

<b>TEST REPORT</b> <b>HELIUM LEAK TEST</b> <i>Pressure-vacuum method</i>	<b>F.M.I. S.P.A.</b>
<b>Number:</b> SPS/0131/07e <b>Date</b> 17/04/2007 <b>OMEKO Ref.:</b> 0949 <b>Page</b> 1 of 4 <b>CUSTOMER Ref:</b> ORD.700702 DEL 15/3/7	<b>VIA TARANTO, 10/12 FRAZIONE SAN PANCRAZIO</b> <b>25036 PALAZZOLO SULL'OGLIO BS</b>

**Sample:** Nr. 1 metal spring gasket DN 4", thk. 4 mm, declared type FLEXWOUND

**Identification :** 949 – B

**Date of receipt :** 19/03/2007

**Test standards :** ASME Sect. V Art. 10 App. IX Ed. '04 and VDI 2440 (2000)

**Acceptance level :**  $1,0 \times 10^{-4}$  mbar·l/(s·m) →  $4,3 \times 10^{-5}$  mbar·l/s

**Examined area :** Tightness toward outside

**Equipment :**

<b>Detector :</b>	INFICON UL-200	<b>Nr. Identif:</b> SPS-0335
	<b>Sensibility:</b>	$1,0 \times 10^{-11}$ mbar·l/s
<b>Vacuum gauge :</b>	EDWARDS PIRANI	<b>Nr. Identif:</b> SPS-0375 – SPS-0104
<b>Rotary vane pump :</b>	25 m <sup>3</sup> /h	<b>Nr. Identif:</b> SPS-0336
	12 m <sup>3</sup> /h	<b>Nr. Identif:</b> SPS-0069
<b>Calibrated leak :</b>	<b>Permeation type TL7:</b>	<b>Nr. Identif:</b> SPS-0011
	- Nominal value (Q <sub>0</sub> ):	$2,4 \times 10^{-7}$ mbar·l/s
	- Calibration date:	2005
	- Calibration temperature:	23 °C
	- Temperature drift:	3,5% / °C
	- Leak rate decrease:	< 0,5% / year
<b>Pressure transducer :</b>	f.s. 2000 mbar	<b>Nr. Identif:</b> SPS-0090 – SPS-0021
<b>Load cell :</b>	f.s. 100 Ton	<b>Nr. Identif:</b> SPS-0284
<b>Sliding caliber :</b>	f.s. 200 mm	<b>Nr. Identif:</b> SPS-0366
<b>Digital thermometer :</b>	Delta Ohm HD-2307.0	<b>Nr. Identif:</b> SPS-0364
<b>Amplifier :</b>	HBM mod. Spider 8:	<b>Nr. Identif:</b> SPS-0303

Software acquisition data Mod. LEAK WARE, Ver. 1.3, installed on Omeco PC-033

Software acquisition data Mod. CATMAN, Ver. 4.0, installed on Omeco PC-033.

*This test report is the complete translation into English of the test report "SPS/0131/07 dated 17/04/07"*

*This test report concerns only the sample submitted to the test. If not otherwise indicated, the sampling operation were performed by the Customer.*

<b>Date/s of execution:</b> 13/04/07	<b>At:</b> OMECO SRL
Operator/s	Technical Manager
C.MAGNI	M. CASARIL

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**TEST CONDITION AND RESULTS**

**Detector calibration**

- Nominal value of permeability leak ( $Q_0$ )       $2,4 \times 10^{-7}$  mbar-l/s
- Room temperature      22 °C
- Actual value of permeability leak ( $Q_a$ )       $2,3 \times 10^{-7}$  mbar-l/s

