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Specifications for blankets in newspaper offset production

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Foreword

Printing blankets, by means of their properties, have a major influence on the quality of the printing process. In order to have a higher degree of safety when changing blankets, also with a view to process standardisation in newspaper printing, it is essential that the composition of the blankets be known in advance and described in a way that makes it as comparable as possible. For this reason, users initiated a working group with the objective in the long term to standardise the description of the properties of printing blankets. Representatives of the press and blanket manufacturers, users and IFRA, under the leadership of bvdm, discussed blanket parameters from the point of view of their relevance to practice and agreed on the now available specifications for printing blankets.

The specifications contain parameters based on requirements in practice. Existing standards were taken into account, but not always wholly adopted. In part, series of tests and measurements were carried out to verify or establish characteristics, or to define testing methods respectively.

The parameters were categorised by importance, e.g. into parameters to be listed in the data sheet; parameters to be tested bilaterally, and properties demanded by the user and guaranteed by the manufacturer. In addition, instructions for blanket transport and storage were coordinated. The parameter of transport characteristic could not be settled due to the complexity of this aspect.

The following companies have agreed to the specifications: Bundesverband Druck und Medien e.V., CONTITECH Elastomer-Beschichtungen GmbH, DAY International, Felix Böttcher GmbH & Co. KG, IFRA, Kinyo Europe GmbH, Koenig & Bauer AG, MacDermid, MAN Roland Druckmaschinen AG, Trelleborg Engineered Systems, WIFAG Maschinenfabrik AG.

Application of the specifications is recommended. They contribute to more transparency and production safety as well as a better communication between the partners in the process. In principle, deviations from these specifications can be agreed by contract.

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Thanks to all who participated in the project for their commitment and their input for the development of the specifications. Special thanks go to the manufacturers for the carrying out various investigations aimed at creating bases for decision-making.

In the working group participated:

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Literature

[1] DIN 16621: Drucktücher für den indirekten Flachdruck (Offsetdruck); Begriffe, Anforderungen, Prüfung, Kennzeichnung; DIN Berlin 10/1991

[2] ISO 12636: Graphic technology – Blankets for offset printing; ISO Genf 7/1998

① Remarks

The printing properties such as solid printout, mottling of screen, tone value increase, doubling and slurring represent the goal and the quality interface. But in the combination and interaction with other materials and the printing press it may not be possible to assure the printing properties. It is agreed that a printing blanket may not have provable negative influences on the printing properties.

② Groups of discussed parameters

General Information
(Note: Could be attached to delivery. Goes to specific customer.)

Properties of printing blankets to assure the quality:
- Dimensions
- Mechanical properties, static
- Mechanical properties, dynamic
- Technical properties, general
- Technical properties during press operation

Application technology characteristics, which shall not be negatively influenced by the printing blanket:
- Printing properties

③ Specifications for printing blankets

3.1 Overview

3.1.1 Data sheet (Data of manufacturers)

General information
- Manufacturer
- Type
- Colour of top layer
- Field of application

Dimensions
- Average thickness
- Surface roughness

Mechanical properties, static
- Compressibility
- Relative linear expansion
- First setting behaviour

Technical properties, general
- Mechanical stability up to 60 °C

3.1.2 Further specifications (not in data sheet)

General information
- Identification on reverse side of printing blanket:
  Manufacturer
  Printing blanket type
  Nominal thickness
  Batch number
  Week of manufacture
- Place of production (coded in batch no.)
- Instruction leaflet will be attached to each delivery:
  Information about transport and storage
  Temperature
  Humidity
  Storage
  Disposal

Dimensions
- Width (Purchase order or delivery certificate)
- Length (Purchase order or delivery certificate)

3.1.3 To clarify bilaterally

Technical properties, general
- Thickness change due to effect of ink
- Thickness change due to effect of washing agent
- Thickness change due to the effect of fountain solution
- Stability of glue to effect of fountain solution and of washing agent

3.1.4 Characteristic is presupposed/To be ensured by manufacturers

Dimensions
- Parallelism of cutting edges
- Angle between cutting edges

Mechanical properties, static
- Tensile strength
- Pull-out strength of bar
- Later expansion (Creep behaviour)
- Bending strength

Mechanical properties, dynamic
- Relaxation behaviour or Wrinkling behaviour

Technical properties, general
- Penetration behaviour of fabric to effect of fountain solution and of washing agent

Technical properties during press operation
- Increasing of print load due to cylinder rotation

3.1.5 Parameters not contained in the specification for various reasons

General information
- Week of delivery
- Storage duration

Dimensions
- Difference in thickness
- Parallelism of top/reverse sides

Technical properties, general
- Corrosion behaviour
- Wetting behaviour
- Durability

