

VDA Recommendation

Specification of packagings made of corrugated cardboard

VDA 4540

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1 Introduction/Objective

The aim of this VDA Recommendation is the development of a standard specification for packagings made of corrugated cardboard, which is based on internationally recognised standards with reference to material quality, labelling and test methods.

The following benefits will be gained in this way:

- Generally comprehensible information on drawings, data sheets and other technical documents
- Comparability of technical parameters for tenders in the international sphere
- Testing and assurance of existing quality standards
- Prevention of fluctuations in quality and resultant damage and additional costs

2 Logistical requirements

The logistical requirements are presented in the section below; these are divided into delivery condition of the packaging, the labelling and the logistical information of the packaging.

2.1 Delivery condition

- Delivery occurs in line with the requirements of the customer, on Euro pallets as a rule in Europe.
- There may be deviations with special packagings, which must be coordinated separately.
- The packagings must not protrude beyond the pallet surface. If necessary an appropriate number of pallets must be inserted so that handling and ability to drive below are guaranteed.
- Deformations of the packaging on the delivery pallet are not permitted.
- The stacking of the load unit must be secured against warpage and slipping.
- The amount of harnessing must be agreed with the customer before the first delivery. The packaging unit should generally have at least double strapping both lengthways and crossways.
- The packaging manufacturer must guarantee that the quality of the packaging is not adversely affected by the delivery condition (overhang + securing of load where appropriate)
- Additional packaging aids must be used to prevent damage to the packaging e.g. edge protection, additional floor, cover layer.
- The supplier of the packaging material is responsible for damage free delivery.
- Packaging units must be supplied with even quantities in a single variety.
- The quantity and the dimensions per load unit are defined by the supplier of the packaging material together with the customers and the supplier of the packaging material must not change this without prior agreement.
- The stacking factor of the delivery must be indicated in the following format, stacking factor 1 = 1+1;
stacking factor 2 = 1+2.

2.2 Labelling of the packaging unit or shipping and accompanying documentation

- Each packaging unit must be labelled in a customer-specific way, with a corresponding VDA label as a rule.
- Changes in packaging can be incorporated by the customer. The first use of the change must occur with labelling (customer-specific) and corresponding information.

2.3 General information for first delivery

The following information is relevant for the customer on initial agreement and must be prepared correspondingly:

- Quantity per delivery
- Flat dimensions
- Container dimensions
- Weight of the load unit
- Delivery condition (flat/built)
- Stacking factor for delivery
- Pallet type (Euro pallet/other)

Additional requirement:

- Load securing (harnessing, stretch film, outer packaging, additional packaging units (bundles) if necessary)
- For special packaging any additional customer requirements must be taken into account and requested in advance if necessary (building instructions/commissioning instructions for deliveries plus the build-up of the special packaging as an image document).

2.4 Reasons for complaints and test reports

The following points may lead to complaints:

- Deviating quality of packaging
- Delivery quantity
- Labelling
- Implementation (including print image, adhesion quality, folding)
- Delivery condition (including damage to the packaging by the packaging supplier and transport damage)

3 Technical requirement

It is essential that the technical parameters of the completed packaging are specified and measured.

3.1 Time of measurement

Sampling in line with DIN EN ISO 186



3.2 Specification and test method according to use

VDA type	Designation Construction	Use in the process	ECT kN/m	BS Nm	(BST) kPa	BCT N	PET J	Flute type	Flute quantity
1.a	Box	Warehouse packaging; single and multi-packaging	I		I	X (as a rule 23°C / 50% relative humidity or customer specifically)		I	P
1.b		Shipping or outer packaging (on the pallet or without)	I	I		X (as a rule 20°C 90% relative humidity or customer specifically)		I	P
2.a	Cut	non-load bearing intermediate layer or constructional packagings	I		P		P	I	P
2.b		load-bearing constructional packagings	P		P		P	I	P

P = Required parameters (performance parameters):

Minimum requirements of the complete packaging which must be contractually guaranteed.

I = Informative parameters:

Parameters which must be met so that the performance parameters are achieved.

(simplified tender for calculation, carrying out quick tests)

Definition "Use in the process"

1.a Box (warehouse packaging; single and multi-packaging)

Corrugated cardboard boxes which are packed in a shipping container (e.g. SLC, shipping or outer packaging).

