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Report

on Testing a Sealing Material for Reactivity with Oxygen

Reference Number II-1471/2005
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1 Application

Customer DONIT TESNIT d. d.
Cesta komandanta Staneta 38
1215 MEDVODE,
SLOVENIJA

Order date May 18, 2005

Reference -

Receipt of order May 20, 2005

Test samples Gasket BA-55 for use in flanged connections in gaseous oxygen piping at temperatures greater than 60 °C;
BAM Order No. II.1/48 087

Receipt of samples May 20, 2005

Test Date June 24, 2005 to July 6, 2005

Test Location BAM-Working Group "Safe Handling of Oxygen";
building no. 41, room no. 120

Test procedure according to DIN EN 1797:2002-02 „Kryo-Behälter – Verträglichkeit von Gas/Werkstoffen“ bzw. „Liste der nichtmetallischen Materialien, die von der Bundesanstalt für Materialforschung und -prüfung (BAM) zum Einsatz in Anlageteilen für Sauerstoff als geeignet befunden worden sind.“, Stand: 31. August 2004, nach der berufsgenossenschaftlichen Regel BGR 500 „Betreiben von Arbeitsmitteln“, Teil 2, Kapitel 2.32 „Betreiben von Sauerstoffanlagen“, Stand: Februar 2005.

TESTREPORT

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, exclusively the German version is binding.



2 Documents and Test Samples

The following documents and samples were submitted to BAM:

- 1 Application for testing,
- 1 Technical data sheet on BA-55 and
- 15 disks of BA-55, diameter: 140 mm, thickness: ca. 2 mm; color: green marbled, one side with imprint „TESNIT BA-55“

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 $p_a = 71$ bar, an AIT of 145 °C was determined with a standard deviation of ± 6 °C. The oxygen pressure p_e at ignition is approximately 101 bar.

3.2 Artificial Aging

The test method is described in annex 2.

Results:

After aging of BA-55 at 100 bar oxygen pressure and 110 °C, the material was very brittle and the color changed to brown. The sample gained 4,8 % in mass.

The AIT of the aged sample at 104 bar oxygen pressure was 158 °C with a standard deviation of ± 5 °C. The test shows that the AIT is slightly higher regarding the AIT of the un-aged sample within the precision of measurement.

3.3 Flange Test

The test method is described in annex 3.

Results:

The samples were tested at 100 bar oxygen pressure and 85 °C. Only those parts of the gasket burn that projected 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 100 bar and 85 °C. The same result was obtained as before.

4 Evaluation

The tests have shown that the autogenous ignition temperature of the material is (145 ± 6) °C at an oxygen pressures of 101 bar.

At a temperature of 110 °C and an oxygen pressure of 100 bar, the material proved not to be sufficient aging resistant. As a result of the aging test, the material was very brittle and changed its color to brown. Therefore, the gasket BA-55 is suitable only for use in flanges that are not dynamically stressed. Furthermore, the unfavourable aging behaviour may have an impact on the gasket's usability.

On basis of the test results, regarding technical safety, the flat gasket BA-55 may be used in flange connections made of copper, copper alloys or steel at oxygen pressures up to 100 bar and temperatures up to 85 °C. This applies to flat faced flanges, male and female flanges, and flanges with tongue and groove.

This report does not cover the use of the gasket BA-55 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.

5 **Comments**

This report expires at once, if the composition of the tested material is changed. This report expires on July 31, 2015, 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, July 18, 2005**

**Division II.1
"Gases, Gas Plants"**


Dr. Chr. Binder
Head of Working Group

**Working Group
"Safe Handling of Oxygen"**


Dipl.-Ing. K. Arlt
Engineer in Charge

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