Mechanical properties, static
- Microhardness top layer
- Waist formation

Mechanical properties, dynamic
- E-modulus/Loss factor (perpendicularly to the surface)
- Shear-modulus/Loss factor (tangential to the surface)

Technical properties during press operation
- Lateral moving; change of gap-width after 20.000 copies

3.1.6 Further investigations necessary

Technical properties during press operation
- Transport characteristic
- Powertrain torques

3.2 Details

3.2.1 Data sheet (Data of manufacturers)

Parameters	Definition of terms/ Specifications	Testing method/Test device	Range of tolerances
General information			
Manufacturer			
Type			
Color of top layer			
Field of application			
If not otherwise ordered, the tolerances stated in the standards apply. The data in the order drawing are usually more exact than the standard data. Printing blankets can be ordered now also according to the specifications co-ordinated in this publication.			
Dimensions			
Average thickness	Order drawing	Measure point drawing/Thickness gauga In accordance with DIN 16621/ISO 12636 with a measuring surface from 1 to 2 cm² and a measuring pressure of (6 ± 0,5) N/cm²; measurement points accordingly illustration 1 of ISO 12636	over the printing blanket/ batch/delivery ± 0,02 mm
	Practice-relevance Register accuracy		
Surface roughness		Measure point drawing/Perthometer	–
	Remarks N.B.: The measured values of the individual printing blanket manufacturers are not comparable with one another.		
	Practice-relevance Smooth surface: positive for dot gain, dot sharpness, contrast; negative for web tracking, paper transport, QR (adhesion)		
Mechanical properties, static			
Compressibility		Compressibility Tester ISO 12636 indentation-method with the forces 2.060 kPa and 1.060 kPa; determination of 3 measuring points 1.060 kPa = 106 N/cm² 2.060 kPa = 206 N/cm² (Indication of both measurement values)	–
	Remarks Under the condition that the spring characteristic is a straight line, force and constant deformation measurements result in comparable values for the compressibility. Three measuring points will be determined, in order to guarantee that the measurements are done within the linear range of the spring characteristic.		
	Practice-relevance uniform printing, sinking, crumpling resistance, clouding, register accuracy, dynamic stability steeper curve (lower compressibility) positive for entire surface (halftone dotting); flatter curve (higher compressibility) increases processing and packing sensitivity, durability and vibration and wrinkling absorption, negative for printing quality		

Parameters	Definition of terms/ Specifications	Testing method/Test device	Range of tolerances
Relative linear expansion	< 1,0 % This recommendation is deviating from ISO 12636 chapter 3.3 (< 1,5 %).	ISO 12636 in accordance with chapter 4.2, Tensile strength tester	
First setting behaviour		True rolling tester Tension, with which the printing blanket becomes stretched on the cylinder, should lead to an extension of the printing blanket of approx. 1 %. Deflection: 0,16 mm Web speed: 5 m/s Rolling over: 5.000 Rolling up phase with retightening Result of measurement: Comparison of the relaxed flat printing blanket compared with the printing blanket stretched on the cylinder thereafter.	–
	Remarks The obtained number for the first setting behaviour can be only a hint/information and not a forecast for practice with original materials. The first setting behaviour may not be so strong that the performance characteristics are no longer ensured.		
	Practice-relevance Retightening behaviour of the printing blankets, tone value increasing, doubling		
Technical properties, general			
Mechanical stability up to 60 °C		Determination of compressibility and the sizes of dimension before warming up and after cooling down from 60 °C. See compressibility See average thickness, width, length	
	Remarks With this parameter it is to be guaranteed that a printing blanket after warming up and cooling in the machine maintain its original compressibility and dimensions.		
	Practice-relevance See above average thickness and compressibility		

3.2.2 Further specifications (not in data sheet)

Parameters	Definition of terms/ Specifications	Testing method/Test device	Range of tolerances
General information			
Identification on reverse side of printing blanket: Manufacturer Printing blanket type Nominal thickness Batch number Week of manufacture			
Place of production coded in batch no.	on printing blanket: manufacture batch no. in production direction; converter batch no. across to the production direction		
Information about transport and storage: Temperature Humidity Storage Disposal			
	Remarks Instruction leaflet to transport and storage (see chapter 4), will be attached each delivery		
	Practice-relevance Notes for carriers, converters, customers		
Dimensions			
Width	Order drawing	Measure point drawing DIN 16621/ISO 12636	See Order drawing
	Remarks In delivery certificate or purchase order.		
Length	Order drawing	Measure point drawing DIN 16621/ISO 12636	See Order drawing
	Remarks In delivery certificate or purchase order.		

