TechInfo 21

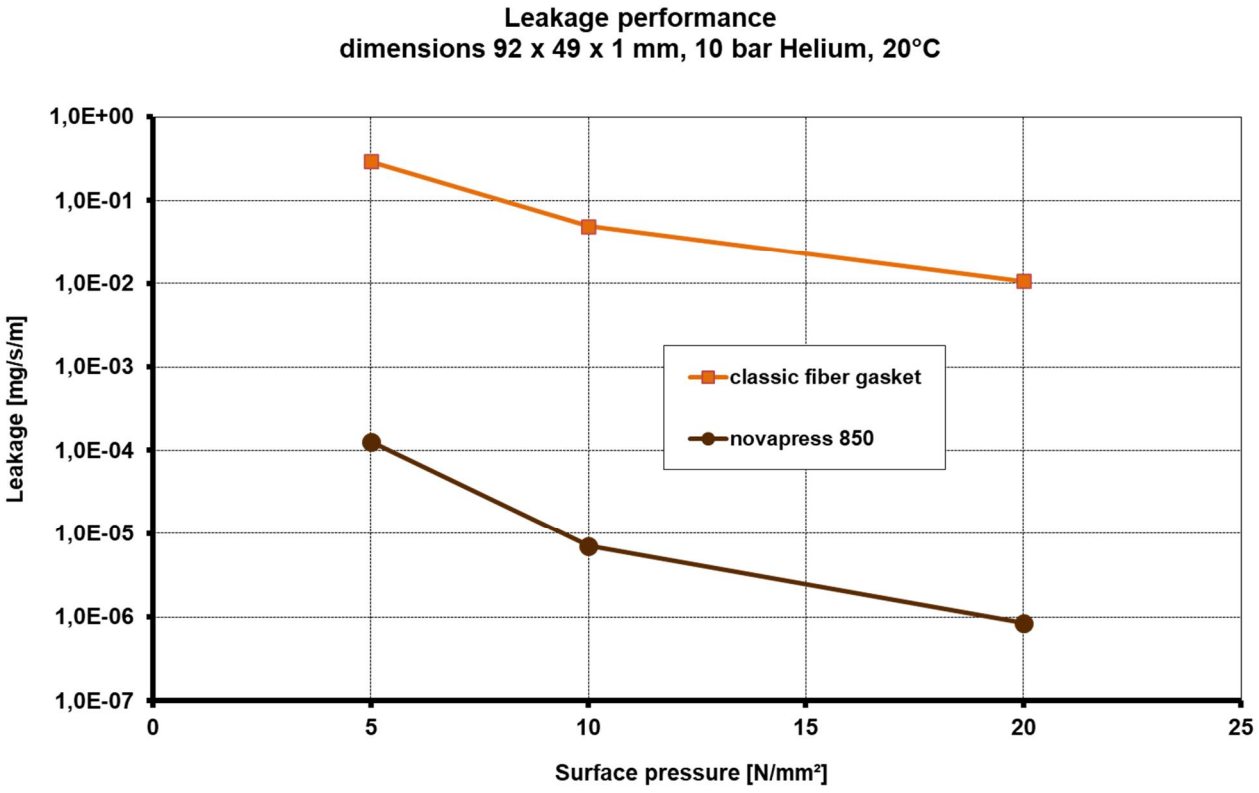
Large-format gaskets with narrow dimensional tolerances made of novapress® 850

Scope

The information and instructions in this TechInfo refer exclusively to the production of large-format gaskets made of novapress® 850 with extremely narrow dimensional tolerances. An outside dimension of > 500 mm can be used as a rough guideline.

Special properties of novapress® 850

novapress® 850 is characterised by a significantly higher adaptability and tightness compared to conventional fibre gaskets. If the compression of a classic novapress® gasket is measured according to ASTM F36J, values between 5 and 9 % are obtained while novapress® 850 achieves results of approx. 40 %. Likewise, the tightness - especially with rather low levels of surface pressure of approx. 5 to 20 N/mm^2 - is up to four powers of ten, i.e. 10,000 times higher.



These outstanding properties qualify novapress 850 for numerous applications that could previously only be covered by elastomers - including all the typical disadvantages of elastomers. These are, in particular, sealing solutions for poorly designed housings and materials with low load-bearing capacity, also made of plastics or with large distances between the bolts or low bolt loads in the first place.