These are as a rule not exposed to the external climate.

1.b Box (shipping or outer packaging on the pallet or without pallet)

Corrugated cardboard boxes which are used as shipping or outer packaging for transport. These are as a rule not exposed to the external climate.

Load-bearing inner packagings can also be tested for the BCT test depending on customer-specific requirement.

2.a Cut (non-load bearing intermediate layer or constructional packagings)

Inner corrugated cardboard packaging for product protection or for packing in layers (cuts, compartments etc.)

These are as a rule not exposed to the external climate.

2.b Cut (load-bearing constructional packagings)

Corrugated cardboard inner packaging for product protection (cuts, compartments, component-specific retainers etc.).

These are as a rule not exposed to the external climate.

3.3 Technical parameters

All the technical parameters which follow are minimum values and they must be made available to customers by means of a test report within 4 weeks of initial delivery.

Burst compression strength in accordance with DIN 55440/DIN ISO 12048:

- Definition: **BCT** in N
- Measurement method in accordance with DIN 55440/DIN ISO 12048
 - at least 3 test specimens under freely oscillating plate
 - additional test specimens must be tested in the event of fluctuations greater than 10%
- Measurement occurs on the completed series packaging; it may be necessary to amend transport pallets above and below. The pallets required for the test must be agreed with the customer.
- It is not necessary to relate to the BCT in practice for the technical appraisal during the tendering process.

Edgewise crush resistance in accordance with DIN ISO 3037

- Definition **ECT** in kN/m
- Measurement method in accordance with DIN ISO 3037

Puncture resistance in accordance with DIN 53142-2

- Definition: **PET** in J
- Measurement method in accordance with DIN 53142-2

Bursting strength in accordance with DIN EN ISO 2759:

- Definition: **BST** in KPa
- Measurement method in accordance with DIN EN ISO 2759

Bending stiffness in accordance with DIN 53121/ ISO 5628:

- Definition: **BS** in Nm
- Measurement method in accordance with DIN 53121/ ISO 5628
- Is to be regularly established with 4-point bending test. If a different measurement method/standard is used, this must be agreed with the customer and displayed in the technical data sheet.

Flute type (A-, B, C-, D-, E, F, G-flute and combinations):

- Definition: Thickness flute heights in accordance with DIN 55468 or ASTM D 5639
- Measurement method in accordance with DIN 55468 or ASTM D 5639
- The flute type, flute direction and dimensions of the packaging must be taken from the technical data sheet. A reduction in thickness is possible to some degree for equivalent technical minimum values and flute quantity and must be agreed with the customer prior to production.
e.g. CAA to ACC; BC to BE; C to B

Cobb value in line with DIN EN 20 535

- can be requested on a customer-specific basis

Climate following customer specification in line with DIN ISO 2233:

- Definition of test climate 6 (20°C and 90% relative humidity) and 7 (23°C and 50% relative humidity)
- DIN ISO 2233

Wet strength adhesion:

- In accordance with DIN 55468-2/ DIN ISO 3689 / TAPPI T812
- Layers or paper web (outer web) in accordance with customer-specific stipulation

3.4 Tolerance dimensions:

- in accordance with DIN 55429-2 manufacturing tolerances (e.g. roller die cutters/flat bed die cutters)
- the function of the packaging must be assured through a suitable tolerance selection

3.5 Notes for the technical data sheet:**Boxes and constructive packagings:**

In the data sheet template the measurements to be adhered to are marked with an X and must be adhered to if:

- there is an X in front of the interior dimensions, these must be regarded as minimum values
- there is an X in front of the exterior dimensions, these must be regarded as maximum values

4 Appendices

- Technical data sheet
- Data sheet print image
- Data sheet logistical requirements
- Data sheet change history
- Tender template

5 Abbreviations

BCT	Burst Compression Strength
BS	Bending stiffness
BST	Bursting strength
DIN	German Industrial Standard (Deutsche Industrie-Norm)
ECT	Edge Crush Test
EN	European Standard
I	Informative parameter
ISO	International Organization for Standardization
PET	Puncture Effort
TAPPI	Technical Association of the Pulp and Paper Industry
VDA	German Association of the Automotive Industry
VDW	German Association of the Corrugated Cardboard Industry
X	Required parameters