3.2.3 To clarify bilaterally

Parameters	Definition of terms/ Recommendations	Testing method/Test device	Range of tolerances
Technical properties, general			
Thickness change due to effect of liquids and after airing	Calcualtion in accordance with ISO 12636: $\Delta T_1 = (T_1\text{-}T_0)/T_0 \times 100\ \%$ $\Delta T_2 = (T_2\text{-}T_0)/T_0 \times 100\ \%$ with T_0 = Nominal thickness; T_1 = Thickness after influence; T_2 = Thickness after airing; ΔT = Thickness change	Are different from ISO 12636. That's why the specifications for the thickness change are recommendations of the working group.	–
Thickness change due to effect of ink	Part 1: Influence: $\Delta T_1 < 2\ \%$ Part 2: Airing: $\Delta T_2 < 2\ \%$	Part 1: Influence: 7 days with 50 °C Inspection surface/Diameter ≥ 30 mm Height of the substance which be applied ≥ 5 mm Part 2: Airing: After test end: Take out the sample of the test substance, cleaning the sample, determination of thickness 72 hours later	–
	Remarks It is important to reach the final value of the procedure. With machine start-up one guarantees (instruction manual).		
	Practice-relevance Plate abrasion, print out, embossing, piling, cleaning properties.		
Thickness change due to effect of washing agent	Part 1: Influence: $\Delta T_1 < 4\ \%$ Part 2: Airing: $\Delta T_2 < 3\ \%$	Part 1: Influence: 1 day with ambient temperature Inspection surface/Diameter ≥ 30 mm Height of the substance which be applied ≥ 15 mm Part 2: Airing: After test end: Take out the sample of the test substance, clean the sample, determination of thickness 72 hours later	–
	Remarks See Thickness change due to effect of ink.		
	Practice-relevance See Thickness change due to effect of ink.		

Parameters	Definition of terms/ Recommendations	Testing method/Test device	Range of tolerances
Thickness change due to the effect of fountain solution	Part 1: Influence: $\Delta T_1 < 2$ % Part 2: Airing: $\Delta T_2 < 2$ %	Part 1: Influence: 7 days with ambient temperature with 4 % solution; dipping process Part 2: Airing: After test end: Take out the sample of the test substance, cleaning the sample, determination of thickness 72 hours later	–
	Remarks See Thickness change due to effect of ink.		
	Practice-relevance See Thickness change due to effect of ink.		
Stability of glue to effect of fountain solution and of washing agent			
	Remarks E.g. used printing blankets could be tested by the printing blanket manufacturer; adhesive could be soaked and taken off in washing agent and fountain solution; a test with water does not give security		
	Practice-relevance Concerns bar.		

3.2.4 Characteristic is presupposed/To be ensured by manufacturers

Parameters	Definition of terms/ Specifications	Testing method/Test device	Range of tolerances
Dimensions			
Parallelism of cutting edges	Order drawing	Measure point drawing/ accordingly DIN 16621	See Order drawing
	Remarks Tolerances of the order drawing are closer than the standard.		
Angle between cutting edges	Order drawing	Measure point drawing/ in accordance with DIN 16621	See Order drawing
	Remarks Tolerances of the order drawing are closer than the standard.		
Mechanical properties, static			
Tensile strength	ISO 12636: > 40 N/mm for all printing blankets of thickness 1,68 mm or more	ISO 12636/Tensile strength tester	
	Practice-relevance Tensile strength had to be correct for the clamping system.		

Parameters	Definition of terms/ Specifications	Testing method/Test device	Range of tolerances
Pull-out strength of bar	> 40 N/mm from 20 °C to 60 °C	Tensile strength tester According to model check. Method: The cheeks, with which the printing blanket is held, are heated. The bar must withstand a certain force over a certain time.	
	Practice-relevance Tensile strength had to be correct for the clamping system		
Later expansion (Creep behaviour)	Later expansion should not occur.		
	Remarks Manufacturer internal test (R&D), where appropriate, higher level of importance		
	Practice-relevance Retightening behaviour of the printing blankets		
Bending strength		The manufacturers have appropriate testing methods.	
	Remarks Manufacturer internal test		
	Practice-relevance Clamping of the printing blankets		
Mechanical properties, dynamic			
Relaxation behaviour or Wrinkling behaviour			
	Remarks Manufacturer-internal tests		
	Practice-relevance Quality of print out, compensation of streaking printing, durability		
Technical properties, general			
Penetration behaviour of fabric to effect of fountain solution and of washing agent			
	Remarks Testing method of 3M Protective Chemical Products Division for water-rejecting fabrics. Test liquids (water wetting, oil wetting) are applied and determined whether they will penetrate in the fabric or not.		
	Practice-relevance It has influence on the equality of the printing blanket characteristics		
Technical properties during press run operation			
Increasing of print load due to cylinder rotation		True rolling tester	
	Remarks R&D manufacturer		
	Practice-relevance Durability of cylinder bearings		

