



Gesamtverband
Kunststoffverarbeitende
Industrie e.V.

GKV TESTING AND VALUATION CLAUSE

for polyethylene films
and products

set up by
IK Industrievereinigung Kunststoffverpackungen e.V.
(German Association for Plastics Packagings and Films)
– a carrier association of the GKV –
and on file at the
SKZ Das Kunststoff-Zentrum in Würzburg, Germany
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The Testing and Valuation Clause, revised by experts of the plastic film industry, describes what is customary in commerce with PE films and products unless otherwise agreed. For plastic packaging, the provisions of the German Pre-packaging Regulation and, where applicable, European standards apply, taking precedence in the event of a conflict in the clause.

It is expressly pointed out that the measurement values may change due to the addition of colours and batches. This also applies to Sheet II, Sheet III and Sheet IV.

Thickness and Weight per Unit Area

1. Thickness and Weight per Unit Area

1.2 Measuring Instruments

The measuring instruments used must be calibrated/verified. The resolution of the measuring range must correspond to the application.

2. Sampling, Shape and Number of Specimens

When taking samples as many samples shall be taken that the production lot size is represented.

2.1

Determination of Thickness

To determine the thickness an approx. 10-cm-wide strip is taken from each sample across the entire width of the film web. If necessary, tubular material is slit on one side and laid wide. This equally applies to finished products.

2.2

Determination of the Weight per Unit Area

The determination of the weight per unit area can be based on DIN EN ISO 2286-2 (Rubber- or plastics-coated fabrics – Determination of roll characteristics – Part 2: Methods for determination of total weight per unit area, weight per unit area of coating and weight per unit area of substrate) or by taking a 1-m-long strip of the entire width.

3.

Conditioning of Samples

Information on conditioning can be found in DIN EN ISO 291 (Plastics – Standard atmospheres for conditioning and testing) or DIN EN ISO 527-1 (Plastics – Determination of tensile properties). As an alternative, corresponding standards can be used for specific product properties; tests accompanying production are carried out in the respective environment.

4.

Performance and Evaluation of the Tests

Testing for the detection of defects may be requested by either contracting party within the period specified by the parties. The test report from the commissioned institute must expressly state whether or not the tested goods comply with the requirements of the GKV Testing and Valuation Clause. Any legal claims arising from alleged defects may be asserted after delivery of the test report. The costs of the inspection shall be borne by the purchaser if the goods comply with the clause; otherwise the inspection costs shall be borne by the supplier.

4.1 Thickness

The thickness measurement must extend uniformly over the entire width (manufacturing width) of the specimen. At least 10 measurements shall be performed on a foil width of 1 m.

The thickness measurement shall be performed with a calibrated thickness gauge in accordance with DIN 55543 (Packaging test – Test methods for packaging films – Part 1: Determination of the film thickness). The thickness measurement shall generally be carried out transversely to the production of the film. The scattering range of the individual deviations may be from the nominal thickness (target thickness):

4.1.1 To a width of 2500 mm

Nominal, Target Thickness	Maximum Individual Deviation Thickness Tolerance
≤ 15 µm	± 22%
> 15 ≤ 25 µm	± 15%
> 25 µm	± 13%

4.1.2 From a width of 2501 mm to 6000 mm

≤ 25 µm	± 25%
> 25 ≤ 50 µm	± 20%
> 50 µm	± 15%

4.1.3 Width > 6001 mm

≤ 50 µm	± 25%
> 50 µm	± 20%

These values must be met by at least 95% of the measuring points (corresponds statistically to 2 σ). The thickness is given in mm or µm. The arithmetic mean is calculated using the determined individual measurements.

4.2 Weight per Unit Area

The determined mass per unit area is given in grams per m². The samples taken are weighed after conditioning according to Point 3. If several samples within the meaning of Point 2.2 are taken, the arithmetic mean of all individual measurements shall apply.

4.3 Average Thickness/Average Weight per Unit Area Over Lot Size

For the ordered lot size, the following tolerances apply to the measured thickness or the measured weight per unit area:

Area (g/m ²)	Allowable Deviation from the Target Thickness (µm) or from the Target Weight per Unit
≤ 200 kg	± 10%
> 200 kg ≤ 1,000 kg	± 7%
> 1,000 kg ≤ 5,000 kg	± 5%
> 5,000 kg	± 4%

5. Copies of the Test Report

The goods are in conformity with the GKV Testing and Valuation Clause if all of the tolerances named under Points 4.1 to 4.3 were complied with. An addition of both tolerance ranges is not allowed.

