

A - Z o f P A P E R

Interesting Facts on Paper



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A

Absorption performance

The absorption performance of papers describes their ability to absorb a liquid on a defined area of paper within a defined time. The absorption performance is highly influenced by the raw material chosen as well as the beating of the pulp.

Acid free

→Neutral sizing

Additives

A large number of organic and mineral additives (e.g. size, glue) and →fillers (e.g. kaolin, chalk) as well as →dye stuffs. They are necessary to give each →paper the required properties.

Ageing resistance

All paper is subjected to an aging process. This involves a loss of use-value or performance, in the case of paper this can affect its strength, surface and colour. A very long life can be achieved by using appropriate raw materials and additives. All Hahnemühle papers and cardboards correspond to the highest →Life class, i.e. they retain their use-value for several hundred years.

(→Neutral sizing, →pH value, →Calcium carbonate, →Buffer)

Non-aging properties

Alpha cellulose

Almost 90% of →wood cellulose (wood pulp) consists of alpha cellulose, and it accounts for almost 99% of →Linters. Alpha cellulose is a so-called polysaccharide (multiple sugars bonded together), whose molecule is made up of numerous individual building blocks held together in a chain. The other constituents of wood cellulose are →Lignin and short-chained →Cellulose (so-called hemicelluloses).

Alum

Aluminium sulphate, which papermakers incorrectly call alum, used to be used to precipitate and fix the resin size (resin adhesive). Alums are complex salts, which are rarely used

in paper production. Today all Hahnemühle papers and cardboards are produced without alum.

AOX

The term AOX refers to organic chlorine compounds, which are dissolved in →water, and after an appropriate test method can be absorbed into activated carbon. The organic chlorine compounds are created by pulp bleaching with elementary chlorine or are introduced to the paper by additives, e.g. →wet strength agent. Hahnemühle uses →TCF or “totally chlorine free bleached” →pulp (cellulose).

Archive board

An →acid free / →stock sized →unbleached board, which is especially suitable for preserving extremely valuable museum and archive pieces. Hahnemühle produces all kinds of different archive boards.

Art printing techniques

A brief overview of traditional art printing techniques is given on page 23 onwards of this brochure.

Artists proof

Artists proofs (AP), as well as printers' proofs (PP), are absolutely identical with the prints of the regular edition. The number of artists' proofs traditionally lies at maximum 10% of the edition – it is mostly higher (1 to 3 copies) in the case of digital FineArt editions, which are often only produced in small quantities of up to 7 copies. Artists' proofs are normally consecutively numbered in Roman numerals.

Ash content

Apart from the pulp of its organic constituents, paper consists of so-called →fillers. The proportion of these fillers can be determined by burning (incinerating) the paper.

B

Backing board

Spacer between album sheets and as inside of the spine of a book. Hahnemühle backing board is dyed white, is soft and the →surface is →felt marked.

Basis weight

Grammage per square metre (gsm). Depending on the paper machine used, Hahnemühle produces its papers and boards in basis weights between 80 gsm and 450 gsm.

Beater

Trough shaped mill work with fixed blades and rotating rag engine cylinder developed by the Dutch in the 17th century for preparing (crush, cut) fibres for paper. Depending on the setting of the blades, the fibres are beaten (refined) in a different way: depending on the intended use in “free (fast draining) beating” or “wet beating”, in short or long. This is decisive for the character of the paper.

Black papers

Hahnemühle produces black papers and boards both using the →cylinder mould paper machine as well as the →Fourdrinier paper machine. These are dyed with soot and black dyes. These papers are also →neutral sized and →non-ageing. A high degree of →lightfastness is achieved. The black papers and boards are particularly popular as the base for white and light, brilliant prints.

Blotting board

Hahnemühle keeps unsized, very absorbent board with various →basis weights in stock. These can be used, among other things, for drying as an intermediate layer between art papers or for absorbing liquids.

