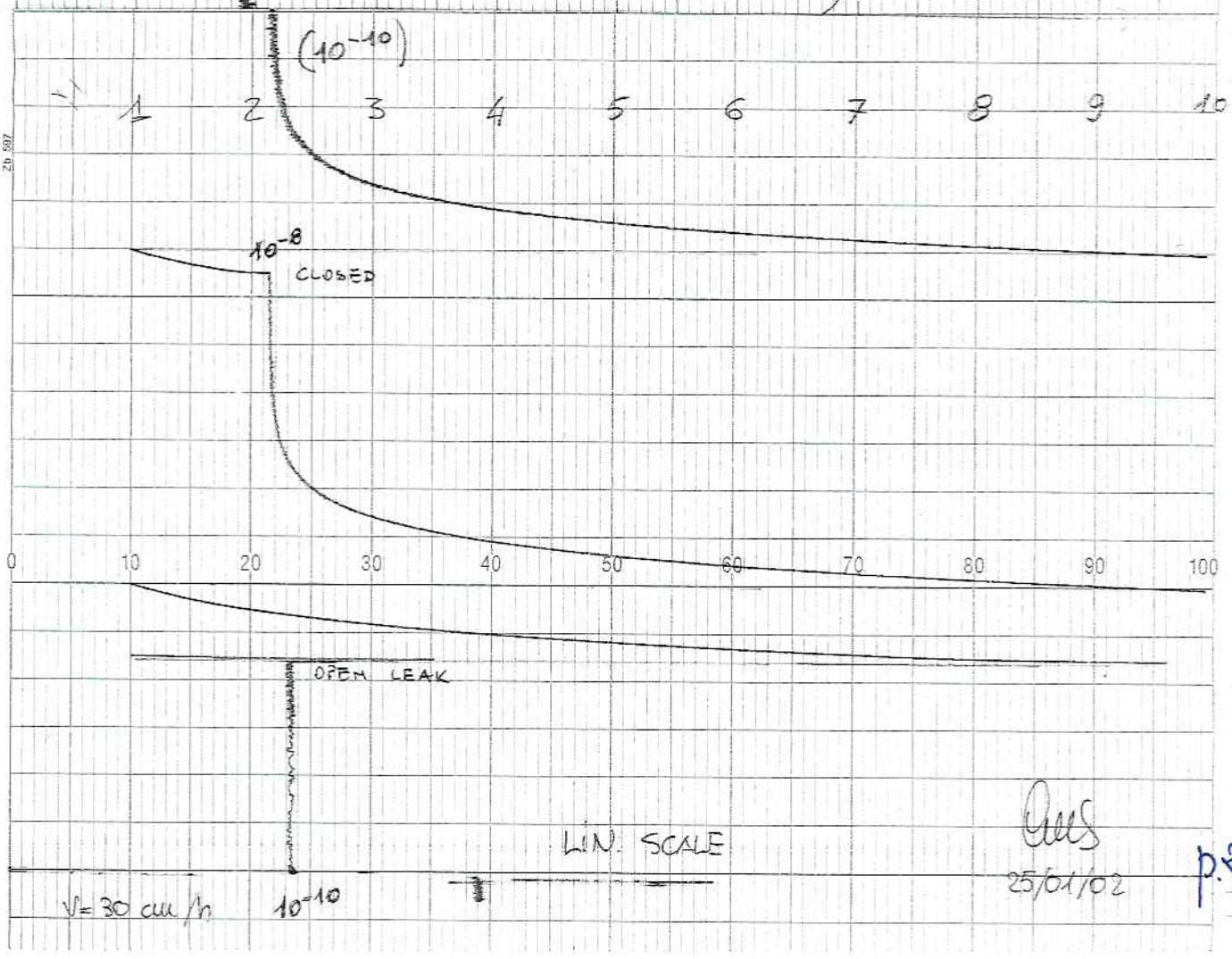
$3{,}37 \cdot 10^{-8}$ (CAMERA / vessel)

25.01.03

p.1/2

H CMBBRA001 – 02000006





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