

# **Chapter 6 Corrugated cardboard packaging**

## **Section 6.0 General information**

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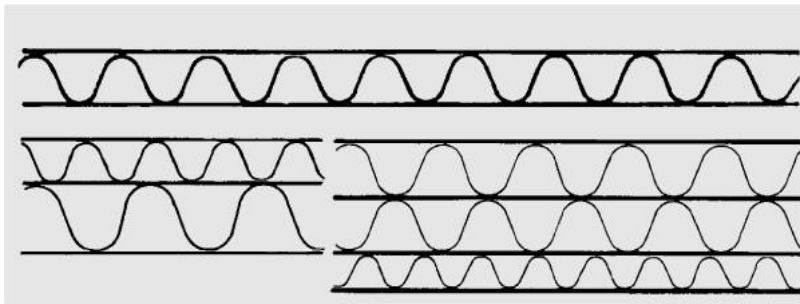
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### 6.0.1 Introduction

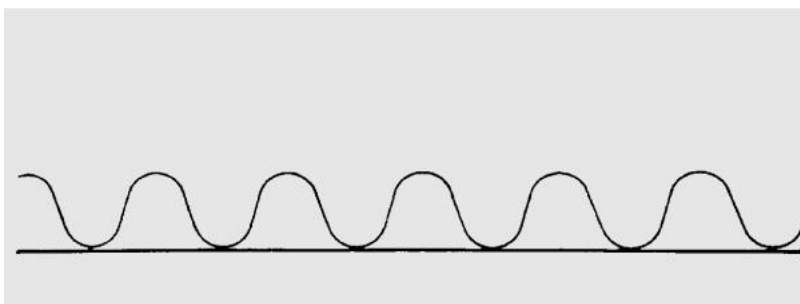
Corrugated cardboard packaging is produced out of renewable raw materials, which can be optimally integrated into cycles of valuable substances. The packaging material connects effective product protection with very low material usage and low weight as well as their outstanding mechanical processability. Therefore, their economic and ecological advantages are linked ideally. The good physical characteristics enable a wide range of applications due to the flute profiles and their combinations.

Corrugated cardboard is according to DIN 55405 cardboard made up of one or more layers of corrugated paper, which is glued to one layer or between several layers of paper or cardboard. Corrugated cardboard is distinguished between single-layer or multi-layer cardboard. Corrugated cardboard is manufactured in a continuous automated process from pre-made paper and cardboard.

Structure of corrugated cardboard



The type of flute mainly used is the circular flute shape (sinus wave)

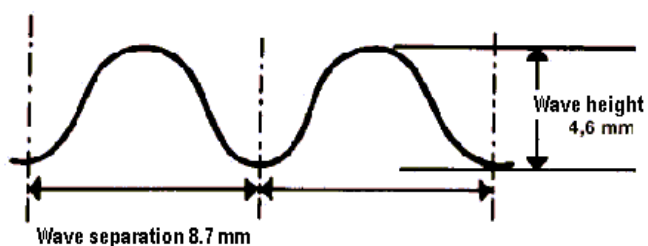


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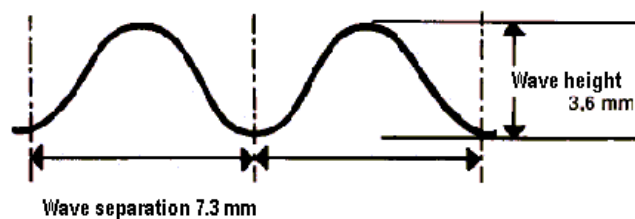
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### 6.0.1 Introduction

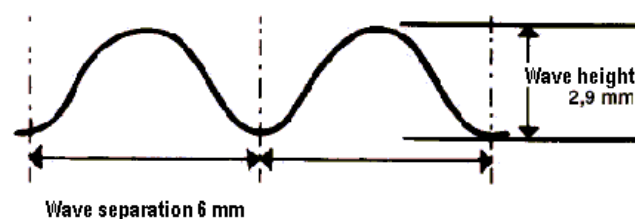
For corrugated cardboard the size of the flutes determines their nomenclature and their main point of usage.



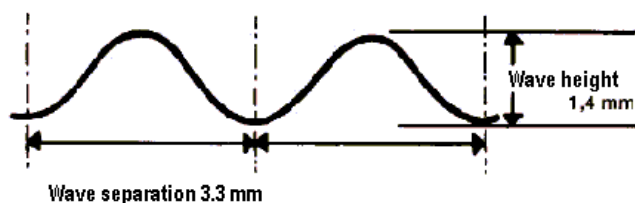
Flute coarse springs well, has good cushioning properties.



Flute medium is suitable for folding box boards, dimensions lie between the coarse and the fine flute.



Flute fine is suitable for printing on sales packaging.



Flute finest, area of usage for e.g. folding box.

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### 6.0.2 Application

The classification of corrugated cardboard in different types and their respective technical characteristics is illustrated in DIN 55 468-1.