Board

Generic term for various grades and qualities of papers, which have a →basis weight of approx. 130 gsm and 600 gsm and thus lie between →papers and cardboard with respect to

weight. A brief overview of different grades of paper and board is given on page 30 onwards of this brochure.

Bonding lines

→ribbed

Book end paper

The high quality book end papers produced by Hahnemühle on the Fourdrinier are →neutral sized and →non-ageing. The name book end paper comes from the fact that this paper is used as the first cover sheet in a book, between the cover and the title page. The surface is mostly ribbed. Hahnemühle book end paper qualities are available under the name “Natural Line” in various designs. Apart from their original purpose, these papers can also be used as text papers as well as for prints and drawings.

Breaking length

The highest load paper can withstand before it tears.

Buffer effect

Without exception, all →neutrally sized, →non-aging Hahnemühle papers and boards are buffered with approx. 4 % →calcium carbonate. The buffer effect serves to provide high →permanence and as a defence against harmful environmental effects. Acidic contaminants in the air are neutralised by the dissolved chalk and further chalks can dissolve, which ensures that the pH value remains approx. 8 (→Frankfurter Requirements, →pH value).

Bugra

Mould-made paper, which is only produced by Hahnemühle. The coarse →ribbing, which lends the paper a pleasantly rough →surface is characteristic. It is available with a →basis weight of 130 gsm and in 22 different colours and is used for various printing techniques, book bindings, artistic applications and for →lining (laminating). The “Bugra” quality has been produced by Hahnemühle for over 70 years and was named after the “BUGRA”

book and graphic trade fair ("BUch- und GRAfikmesse"), which was held in 1928 in Leipzig.

C

Calcium carbonate

Filler in →neutrally sized papers and boards, which is also called "Parisian chalk". As calcium carbonate neutralises acids, it is used in paper as an acid-binding →buffer and forms the main building block for the →ageing resistance. All Hahnemühle papers and boards are buffered against external harmful substances acting on the paper with at least 4% calcium carbonate in accordance with →DIN 6738 and →ISO 9706.

Calendar

Several steel roll lying on top of each other and hard, but more elastic paper rolls. These two types of rolls are alternated, however two paper rolls meet at a point. When the paper web passes through the rolls →friction occurs between the soft and hard roll. This, as well as the pressure of the roll produce the →smoothness on papers (→calendaring).

Calendering

All unlaminated Hahnemühle papers and boards can be subsequently given a calendering finish in sheets.

Calliper

Hahnemühle mostly produces its papers and boards according to →basis weight. For special grades or at the request of the customer, papers and boards are also produced according to calliper (thickness). The calliper of a paper or board is determined using a micrometer sensor (thickness gauge) at a certain pressure load (e.g. 1 kg/cm²).

Cellulose

Cellulose is the most frequently, naturally occurring, organic compound. The cell walls of plants are made from this pulp (fibrous sub-

stance). In wood, cellulose is bonded with →lignin and the other constituents of the cell wall.

Certificate

Confirmation from Hahnemühle's the works and production managers of fulfilment of the standards →DIN 6738 (→Frankfurter Requirements) and →ISO 9706.

Circa format

The format of all mould-made papers and boards, which have a real or torn →deckle edge must always be given as a circa (approximate) format. Precise formats with exact →square cuts can be cut from these circa formats, however the decorative deckle edge is lost as a result. This is especially true if →mould-made papers are used as →laminating or lining papers.

CMYK

= Cyan, Magenta, Yellow and Key (Black). Colour printing is based on the CMYK colour space. Cyan, magenta, yellow and black inks are mixed on the paper, to produce a certain colour. The composition of the elementary colours cyan, magenta, yellow and black differs in Europe (Euroscale), the USA (SWOP) and Japan.

Cobb value

The absorption of water on one side of a sheet of paper within a given time (mostly 1 minute or even 10 minutes) is called the Cobb value. It depends on the sizing and the →degree of beating condition (freeness value) of the paper.

