



## Test Report

Customer: SGL Carbon GmbH  
Werner-von-Siemens-Straße 18  
D – 86405 Meitingen

Project number (amtec): 304 975  
Report number: 304 975 1/-

Test procedure: Hot Blowout Test ASTM WK61856  
(dated October 2020)

Material: SIGRAFLEX iNXT V20010C5N

Date: August 11<sup>th</sup>, 2022  
Pages: 5  
Appendices: 4

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**Test Engineer**

Approval:

Dr.-Ing. M. Schaaf

**Managing Director**

Test results are only relevant to the test objects submitted.

## 1. Subject of Investigation

The subject of investigation was a sheet gasket material of graphite from SGL Carbon GmbH which is customer named

- SIGRAFLEX iNXT V20010C5N.

The flat gasket is a flexible graphite gasket reinforced with a 0.05 mm thick flat stainless steel foil.

Samples receipt: August 1<sup>st</sup> , 2022.

## 2. Goal of Investigation

The goal of the investigation was the determination of safety against blowout according to standard method ASTM WK61856 (dated October 2020): Hot Blowout Test.

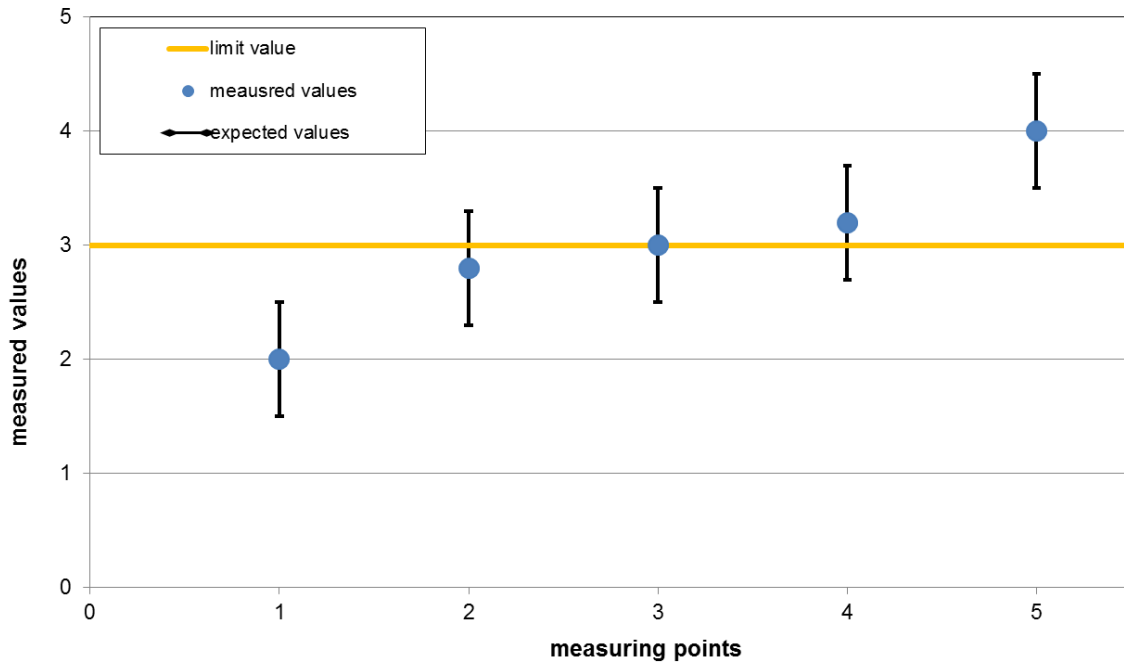
Deviant from the standard, which is developed for PTFE gasket materials, a graphite material was tested. Also, first the test temperature was applied and afterwards the internal pressure was increased in several steps to find the blowout condition. No thermal cycles were applied to the specimen. In a previous draft of the standard, this test procedure was called HOBT-1.

### 2.1 Declaration of conformity in the test laboratory of amtec

A declaration of conformity is a written confirmation at the end of a conformity assessment in which the amtec test laboratory for a specific examination bindingly declares and confirms that the product sample has a specified property. The properties are usually specified by limit values in standards, technical specifications or test methods.

