

**BAM**Bundesanstalt für
Materialforschung
und -prüfung**Report**
on Testing a Gasket Material for Reactivity with Oxygen

Reference Number 2-1543/2013 II E

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Customer Donit Tesnit d.o.o.
Cesta komandanta Staneta 38
1215 Medvode
Slovenija

Order Date May 13, 2013

Receipt of Order May 23, 2013

Test Samples Gasket material Tesnit® BAGL 3000, undefined batch, for
use in flanged connections in piping, valves and fittings
or other components for gaseous oxygen service at
120 bar and 60 °C;
BAM Order-No.: 2.1/51 551

Receipt of Samples May 15, 2013

Test Date February 7, 2014

Test Location BAM - Working Group "Safe Handling of Oxygen";
building no. 41, room no. 073Test Procedure according to DIN EN 1797: 2002-02
„Cryogenic Vessels - Gas/Material Compatibility“
ISO 21010: 2004-07
„Cryogenic Vessels - Gas/Material Compatibility“
Annex of pamphlet M 034-1 (BGI 617-1)
"List of nonmetallic materials compatible with oxygen by BAM
Federal Institute for Material Research and Testing.", by
German Social Accident Insurance Institution for the raw
materials and chemical industry,
Edition: March 2013;
Rule BGR 500 "Betreiben von Arbeitsmitteln" part 2,
chapter 2.32 "Betreiben von Sauerstoffanlagen",
paragraph 3.17 "Lubricants and sealing materials",
Edition: April 2008.All pressures of this report are excess pressures.
This test report consists of page 1 to 3 and annex 1.This test report may only be published in full and without any additions. A revocable permission in writing has to be
obtained from BAM for any amended reproduction of this certificate or the publication of any excerpts. The test results
refer exclusively to the tested materials.

In case a German version of the test report is available, exclusively the German version is binding.

DONIT TESNIT, d.d.	DATUM 15.4.2014
ŠIFRA 3 03 132	PODPIS <i>[Signature]</i>



1 Documents and Test Samples

The following documents and samples were submitted to BAM:

- 1 Test Application
- 1 Material Data Sheet (1 page, issue date unknown)
- 1 Safety Data Sheet (5 pages, issue date November 23, 2010)
- 15 Disks gasket material Tesnit® BAGL 3000, undefined batch
 - Diameter: 140 mm; Thickness: 2 mm
 - Color: turquoise
 - One side marbled, other side with imprint: Tesnit BAGL 3000

2 Test Methods

To test and evaluate the compatibility of the nonmetallic material Tesnit® BAGL 3000, undefined batch, for use as a gasket material in flanged connections in piping, valves and fittings or other components for gaseous oxygen service at 120 bar and 60 °C, a flange test was carried out at 120 bar and 60 °C.

A determination of the autogenous ignition temperature (AIT) and an investigation of the aging resistance in high pressure were not necessary as the gasket material Tesnit® BAGL 3000, undefined batch, is not for use at temperatures greater than 60 °C.

3 Results

3.1 Flange Test

The test method is described in annex 1.

Results:

Test No.	Oxygen Pressure [bar]	Temperature [°C]	Notes
1	120	60	Only those parts of the gasket burn that project into the pipe.
2	120	60	same behavior as in test no. 1
3	120	60	same behavior as in test no. 1
4	120	60	same behavior as in test no. 1
5	120	60	same behavior as in test no. 1

In five tests at 120 bar oxygen pressure and 60 °C, only those parts of the gasket burn that project into the pipe; the fire is neither transmitted to the steel nor does the gasket burn between the flanges. The flange remains gas-tight.

4 Summary and Evaluation

On basis of the results of the flange testing, there are no objections with regard to technical safety to use the gasket material Tesnit® BAGL 3000, undefined batch, with a maximum thickness of 2 mm in flange connections made of copper, copper alloys or steel at following conditions:

Maximum Oxygen Pressure	Maximum Temperature
120 bar	60 °C

This applies to flat faced flanges, male/female flanges, and flanges with tongue and groove.

This evaluation does not cover the use of the gasket material Tesnit® BAGL 3000, undefined batch, for liquid oxygen service. For this case, a particular test for reactivity with liquid oxygen needs to be carried out.

5 Comments

The test results only refer to the particular batch of Tesnit® BAGL 3000, undefined batch.

Products on the market that contain a reference to BAM testing shall be marked accordingly. It shall be evident that only a sample of a batch has been tested and evaluated for oxygen compatibility. The reference shall not produce a presumption of conformity that monitoring of the production on a regular basis is being performed by BAM.

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.

**BAM Federal Institute for Materials Research and Testing
12200 Berlin, February 21, 2014**

**Division 2.1
"Gases, Gas Plants"**

On behalf of



Dr. Thomas Kasch

Copies: 1. Copy: Donit Tesnit d.o.o.
 2. Copy: BAM – Division 2.1 "Gases, Gas Plants"

Annex 1

Testing of Gaskets for Flanges in Oxygen Steel Pipings

The test apparatus mainly consists of two DN 65 PN 160 steel pipes, each approximately 2 m in length, with corresponding standard flanges welded to each pipe.

Both pipes are sealed using the gasket to be tested. In case of a gasket disk its inner diameter is chosen in such a way that it projects into the pipe. If a gasket tape is under test, both ends of the tape are allowed to project into the pipe. The test apparatus is then pressurized with oxygen up to the desired test pressure. The flange is heated by heating sleeves to the test temperature, at least 50 K lower than the ignition temperature of the gasket. An electrical filament ignites that part of the gasket projecting into the pipe. If the gasket is electrically conductive, such as spiral seals or graphite foils, a nonconductive primer capsule of organic material (PTFE, rubber) is used which acts on the seal.

The gasket's behavior after ignition is important for its evaluation. If the seal burns with such a hot flame that the fire is transmitted to the steel of the flange (in most case the test apparatus is destroyed), the seal is considered unsuitable from the beginning. If only those parts of the seal burn that project into the pipe and the fire is not transmitted to the flanges and if the seal does not burn between the flanges there are no objections with regard to technical safety to use the seal under the conditions tested. Such a positive result is to confirm in four additional tests. If, however, the flanged connection becomes un-tight during a test, e. g., because of softening or burning of the seal, the test has to be continued at a lower temperature and oxygen pressure until a positive test result is reached in five tests, as mentioned above.