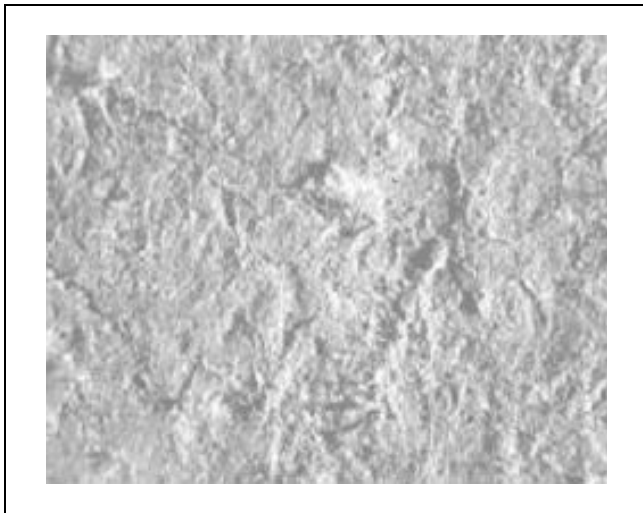


# novaplan 2816

## High performance facing for Cylinder Head Gaskets



Supplier: **Frenzelit**  
Material: **novaplan 2816**  
Density g/cm<sup>3</sup>: **0.80**  
Sample: **1**  
Scale: **30 : 1**

Position:  $\longleftrightarrow$  Transverse  
 $\updownarrow$  Longitudinal

- **Application**
- **Soft material technology**
- **Material structure**
- **Sandwich technology**
- **Survey of processing**
- **Typical mechanical characteristics**

GASKETS

TECHNICAL TEXTILES

EXPANSION JOINTS

INSULATION

NEW MATERIALS

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 **Frenzelit**

creating  
hightech  
solutions

# novaplan 2816

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## novaplan 2816

### High performance Facing for Cylinder Head Gaskets

This facing material has originally been developed for the OEM-market and has proved itself at all OEMs since its product launch in 1988. Being the second generation of non-asbestos soft materials, the **novaplan 2816** stands out for decades of experience in the production of CHG materials.

This material is mainly composed of aramide, high-grade mineral fibers and anorganic fillers. The high volume of pores allows a smooth impregnation with oil or silicone. Due to the low density the roll-on process is possible with low strength. Due to the extreme temperature resistance of **novaplan 2816** the application for outlet manifold or turbo chargers as well as for exhaust systems is recommended.

As the components of **novaplan 2816** are sulphuric-free any impregnation, silk screen printing or top coating on this material is possible without problems.

The material is available with various, attractive antisticking coatings in different colours.

It is possible to produce well-adaptable, however high-temperature resistant CHGs by well-dosed impregnation. Therefore the **novaplan 2816** is recommended as economic solution for **EURO III** and **EURO IV** engines. The capacity comparison with MLS can be taken for granted and has proved. The economic advantages of CHGs from soft material result from the simpler machine and process technology and this results in lower costs.

Starting from a sandwich density of **1.60 g/cm<sup>3</sup>** the gasket can be used without additional impregnation.

The following table shows the weights per unit area necessary for typical thicknesses of the sandwich:

**Frenzelit** keeps sample quantities of the following weights per unit area

**879 / 991 / 1024 / 1166 g/m<sup>2</sup>.**

In case of orders increasing 5 tonnes we are able to produce also any other weight per unit area (e.g. 777 g/m<sup>2</sup>) in the range of 529 - 1237 g/m<sup>2</sup>.