**System calibration**

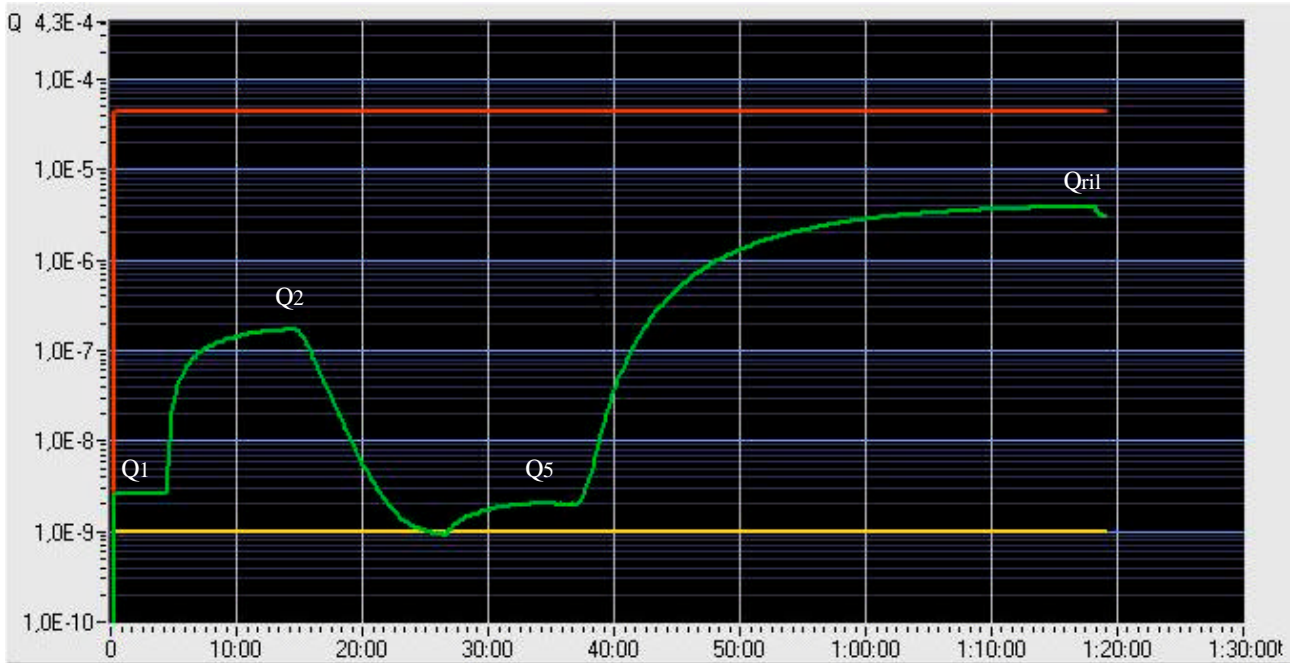
- Vacuum chamber pressure       $5,0 \times 10^{-3}$  mbar
- Pressure inside M.S.       $< 10^{-4}$  mbar
- Background noise ( $Q_1$ )       $2,5 \times 10^{-9}$  mbar-l/s      (Vd. Fig.1)
- Response time      9 min      (Vd. Fig.1)
- Detected signal with calibrated leak ( $Q_2$ )       $1,7 \times 10^{-7}$  mbar-l/s      (Vd. Fig.1)
- Initial sensitivity       $S_1 = \frac{Q_a}{Q_2 - Q_1}$       1,37

**Pressure-vacuum test execution**

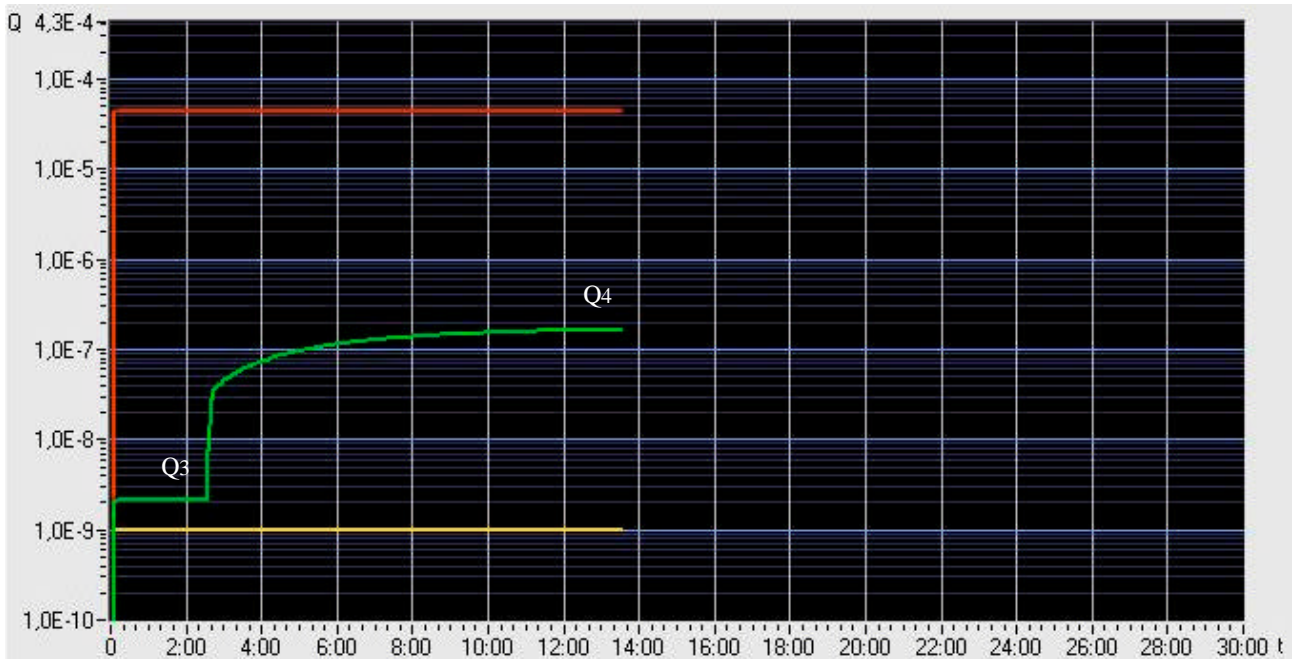
- Gasket applied load      30 Mpa
- ? p      1 bar
- Helium concentration (C)      100 %
- Background noise ( $Q_5$ )       $2,0 \times 10^{-9}$  mbar-l/s      (See. Fig.1)
- Soak time      45 min      (See. Fig.1)
- Max detected signal ( $Q_{ril}$ )       $3,9 \times 10^{-6}$  mbar-l/s      (See. Fig.1)
- Signal present after the test ( $Q_3$ )       $2,2 \times 10^{-9}$  mbar-l/s      (See. Fig.2)
- Detected signal ( $Q_4$ )       $1,7 \times 10^{-7}$  mbar-l/s      (See. Fig.2)
- Final sensitivity       $S_2 = \frac{Q_a}{Q_4 - Q_3}$       1,36
- Sensitivity difference       $\Delta S = \frac{S_2 - S_1}{S_1} \cdot 100$       -0,73 %
- Actual leakage       $Q_{act} = S_2 \cdot (Q_{ril} - Q_5) \cdot \frac{100}{C}$        $5,3 \times 10^{-6}$  mbar-l/s