Cold extraction

→pH value

Colour Management

Colour management ensures the colour fidelity of the presentation graphic input devices (scanners, digital cameras), monitors and printers. This system matches the various colour rendition capabilities of the individual devices with each other. The devices are measured using so-called IT8 targets (colour pattern for transmitted and incidental light).

Colour series (gamut, gamut mapping)

The colour series, also called the gamut, is a range of colours a certain device can produce. "Gamut mapping" means that the colours which, e.g. can be supplied by a scanner, must be redefined so that when output on a device with less colours the overall impression of the image is retained.

Colours

Hahnemühle offers an extensive and up-to-date range of colours suitable for ally requirements.

Any special wishes of customers can be taken into consideration, whereby suitable colour samples have to be submitted to our colour laboratory for rematching.

Cotton

Instead of the →rags previously used, nowadays it is mostly cotton which is added to paper in the form of →linters.

Crease resistance

→Neutrally sized and →non-aging Hahnemühle boards can be furnished with a groove or crease due to their →suppleness and are then used to produce →archive boxes.

Cross cutter

Are used to cut paper webs with previously determined into →sheets. Here the paper webs run in one or several layers on top of each other through a fly cutter, which is precisely set to the required size.

Cut edges

The papers produced by Hahnemühle in →machine made rolls are furnished with 4-sided cut edges using a →cross cutter.

Cylinder mould paper machine

Hahnemühle produces its complete range of →mould-made papers and boards on its cylinder mould paper machine. The sheets are formed on a rotating cylinder mould. The circumference of the cylinder mould determines the size of the →format to be produced (with 4-sides, real →deckle edges). The required sheet format is achieved by dividing up the cylinder

using gutters, and by the winding on at the sides of the cylinder mould. A further characteristic of cylinder mould paper machine is that the paper web tears or breaks under varying feed speeds at the predetermined break lines (= gutters) and so the real →deckle edge results. Cylinder moulds can be covered with a →ribbed or →vellum wire.

D**Deckle edged paper**

→Hand-made paper →mould-made paper

Deckle edges, real

Real deckle edges can only be produced on the →cylinder paper machine or in →hand-made paper. Where the →cylinder paper machine is used, 4-sided, real deckle edges are produced during the sheet production. Varying operating speeds cause the initially still continuous paper web to be ripped apart at previously determined positions (see also →watermark) between the →wet end and the →dry end. This creates two real deckle edges. The two remaining real deckle edges form directly due to the lateral limits on the →cylinder. During roll production only two deckle edges form due to the lateral limits on the →cylinder. Following production the →machine-made rolls are cut by the →cross cutter to →form sheet paper (formatted goods). Formats, which do not fit the paper machine can also be supplied with a →torn (broken) edge.

Deed paper, loan paper

Used to prepare durable documents and certificates. Hahnemühle mould-made papers produced using a special method, which usually contain →linters as their most important raw material fraction.

Degree of beating

The beating causes the fibres to change their shape. I.e. the fibre length reduces and fibrils are produced on the wall of the fibre. One of the properties of pulp, which is dependent on

the beating, is the dewatering (draining) performance. The dewatering of pulp takes longer with increasing beating.

Degree of sizing

Proportion, with which the paper is hindered from absorbing water by adding sizing agents.

Diavography

Diavographie is a new printing process based on the combination of the digital colour printer with a special print carrier. The printing copy can be produced by any image, slide or CD-ROM. Electrostatic colour transfer can then be used to produce true colour and sharp contoured prints. Hahnemühle has developed a special diavography board for this technique.

Digital FineArt (DFA)

The term DFA stands for the reproduction of images using state of the art digital technology. Most attention is paid in using InkJet technology for producing limited art editions, giclées (formerly iris prints), digital image creations, picture restoration and photo print-out. The advantage of this technique lies in the authenticity of the original and reproduction and the associated high flexibility due to the use of "print on demand". No more concessions have to be made with respect to intensive, brilliant colours, high print resolution. In order to guarantee a distinctive print image, only coated →InkJet papers with an individual surface and structure should be used, which do not permit any compromises in the heat and originality of an art paper. Hahnemühle's Digital FineArt Collection is made from uncoated paper to which a special coat is then applied, and has outstanding properties including high ink absorption, excellent ink brilliance and very good lightfastness, which satisfy even the highest standards.