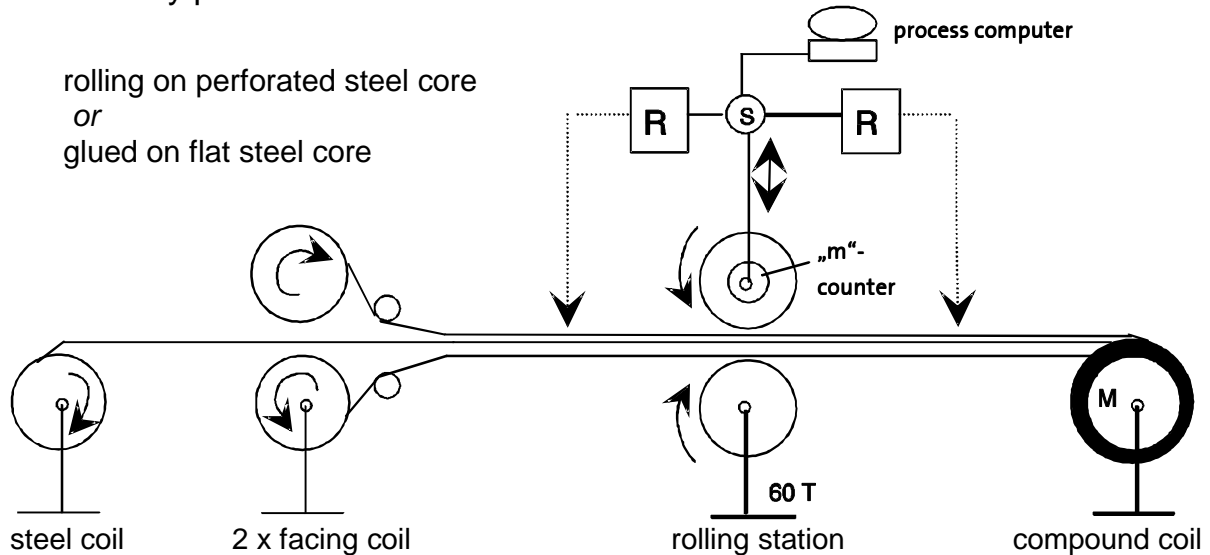
With **novaplan 2816** it is possible to produce reliable cylinder head gaskets.

Modern engine technology and changed material profiles require continuous improvement and creativity.

**Frenzelit** are well-equipped for solutions as required in practice. Our well - experienced application engineers will give you all necessary advice. Personal discussions always lead to precise proposals.

## novaplan 2816 Technology for Facing Materials

It is possible to either use **novaplan 2816** as a blank or on all common machinery without any problems.



<b>Roll-on density</b>	<b>1.40 g/cm<sup>3</sup></b>	Cylinder head gaskets and secondary soft gaskets oil or silicon saturation possible high adaptability
	<b>1.60 g/cm<sup>3</sup></b>	Cylinder head gaskets with high surface pressure high compressive strength and temperature resistance.
	<b>1.70 g/cm<sup>3</sup></b>	<b>impregnation-free</b> , cross-sectional tightness Cylinder head gaskets with surface pressures in the critical range (Diesel)