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Production-related challenge

novapress® sealing sheets are built up layer by layer in a high-pressure calendering process. A 2.0 mm thick gasket, for example, consists of approx. 100 individual layers that are cross-linked homogeneously. Due to the manufacturing process, a small amount of residual humidity remains inside the sealing sheet, which cannot escape easily due to the extreme tightness of the material. However, the drying process will be much faster as soon as the surface of cut edges approaches the surface of the geometry, as drying in the direction of the layer structure is faster than perpendicular to the sheet. This drying process is accompanied by minimal length shrinkage.

For a common gasket geometry with small gasket width, the drying or shrinking process is completed after approx. 14 days (1.5 mm thickness) to 21 days (3.0 mm thickness), whereas an unprocessed gasket sheet undergoes virtually no dimensional change. This means that the shrinkage process described mainly affects finished gasket geometries.

Factors influencing the dimensional change

The calendering process gives the sealing sheet an anisotropy with regard to the alignment of the aramid reinforcing fibres used. Due to the manufacturing process, the shrinkage transverse to the fibre orientation is approximately twice of the shrinkage in fibre orientation. Naturally, the thickness of the gasket also plays a role here. The shrinkage increases with the gasket thickness.

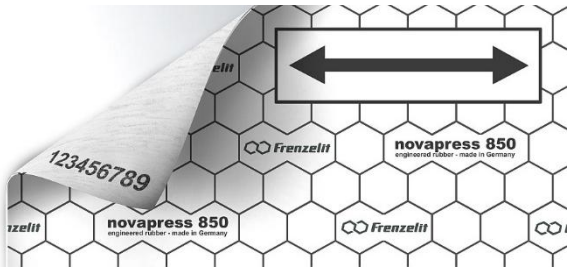
thickness	shrinkage transverse	shrinkage longitudinal
≤ 1.0 mm	< 0.1 %	< 0.1 %
≥ 1.5 mm	approx. 0.4 to 0.6 %	approx. 0.15 to 0.25 %

Practical handling of material-specific dimensional changes during production

In principle, suitable tolerances should be used for the manufacture of fibre gaskets. These materials should never be equated with metal workpieces with regard to the dimensional tolerance to be applied. Experience has shown that the gasket geometry can be optimised with regard to the tolerances to be maintained by using, for example, slotted holes.

Practical tip #1

To ensure that reasonable dimensional tolerances are maintained, it is recommended that the longer side of the seal geometry be manufactured lengthwise to the fibre orientation. The fibre direction can be clearly identified by the batch number printed on each gasket format, which is always applied at right angles to the fibre orientation. The arrow on the printed side also indicates the fibre orientation.



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Practical tip #2

Ideally, the geometry should be manufactured with an increased dimensional factor in longitudinal and transverse direction, as shown in the table above. If the use of checking gauges is required, one of two gauges with the corresponding oversize is used during production, while the second gauge with the drawing dimensions can be used randomly before delivery after the punched parts have dried completely.

In order to achieve the best results, the appropriatly applicable dimensional allowances are determined beforehand based on the original geometry in a corresponding measuring cycle. Alternatively, test strips modelled on the sealing geometry can be measured longitudinally and transversely from the gasket sheet.

In any case, it is recommended that the production geometry is always fixed at the upper end of the field of tolerance.

Practical tip #3

There should be approx. 14 to 21 days between production and installation of the cut-to-size seals until the shrinking of the seals is complete. This process can be accelerated by a moderate tempering process (a few hours at approx. 80°C).

Alternative

Alternatively, the dimensional accuracy of the punched geometries can be guaranteed by a previously executed drying process (8 to 16 hours at approx. 80 to 100°C) of the gasket sheets. In contrast to the procedure described above, however, this process involves a considerable amount of additional work.

Long-term dimensional stability and product properties

After completion of the shrinking process (after approx. 14 to 21 days at ambient conditions, or after accelerated drying by tempering) no further significant changes in dimensions will happen. The sealing performance is completely unaffected by the slight dimensional changes mentioned.

Application engineering questions?

We help you at: gaskets@frenzelit.com, Phone: +49 9273 72-140

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