

## Raport

on Testing a Sealing Material for Reactivity with Oxygen

Reference Number 11-1301/2004  
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### Application

Customer TEMAC a.s.  
28913 Zvefnek  
CZECH REPUBLIC

Order Date April 2, 2004

Reference Receipt  
of Order Test Samples April 6, 2004

Gasket TEMASIL for use in flanged connections in gaseous oxygen pipings at temperatures greater than 60 °C; BAM-Order No. 11.1/47 343

Receipt of Samples April 6, 2004

Test Date Test May 19, 2004 - May 26, 2004

Location BAM-Laboratory 11.13; building no. 41, room no 073

Test Procedures According to Regulation BGV B 7 „Oxygen“ of the „Berufsgenossenschaft der chemischen Industrie“. Test methods according to the annex of the pamphlet „Liste der nichtmetallischen Materialien die von der Bundesanstalt für Materialforschung und -prüfung (BAM) zum Einsatz in Anlageteilen für Sauerstoff als geeignet befunden worden sind.“ (Edition: 31. August 2003) of BGV B 7.

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This test report consists of page 1 to 3 and annex 1 to 3.

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In case a German version of the test report is available, it shall prevail over the English version.

For information see BAM website: [www.bam.de](http://www.bam.de) in the section: „Chemical and Material Technology“

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## 2 Documents and Test Samples

The following documents and samples were submitted:

- 1 application for Testing,
- 1 product information,
- 1 data sheet,
- 1 material safety sheet and Disks of TEMASIL (thickness: ca. 2 mm; diameter: 140 mm), color; one side blue and one side tinged with blue and imprints as follows: TEMAC; DIN 2G 091-2, FA-MA1-0; ASTM 104-F712 111-M5: TEMASIL

## 3 Test Methods and Results

### 3.1 Autogenous Ignition Temperature (AIT)

The test method is described in annex 1.

Results:

In five tests with an oxygen pressure of  $p_a = 54$  bar, an AIT of 169 °C was determined with a standard deviation of + 5 °C. The oxygen pressure  $p_e$  at ignition is approximately 52 bar.

### 3.2 Artificial Aging

The test method is described in annex 2.

Results:

During aging of TEMASIL at 80 bar oxygen pressure and 105 °C, the material was brittle. The sample gained 4 % in mass.

The AIT of the aged sample at 81 bar oxygen pressure was 165 °C with a standard deviation of  $\pm 5$  °C. The test shows that the AIT is unchanged compared to the AIT of the unaged sample within the precision of measurement.

### 3.3 Flange Test

The test method is described in annex 3.

Results:

Due to the aging behavior of the material, the samples were tested at 80 bar oxygen pressure and 80 °C. Only those parts of the gasket that project into the pipe; the fire is neither transmitted to the steel nor does the gasket burn between the flanges. The flange remained gas-tight. Thereupon, the test was repeated four times at 80 bar and 80 °C. The same result was obtained as before.

## Evaluation

The tests have shown that the autogenous ignition temperature of the material is  $(169 \pm 5) \text{ }^\circ\text{C}$  at 82 bar oxygen pressure

At a temperature of  $105 \text{ }^\circ\text{C}$  and an oxygen pressure of 80 bar, the material proved to be not sufficient aging resistant. As a result of the aging test, the material was brittle. Therefore, the gasket TEMASIL is suitable only for use in flanges that are not dynamically stressed. Furthermore, the unfavourable aging behaviour may reduce the gasket's usability.

On basis of those test results and the results of the flange testing there are no objections with regard to technical safety to use the gasket TEMASIL in flange connections made of copper, copper alloys or steel at oxygen pressures up to 30 bar and at temperatures up to  $80 \text{ }^\circ\text{C}$ . This applies to flat faced flanges, male/female flanges, and flanges with longue and groove.

This report does not cover the use of the gasket TEMASIL for liquid oxygen service. A particular test for reactivity with liquid oxygen needs to be carried out to evaluate the compatibility of the gasket with liquid oxygen.

## Comments

This report expires at once, if the composition of the tested material is changed. This report expires on June 30, 2014, at the latest. A prolongation beyond this date is possible, if the manufacturer confirms in writing that the material has not changed since this evaluation.

Products that have been tested by us, and which are on the market, shall be marked according to our evaluation in the BAM test report. A label on a product saying that a BAM test has been performed and (or) citing our reference number, only, is not tolerable. The use of the product and its safe operating conditions must also be given

It shall be clear that the product may only be used for gaseous oxygen service. The maximum safe oxygen pressure of the product and its maximum use temperature as well as other restrictions in use shall be given.

Federal Institute for Materials Research and Testing (BAM)  
12200 Berlin, 4. June 2004

Subdivision 11.1  
"Gases, Gas Plants"



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Head of Laboratory

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"Equipment for Gases, Oxygen"



Dipl.-Ing. K. Arlt  
Engineer in Charge

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