Testing of corrugated board

Corrugated board is a widely used material for the manufacture of packaging. One of the main functions of packaging is to protect the content against external influences and corrugated board is in this case a very suitable material. A packaging made of corrugated board is designed to offer protection as well as strength and is mostly used as secondary packaging which makes it very suitable to survive the whole distribution chain, from producer to end consumer. In this distribution chain packaging is exposed to many influences during filling, transport, handling and storage ... and therefore it is clear that the quality of the corrugated board is of great importance.

The quality of corrugated board is determined by the quality of the used material (paper), the gram weight and its fluting or the combination of flutings. This can be controlled by means of different tests, whereby specific testing equipment is used, that comply with various international and national standards (ISO, ASTM, TAPPI, FEFCO, DIN...). The IBE-BVI Group has a wide range of testing equipment which can check the quality of the corrugated board according to these standards.

An important point prior to the analysis of corrugated board is the conditioning of the material. Paper, as a natural product, is sensitive to climatic conditions, whereby the influence of humidity is the most critical point. Therefore, in each standard is referred to the standard conditions for conditioning, namely 23 °C and 50% relative humidity. This conditioning makes it possible to compare test results with each other. Due to the fact that climatic conditions have an important influence on the physical properties of corrugated board, it can be necessary to perform the tests also with other conditioning parameters similar to the real situation.

It is also important that the analysis is performed on test samples that are undamaged, i.e. free of creases, impressions and moisture spots. The analyses range from basic physical tests to more chemical tests.
Physical tests:

The most important physical tests are the determination of the thickness and the **determination of the gram weight**. For the last one, the total and the individual liners are analysed. The weight of the material is measured per square meter.

A sheet of corrugated board decomposed:
outer layer, fluting, inner layer

The **determination of the thickness** (FEFCO 3, ISO 3034) gives us also more information about the status of the fluting. If this measurement doesn’t comply with the specifications – for example the measured thickness is lower – it may indicate that the board has been pressed together what results in loss of strength.

Furthermore, the **ECT (edge crush test)** (according to ISO 3037 or FEFCO 8) is an important parameter that determines the strength of the fluting. The upright fluting of a test monster of 10 cm by 2,5 cm is subjected to compression. The obtained value allows us to calculate the theoretical compression strength of a box, even before this box was produced.
The compression strength of a corrugated box can also be measured by performing a compression test (BCT) on the box.

Measurement of the ECT-value
on a test monster of 10 x 2,5 cm
Determining **the bursting strength** on both sides (recto & verso) gives us more information about the material used on both outsides of the corrugated board. As corrugated board is usually not symmetrical built (where the outside liner is mostly of better quality) this is an important fact. The analysis to determine the bursting strength is described in the standard ISO 2759 or FEFCO 4.

The ability to **absorb water** is measured by means of a Cobb-test (ISO 535, FEFCO 7).

![Cobb-test](image)

The **water resistance of the gluing**, which can be tested according to FEFCO 9, can be important for certain applications.

To determine **the puncture resistance** of the corrugated board (FEFCO 5, ISO 3036), a test that was performed more often in the past, an impact with a triangular pyramid head is created by means of a pendulum.

Furthermore, the **fluting type** and **bending resistance** can also be determined.

**Chemical analyses:**
In addition to these physical tests, chemical analysis can provide more information about the characteristics of the material. The fiber analysis, by means of microscopic examination and coloration testing, are a method to distinguish the various qualities of the used papers (kraftliner, testliner, wellenstof, schrenz...). If necessary, also the moisture content (ISO 287) and the pH (acidity) of the board can be determined.

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*Info and test requests: visit our [website](#)*

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