3.2.5 Parameters not contained in the specification for various reasons

Parameters	Remarks	Practice-relevance
General information		
Week of delivery	Not so important	
Storage duration	Dropped	
Dimension		
Difference in thickness	Specification by indication of the average thickness not necessary.	Register accuracy
Parallelism of top/reverse sides	Specification because indication of the average thickness not necessary.	Examination of the flatness with the converted printing blanket in order to avoid distortion/waves and an nonuniform printing.
Technical properties, general		
Corrosion behaviour	Meaning with Nopack blankets, which are hardly supplied in Germany; dropped	
Wetting behaviour	No knowledge available on how to correlate the surface energy with the characteristics of the printing blanket. The edge angular measurement is not regarded as relevant for practice, because the printing blanket surface does not long remain clean. In addition the results depend strongly on the used method and the person carrying out the tests.	QR/adhesion, contrast, gloss solid tone, sharp contours
Durability	No claims because the durability is effected by many factors.	
Mechanical properties, static		
Microhardness top layer	For the printer, the indication of microhardnes provides no information. The microhardness gives information over the cross-linking degree of the surface layer. The printing blanket manufacturers use the microhardness as a quality parameter during manufacturing. - The shore hardness is indicated sometimes in brochures, as the manufacturer releases his mix via the shore hardness.	
Waist formation	Classification as in the specification not contained parameter, because the waist formation is located in practice not in the foreground and no testing method is present. Further observation.	
Mechanical properties, dynamic		
E-modulus/Loss factor (perpendicularly to the surface)		
	Remarks Postponement in favour of practice-oriented testing method/parameters	
	Practice-relevance Loss factor correlates with absorption ability and warming up of the printing blankets, optimisation in direction smallest enegy destruction	

Parameters	Remarks		Practice-relevance
Shear-modulus/Loss factor (tangential to the surface)			
	Remarks Postponement in favour of practice-oriented testing method/parameters		
	Practice-relevance Loss factor correlates with absorption ability and warming up of the printing blankets, optimisation in direction smallest enegy destruction		
Technical properties during press operation			
Lateral moving; change of gap-width after 20.000 copies	Lateral moving emerges in practice always times again. The problem is seen in the proximity of the waist formation. A testing method does not exist. Result: Parameter is to be observed further.		

3.2.6 Further investigations necessary

Parameters	Definition of terms/ Specifications	Testing method/Test device	Range of tolerances
Technical properties during press operation			
Transport characteristic		True rolling tester	
	Remarks Very important, comparison test carried out		
	Practice-relevance Paper web tension, register accuracy, ghosting, formation of wrinkles		
Powertrain torques		True rolling tester	
	Remarks	Very important	
	Practice-relevance	Heating up, current consumption	
Comparative true rolling study: Investigation of the transport characteristic			
Results:	Investigation of positive, neutral and negative transporting printing blankets from one batch on the true rolling tester of the printing blanket and printing machine manufacturers. With the different true rolling testers of the manufacturer an allocation of the printing blankets to positive, neutral or negative transporting is possible. The quality of the allocation is despite identical test conditions however different. It is not possible to make a really forecast to the promotion behaviour, because the investigated effects are in the per thousand and tenth range. To understand the differences in the results and to make an adjustment, the true rolling tester would have to be regarded in detail. A generally accepted characteristic value for the transport characteristic is at short notice not developable. The work will continue. The powertrain torques could not be investigated.		

④ Instruction leaflet for transport and storage of printing blankets

Temperature

- Storage at room temperature is recommended.
- Avoid extreme temperature fluctuations.

Humidity

- The storage should take place with a relative humidity < 85 %.
- Avoid extreme fluctuations of relative humidity.

Storage

- Printing blankets can be stored in their transportation tubes or boxes. It is preferable to position the containers vertically rather than horizontally.
- If the printing blankets are removed from transportation packaging they should be stored, face-to-face, on a flat surface.
- Printing blankets should be stored flat in stacks of ten or less.
- Do not expose printing blankets to sunlight or fluorescent or UV lights.
- Printing blankets must not be stored near sources of ozone, i.e. electric motors.
- A correct ventilation of the storage area is recommended.
- Stock rotation should be maintained to ensure the oldest printing blankets are used first. Under ideal storage conditions the maximum shelf life of a printing blanket is 12–24 months, longer storage periods will result in hardening of the printing blanket.

Disposal

- Disposal must be made according to local regulations.
- Check your local regulation/Contacting your authorities.