	Type	Bursting strength kPa	Penetration energy* J	Edge crush resistance- kN/m
single-layer	1.01		2,5	3,5
	1.02		3	4
	1.03		3,5	4,5
	1.04		4	5,5
	1.05		4,5	6,5
	1.10	600	3	3,5
	1.20	850	3,5	4
	1.30	1 100	4	4,5
	1.40	1 350	4,5	5,5
	1.50	1 600	5	6,5
multi-layer	2.02		5,5	6,5
	2.03		6	7
	2.04		6,5	7,5
	2.05		7	8,5
	2.06		7,5	9
	2.20	850	6	6,5
	2.30	1 100	6,5	7
	2.40	1 350	7,5	8
	2.50	1 600	8,5	8,5
	2.60	1 900	9,5	9
	2.70	2 200	10,5	9,5
	2.90		15	14
	2.91		18	16
	2.92		22	18
	2.95		27	21
	2.96		30	24
Note: strength parameter do not apply to cardboards only from waves D,E,F and G				
* For single layer cardboard in flute type B the indicated values of the sort reduce by 10%				

Table: Abstract made from DIN 55 468-1 burst resistance, puncture test, and edge crush test of corrugated cardboard in use.

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### 6.0.2 Application

In practical use beside the technological properties listed in the norm for the application and processing the following parameters are relevant:

- Ability for water absorption (Cobb)
- Air permeability of the papers
- Delamination of the papers
- Box compression test/edge crush test
- Bending stiffness