For declarations of conformity in the amtec test laboratory the following decision rules have to be considered. The decision rules are explained in an example.

In the following test, a limit value of  $\leq 3$  should be reached.



conformity assessment		√ = pass    x = fail			
measuring points	1	2	3	4	5
decision rule	√ = pass	√ = pass	x = fail	x = fail	x = fail

In the example above, measurement points 1 and 2 are a positive conformity statement, the measuring points 3, 4 and 5 are a negative conformity statement.

The standard deviations of the different physical parameters pressure, displacement, temperature, force (surface pressure) and leak rate (when measuring with a leak detector) can be found in the protocols of the last maintenance of each test rig.

### 3. Test Specimens

The geometry of the tested specimen was NPS 3 Class 150 per ASME B16.21. The gasket thickness was 2.0 mm.

### 4. Testing Equipment

The gasket test was carried out on the following test rig in the laboratory of amtec:

Test rig: TEMES<sub>fl.ai1</sub>

Serial number: 010 181

A photo and the schematic view of the testing equipment are shown in **appendix 1**.

## 5. Test Procedure

The HOBT-1 test can be performed in a fixture joint (ASME B16.5 NPS 3Class 150) or in a hydraulic test rig, in which the rigidity of the flange can be simulated. In the amtec lab the HOBT-1 tests are carried out in a hydraulic testing equipment.

The HOBT-1 test procedure consists of different steps, which may be described as follows:

1. The gasket is compressed to the initial gasket stress.
2. The gasket is left undisturbed for 5 minutes before it is reloaded up to the initial gasket stress. During this period it creeps and relaxes according to the defined rigidity of the test rig.
3. The gasket is left undisturbed for 30 minutes before the test temperature is applied with an increasing rate of 1.7 K/min (3 °F/min). During this period the gasket is therefore left to creep and relax according to the defined rigidity of the test rig (780 kN/mm / 4400.00 lb/in).
4. After reaching the test temperature the specified helium pressure is applied to the test rig. Because of the increasing internal pressure, the gasket stress is decreasing. This may lead to the sudden blowout of the gasket, in which case, the blowout temperature, the actual internal pressure and the gasket stress are recorded.

For the flat gasket SIGRAFLEX iNXT V20010C5N the following testing parameters were chosen:

- Initial gasket stress: 30 MPa,
- Test temperature: 300 °C,
- Maximum internal pressure: 190 bar.

## 6. Results

Test date: August 10<sup>th</sup>, 2022.

One Hot Blowout Test with the material SIGRAFLEX iNXT V20010C5N has been carried out for the measure of its margin of safety against blowout.

In **appendix 2** the course of test of the Hot Blowout Test is shown. After the initial gasket stress of 30 MPa was applied, the temperature raised to 300 °C. During heating up the gasket stress decreased to 26.9 MPa.