**Impregnation** with silicone resin or oil

is recommendable for reaching **EURO III** or other emission standards

**Silk screening** with silicone or epoxy resin

for locally increasing the surface pressure is possible

**Top Coating** with silicone or epoxy resin

for better micro-sealing and antisticking (customer) is possible

**Factory-made antistick** based on silicone or A 310 (e.g. black)

as standard on rolls is available

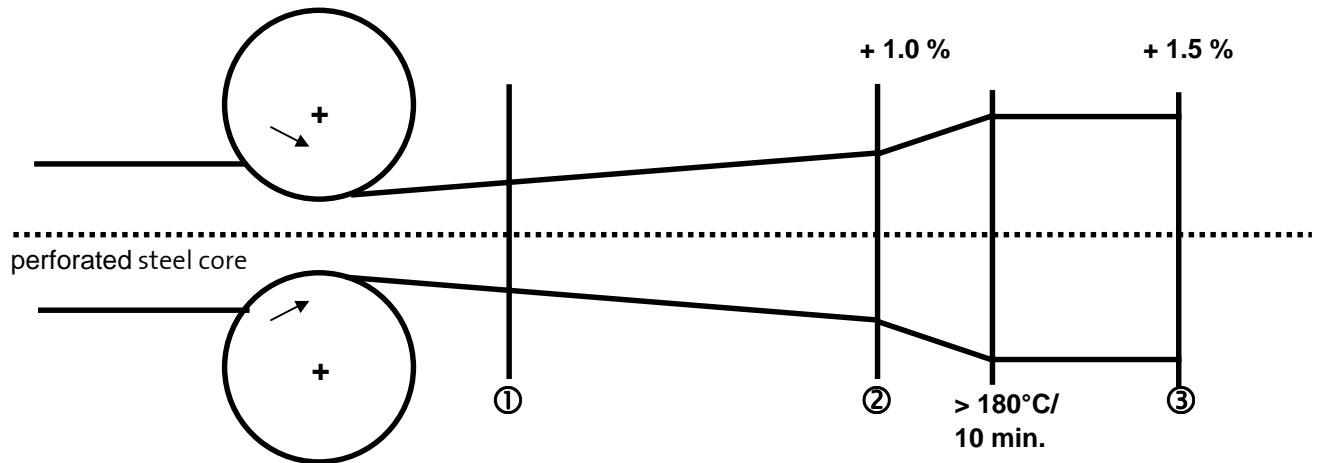
## novaplan 2816

### Selection & Calculation of the right sandwich thickness

$$\text{Density (g/cm}^3\text{)} = \frac{2 \times \text{grammage [g/m}^2\text{]}}{1000 (\text{thickness sandwich - thickness steel [mm]})}$$

Example  
ex works

$$1.518 \text{ g/cm}^3 = \frac{2 \times 1024 \text{ g/m}^2}{1000 \times (1.60 - 0.25 \text{ mm})}$$



Condition 1	After <b>roll-on</b> (1 min.) thickness = 1.56 mm density = 1.563 g/cm <sup>3</sup> (Frenzelit reference value)
Condition 2	After <b>storage</b> (2 days) in the stock thickness swell of sandwich appr. <b>1.0 %</b> thickness = 1.58 mm density = 1.545 g/cm <sup>3</sup>
Condition 3	After additional <b>impregnation &amp; vulcanisation</b> thickness swell of sandwich appr. <b>1.5 %</b> thickness = 1.60 mm density = 1.518 g/cm <sup>3</sup>

The engine type determines the performance values like compressibility and recovery of the sandwich. And these values are determined by the density of the rolled-on facing material.

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### Advantages of an impregnation

The development of engine capacities of the past decades has also generated the development of high performance impregnations.

The impregnation of a gasket body influences the performance of the CHD decisively.

- Compressibility and Recovery
- Resistance to the engine mediums
- Increasing of the temperature resistance
- Increasing of the hardness
- Increasing of the hot creep and the residual stress

Using oil- and silicone impregnations of today requires a most careful method of operation.

For impregnation of a common 4 cylinder gasket there have to be used 3-5 gr. impregnation material only.

This already results in drastic changes regarding the typical performance of the CHG.

By elaborated selection and combination of individual CHG components and processes - steel core, facing material, perforation form and process, roll-on process, cutting process, fire ring steel grade, flanging of the fire ring, impregnation process, calibration, screen printing and top coating – it is nowadays possible to manufacture CHGs with formidable performance.

Of course Frenzelit is pleased to help their partners with the selection and processing.

Against all odds it is possible to manufacture CHGs with traditional soft material technology, which comply with the regulations of **EURO III** or **EURO IV**.

Furthermore after evaluation of the necessary machine- and process technologies the production of a soft facing gasket is more cost-efficient than the production of a multi-layer-steel gasket.

## novaplan 2816

### Technical assistance

**Frenzelit** has a respectable reputation regarding the development and manufacturing of gasket materials worldwide.

Our materials are consequently developed according to the needs of the automotive industry and we are always in direct dialogue with the automotive manufacturers and their sub-suppliers. We are thus able to offer revolutionary solutions to the automotive industry with state-of-the-art technology.

We have proved as reliable and competent partner for our partners as sub-suppliers of the automotive industry.

Our individual calculation software is supporting our technical advice, thus we are able to calculate CHGs without extensive laboratory examination.

- Roll-on density and thickness
- Finished density and thickness
- Pore volume / absorption of impregnant
- Cold setting / hot creeping (clamped thickness CHG)

In collaboration with the automotive industry **Frenzelit** has developed test rigs, which make scrutinise testing of the CHG possible already before the cost-intensive test run. This comprises the following tests:

- Cold deformation at gasket body
- Cold deformation at fire ring
- Break-Point-Test at gasket body
- Break-Point-Test at fire ring