Digital Print

A printout, which is produced on an InkJet printer by a digital file on the computer. See →Giclée.

Dimensional stability

Size accuracy of Hahnemühle papers and boards, which may only change within the specified tolerances, even under the effects of →moisture.

DIN 6738 (DIN 6738)

→Life (durability) class (LDK)

Document paper

→Deed paper

Double folds

It is important that papers which are frequently subjected to all kinds of different folds during daily use or further processing, do not tear or break as a result. The double fold is a measurement for the durability of papers and boards under continuous loads.

DPI

The dots per inch of an image are a measure of its resolution. The dpi-value of a given device (e.g. scanner, printer) defines its resolution capacity. Very clear and sharp images require input/output devices with a very high resolution (around 300 dpi or more). Monitor resolutions usually lie between 72 and 100 dpi. The quality of an image therefore depends on its resolution. The more dots per inch, the higher the resolution and therefore the better the quality of the image.

Drawing papers

Hahnemühle →Ingres and →Bugra mould-made papers are eminently suited for painting with chalk, red ochre and other crayons. Artistic drawings are also possible on our Fourdrinier boards, e.g. even on the →mounting board.

Dry end

This part of the paper machine follows the →wet end. The continuous paper web (→Fourdrinier paper machine) or the paper sheet (→cylinder paper machine) is passed around several heated rolls with the aid of felts. This removes the →water from →paper and consolidates it.

Durability class, life class (LDK)

According to →DIN 6738 the life (durability) of paper and board is classified under many years' storage in non-air conditioned rooms. All Hahnemühle papers and boards can be called →non-ageing, as according present day knowledge and when treated and stored carefully they have a life or durability which meets even the highest requirements.

Dye stuffs

Substances, which through chemical compounds or by simple deposit, individually or in a mixture, lend the paper the required →colour. We make a difference between substantive, acidic and basic (alkali) dyes, which react by combining with the →wood pulp, but are not lightfast. High →lightfastness is achieved by colour pigments and earth colours, which lodge between the pulp cells. Both dye groups are used for Hahnemühle papers and boards, depending on the requirements.

E**ECF**

Elementary chlorine free / →chlorine free

Edge of tearing

Some special customer wishes require so-called "copy formats" or "use formats" for Hahnemühle mould-made papers, i.e. existing original sheets are skilfully torn by hand on 4 sides to the required use size. As in the real deckle edge, the torn edge format is also given as a →circa format. The torn edge is also called a rough edge.

Edge waviness

Hahnemühle mould-made papers primarily have a real →deckle edge. Due to the production method used, →mould-made papers tend to have a slight edge waviness, which cannot be completely precluded.

Egoutteur

Also called a "dandy roll", a wire covered cylinder, which is used in the wire section to even out the surface of the paper. The egoutteur can

be equipped with a →vellum wire or →vergé (laid paper) wire. The ripped cover creates the ribbed paper. A special egoutteur with watermark (= watermark roll) is required to produce a continuous →watermark. This is also attached to the Fourdrinier to give the paper the required raised areas and impressions (e.g. watermark, pattern, etc.).

The required mark is pressed into the wet, still mouldable paper web, and afterwards can be recognised as ribbing or an egoutteur watermark in the finished paper.

Embossing

Hahnemühle papers and boards are particularly suitable for embossing due to their open →surface structure and →suppleness. The paper web is embossed by passing it through an engraved steel roll pressed onto a so-called paper roll under the effect of temperature.

Etching Board for copperplate printing

Hahnemühle mould-made board for copperplate printing is produced in sheets on a →cylinder paper machine with real →deckle edges – and sometimes on rolls. These boards produced with pure spring water and are →acid-free and →non-ageing to DIN 6738 and →ISO 9706. Their outstanding qualities are their high →volume and →suppleness. The matt, velvety soft, whose →surface appears to be alive enable especially effective prints to be realised.