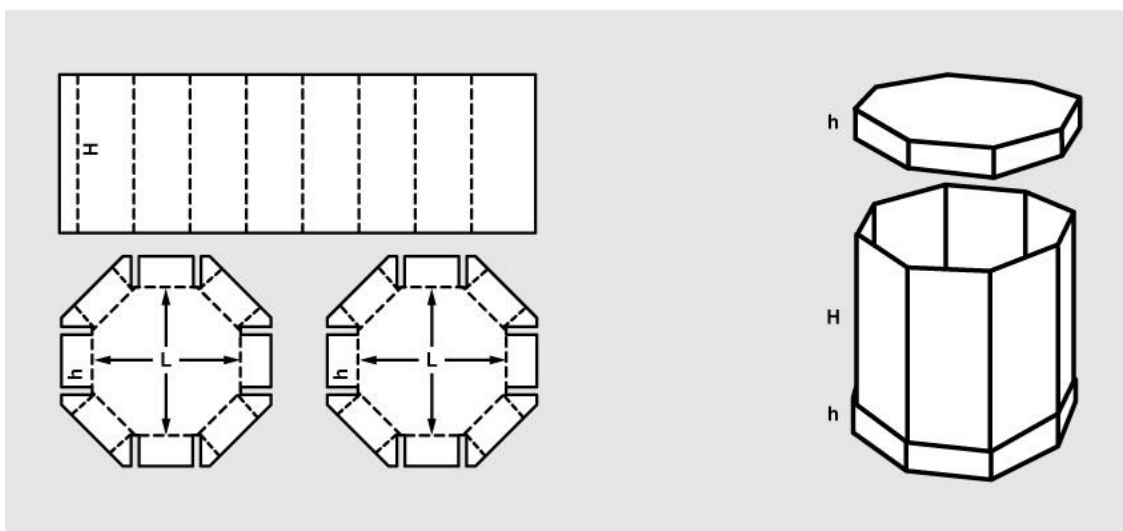


Fig. 1 Octagonal box

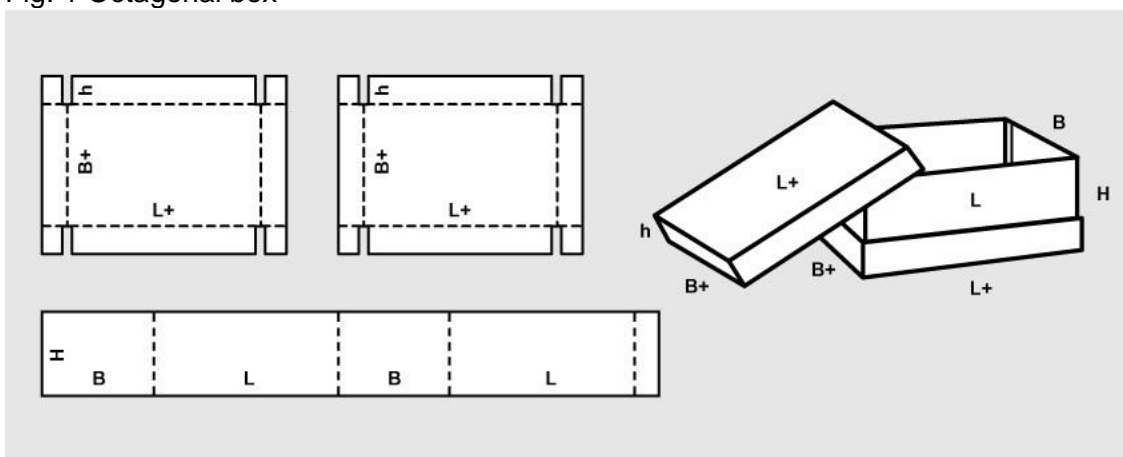


Fig. 2 Hooded lid box

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#### 6.0.2 Application

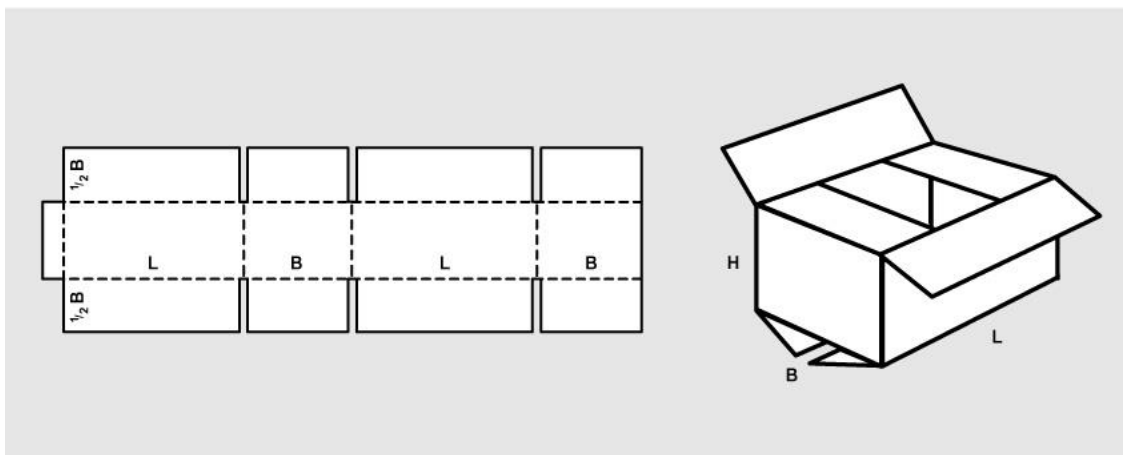


Fig. 3 Corrugated cardboard folding box

The broad application spectrum for corrugated cardboard packaging ranges from small size packaging (e.g. for samples) to IBCs (e.g. octagonal box). Corrugated cardboard packaging is used as primary and secondary packaging. The standardised types are laid down in international FEFCO-code.

IBC made from cardboard are described in this chapter on reason they are made from cardboard.

Corrugated cardboard packaging is motion amongst others with automatic / manual siphons. On paper quality selection is to allow that par example air permeability, surface texture, paper composition is specify.

The air permeability of papers can be calculated according to DIN 53120-1.

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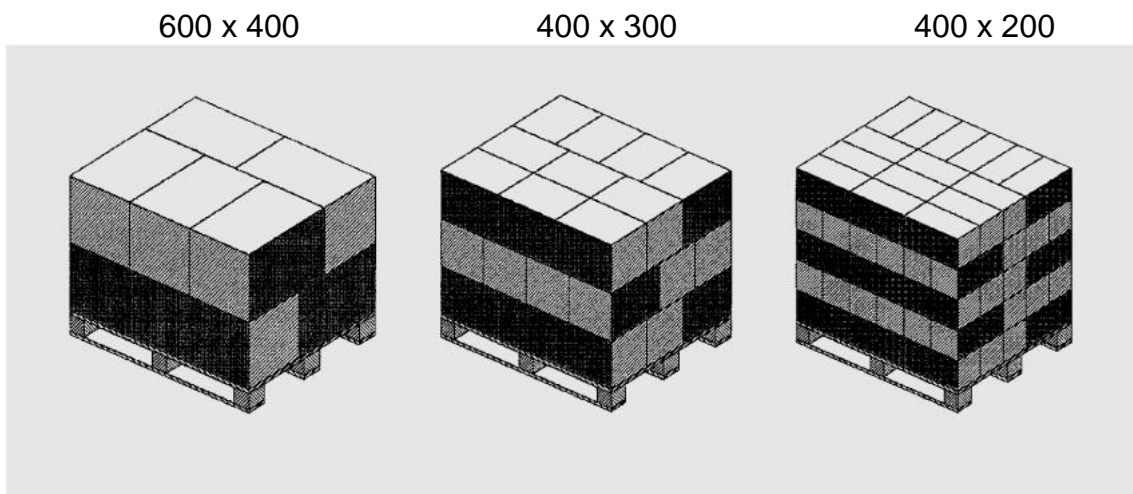
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### 6.0.3 Module systems

A better usage of the means of transportation can be achieved when using module systems, i.e. usage of corrugated cardboard boxes with base area dimensions of 600 x 400 mm or a conjugation of them.

CP 1 and CP 2 pallets are adapted to this module system.

Examples for loadings of a CP 1 pallet:




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#### **6.0.4 Approval for dangerous substances**

Corrugated cardboard packaging is possible for the transport of dangerous substances in type-approved and UN-certified types. Further information see chapter 1.3.





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#### **6.0.5 Quality requirements**

Information on quality assurance can be taken from chapter 9.

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### **6.0.6 Recovery systems**

Information on return / recycling systems of used packaging can be taken from chapter 10.1.4.