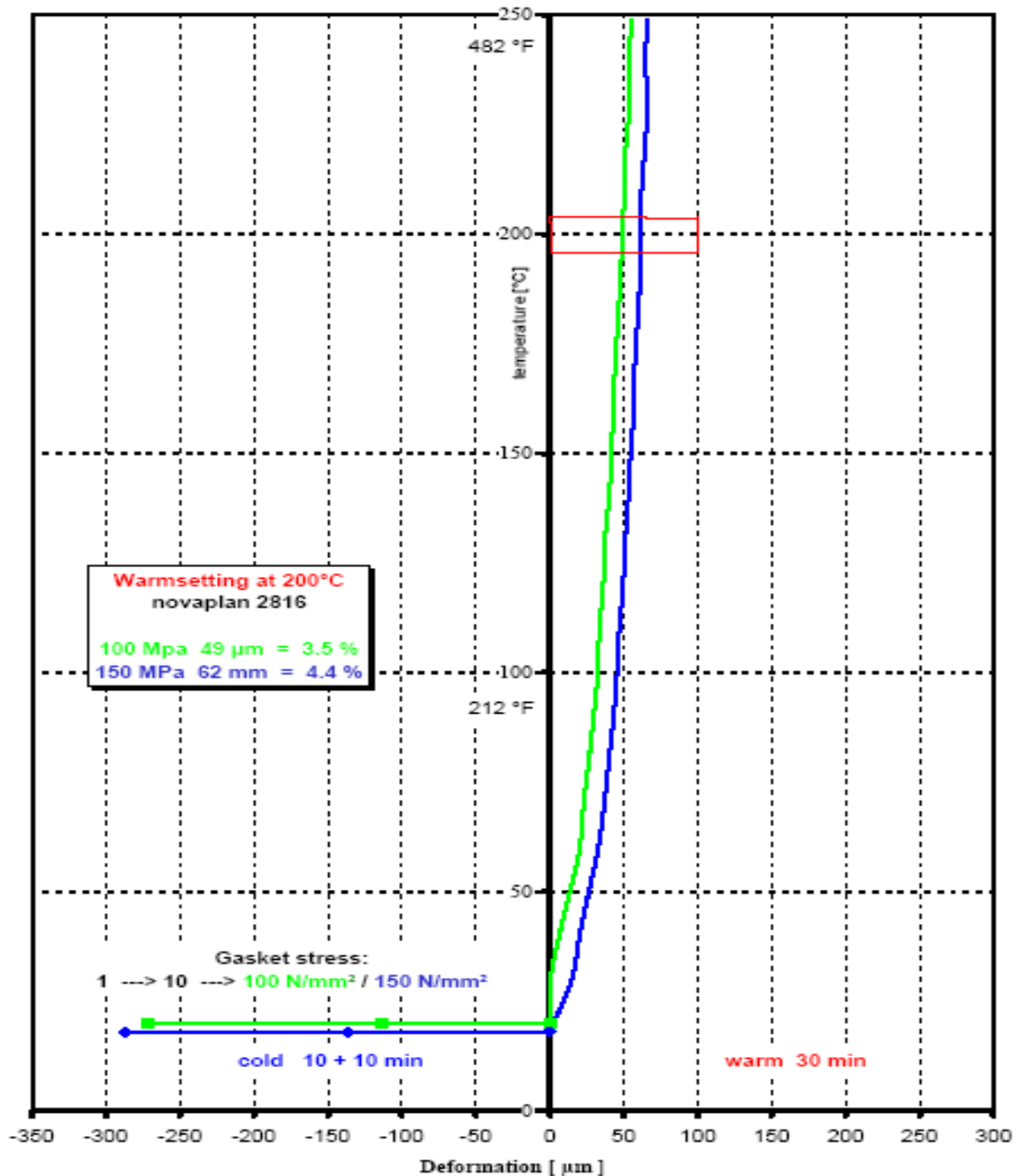
Thus it is possible to examine and determine the capacity of a CHG already at the early stage of development.

We would like to explain the results of these special tests on following pages:.

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### Break Point Test CHG body, overloaded

