EUROPA

needs a uniform

Corrugated Board Standard

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# 1. Background

Most of the European countries have a Corrugated Board Standard

**Examples of flute profiles:**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Country</th>
<th>Flute profile B</th>
<th>Flute profile C</th>
<th>Flute profile E</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIS</td>
<td>S</td>
<td>Board thickness 2,4 - 3,0 mm</td>
<td>Board thickness 3,25 - 4,25 mm</td>
<td>not described</td>
</tr>
<tr>
<td>DIN</td>
<td>D</td>
<td>HEIGHT: Range: 2,2 - 3,0 mm</td>
<td>HEIGHT: Range: 3,2 - 3,9 mm</td>
<td>HEIGHT: Range: 1,0 - 1,8 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PITCH Range: 5,5 - 6,5 mm</td>
<td>PITCH Range: 6,8 - 7,9 mm</td>
<td>PITCH Range: 3,0 - 3,5 mm</td>
</tr>
<tr>
<td>GIFCO</td>
<td>I</td>
<td>Board thickness &gt; 2,5 mm</td>
<td>Board thickness &gt; 3,5 mm</td>
<td>Board thickness &gt; 1,2 mm</td>
</tr>
</tbody>
</table>
2. Requirements for Corrugated Board

The enduser has requirements to the performance of the box!

from:
- the point of technical properties of the product
- point of the price according to their own specification (Quality Management System)

In the age of hard cost pressure, the enduser now more needs comparability of the offers. Otherwise there is a big risk that performance decrease to levels where the material is questioned.
Development

On condition that BCT is the most important value for the enduser, it is necessary to calculate - Mc Kee Formula - and to measure the Box Compression Strength.
Steps:

- Calculation of Bending Stiffness of the board on the basis of the Tensile Stiffness of the used papers (MD and CD)
- Predicting of the Geometrical Mean Stiffness of the corrugated board (theoretical)
- Measurement of the ECT
- Measurement of the BS
- Calculation of the BCT
- Measurement of the BCT

Comparision
BS

Bending Stiffness
MD and CD

ECT

Edge Crush Test
23°C / 50% RH

BCT

Box Compression Test

http://www.bfsv.de/english/Standards/EUPS
3. WHY we use the Bending Stiffness?

According to calculating and testing of other materials i.e. steel or plastics, we need test results with limits in the elastic/plastic area, that means:

- not destroying properties

4-Point Bending Stiffness is a non destroying property and gives the relationship between the applied load and deflection within the elastic area!
4. Requirements of the Enduser

* Specifications must be independent from the paper qualities and the corrugated board profiles

* flute geometry must not be fixed

* thickness of the board is necessary
5. Why we need the Bursting Strength?

Bursting strength is needed for:

- pulling resistance
- lifting resistance
- containing strength during distribution and enduser transport
- opening
- the production of Corrugated Board
  - crack resistance
6. Why we need ECT, Geometrical Mean of BS and FCT

- transportability
- stacking strength
- constant thickness of single wall corrugated board
7. The new range of Corrugated Boards

independent from:

➲ the used papers
➲ construction of the corrugated board
Definition of the End Use Performance Standard

<table>
<thead>
<tr>
<th>EUPS code</th>
<th>Corrugated board properties¹</th>
<th>Geom BS²(Nm)</th>
<th>ECT²(KN/m)</th>
<th>BURST²(kPa)</th>
<th>FCT²(kPa)</th>
<th>BCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flute geometry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Board 10</td>
<td>0.7</td>
<td>4.2</td>
<td>700</td>
<td>500</td>
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</tr>
<tr>
<td></td>
<td>Board 20</td>
<td>0.9</td>
<td>4.8</td>
<td>1000</td>
<td>500</td>
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</tr>
<tr>
<td>B</td>
<td>Board 30</td>
<td>2.7</td>
<td>4.2</td>
<td>700</td>
<td>320</td>
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</tr>
<tr>
<td></td>
<td>Board 40</td>
<td>3.0</td>
<td>4.6</td>
<td>800</td>
<td>320</td>
<td></td>
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<tr>
<td>C</td>
<td>Board 50</td>
<td>3.3</td>
<td>5.4</td>
<td>1000</td>
<td>380</td>
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</tr>
<tr>
<td></td>
<td>Board 60</td>
<td>5.5</td>
<td>4.6</td>
<td>800</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Board 70</td>
<td>6.5</td>
<td>5.4</td>
<td>1000</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Board 80</td>
<td>8.0</td>
<td>6.0</td>
<td>1250</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Board 90</td>
<td>9.0</td>
<td>7.0</td>
<td>1500</td>
<td>370</td>
<td></td>
</tr>
<tr>
<td>BC</td>
<td>Board 100</td>
<td>17</td>
<td>8.0</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Board 110</td>
<td>22</td>
<td>9.5</td>
<td>1450</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Board 120</td>
<td>31</td>
<td>12.0</td>
<td>1900</td>
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</tr>
</tbody>
</table>

¹ Testing methods  
² Average values
8. Test procedures and Standards

<table>
<thead>
<tr>
<th>Testing method</th>
<th>Unit</th>
<th>Standards</th>
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<tbody>
<tr>
<td>ECT</td>
<td>kN/m</td>
<td>EN ISO 3037 / FEFCO 8:1982</td>
</tr>
<tr>
<td>4-point bending stiffness</td>
<td>Nm</td>
<td>ISO 5628:1990</td>
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<tr>
<td>Bursting Strength</td>
<td>kPa</td>
<td>EN ISO 2759 / FEFCO 4:1994</td>
</tr>
<tr>
<td>FCT</td>
<td>kN/m</td>
<td>EN 23035 / FEFCO 6:1985</td>
</tr>
</tbody>
</table>

We do not need the puncture test in the future!
9. Aim of the EUPS

- Supporting performance selling with logical steps between the board grades
- Providing a good selection of board qualities
- Optimising material utilisation and box design
- Reducing costs of the logistic chain
  - Calculation of the BCT
- Cutting stock levels and transport costs
- Improving board quality
- Reducing waste ordering longer lengths in the corrugator

http://www.bfsv.de/english/Standards/EUPS