F**Felt marking**

Marking of the felt texture of the paper machine on the →surface of the paper.

Felt side

Due to the fabrication process, each paper produced by Hahnemühle has a felt side and a →wire side. In Hahnemühle mould-made papers and boards produced by the →cylinder mould paper machine, the →wire side is called the top side. The felt side, which is called the underside, is more highly structured. Both sides are touched by wet and dryer felts. On the

other hand, in Hahnemühle papers produced by the →Fourdrinier paper machine, the felt side is called the top side and the →wire side the underside.

Felts

Specially woven cloths. They guide the paper web to dewatering through the press section of the paper machine and then through the →dry end too, whereby the felts press the moist paper web against the steam heated drying cylinder. The woven structures, partly still produced in wool qualities, are transferred on to the paper web where they are called “felt marking”.

Fillers

→Additives for paper production. They fill out the gaps between the paper fibres, improve the →opacity, the printability and also the →smoothness of a paper. The fillers are mostly floated in →water and added to the →pulp in the mixing mould. Fillers are usually mineral substances, such as →kaolin or →calcium carbonate.

Filter(ing) paper

Hahnemühle papers and boards used for filtration, which are very permeable and absorbent, because they are unsized. These papers and boards are produced on the →Fourdrinier paper machine and with special care and are sold via →Schleicher & Schuell MicroScience.

Finely ribbed

The number of ribbing lines per centimetre determines the type of ribbing. The finely ribbed Hahnemühle papers have 8 to 9 ribbing lines per centimetre (→Ingres). However, if there are only 6 ribbing lines per centimetre the paper is called →coarsely ribbed papers (→Bugra).

Flexibility

Outstanding property of Hahnemühle, in order to quickly and precisely meet diverse customer wishes. Important flexibility standards include service level (readiness for delivery), the low →minimum production quantities and the

personal service provided by Hahnemühle, especially when it comes to customers' special wishes.

Format

Dimensions of a →sheet taking into consideration the length and width. The →cylinder mould paper machine produces →circa (approximate) formats for 4-sided buckle edges. These depend on the circumference and the →machine (web) width of the cylinder mould. The formats of paper produced on a roll/reel match the cut or uncut machine width of up to 126 cm. Paper produced on the Fourdrinier paper machine have formats suitable for the cut →machine width of up to 128 cm.

Fourdrinier paper machine

Hahnemühle has a Fourdrinier paper machine with a →machine width of 128 cm. The head-box directly follows the long stretched-out wire. This is where the actual paper sheet is formed. By rising up through the fibre suspension and under lateral shaking the resulting paper web is dewatered in a certain look-through, supported by continuous, rotating drainage elements. The paper formed on the look-through is then pressed and dried.

Frankfurt Requirements

Results of a symposium held by the Deutsche Bibliothek (German National Library) and the Gesellschaft für das Buch (Book Society) on 14. February 1990 on the use of →persistent papers for the production of books. All Hahnemühle papers and boards fulfil the Frankfurt Requirements.

Friction

Both in the →calender as well as in the →sheet decurler, short-term friction (slippage) occurs when the paper web is fed through the smoothing rolls in a very small space, and contributes to the smoothing of the paper along with the pressure of the rolls.

Front (face) side

The back side (perfecting side) and front (face) side are opposites. They correspond to the terms →wire side →felt side used by paper manufacturers

Full stock sizing

→sizing

G**Giclée prints**

Comes from the French word gicler=spray. The giclée print is a high quality "→Digital FineArt" printing process, which was developed in America by Iris at the end of the nineteen eighties. In this Iris printing process, called "giclée", a cylinder with the stretched over it rotates with a high speed. At the same time, tiny drops of ink are applied, some of which are smaller than a tenth of the diameter of a human hair. Giclée prints are so good, that even the experts often have problems telling the difference between the print and the original artwork.

