Forum Papier und Druck

Characteristic paper values –

Recommended characteristic paper values for communication within the value chain of paper – print

A joint initiative of VDMA and ZELLCHEMING

1. Preamble

1.1 Targets

The FORUM Papier und Druck is a joint initiative of the printing industry, manufacturers of machinery for printing and paper, the printing ink industry, companies of the paper industry and members of ZELLCHEMING, respectively.

This publication was prepared by the participants listed in the Annex.

The overall objective of the FORUM is to improve communication within the value chain – from the production of materials to print product finishing. This shall increase both the reliability of industrial production processes in printing and bookbinding companies and the competitiveness of print products.

Co-operation in the FORUM Papier und Druck is open to all interested parties.

Papermaking and printing are managed processes. Defined targets are controlled by means of derived target values within fixed variation tolerances. Papermakers take the needs of the market and the converting processes as an orientation for their technical specifications.

Stable industrial print production requires input parameters for the materials used (e.g. paper, printing ink, blanket). For paper, they can partly be taken from the targets set for papermaking.

Changes of the properties of paper which may occur as a result of the further development of paper or changes in raw materials shall be described by technical specifications. They may be related to look, haptics, printability and runnability as well as convertibility. In printing, the use of these specifications enables the optimization of paper selection and the design of the production process so that problems can be eliminated in advance. This helps to avoid complaints and can lead to reduced costs.

The interrelations between printing problems and paper properties are not always mono-causal. Some characteristics that are important for printing on different papers have not yet been defined by reproducible measurement methods. As a consequence, the converter has only inadequate parameters for the processing materials used in the printing process.

1.2 Benefits

With the involvement of suitable partners from industry, research, development and teaching, the FORUM Papier und Druck wishes to jointly

- define suitable uniform parameters and develop verified measuring processes
- make uniform and comprehensive parameters available to all interested parties
- strengthen communication with the users as well as build motivation and provide support for the use of these data

The benefits for printers and bookbinders include:

- information for a change in the specification of printing substrates
- increased knowledge of the parameters of the processes
- increased process reliability
- reduction of costs for rejects and complaints
- assurance of product quality
- efficient, standardized print production, and
- more background information for talks with customers (agencies)

Papermakers and paper merchants profit from:

- improved communication with the customer(s)
- a decreasing rate of complaints

image source: Heidelberger Druckmaschinen AG, Heidelberg

1.3 Implementation guidelines

Within separate working groups for sheetfed offset, heatset and gravure printing, the FORUM Papier und Druck has prepared process-specific lists of characteristic values. For these, there are generally accepted measuring methods. These characteristic values are given in this brochure and are recommended for publication.

For their implementation, the following guidelines, which are supported by all parties concerned, are applicable:

- The characteristic values are published on a voluntary basis.
- The exchange of information shall be simple and uniform.
- The characteristic values shall be published on the papermakers` websites (see Item 3).
- The published target values shall give the characteristics of the paper supplied and shall be relevant for prepress and print production.
- All concerned shall actively inform about the availability and correct use of the characteristic paper values.

1.4 Training

The active use of characteristic paper values in practice requires that experts be qualified. One important task of the FORUM, therefore, is to convey a high level of competence regarding characteristic paper values to the companies. This can be achieved by training specific target groups for characteristic paper values. The content of teaching shall comprise the significance of the characteristic values, their application and measurement methods.

In co-operation with the participating institutes, associations and companies, the FORUM will offer training courses for the following target groups:

- Experts and middle management staff of printing and papermaking companies (machine operators, foremen, heads of production, technicians, etc.)
- Paper purchasers
- Paper sellers
- Paper merchants

Information visits to the technical facilities of the partners lend themselves as a useful supplement to profound training. Printers visit papermaking companies, papermakers make a tour of the facilities of printing companies. The aim is to establish a dialogue for a better understanding of problems and shorter problem-solving times.

1.5 Further development

The inter-relationships between the characteristic paper and ink values and the printing process-related and paper run-related technical parameters at the printing press have proved to be very complex. In this respect, there is a need for research in order to determine relevant measuring values and methods.

The long-term aim is to establish cooperation between all parties with a share in the value chain of paper: the printing industry, machine manufacturers, the paper industry and their suppliers as well as their associations and institutions. With the intention to concertedly refine the printing process-related and reproducible technical specifications and to communicate the results.

To start with, the focus is on measuring values determined by both printers and papermakers. The parties concerned, however, partly draw on different measuring methods with non-correlating results. The measurement values concerned are:

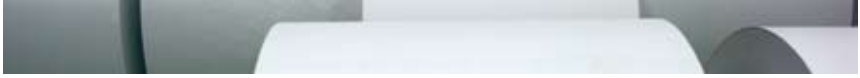
- gloss
- paper colour
- porosity
- roughness (topography), and
- ink drying properties

At the same time, measuring methods for properties, for which there is to date no measuring method that can efficiently be used in practice, need to be developed.
They include:

- volume resistivity
- half-time ($t_{1/2}$) of discharge
- moisture expansion
- surface resistivity
- resistance to picking
- rub resistance
- fold crack resistance
- dot gain (tonal value increase – TVI)
- mottling
- relative humidity
- pH value of the surface

New characteristic values will only be included as standard parameters if their measurement methods have been standardized. A prerequisite is that they supply reproducible results and are generally accepted.

Furthermore, the associations and all interest groups concerned will continue to take a stand for a European harmonization of the characteristic values.



1.6 Background

Small and medium-sized companies are nowadays often faced with the challenge to transform their traditional printshop to industrialized production. This requires more and more process automation and standardization. Printing houses must guarantee reliable, reproducible print quality – combined with an adequate use of resources and within tight deadlines and under competitive pressure.

