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Graphic technology — Blankets for offset printing

Technologie graphique — Blanchets pour impression offset



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 12636 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

Annex A of this International Standard is for information only.

Introduction

The blanket is an essential part of every offset printing press. Its properties exert a profound influence on the mechanical conditions within the press and the visual characteristics of the prints produced. It is therefore useful to provide test methods, unified data, and tolerances for some essential properties of the blankets. This permits the suppliers to state properties of blanket types in a unified and well-known manner. It also helps the printer to select the appropriate blanket type for a particular press type or press condition. A further benefit is that the design of printing presses can be based on blanket data resulting from unified test methods.

Graphic technology — Blankets for offset printing

1 Scope

This International Standard defines vocabulary, specifies test methods, characteristics, ordering and labeling information for blankets for offset printing. This International Standard does not apply to untensioned or unclamped blankets for offset printing, nor offset printing sleeves used with gapless presses.

2 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

2.1

across direction

direction of the side of the blanket as intended to be applied perpendicular to the direction of rotation

2.2

around-the-cylinder direction

direction of the side of the blanket as intended to be applied in the direction of the rotation

2.3

average thickness

mean of four measurements on a cut blanket where the measurements have been made on the points indicated in figure 1, namely on 2 diagonally opposed corners and one each at the middle of the two sides that are perpendicular to each other within a right triangle

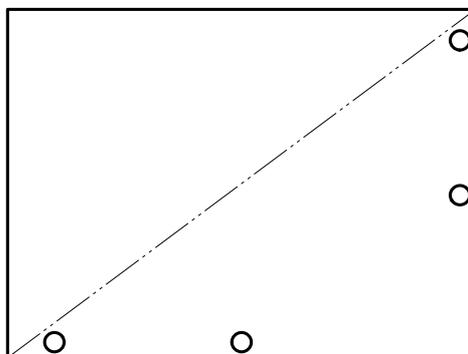


Figure 1 — Thickness measurement points

2.4

blanket

composite body, consisting of coated carrier material, e.g. fabric, used for transfer of the printing ink from the forme onto material to be printed on, e.g. for offset printing

2.5**compressibility-deflection**

average thickness reduction of a blanket measured under a specific pressure, expressed in millimetres

2.6**compressibility-indentation**

average depth of impression, l , in a blanket measured under a specific pressure, expressed in millimetres or as percentage indentation l_p

2.7**elongation**

increase of the dimension in the around-the-cylinder direction of a blanket under longitudinal stress, expressed in percent of the length at a specified force per width

2.8**packing**

underlay material placed under the blanket to adjust the effective thickness of the blanket on press

2.9**printing surface**

side of the blanket that is used for the transfer of printing ink

2.10**shrinkage**

decrease in thickness due to exposure of the blanket printing surface to a liquid, expressed as a percentage of the original blanket thickness, or as an absolute thickness decrease in millimetres

2.11**sizes**

dimensions (thickness, width and length) of a cut ready-to-use blanket

2.12**swelling**

increase in thickness due to exposure of the blanket printing surface to a liquid, expressed as a percentage of the original blanket thickness, or as an absolute thickness increase in millimetres

2.13**tensile strength**

force per unit width required for breaking a blanket under longitudinal stress in the around-the-cylinder direction

2.14**thickness variation**

difference between the greatest and the smallest thickness value in millimetres

3 Requirements

3.1 Dimensions

3.1.1 Thickness

The test method according to 4.1 shall be used. For applications with packing the nominal thickness shall be 1,68 mm or 1,95 mm. For applications without packing the nominal thickness should be agreed upon between the supplier and the user of the product.

NOTE The nominal thickness should be stated in technical descriptions and when ordering.

The thickness variations of blankets with an area not in excess of 1,5 m² shall be less than $\pm 0,02$ mm, those of greater sizes shall be less than $\pm 0,03$ mm. No individual thickness measurement shall yield a value which deviates more than 0,05 mm from the ordered thickness.

3.1.2 Accuracy of width and length

If one of the sides is 1 m or less, the tolerance shall be ± 3 mm, otherwise it shall be ± 4 mm.

3.1.3 Plan view

The sides of the blanket shall form right angles. The difference between the length of the diagonals and the length of any two parallel sides shall not exceed 0,5 %.

3.2 Materials and surface finish

No specifications are given. The material formulation and surface finish are the choice of the manufacturer and may be stated in technical descriptions by the supplier. The surface finish may vary, e.g. cast (molded) or ground (buffed).

3.3 Elongation

The elongation E shall be less than 1,5 %. The test method according to 4.2 shall be used or any other method where results can be correlated to those of the test method.