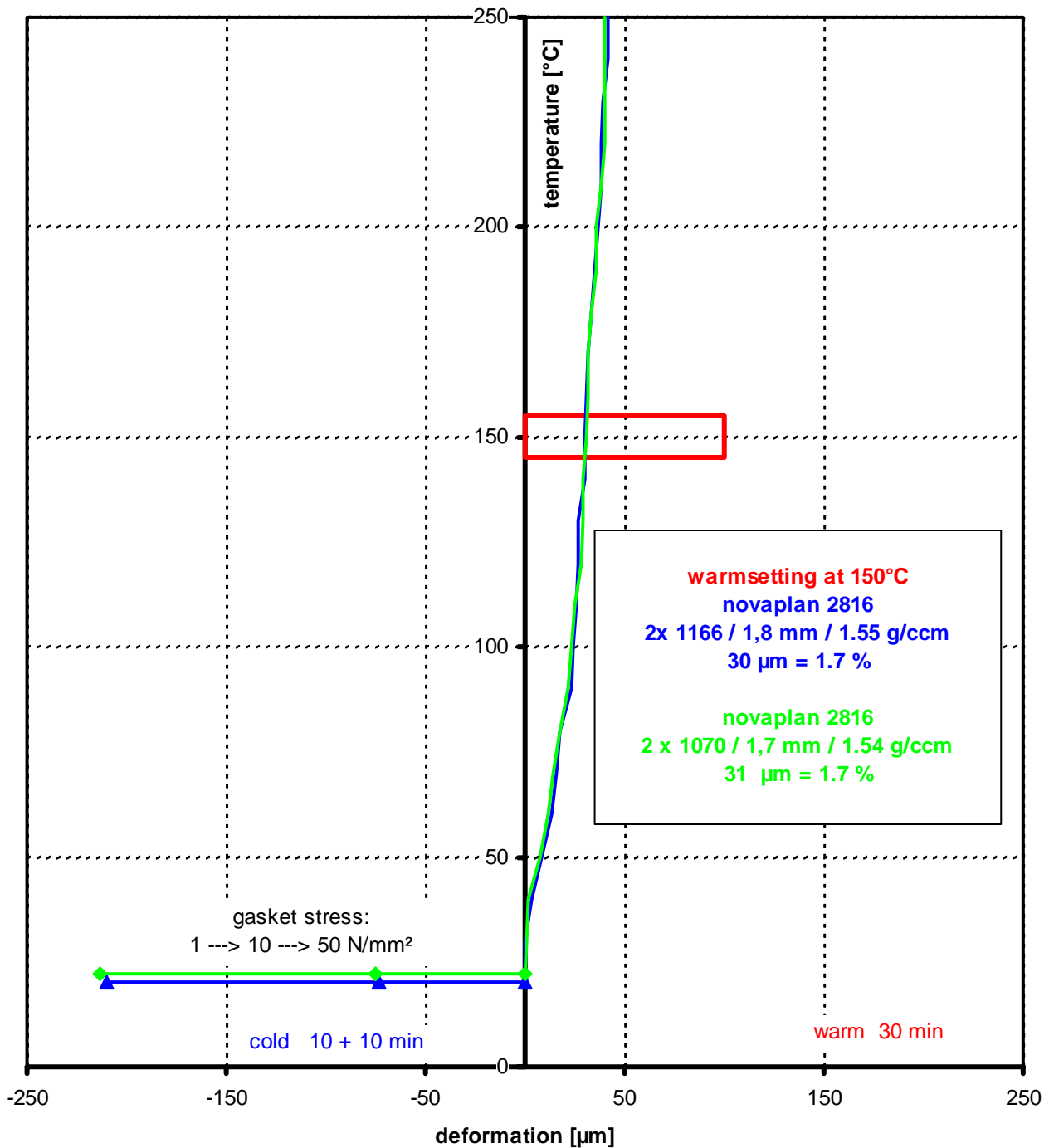
novaplan 2816 rolled on 0.25 mm perforated steel core,  
without impregnation  
 test area 3 x 10 mm x 33 mm = 1000 mm<sup>2</sup>,  
 area load 1 ⇒ 10 ⇒ 100 / 150 N/mm<sup>2</sup>,  
 temperature = 250 °C  
 total testing time = 50 min.



