

As a result of European Commission study and based on the content of the General Products Safety Directive (GPSD) 2001/95/CE, a specific document has been prepared containing all the products that needed a technical standard: among those there was also the mattress for children.

After some years of work, the standard for safety and test method for cots and cribs mattresses: EN 16890:2017 will be published soon. This standard applies to mattress base and mattress toppers, used in children's cots, travel cots, cribs and suspended baby beds, for domestic and non-domestic use.

Babies and children are the categories most at risk in relation with such products. If we consider that babies during the night are not under direct control, mattress, cots and cribs, must really be safe products.

About this, till now, requirements on mattresses were only described in the standard for cots, EN 716-1:2008+A1:2013: the mattress used in a cot shall be only one and the gap between the mattress and sides/ends shall be less than 30 mm, to avoid the risk of entrapment and suffocation.

A risk which a baby, during sleeping, could incur is the "Sudden Infant Death Syndrome" (SIDS). The causes of that dead are external or due to position during sleeping and due to an obstruction of the respiratory tract. With some indications as: supine position during sleeping, reducing temperature of the place where the baby sleep, mattress no too soft, have significant reduced SIDS cases.

About that, the standard that will be published describes some requirements to evaluate the "sinking" of baby head into the mattress.

REQUIREMENTS

Chemical hazards are valuated using EN 71-3 standard (Migration of certain elements), thermal and fire hazards according to standards EN 71-2 and EN 597-1. In this article we pay more attention to mechanical hazards.

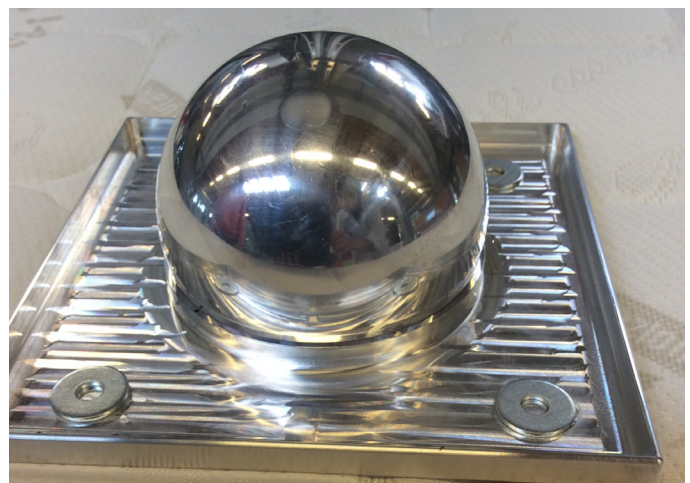
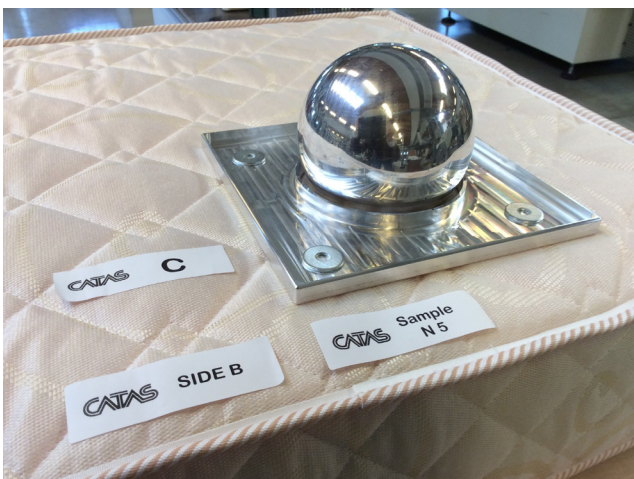
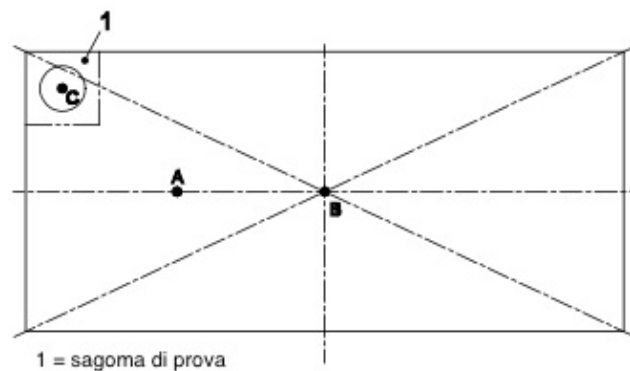
Entrapment hazards from gaps and openings.