The GKV Test Report will include:

- Manufacturer, batch number or a similar identification number, date of delivery and date of sampling
- Sample size
- Agreed target values
- Actual values and deviation from the target values in %
- Assessment of whether the test results lie within the test and evaluation standards as defined by GKV

A copy of the test report shall be sent to the customer and the supplier at the same time. Special agreements should be made for film and film products that show deviations from the target values of the GKV Testing and Valuation Clause.

6. Additional Information/Documentation

- DIN 16995: Films for packaging – Plastic films – Properties, testing
- "MATRIX – Compilation of Test Methods for plastics films and products made of plastic films", available on the IK Extranet
- Technical brochures (technical information), available on the IK Extranet

All references to standards refer to the current valid version of each standard.

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Maximum Permissible Width/Length Deviations (Tolerances) for Tubular Film, Centre Folded Film, Flat Film and Blown Film with Side Fold (on Roll)

Preliminary note:

Technically induced fluctuations, not just in the metering systems, are inevitable due to various possible influences. Among other things these include different cutting devices for roll changes. The mainly mechanical measuring devices used therefore can easily lead to predictable deviations and this must therefore be

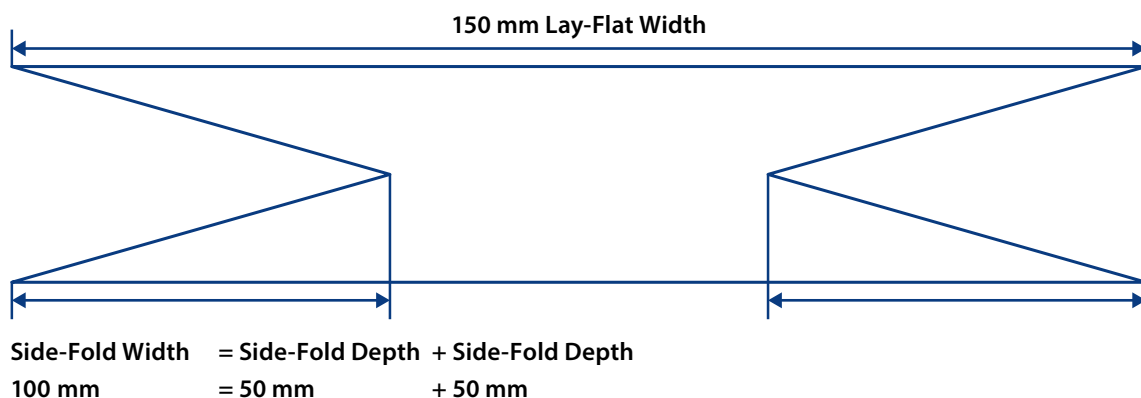
1. Terms

1.1

Width refers to the distance between the two edges of the tubular film, centre folded film and flat film. The lay-flat width is the distance between the two edges of a blown film with inserted side fold.

1.2

The side-fold width is twice the side-fold depth. The designation of the side fold is given by specifying the lay-flat width + side-fold width. Example: The specification 150 + 100 mm means: lay-flat width 150 mm, side-fold width 100 mm; accordingly: side-fold depth = 50 mm on each side. Side-fold width 2 times 50 mm = 100 mm.



1.3

Length is the unwound number of metres of a roll.

2. Width Tolerance

The film width is measured in the relaxed state. The width on the roll can deviate due to technical reasons.

2.1

The following width tolerances apply to tubular film, centre folded film, blown film with extended side fold and unedged flat film:

Width in mm	Width Tolerance in mm
≤ 800	± 8
> 800 ≤ 1.200	± 10
> 1.200 ≤ 2.000	± 12
> 2.000 ≤ 3.000	± 15
> 3.000 ≤ 4.000	± 30
> 4.000 ≤ 5.000	± 50
> 5.000	± 80

2.2

For trimmed flat film, 50% of the width tolerance specified under Point 2.1 applies.