3.4 Tensile strength

For all blankets of thickness 1,68 mm or more, the tensile strength shall be greater than 40 N/mm. The test method according to 4.3 shall be used or any other method where results can be correlated to those of the test method. For blankets of lower thickness no specification is given.

3.5 Compressibility

No specification is given. Either test method according to 4.4 or 4.5 shall be used.

NOTE The use of compressibility-deflection or compressibility-indentation method is the choice of the manufacturer and may be stated by the supplier.

3.6 Thickness change

3.6.1 Swelling or shrinkage due to printing ink ingredients

The thickness change ΔT due to exposure to printing ink ingredients shall not exceed 4 % maximum swelling or 2 % maximum shrinkage. The test method according to 4.6 for each property shall be used.

3.6.2 Swelling and/or shrinkage due to blanket washes

When testing blanket washes for their compatibility to an offset printing blanket, it is the option of the blanket manufacturer to report test results using the test method according to 4.6 for each property.

When choosing a blanket cleaning material for composition, it should be tested for compatibility with the blanket.

NOTE The choice of a proper wash is a difficult decision due to the need to balance effectiveness versus safety and environmental needs.

3.7 Hardness

The overall hardness and the microhardness are not specified in this International Standard. They are the choice of the manufacturer.

3.8 Cut blanket markings

On the non-printing side of the cut-to-size blanket the following should be reported:

- a) Blanket dimensions (average actual thickness, width and length), indicating which dimension is the around-the-cylinder direction. If the recorded thickness is nominal this shall be stated.

- b) The batch control number.
- c) The name of the manufacturer or the supplier and the blanket brand or trade name.

4 Test methods

4.1 Thickness

Place the blanket between two parallel flat circular disks of 100 mm² to 200 mm² area. Load the disks with a force that produces a pressure of (60 ± 5) kPa. Measure the gap between the disks in millimetres. Other methods, e.g. continuous ones, may be used instead if the results can be correlated to those of the method specified.

4.2 Elongation

Cut a 50 mm by 350 mm (minimum) sample from the blanket with the long direction parallel to the around-the-cylinder direction. Apply to the sample two bench marks 250 mm apart. Clamp the shorter sides of the sample in a tensile testing apparatus with a jaw separation of 300 mm (minimum), and apply a static line force of 10 N/mm. After 10 min dwell time, determine the distance *L* between the benchmarks under load. Calculate the percentage elongation from

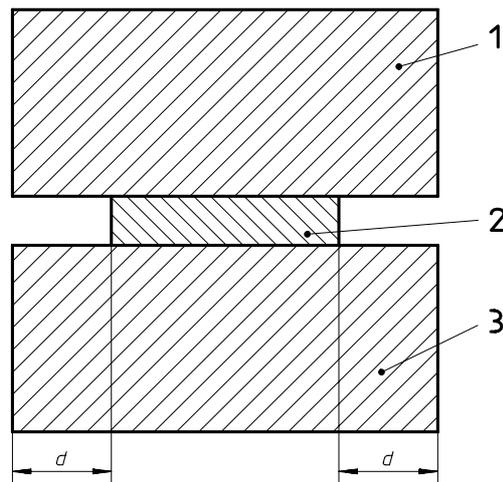
$$E = \frac{L - L_0}{L_0} \times 100 \%$$

where *L*₀ = 250 mm benchmarks and *L* is the length after 10 min under load.

4.3 Tensile strength

Cut a 50 mm by 300 mm (minimum) sample from the blanket with the long direction parallel to the around-the-cylinder direction. Clamp the shorter sides of the sample into a tensile strength testing apparatus with a minimum jaw separation of 200 mm. Apply the load with a jaw separation speed of 50 mm/min. Increase the load till the break occurs, read the force at break. The tensile strength is expressed in N/mm.

4.4 Compressibility - Deflection



Key

- 1 Upper face of compression apparatus
- 2 Circular sample 700 mm²
- 3 Lower face
- d* Distance 10 mm (minimum)

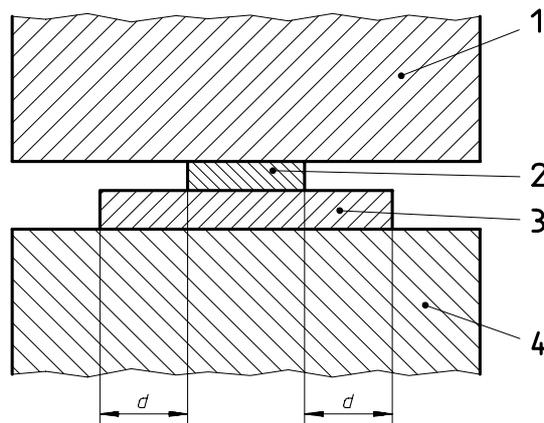
Figure 2 — Compressibility - Deflection (not to scale)