Glazing rolls

Several heatable steel rolls, which are part of the →Fourdrinier paper machine, and are located at the end of the →dry end. The paper web runs through these rolls and acquires various stages of smoothness depending on the paper quality and the required →smoothness. Hahnemühle can produce →surfaces with various stages of smoothness on the Fourdrinier paper machine. Hahnemühle papers and boards, which do not have this smoothness are called →machine finished (paper) or machine glazed (board).

Grammage

→basis weight

Grain

Hahnemühle cylinder and Fourdrinier products have a certain grain depending on the production method, i.e. the cellulose (pulp) fibres are primarily oriented lengthwise (grain). The grain must be given for formatted papers

and is expressed either as →long grain (SB / cut lengthwise) or →short grain (BB / cut crosswise).

Guillotine

The function of the guillotine is to make a so-called face cut in a stack of sheet formats. I.e. the paper sheets are cut to their final format, for example four-sided right-angled sides.

H**Hammer finish**

If needed, all Hahnemühle boards can be retrospectively furnished with a hammered →surface structure with the aid of an →embossing roll.

Hand-made paper, mould-made paper

The original way to make paper, which was invented in China around 2000 years ago. The fibres were scooped out of the fibre pulp using a frame covered with a wire (screen), the frame was then shaken until the fibres were evenly distributed over the wire, removed from the wire (couched) and then dried. Hand-made papers do not have any →grain and represent the most uniform form of →intermatting.

Hardness

The hardness (softness) is identical with the so-called "compressibility" under the effect of pressure perpendicular to the →surface of the paper. However, experts can assess the hardness of paper from its sound, which occurs when they move the paper in their hand. Printing papers are often hard, which makes the printing process easier. →Mould-made papers and boards on the other hand are mostly softer due to the raw materials used.

Headbox / Pulp arrival

An important part of the →Fourdrinier paper machine. It uniformly feeds the respective correct quantity of pulp for the defined paper thicknesses into the continuous wire and over the whole width of the machine.

Hemicellulose

→Cellulose

High matt machine finish

→glazing rolls →surface

Hot embossing

The pigment layer, metallic or coloured is applied to the surface of the paper with a heated metal stamp, which can be designed as an area, characters or a motif. Hahnemühle →uncoated papers and boards are eminently suited for this. Very attractive relief effects can be achieved with most Hahnemühle →mould-made papers and boards due to their →suppleness and the →voluminosity (bulk).

Hot extraction

→pH value

Hygroexpansivity

Depending on the →pulp quality, →degree of beating and →additives, under different humidity conditions, corresponding hygroexpansivities result, which have to vary within specified tolerances, in order to obtain an appropriate register precision (accuracy of fit), e.g. during printing processes (→dimensional stability).

I/J

Ingres

High quality, fine drawing paper named after the French artist, Jean Auguste Dominique Ingres, (1780 to 1867), which Hahnemühle produces on its →cylinder-mould paper machine as mould-made Ingres paper. It is available →laid (vergé), →fully stock-sized, with four-sided real →deckle edges and the “rooster” watermark in 21 →colours.

InkJet paper

An important factor for high print quality is the use of special coated papers, InkJet papers. These papers are “upgraded” or “converted” with additional surface layers. These layers act as absorption and reception layers for the ink drops. The coloured pigments are fixed on the

surface and bound, i.e. they do not penetrate into the lower layers. As a result, high-resolution, true colour print results with high ink brilliance and faster drying can be achieved. The high absorption capacity of these layers prevents the inks or colours from blurring and running into each other and thus ensures printouts with high edge definition. A further characteristic is the protection of the printouts from moisture. In uncoated papers the absorbency properties of the fibre →cellulose (pulp) cause bleeding edges, the inks blot and the colours fade.

InkJet print

This printing technique is primarily used with computers and nowadays is the most frequently used printout facility used in private homes as well as most offices.