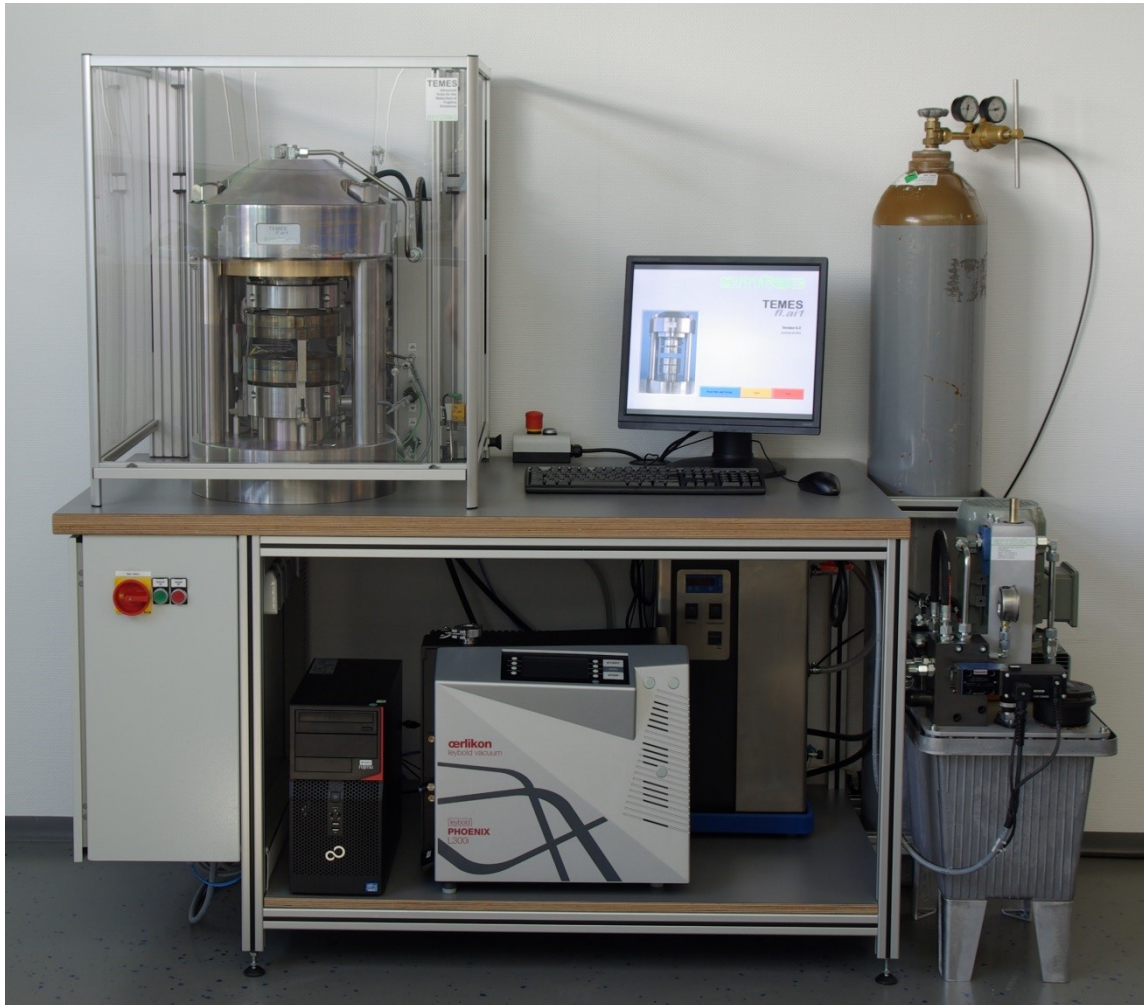
During pressurization with Helium the gasket dropped to 14.7 MPa at 190 bar. With a maximum pressure of 190 bar and a dwell time of 2 x 15 minutes no blowout could be recognized.

In **appendix 3** the results of the HOBT-1 test of the flat gasket SIGRAFLEX iNXT V20010C5N are summarized.

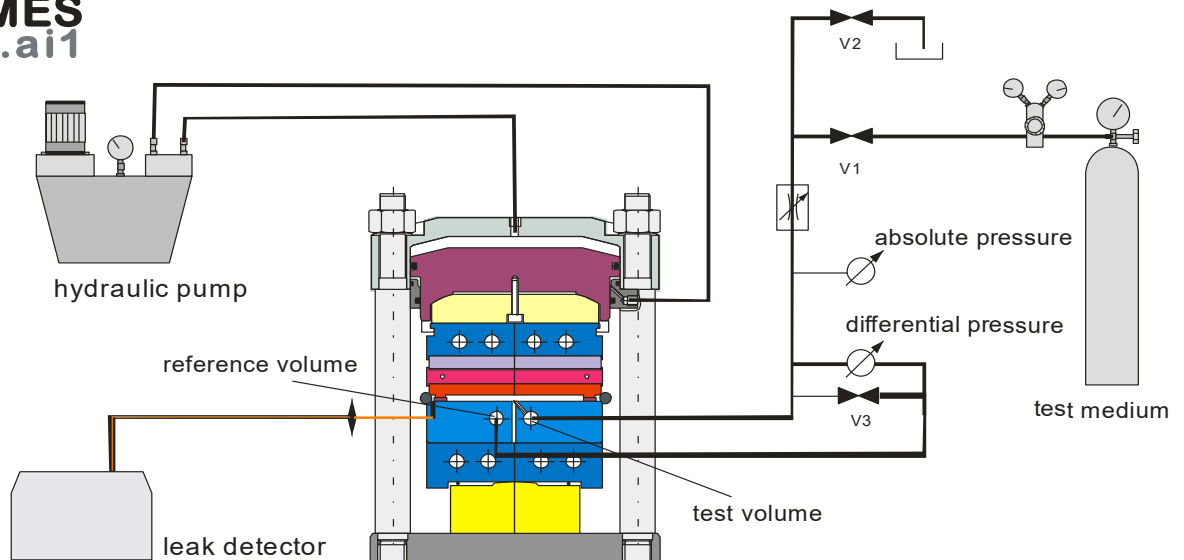
For this material no blowout occurred up to an internal pressure of 190 bar after an initial gasket stress of 30 MPa and a temperature of 300 °C was applied.