There are various parameters that have an effect on print quality. Besides printing ink, they also include the substrate. As far as preparations for the production process are concerned, the information available to the printer and bookbinder has so far been inadequate.

This communication deficit has been increasingly recognized during recent years. This is the reason why, following the initiative of VDMA and ZELLCHEMING, the FORUM Papier und Druck – a body composed of experts from all industries concerned – was established in 2004. The publication of recommended characteristic paper values is a first milestone of their joint efforts.

Co-operation in the FORUM is open to all interested parties. The circle is expanding more and more, since preferably all parties participating in the value chain shall be involved.
The FORUM Papier und Druck meets at regular intervals and at present has three process-specific working groups dealing with the preparation of characteristic values and their measurement methods:

- Sheet-fed offset printing
- Heatset
- Gravure printing

For coldset, DIN 19306-4 “Technische Lieferbedingungen für Zeitungsdruckpapier” (Technical delivery standards for newsprint) constitutes a currently accepted system of characteristic paper values.

Image source: Voith Paper Holding GmbH & Co. KG, Heidenheim

2. Overview of characteristic paper values

During the first step, the following characteristic paper values, differentiated by the three printing methods, are recommended for general use:

2.1 Characteristic values for gravure printing papers

1. Production site
2. Paper grade
3. Paper grammage (ISO 536)
4. Specific volume (ISO 534)
5. Absolute moisture content (ISO 287)
6. Roughness/ smoothness PPS – S10 (DIN ISO 8791-4)
7. Gloss (ISO 8254-1)
8. Opacity (ISO 2471)
9. Paper colour CIE L*,a*,b* D65/10° (ISO 5631-2)
10. Tensile strength (ISO 1924-2)
11. Strain at break (ISO 1924-2)

2.2 Characteristic values for heatset printing papers

1. Production site
2. Paper grade
3. Grammage (ISO 536)
4. Paper thickness (ISO 534)
5. Specific volume (ISO 534)
6. Absolute moisture content (ISO 287)
7. Roughness/ smoothness:
   Coated paper:
   PPS-S10 (ISO 8791-4)
   Uncoated paper:
   Bendtsen (ISO 8791-2)
8. Gloss (ISO 8254-1+2)
9. Opacity (ISO 2471)
10. Brightness (ISO 2470-2)
11. Paper colour:
    CIE L*, a*, b* D50/2° (including details re measuring device and measuring conditions) and D65/10° (ISO 5631-2)

2.3 Characteristic values for cut-size papers/sheetfed offset printing

1. Paper grade
2. Grammage (ISO 536)
3. Paper thickness (ISO 534)
4. Absolute moisture content (ISO 287)
5. Roughness/ smoothness:
   Coated paper:
   PPS-S10 (ISO 8791-4)
   Uncoated paper:
   Bendtsen (ISO 8791-2)
6. Opacity ISO 2471
7. Gloss (ISO 8254-1)
8. Brightness (ISO 2470-2)
9. Paper colour:
   CIE L*, a*, b* D50/2° (incl. details re measuring device and measuring conditions) and D65/10° (ISO 5631-2)
10. Bending stiffness (DIN 53121)

3. Links to the technical specifications of the paper manufacturers

Grupo Portucel Soporcel, Setubal (PT)	www.soporset.com
Soporcel Deutschland GmbH, Köln	www.inaset-paper.com
Kübler & Niethammer Papierfabrik Kriebstein AG	www.k-n-paper.de/prod_spez.html
Leipa Georg Leinfelder GmbH, Schwedt	www.leipa.de
M-real Zanders GmbH, Bergisch Gladbach	www.m-real.com
Myllykoski, Unterschleißheim	www.myllykoski.com
Sappi Fine Paper Europe, Brussels	www.sappi.com
Stora Enso, Düsseldorf	www.storaenso.com
UPM Kymmene Sales GmbH, Hamburg	www.upm-kymmene.com

Annex

This publication was prepared in co-operation with the following companies, associations and institutes

Flint Group Germany GmbH	Stuttgart
Grupo Portucel Soporcel	Setubal (Portugal)
Heidelberger Druckmaschinen AG	Heidelberg
Koenig & Bauer AG	Radebeul
Kübler & Niethammer Papierfabrik Kriebstein AG	Kriebstein
Leipa Georg Leinfelder GmbH	Schwedt (Stadt)
manroland AG	Offenbach
M-real Zanders GmbH	Bergisch Gladbach
Myllykoski	Unterschleißheim
Norske Skog Walsum GmbH	Duisburg
Omya International AG	Oftringen (Switzerland)
Sappi Fine Paper Europe	Brussels (Belgium)
Soporcel Deutschland GmbH	Köln
Stora Enso	Düsseldorf
UPM Kymmene Sales GmbH	Hamburg
Voith Paper Holding GmbH & Co. KG	Heidenheim

Fachgruppe Druckfarben im Verband der deutschen Lack- und Druckfarbenindustrie e.V.	Frankfurt
PMV Fachgebiet Papierfabrikation der TU Darmstadt	Darmstadt
PTS Papiertechnische Stiftung	München/Heidenau
SID Sächsisches Institut für die Druckindustrie	Leipzig
VDMA Verband deutscher Maschinen- und Anlagenbau	Frankfurt
vdp Verband Deutscher Papierfabriken e.V.	Bonn
ZELLCHEMING Verein der Zellstoff- und Papierchemiker und -Ingenieure e.V.	Darmstadt

Image source: Voith Paper Holding GmbH & Co. KG, Heidenheim

Image source of front and back cover page: manroland AG, Offenbach

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