Intermatting

Degree of orientation of the fibres during paper production (→headbox – wire). While intermatting in a Fourdrinier machine is primarily spread in the lengthwise, the “slow” running cylinder paper machine enables almost uniform intermatting in the lengthwise and cross direction.

Internal (beater) sizing

The gluing substance required in the mass, i.e. the →pulp, to achieve a certain sizing is added before the paper machine. This guarantees uniform and complete sizing of all the fibres (→full stock sizing).

Iris

An InkJet printer, which was the first capable of reproducing works of art on FineArt papers.

ISO 9706

Paper, which has a high degree of permanency, and simultaneously displays no or only slight changes in the properties, which have an influence on legibility and handleability if it is stored for a long period in a protected environment. Hahnemühle papers fulfil the requirements of DIN ISO 9706:1995 for age resistant paper for records and print products.

IT8

Also called the colour reference copy. This is an standardised industrial aid for calibrating and characterising the colour properties of input and output devices.

Jumbo reel

All papers and boards made by Hahnemühle on the Fourdrinier paper machine are produced as rolls (reels). Hahnemühle →mould-made papers can also be produced on rolls using the →cylinder mould paper machine. The rolls are further processed on the →cross cutter to form sheets.

K**Kaolin**

Used in paper production as a →filler and coating pigment. An aluminium silicate, which results as a decomposition product of minerals containing clay (mainly feldspar).

L**Laid (water) lines**

→ribbed

Large format printing (LFP)

LFP is large format printing using digital print systems, e.g. Hahnemühle uses InkJet systems with widths of 24" (0.61m) to 44" (1.118m). The print media can be processed in roll format or as large sheets.

Lightfastness

All coloured Hahnemühle papers and boards are made lightfast. The lightfastness is tested using the action of strong light; because the UV fraction of daylight has a particularly harmful effect on the →dyestuffs in paper. The lightfastness results from a comparison with a simultaneously exposed, dyed →wool scale (scale values of 1-8).

Lignin

Lignin is a substance contained in wood, along with →cellulose and other constituents. It provides additional stiffening of the fibres. In high quality papers it is an undesirable →additive, which makes the paper yellow quickly. Therefore, it is mostly separated out of the →cellulose (pulp) during the →cellulose extraction process.

Lining / Laminating

The gluing together of several sheets or webs of paper is called laminating or lining. A basic differentiation is made between roll laminating (web laminating) and sheet laminating (lining). In roll laminating, several paper webs are fed together in parallel to form a paper web and are glued (sized). A downstream cutter cuts the continuous paper web to defined →formats. In paper laminating, several already pre-cut individual sheets are put together and glued. Laminated sheets are used, among other things as →mountings in framing and in museums for archiving purposes.

Linters

Short fibres in cotton seeds. These represent a valuable replacement for →rags and satisfy particularly high standards for art papers and →document papers.

Lithography board

Hahnemühle mould-made lithography board is produced on a →cylinder paper machine with real →deckle edges, partly in sheets and partly in rolls. This board, produced with pure spring water is →acid free and →non-ageing and its outstanding qualities are its high →volume and its →suppleness. The smooth and hard →surface enables particularly effective prints to be realised.

Long grain

The paper's →grain is due to the orientation of the fibres in a lengthwise and cross direction during the →sheet formation both on the →cylinder paper machine as well as on the →Fourdrinier paper machine. If the narrower side of the cut paper runs perpendicular to the grain of the continuously produced paper

web, the grain is called the long grain. Vice-versa, if the wide side of the cut paper sheet runs perpendicular to the grain of the continuously produced paper web, it is called →short grain.

Low-chlorine (elementary chlorine free) /chlorine free

After being produced by boiling, wood pulps (celluloses) are still brown due to their residual →lignin content and are bleached. The chemicals used for this often contain chlorine and among other things, elementary chlorine is used. During this process, organic chlorine compounds are produced. If the proportion of this quantity of chlorine compounds, grouped together as →AOX, is less than 0.2 kg per tonne →wood pulp, the pulp is called totally chlorine free (→TCF) bleached pulp. If the proportion is higher, but still less than 0.8 kg per tonne, these pulps are called elementary chlorine free (→ECF) bleached pulp. For environmental protection reasons, the bleaching is increasingly carried out without chlorine, especially for →sulphite pulp. For this reason, Hahnemühle uses totally chlorine free bleached pulps to a technologically justifiable extent, however for production reasons it also has to use elementary chlorine free pulps in its recipes.