- Entrapment hazards between the mattress and the sides. The tolerances on nominal dimensions (width and length) of the mattress shall be ± 10 mm.
- Body entrapment hazards. There shall be no gaps between components of the mattress > 60 mm. The checking is carried out pushing a $\varnothing 60$ mm cone with a force of 30 N into the openings.
- Entanglement hazards. To avoid the risk of entanglement into cords, ribbons and similar parts, they shall have a length less than 220 mm. In case of loops, they shall have a perimetral dimensions less than 360 mm.

External suffocation hazards.

- Label and decals. If presents, they shall no become detached from the product, applying a specific force.
- Plastic packaging. It shall comply with EN 71-1 requirements (dimensions and thickness). Otherwise, the packaging shall be marked with safety advices (it shall be removed, destroyed and keep away from baby, to avoid suffocation hazards).
- Firmness. This test is applicable only on mattress with a thickness more than 30 mm. It is a simple test method: the spherical mass, which simulates the head of the baby, shall not subsided too much into the surface mattress.

The test is carried out after the sample conditioning at temperature $(23 \pm 2) ^\circ\text{C}$ and humidity $(50 \pm 5) \%$ for at least 72 hours. The spherical mass is positioned into the test template and the assessment is carried out after 5 min: the mass shall not be in complete contact with the template edges. In this case the test results is negative. The control is repeated in other two different positions (see picture).



Chocking and internal suffocation hazards

- Small parts. The mattress shall not have small parts that can be detached after a torque and tension tests, and that can be ingested by children.
- Accessibility to filling materials. It shall not be possible by the children to have access to filling materials. A minimum force of 50 N is required to open the closing system, two actions or two independent actions are necessary, or the use of a tool is required. Also the zip, if present, shall be assessed in relation to this requirement.

Hazards due to edges and protrusion

- This evaluation is carried out before and after the tests.

Structural integrity

- Shrinkage. After washing and drying twice according to the producer information, the resulting shrinkage in the fabric covering materials shall not prevent removable fabrics from being refitted and the dimensions of the mattress shall still meet the nominal dimensions requirements.
- Hazard due to deformation of the filling. The test consist into apply a force of 300 N by means of a loading pad, in two different points (B and C), for a total of 10.000 cycles. After at least 5 hours, on the same positions, is repeated the firmness valuation, according to the test method described before.

The last part of the standard regards the product information: marking, purchase information e instruction for use. This information should follow the comply product and arrive to the consumer.

CATAS, in 2015, worked on a University thesis to evaluate the correctness, the applicability, the repeatability of the firmness test of mattress, using the method described in a previous CEN document and now published as EN 16890 standard. Fourteen mattresses of different composition, material and thickness, from Italian and foreign providers were purchased. The firmness and deformation of the filling material tests (durability test) have been carried out. Results: one mattress did not pass the firmness test and other two did not pass the same test after the durability test.

Due to this thesis we had proposed changes and integrations in some parts not so clear of the test method.

The method now results repeatable and easy to perform.

Our hope is that the mattresses that comply with the requirements of this standard, with also the other precautions and suggested warnings, will help to reduce a lot the SIDS cases and prevent accidents.

CATAS is able to carry out all the tests according to this European standard, in our office in San Giovanni al Natisone (UD) and in our branch in Lissone (MB).

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