2.3

The following applies to blown film with side fold: In addition to the tolerances mentioned under Point 2.1, the following deviations apply to the side-fold depth and the edge coverage:

Lay-Flat Width in mm	Edge Coverage in mm
≤ 1.200	± 8
> 1.200 ≤ 2.000	± 10
> 2.000 ≤ 3.000	± 12
> 3.000 ≤ 5.000	± 15
> 5.000	± 18

Seitenfaltenbreite in mm	Side-Fold Width Tolerance in mm
≤ 500	± 6
> 500 ≤ 800	± 8
> 800 ≤ 1.200	± 12
> 1.200 ≤ 2.000	± 16
> 2.000 ≤ 3.000	± 20

In order to avoid fold breakage or to take other processing requirements into account, the edge coverage must be larger.

3. Length Tolerances

For special applications, a special agreement on length is recommended.

The following length tolerances apply to tubular film, centre folded film, blown film with side fold and flat film:

Roll Length in m	
≤ 100	± 3,0 %
> 100 ≤ 500	± 2,5 %
> 500 ≤ 1.000	± 2,0 %
> 1.000 ≤ 2.000	± 1,5 %
> 2.000 ≤ 5.000	± 1,2 %
> 5.000	± 0,8 %

4. Additional Information/Documentation

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Dimensions and designations of bags and sacks.

1. Bag Dimensions

1.1 Validity of the Dimensions

The defined dimensions refer to the bag dimensions and not to the filling volume. Unless otherwise agreed by the contracting parties, the stated dimensions refer to the external dimensions of the bags and bags on rolls in accordance with standard commercial practice. If product-specific dimensions absolutely require smaller tolerances, these must be specially stated when the order is placed. The dimensions are given in the following order: width, length, film thickness, whereby these dimensions are linked by a multiplication sign, i.e. width x length x thickness.

1.1.1

The width of a bag is the opening side. All dimensions are given in millimetres (mm).

1.1.2 Other

Additional and other designs (other bag shapes, closures, needling, punching, perforation, etc.) must be agreed to separately.

2. Tolerances

Maximum permissible width/length deviations (tolerances) from the dimensions resulting from the manufacturing process (unless otherwise specified by national or European standards):

Bag/Sack Length	+/- 3%
Bag/Sack Width	+/- 3%

For deviations (tolerances) resulting from the production of the film, the guidelines according to Sheet I and Sheet II, 2.1 to 2.3 of this provision apply.

3. Welding Seam Quality

Unless otherwise agreed by the contracting parties, the following rules shall be deemed customary for products made of polyethylene film and joined by welding:

3.1 Term

The weld quality is defined as follows:

Breaking strength of the weld [in N]

Breaking force of the film [in N]

3.2 Performance of the Test

The test is carried out in accordance with DIN EN ISO 527-3 "Determination of tensile properties."

Please note that the tensile test for weld and film is performed in the same direction (either transverse or longitudinal depending on the weld direction), test speed and test-strip width.

3.3 Specification

The weld quality is expressed as the welding factor. It is calculated as the arithmetic mean of all individual values according to Point 3.2 and shall be at least:

$$\frac{\text{Breaking force of the weld [in N]}}{\text{Breaking force of the foil [in N]}} = 60\%$$

These values must be met by at least 95% of the measuring points (statistically corresponds to 2 σ). The thickness is given in mm or μm . The arithmetic mean is calculated from the determined individual measurements.

There can be a deviation with bags with inserted folds.

4. Sampling and Number of Specimens

The samples shall be taken individually from different packaging units. The number of samples to be tested in the event of a complaint shall be as follows:

$\leq 5,000$ pieces: 10 samples

$> 5,000 \leq 10,000$ pieces: 2 samples per 1,000 pieces

for every additional 10,000 pieces: 2 samples per 10,000 pieces

5. Additional Information/Documentation

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	Conventional Stretch Films	Pre-stretched Stretch Films
1. Product	The scope includes the product groups of conventional stretch film rolls for manual and machine use.	The scope includes the product group of pre-stretched stretch film rolls for manual and machine use. This also includes the pre-aligned stretch films used in the production process.
2. Permissible Tolerances		
2.1 Film Width	< 250 mm ± 3% ≥ 250 mm ± 2%	
2.2 Roll Length		± 2%
2.3 Roll Weight Roll Weight = Film Weight + Core Weight	≥ 13 my ± 5% < 13 my ± 10%	
3. Performance of the Test	Testing for the detection of defects can be requested by either contracting party within the period specified by the parties. The test report of the commissioned institute/the commissioned test facility must expressly state whether or not the tested goods comply with the requirements as stated herein. Any legal claims arising from the alleged defects may be asserted after delivery of the test report. The costs of the inspection shall be borne by the purchaser if the goods comply with the clause; otherwise the inspection costs shall be borne by the supplier.	
4. Sampling and Sample Preparation	One sample shall be taken from up to 50 kg of a delivery of the same product with the same dimensions. However, at least 5 samples shall be taken. Samples shall be taken with the involvement of the supplier unless the supplier expressly waives this requirement. The samples are to be stored in a standard climate of 23/50 Class 1 according to DIN EN ISO 291. Care must be taken to remove any impurities from the samples.	
5. Quality Requirements		
5.1 Weight per Unit Area	To determine the average weight per unit area, samples are taken either in accordance with ISO 4591 in the respective current version or by taking a 1-metre-long strip of the entire width. The samples taken are weighed with an accuracy of 0.1% after pre-treatment in accordance with Point 4. The determined weight per unit area is expressed in grams per square metre (g/m ²) or linear metre. Since several samples are taken in the meaning of Point 3, the arithmetic mean of all individual weighings applies. The following tolerances apply to the average weight per unit area: With film weights, a deviation of ± 5% is permissible for films > 13 my and ± 10% for films < 13 my as the threshold value. Film Weight = Roll Weight - Core Weight	

	Conventional Stretch Films	Pre-stretched Stretch Films
5.2 Thickness Tolerance/ Spreading Width	<p>The thickness measurements must extend over the entire width of the samples. The measuring distance is 10 mm or a maximum of 99 measuring points evenly distributed over the entire width. Thickness measurement is carried out in accordance with ISO 4591 and must be performed with a device with a readability of 0.001 mm. One of the measuring surfaces of the thickness gauge must be circular and must not exceed max. 35 mm². The second measuring surface can be congruent with the first and must then be placed exactly opposite it. The surfaces must be parallel to each other. The contact pressure must be between 0.1 and 0.5 N. Thickness measurement must generally be carried out transversely to the manufacturing width of the film. The scatter width of the individual measurements may be related to the nominal thickness:</p> <p>Average Film Thickness $< 13 \mu\text{m}$ $\geq 13 \mu\text{m}$</p>	<p>Thickness Tolerance $\pm 15\%$ $\pm 5\%$</p>
5.3 Film Width	<p>The film width is measured on the film roll. The permissible width tolerance for the roll widths is:</p> <p>$< 250 \text{ mm} \pm 3\%$, or $\geq 250 \text{ mm} \pm 2\%$</p>	<p>The film width is measured on the film roll. In the case of folded or multiple reinforced edges, the edge width must be added to the film width. From a production point of view, the roll width can deviate from the film width. The permissible width tolerance of the film widths is:</p> <p>$< 250 \text{ mm} \pm 3\%$, or $\geq 250 \text{ mm} \pm 2\%$</p>
5.4 Roll Length	<p>The roll length has a tolerance of $\pm 2\%$.</p>	<p>The restoring force added to the pre-stretched film by means of the production technology must be taken into account when determining the film running length. The run-length tolerance of $\pm 2\%$ must therefore be added to the function-related reset of up to 10% or taken into account accordingly in the roll-off tension.</p> <p>Thus taking into account the determined thickness (5.2) and film width (5.3), the net film weight should be used for a practical check of the film running length. The sum of all tolerances may not exceed $\pm 5\%$ for films $\geq 13 \text{ my}$ and $\pm 10\%$ for films $< 13 \text{ my}$.</p>
5.5 Roll Weight	<p>The roll weight is determined from the film weight + core Roll Weight = Film Weight + Core Weight The roll weight must not exceed the sum of all tolerances of width, length, thickness and core weight for films $\geq 13 \text{ my} \pm 5\%$ and $< 13 \text{ my} \pm 10\%$.</p>	
6. Test Report supplier	<p>A copy of the test report shall be sent to the customer and the at the same time. The goods are in conformity with the GKV Testing and Valuation Clause if all of the stated tolerances were complied with.</p>	
7. Other	<p>Additional quality features such as tear strength, elongation, dart-drop and adhesion can be found in the manufacturer's technical documentation if needed. Measured values deviating from the above tolerance values may be specified in a special agreement in the case of films or film rolls with nominal values deviating from the GKV Testing and Valuation Clause.</p>	