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- a) Indication of blanket compressibility is expressed as an absolute deflection at a pre-determined pressure of 2000 kPa.
- b) Apparatus: Continuous loading apparatus (tensometer).
- c) Use a compression load cell with parallel flat surfaces or a compression cage (maximum diameter 100 mm).
- d) Sample size $(700 \pm 10) \text{ mm}^2$.
- e) Head speed: 1 mm/min.
- f) Zero point: $(60 \pm 5) \text{ kPa}$.
- g) Compress the sample until a load of 2060 kPa is reached, recording the deflection at the 1st and 5th cycles at 1060 kPa and 2060 kPa.
- h) Report the 5th cycle deflection values at 1060 kPa and 2060 kPa from an average of 4 samples.

NOTE Due to machine deflection inherent in all test equipment, care should be taken to compensate for this deflection when reporting results. This deflection may be in the fixtures (e.g. compression cage) as well as the load cell. A test with a flat non-compressible circular disk $(700 \pm 10) \text{ mm}^2$ is run to determine deflection of the testing system at different loads. This disk should be of minimum thickness such that all force is borne by the disk during the test. Suggested material for this disk is brass or steel. The stress-strain curve is used to correct for this instrument deflection in order to indicate correct blanket compressibility.

4.5 Compressibility - Indentation



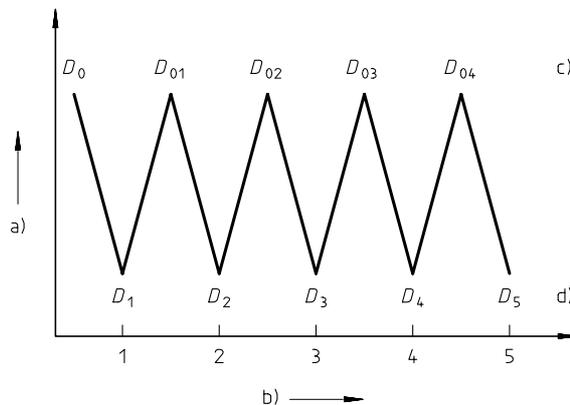
Key

- 1 Upper face of compression apparatus
- 2 Circular load disk of 100 mm^2
- 3 Sample
- 4 Lower face
- d Distance 9 mm (minimum)

Figure 3 — Compressibility - Indentation (not to scale)

- a) Indication of blanket compressibility is expressed as an absolute indentation at a pre-determined pressure of 1000 kPa.
- b) Apparatus: Continuous loading apparatus (tensometer) utilizing parallel flat surfaces and a circular load disk of 100 mm^2 .
- c) Sample size $(700 \pm 10) \text{ mm}^2$.
- d) Zero point: $(60 \pm 5) \text{ kPa}$.

- e) Record the distance between the load disk and the lower face in millimetres at the preload of (60 ± 5) kPa. The recorded value is the initial preload thickness D_0 .
- f) Head speed: 1 mm/min.
- g) Compress the sample until a load of 1060 kPa is reached recording the distance between the load disk and the lower face in millimetres. The recorded value is the indented thickness D_1 .
- h) Repeat the loading three times, then deload to 60 kPa recording the distance between the load disk and the lower face in millimetres. The recorded value is the fifth cycle preload thickness D_{04} .
- i) Compress the sample a fifth time until a load of 1060 kPa is reached and record the distance between the load disk and the lower face in millimetres. The recorded value is the indented thickness D_5 (see figure 4).
- j) Report values from an average of 4 samples.



Key

- a) Thickness
- b) Number of load cycles
- c) Unloaded thickness
- d) Loaded thickness

Figure 4 — Test procedure for Compressibility - Indentation

Report the following:

- The initial preload thickness D_0 .
- The absolute indentation (I_1) at the first loading, $D_0 - D_1$.
- The absolute indentation (I_5) at the fifth loading, $D_{04} - D_5$.
- Alternatively the percentage indentation I_p can be reported; then the percentage indentation at the first loading is

$$I_{p1} = \frac{D_0 - D_1}{D_0} \times 100 \%$$

The percentage indentation at the fifth loading is

$$I_{p5} = \frac{D_{04} - D_5}{D_{04}} \times 100 \%$$

NOTE Due to machine deflection inherent in all test equipment, care should be taken to compensate for this deflection when reporting results. This deflection may be in the fixtures (e.g. compression cage) as well as the load cell. A test with the 100 mm² circular load disk between the parallel flat faces is run to determine deflection of the testing system at different loads. The stress-strain curve is used to correct this instrument deflection in order to indicate correct blanket indentation.

