TEST REPORT

HELIUM LEAK TEST
Pressure-vacuum method

Number: SPS/0131/07e Date 17/04/2007
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CUSTOMER Ref: ORD.700702 DEL 15/3/7

F.M.I. S.P.A.
VIA TARANTO, 10/12 FRAZIONE SAN PANCRAZIO
25036 PALAZZOLO SULL'OGLIO BS

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 :

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

Examinated area :
Tightness toward outside

Equipment :
Detector : INFICON UL-200 Nr. Identif: SPS-0335
Sensibility: 1,0 x 10^{-11} mbar·l/s

Vacuum gauge : EDWARDS PIRANI Nr. Identif: SPS-0375 – SPS-0104
Rotary vane pump : 25 m³/h Nr. Identif: SPS-0336
12 m³/h Nr. Identif: SPS-0069
Calibrated leak : Permeation type TL7: Nr. Identif: SPS-0011
- Nominal value (Q₀): 2,4 x 10^{-7} mbar·l/s
- Calibration date: 2005
- Calibration temperature: 23 °C
- Temperature drift: 3,5% / °C
- Leak rate decrease: < 0,5% / year

Load cell : f.s. 100 Ton Nr. Identif: SPS-0284
Sliding caliber : f.s. 200 mm Nr. Identif: SPS-0366
Digital thermometer : Delta Ohm HD-2307.0 Nr. Identif: SPS-0364
Amplifier : HBM mod. Spider 8: Nr. Identif: 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.

Date/s of execution: 13/04/07 At: 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
- \( \bar{p} \) 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 \[ \Delta S = \frac{S_2 - S_1}{S_1} \times 100 \] -0,73 %
- Actual leakage \[ Q_{act} = S_2 \cdot (Q_{ril} - Q_5) \frac{100}{C} \] 5,3 \( \times 10^{-6} \) mbar·l/s
**GRAPH**

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

Fig.2 – Final sensitivity
**TEST SCHEME (*)**

(*) : Drawing not in scale

**RESULT**

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