

# Polyurethane (PUR) flexible foam for mattress cores

## Quality durability and Claims

### Technical Specialist Group PUR Flexible Foam

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#### Introductory remarks

This leaflet provides information on the design of mattress cores made of PUR flexible foam from the point of view of foam manufacturers. The statements are based on a large number of tests conducted by the member companies and have been supported by studies in cooperation with testing institutes.

Furthermore, the objective determination of material defects is described.

All information on claims relates to the statutory warranty obligation for the sale of consumer goods in accordance with §§ 474-479 German Civil Code (BGB).

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#### 1. Scope of application

This data sheet applies to bed mattresses with a polyurethane flexible foam core.

Since mattresses for children's beds must meet special requirements, this information sheet does not apply to children's bed mattresses as defined by the decision of the European Commission 2010/376/EU of 2 July 2010, section 1, first indent, insofar as a European standard specifies dimensions and tolerances deviating from safety requirements. Mattresses with a length of 120 – 140 cm, a width of 60 – 70 cm and a thickness of 6 – 15 cm are considered as children's bed mattresses. These also include foldable children's bed mattresses.

#### 2. Quality durability PUR flexible foam for mattress cores

Polyurethane flexible foam is a preferred material for the production of mattresses.

In addition to multi-zone mattress cores with a PUR flexible foam quality, mattresses are also produced with a combination of different PUR flexible foams, if necessary also different flexible foam families (foam families see also [Technical Data Sheets and Product Descriptions](#) of the FSK for PUR flexible foam, PUR cold foam, PUR viscous foam, PUR hypersoft foam, PUR gel foam).

A number of tests on PUR flexible foams of different foam families show that a higher density leads to better long-term service properties. As a result, a high-value mattress should be made of PUR flexible foam with a minimum apparent density of 35 kg/m<sup>3</sup> in more heavily loaded zones.

Definitions and underlying measurement methods:

**Apparent density:** Determined by the mass per unit volume (gross density), expressed in kg/m<sup>3</sup>, taking into account a material-specific range of variation. The apparent density describes the density of a mattress core after complete modification (e.g. contour cuts).

The apparent density is determined according to DIN EN ISO 845.

**Indentation hardness:** The total force in Newton necessary to achieve a prescribed deformation in the standardized sample under the prescribed conditions.

The indentation hardness is determined according to DIN EN ISO 2439:2009, Procedure B (Point 7.3).

**Compression** The compression stress/strain is determined in accordance with DIN EN ISO 3386-1.

**Long-term properties:** This parameter is determined in the foam industry based on DIN EN 3385 „Flexible elastic polymeric foams – Determination of fatigue in the long-term fatigue test by constant-load pounding“.

### 3. Requirements for mattress cores modified by contour cuts

All changes to the material structure such as incisions, embossing, removal of material, insertion of material and bonding can lead to an impairment of the long-term properties.

In particularly stressed areas, especially in the hip area of the mattress, the material removal should not exceed the following values:

- **Cut depth:** 25%, based on the thickness of the PUR flexible foam core and
- **Volume:** 10%, based on the surrounding full volume of the material.

For the volume extraction, the direct correlation with the apparent density must be taken into account. Volume extraction from the solid material reduces the apparent density accordingly. Here, too, the recommendation applies that after a volume extraction by contour cuts the minimum apparent density of 35 kg/m<sup>3</sup> should not be undershot.

Critical contours, such as notch cuts or straight incisions without a rounded outlet, permanently impair the dimensional accuracy and the properties of the mattress core and should therefore be avoided.

#### 4. Criteria and measuring methods for the evaluation of defects

A deterioration of properties within the statutory warranty period may be reason for a legitimate claim, whereas a slight loss of height and/or hardness is typical for the material and does not impair the useful properties of the material. An impairment of the useful properties is reliably and objectively determined by the loss of height (due to excessive cavity formation) and/or the loss of hardness, whereby the determination of a deviation in value beyond the limit values alone does not constitute a claim for compensation.

When the claim is received, the care or handling of the product must also be determined, as this may have contributed to a deterioration in its properties.

The members of the FSK consider the following deviations – measured on the polyurethane foam core without cover and covering materials – as no longer negligible:

##### a) Height loss

The height loss of a full-surface mattress core is no longer negligible if it exceeds 10 mm or 10% of the mattress thickness.

The measurement is carried out in accordance with DIN EN 1334 by placing a torsion-free aluminium tube (40 mm x 40 mm x 2 mm, approx. 3 m long, with a mass of 2.5 kg +/- 12.5g). The height loss is measured at the lowest point of the cavity

##### b) Hardness loss

The loss of hardness is no longer negligible if the compressive stress of the sample from the mattress zone in question is more than 20% below that of the reference sample from an unloaded mattress area of the same material.

The decrease in hardness is determined by the difference in compressive stress in loaded and unloaded zones of the mattress core. For this purpose, at least one sample is taken from the centre of the core or visible cavity and from the edge zone, the corners.

The compressive stress is determined in accordance with DIN EN ISO 3386.

For the compressive stress of the samples from the loaded or unloaded zone, the respective mean value shall be determined and used to evaluate the hardness loss.

## 5. Reasons for claims and damage patterns

The careful handling of the product and its general care decisively influences the preservation of the useful properties of mattresses and mattress cores made of PUR flexible foam. For this, reference is made to the [Care Instructions](#) within the framework of the guarantee or warranty conditions of the German Mattress Industry Association (Fachverband Matratzen-Industrie e.V.).

### **Discoloration:**

With increasing service life, discoloration of the foams – typically yellowing – can occur, in particular due to exposure to UV radiation and/or nitrogen oxides (NOX). The useful properties of the mattress are not affected in any way. Discolouration is not a material defect and therefore cannot be accepted as a reason for claim.

### **Nominal size:**

Mattresses as well as mattress cores are designed to be flexible and adaptable. Deviations from the nominal size may occur with mattress cores due to storage, transport and above all due to use. A tolerance of +0/-20mm in length and width and  $\pm 10$ mm or 10% in thickness is customary in the industry according to DIN EN 1334 and does not constitute a claim for compensation.

### **Odour:**

PUR flexible foam has a weak, product-typical inherent odour in the first few days. Due to the protective, gas-tight packaging of mattresses, a perceptible odour can develop after removal. It is recommended to ventilate new mattresses. In a short time, at the latest after one week, the odour should have disappeared. Initially, short-term odour is no reason for claim.

### **Moisture:**

The material properties of PUR flexible foam deteriorate under the influence of permanent moisture. Hardness loss and material instability (cavity formation) are promoted. Damage caused by excessive exposure of mattresses/mattress cores to moisture or moisture not being removed quickly enough is not a material defect, but is due to improper handling. Corresponding claims can therefore not be accepted.

It is recommended to ventilate mattresses and bedrooms daily. When choosing the bed or sleeping systems, it is also important to ensure that the mattress can be ventilated from underneath.

Reliable signs of excessive moisture are in particular mould, mildew stains, residual moisture and urine odour.

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Brussels • Frankfurt • Stuttgart  
 Postal address: Stammheimer Straße 35 • D-70435 Stuttgart  
 Tel. +49 711 993 751-0 • [www.fsk-vsv.de](http://www.fsk-vsv.de) • [fsk@fsk-vsv.de](mailto:fsk@fsk-vsv.de)

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