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**GRAPH**



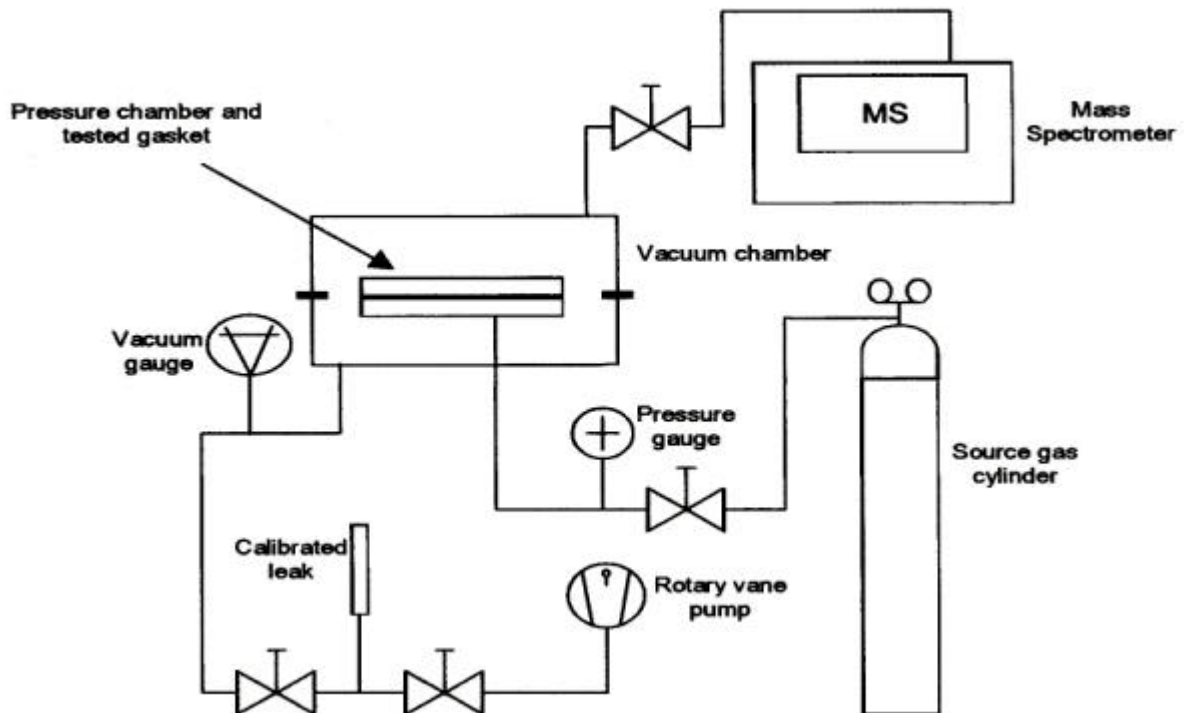
*Fig.1 – Initial sensitivity and pressure-vacuum test execution*



*Fig.2 – Final sensitivity*

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**TEST SCHEME (\*)**



(\*) : Drawing not in scale

**RESULT**

No leakage greater than the acceptance level were found.  
After compression, the gasket was almost undamaged.

*End document*