## novaplan 2816

### Break Point Test CHG body

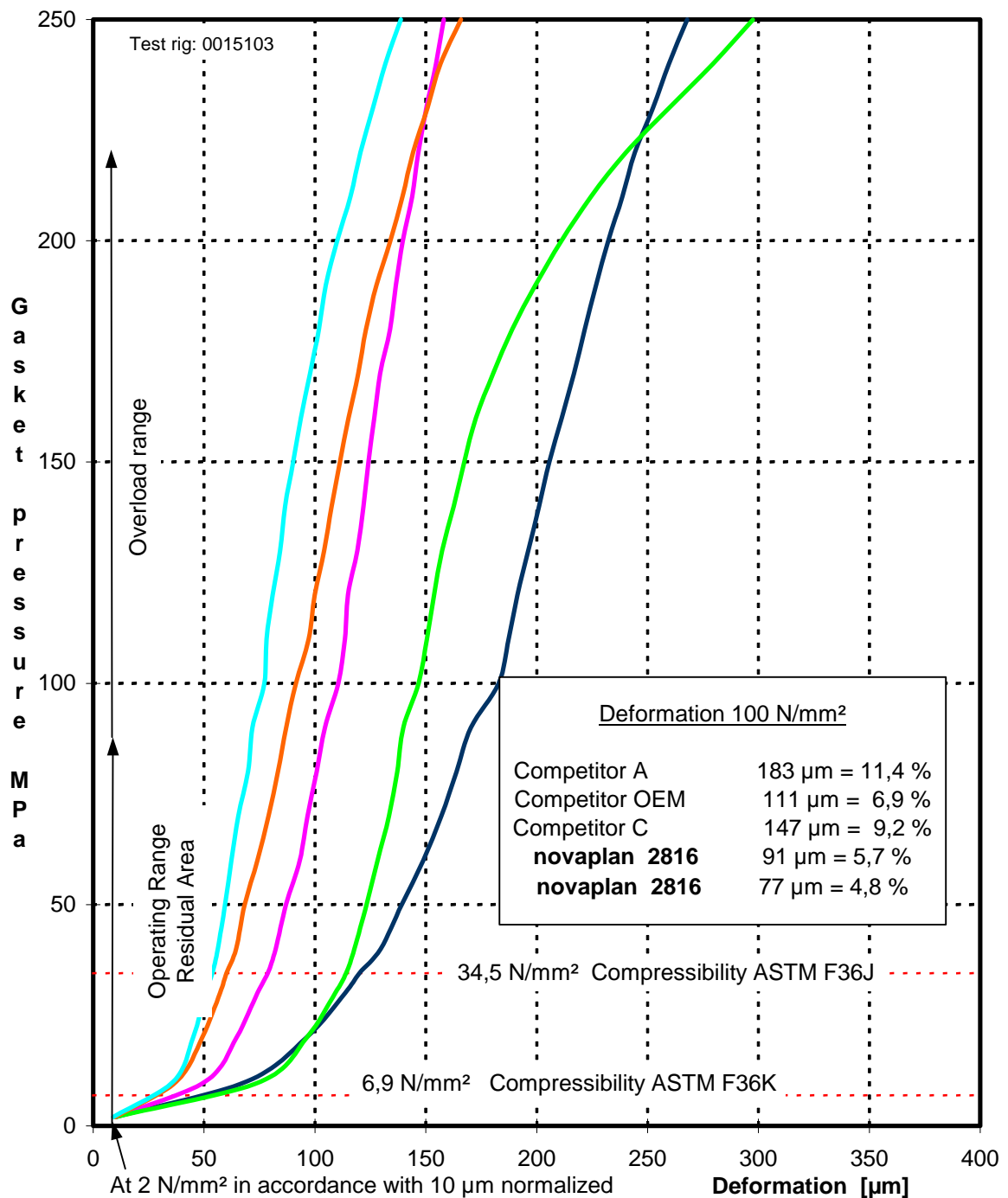
**novaplan 2816** rolled on 0.25 mm perforated steel core,  
 test area 3 x 10 mm x 33 mm = 1000 mm<sup>2</sup>,  
 area load 1 ⇒ 10 ⇒ 50 N/mm<sup>2</sup>,  
 max. temperature = 250 °C,  
 total testing time = 50 min.



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### Cold Compression Fire ring

**novaplan 2816** rolled on 0.25 mm perforated steel core,  
 fire ring test area = 1250 mm<sup>2</sup>,  
 area load = 0 ⇒ 250 N/mm<sup>2</sup>,  
 total testing time = 80 min.



## novaplan 2816

### Break Point Test Fire ring

**novaplan 2816** rolled on 0.25 mm perforated steel core,  
 fire ring test area = 1250 mm<sup>2</sup>,  
 area load = 1 ⇒ 10 ⇒ 125 N/mm<sup>2</sup>,  
 test temperature = RT ⇒ 250 °C  
 total testing time = 50 min.

