Home & Appliance

External Audience Protocol (EAP)

Pillows

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Overview: This testing program is patterned after industry standards including DIN 53420 - for the analysis of foam type and density, DIN 33419 and ISO 15537 (depending on test) for test subjects who are used to evaluate the pillows. Technical hardness of the pillows is measured according to EN 1957. The test program includes gathering general information on the products such as documenting all product labels, advertising claims, use and care instructions, warranty, weight, dimensions, and material composition. To determine the quality of the workmanship of the pillow we analyze the stitching and assembly of the pillow. Judgments are made on how well the cover fits over the pillow/core. For example, if it is too loose it can bunch up and create an uncomfortable situation.

Performance Testing: The main test components include the ability of the pillow to provide side and back sleeper support, resiliency, use and preference, and breathability. When testing pillows which are adjustable (where consumers have the ability to remove or add filling or layers which are provided), multiple configurations of each pillow will be tested. These configurations will follow manufacturer’s instructions – i.e. “Side sleepers may want to add 1/3 of the included additional filling”. The best scores for lateral (side) and dorsal (back) support will be selected from these multiple configurations.

- Side and Back Support

Evaluates the support height and the head angle in the lateral (side) and dorsal (back) positions, using a 5 percentile female and a 95 percentile male. The angle at which the head in both lateral and dorsal positions deviates from the horizontal is measured. A secondary measure of the support height can be achieved by measuring the distance at which a head would sink into a pillow. This distance is measured using displacement sensors (similar to what is performed when measuring the support characteristics on a mattress). Excessive angles in the positive direction would result in lower overall scores. Furthermore, angles in the negative direction are not tolerated as easily and will result in lower scores.
• **Resiliency:** This test includes a combination of characteristics analyzing how the pillow’s firmness, height, and support change with use.
Support change with use

Pillows are preconditioned at 73 degrees F and 50% relative humidity. The force deflection graph of each sample is generated. The technical hardness and height are also measured. Pillows are then placed in an environmental chamber for 24 hours at 98.6 degrees F and 80% relative humidity. After the 24 hours, the pillow is compressed under a load in the chamber for 96 hours. When the 96 hours are completed, the load is removed from the pillow and the pillow is allowed to decompress in conditions of 73 degrees F and 50% relative humidity. After 24 hours, force deflection, technical hardness and height are measured for a second time. Pillows are then "fluffed" up and the technical measurements are taken for a third time to determine if any changes are reversible. This test allows for the measuring of changes in firmness and height – without fluffing and after fluffing the pillow.

- **Use and Preference**: An evaluation of a combination of characteristics analyzing user interaction with the pillow including panel judgments, head contact and pressure distribution.

**Subjective Questionnaire**

14 Test subjects are provided with the opportunity to use the test pillows after which they evaluate the support and sensory perception (includes questions on comfort, support, smell, noise, firmness, quality and design).

**Contact Area Measurements**

Determines the area on the pillow surface that is in contact with the head of a 50th percentile individual. Some pillows are firmer and less than 100% of the back of the head rests on the pillow. Other pillows are softer and when the sleeper is lying on their back the pillow wraps around the head and contacts the ears, thus the percentage of contact is greater than 100% of the back of the head area.

**Pressure Distribution**-The pressure on the head and neck area is measured while lying on the pillow. Sensors are used to determine pressure values for the contact area between the head and the pillow. The data (mm HG) is graphed to provide a pressure distribution of each pillow.
Pressure Distribution Mapping

- **Breathability**: A measure of how effectively the pillow dissipates moisture from the contact area.

**Insulation Classification**

Not a scored test, but rather informational. Does the pillow trap excess heat or does it allow the heat in the contact area to dissipate. A pillow classified as “Warm” is more insulative and develops a higher temperature in the contact area.

**Permeability for Moisture**

Analysis of the moisture properties of the pillow. The amount of moisture present around the pillow is evaluated by a sensor. Less humidity in the contact area means that moisture is able to dissipate and an overall higher score is given.

**Restitution**

This test determines how much moisture a pillow absorbs in a high temperature and high humidity environment, as well as how much moisture the pillow releases after a defined period.