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TEST CERTIFICATE

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MPA STUTTGART Materialprüfungsanstalt Universität Stuttgart

Documentation of results
for testing a hose adapter

Report no.:	903 2404 001
Client:	Krasemann GmbH & Co. KG Max-Planck-Str. 2 D-46414 Rhede
Order no. (client):	
Order no. (MPA):	**903 2404 000 /Hh/Os/Scr**
Test object:	**KRASO® hose adapter including hose connector**
Test specification with issue date:	Bubble test
Date of receipt of the test object:	3 August 2016
Test date:	3 to 5 August 2016
Report date:	9 August 2016
Page 1 of	3 pages of text
Supplements:	1
Appendices:	-
Total number of pages:	4
Number of copies:	1 x Krasemann GmbH & Co. KG

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The test results relate exclusively to the test specimens.

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1 Task

The test object is a **KRASO® hose adapter including hose connector** pre-installed by the client (Figure 1, Attachment 1). This was to be examined with regard to leakage. Due to the fact that soft components are involved, which react to pressure changes with a change in volume, the familiar procedures such as pressure drop, pressure increase and differential pressure methods are not used as evidence methods, even though these could be used for qualitative, but not quantitative, statements regarding the leakage rate. The vacuum or sniffer method fails because the helium leakage, due to the relatively thin material, would take place over the entire surface and not only over the connection points.

This ultimately only left the bubble test.

2 Examinations carried out

The test object is put into an enclosing tube together with two sealing inserts (Figure 2, Attachment 1) and clamped there. A valve, which is attached to the tube on the outside, can be used to apply the test pressure with compressed air. The test pressure therefore takes effect on the test object from the outside. The leakage can escape inside in the form of bubbles and be evidenced by means of visual inspection.

It was able to be established that no visible leakage occurred in the form of bubbles, either at the sealing inserts or at the valve.

3 Test results

At a test pressure of 2.5 bar, only occasional bubbles were able to be observed at an interval of approx. 3 minutes. The bubbles had a volume of approx. 1 mm³ (estimated).

The leakage rate is therefore $1 \cdot 10^{-3}$ ml/180 s. That equates to an absolute leakage rate of approx. $6 \cdot 10^{-6}$ ml/s and a specific leakage rate of approx. $1{,}3 \cdot 10^{-5}$ ml/(s·m) (all figures are conservatively rounded).

4 Summary

A pre-installed **KRASO® hose adapter including hose connector** was examined for leakage according to the bubble test principle.

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5 Interpretation of the result and recommendations

The size of the bubbles and the time interval are merely estimated. Nevertheless, the tested hose adapter can be attributed a high leak tightness, which ought to be close to the high-quality level according to TA Luft. As this measurement method cannot be used as evidence of the high quality according to TA Luft without elaborate validation, no attempt was made to carry out more accurate evaluations.

[Stamp]

[Signature]

Werner Ottens
Experimental stress analysis department

[Signature]

Dipl.-Ing Rolf Hahn
Materials for extreme conditions department

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Enclosure 1

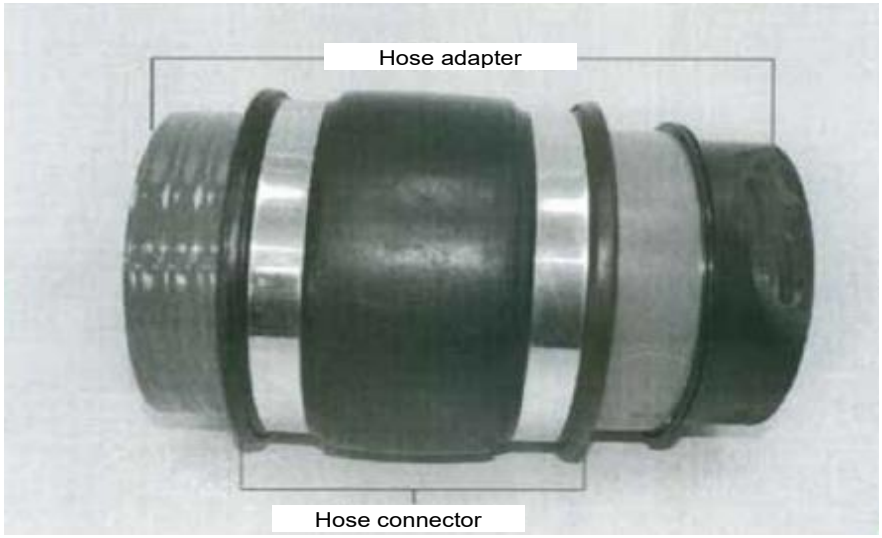

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Fig. 1: Test object: Hose adapter with hose connector

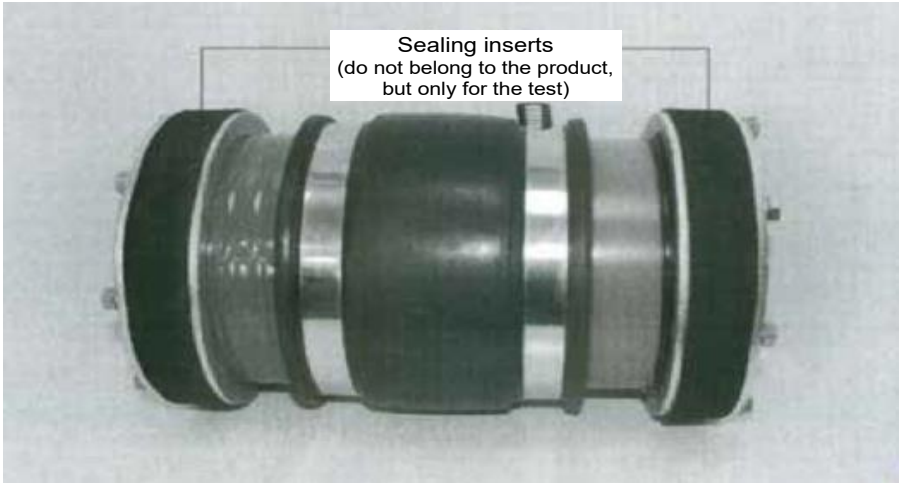

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Fig. 2: Hose adapter and hose connector in installed state with sealing inserts

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