## 7. Photo documentation

In **appendix 4** a photo of the tested gasket specimen SIGRAFLEX iNXT V20010C5N is presented.

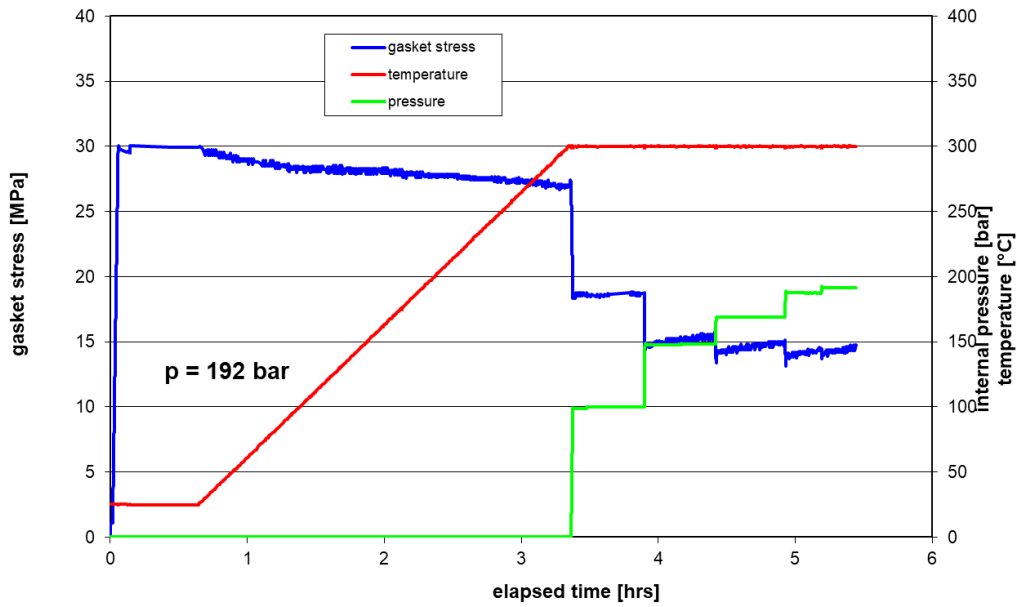


**TEMES**  
fl.ai1

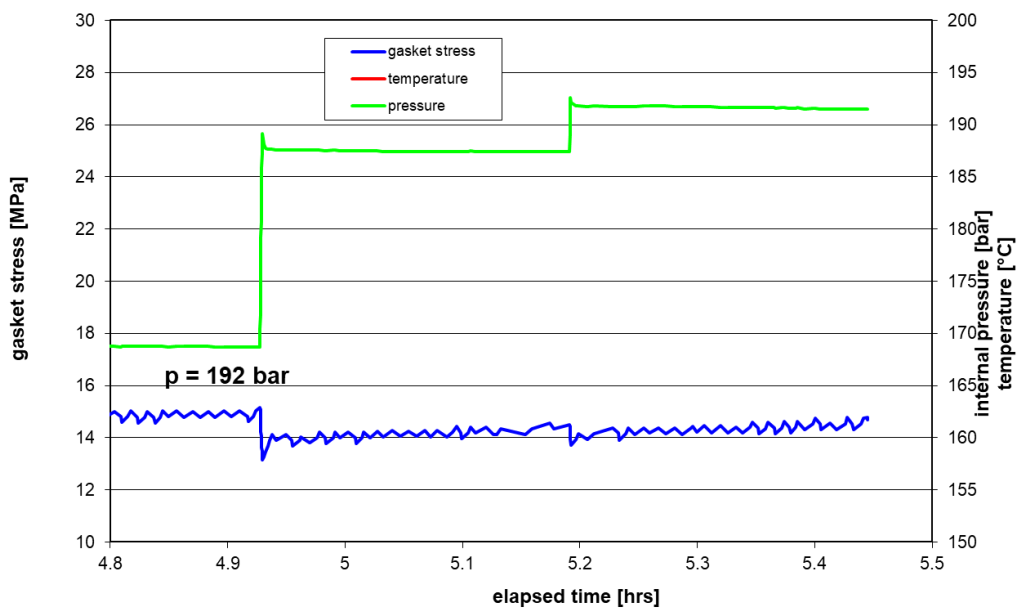


**Testing Equipment TEMES<sub>fl.ai1</sub>**

Hot Blow-Out Test HOBT  
 Sigraflex iNXT V20010C5N 136.85x89.1x2.08 mm  
 Test number: 22-542



Hot Blow-Out Test HOBT  
 Sigraflex iNXT V20010C5N 136.85x89.1x2.08 mm  
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## Hot Blow-Out Test HOBT