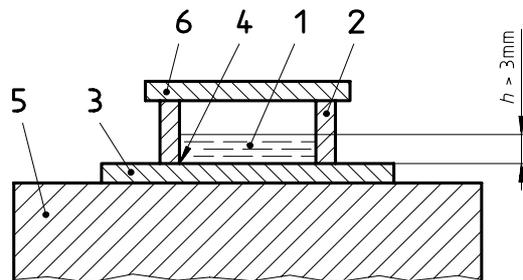
4.6 Thickness change

4.6.1 Swelling or shrinkage after exposure to a test liquid

Cut a 50 mm diameter or 50 mm square sample from a blanket. Measure the initial thickness T_0 of the blanket using the test method according to 4.1. Clamp the sample into a test fixture which protects the edge and non-printing surface from contact with the test liquid (see figure 5). The test liquid shall be at least 3 mm deep. Expose the printing surface to the test liquid for a period t at a temperature ϑ (4.6.3 for inks and 4.6.4 for washes). Remove the sample from the test fixture, clean off excess liquid and measure the thickness T_1 using the method as specified in 4.1. Calculate the percentage thickness change from:

$$\Delta T_1 = \frac{T_1 - T_0}{T_0} \times 100 \%$$

where ΔT_1 is the percentage change after time t . T_1 is the thickness after time t and T_0 is the initial thickness. The absolute thickness change may also be expressed in millimetres.



Key

- 1 Test liquid
- 2 Upper test fixture
- 3 Blanket sample
- 4 Sealing point
- 5 Lower test fixture
- 6 Cover

Figure 5 — Test liquid exposure fixture (not to scale)

4.6.2 Swelling or shrinkage after recovery from exposure to a test liquid

Let the sample remain at a temperature of $(23 \pm 2)^\circ\text{C}$ for 72 hours and measure the thickness T_2 using the test method according to 4.1. Calculate the percentage thickness change from:

$$\Delta T_2 = \frac{T_2 - T_0}{T_0} \times 100 \%$$

where ΔT_2 is the percentage change after 72 hours, T_2 is the final thickness and T_0 is the initial thickness. The absolute thickness change may also be expressed in millimetres.

4.6.3 Exposure conditions for printing ink ingredients

The time of exposure is 20 hours. The temperature of exposure is $(35 \pm 2)^\circ\text{C}$.

4.6.4 Exposure conditions for washes

The time of exposure is five hours. The temperature of exposure is $(23 \pm 2)^\circ\text{C}$.

4.6.5 Report

Report

- the percentage thickness changes ΔT_1 and ΔT_2 and/or absolute thickness change;
- test liquid and time of exposure.

Annex A (informative)

Equivalence of SI values to FPS values

Table A.1 — Equivalence of SI values to FPS values

SI value	FPS value	Appears in subclause
0,02 mm	0,0008 in	3.1.1
0,03 mm	0,0012 in	3.1.1
0,05 mm	0,0020 in	3.1.1
1,68 mm	0,067 in ^{a b}	3.1.1, 3.4
1,95 mm	0,077 in	3.1.1
3 mm	0,125 in (1/8 in) ^a	3.1.2, 4.6
4 mm	0,156 in (5/32 in) ^a	3.1.2
9 mm	0,354 in	4.5
10 mm	0,394 in	4.4
50 mm	2 in ^a	4.2, 4.3, 4.6
100 mm	4 in ^a	4.4
200 mm	8 in ^a	4.3
250 mm	10 in ^a	4.2
300 mm	12 in ^a	4.2, 4.3
350 mm	14 in ^a	4.2
1 m	39 in ^a	3.1.2
50 mm ²	0,078 sq in	4.6
100 mm ²	0,155 sq in	4.1, 4.5
200 mm ²	0,310 sq in	4.1
700 mm ²	1,09 sq in	4.4
(700 ± 10) mm ²	1,09 +/- 0,02 sq in	4.4, 4.5
1,5 m ²	1,8 sq yd ^a	3.1.1
1 mm/min	0,039 in/min	4.4, 4.5
50 mm/min	2 in/min ^a	4.3
10 N/mm	57 ppi	4.2
40 N/mm	228 ppi	3.4
(60 ± 5) kPa	8,7 +/- 0,7 psi	4.1, 4.4, 4.5
1000 kPa	145 psi	4.5
1060 kPa	154 psi	4.4, 4.5
2000 kPa	290 psi	4.4
2060 kPa	299 psi	4.4
^a	Convenience conversions representing practical use.	
^b	Nominal value accepted for a 3-ply blanket.	

ICS 37.100.10

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