**Sigraflex iNXT V20010C5N**

**136.85x89.1x2.08 mm**

**Test number: 22-542**

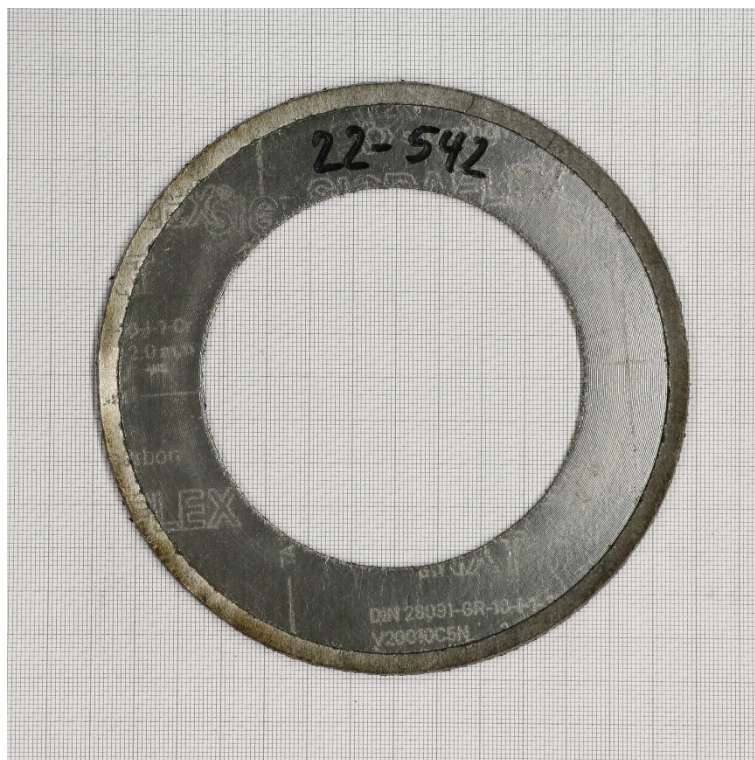
### Test parameters

Nominal initial gasket stress:	4350 psi	30.0 MPa
Nominal pressure:	2749 psi	190 bar

### Test results

Initial gasket thickness:	0.0791 in	2.08 mm
Final gasket thickness:	0.0447 in	1.14 mm
Initial gasket stress:	4360 psi	30.1 MPa
Actual test pressure:	2782 psi	192 bar
Gasket stress $S_g$ :	2132 psi	14.7 MPa
Gasket temperature $T_g$ :	572 °F	300 °C





**HOB1-1: SIGRAFLEX iNXT V20010C5N / test 22-542**