M

Machine finished

→glazing rolls →surface

Minimum production quantity

In order to guarantee economic production, a minimum quantity has to be produced for each grade. Hahnemühle's particular →flexibility is due to its very small production quantities compared to other paper factories. →mould-made papers can be made as a →special production from quantities as small as 1,200 kg, at least 2,000 kg are necessary for Fourdrinier papers and boards.

Moisture

Paper reacts to moisture influences in such a way that it swells when the moisture increases and shrinks when the moisture reduces. This reaction mostly takes place in a range between 0 and 10 % moisture, whereby the greatest lengthwise growth in paper is to be expected between 0 and 6 % moisture.

Moisture content

Proportion of →water in paper. This is measured in absolute percent, i.e. relative to the quantity of paper or relatively, in which case the humidity of the air between the sheets in the stack is measured. The relative moisture in paper depends on the ambient or room temperature and on the composition of the paper or board with, in certain circumstances, the same absolute moisture. All Hahnemühle's Fourdrinier papers are moistened so that they have a relative moisture of approx. 50%.

Mould-made

The term "mould-made" may only be used for 1. handmade papers and 2. papers produced on the cylinder mould paper machine (also called mould paper). Because only with these production methods is the →deckle edge organically formed with the paper sheet, and only these papers and boards are highly qualified fine papers.

As a traditional mould-made paper factory, Hahnemühle guarantees its customers that they are buying "mould-made".

Mounting board

Pulp board, which is used as a frame and/or backing for artistic exhibits, and is often also placed behind glass. Hahnemühle mounting board is kept in stock in two →basis weights (300 gsm and 400 gsm). It is →wood free, →neutral sized and →non-ageing and is available in →lightfast →colours. Very decorative effects can be achieved by →oblique edge and →creasing by →laminating Hahnemühle mounting board in different colours.

Museum board

→Neutral sized and →non-aging Hahnemühle museum board is used for storing valuable exhibits and is also used to produce archiving boxes. Furthermore, museum board is also very good for →mounting board purposes, because due to its softness it is excellently suited for the →oblique edge. Furthermore, the oblique edge is lightfast, so that the decorative effects are retained for decades. Hahnemühle museum boards are kept in stock in two →callipers or thicknesses (1.3 and 1.8 mm). Callipers up to approx. 3.6 mm can be laminated as →special production.

N

Natural felts

→felts

Neutral sizing

All →non-ageing Hahnemühle papers and boards are neutral sized and thus acid-free. The sizing effect is achieved in the →pH-range above 8.0 by adding synthetic sizes to the →mass (pulp). Adding →calcium carbonate (chalk) achieves a lasting alkali setting, which is prerequisite for a long →durability (life).

O

Oblique edge

Oblique edges are frequently used for mounting manufacture or design. Instead of the cutting edge being parallel to the format cut, it is placed at an angle of 45°. This makes the inner layers of the mountings visible. This cut is particularly effective in multi-layered boards made from different types of coloured base papers.

Opacity

is the technical word for the non-transparency of paper. This property is above all important graphic papers, which e.g. are to be printed on both sides.

Operating speed

The operating speed of paper machines is given in metres per minute. →Modern Fourdrinier paper machines, which e.g. produce copy papers, operate with a speed of up to 1400 metres per minute. Hahnemühle's paper machines are run at much speed lower speed due to the high quality requirements. Depending on the grade and →basis weight of the paper, Hahnemühle's →Fourdrinier paper machine produces 10 to 110 metres per minute. The →cylinder paper machine, on which "mould-made" papers are made, "only" works with a speed of 8 to 15 metres per minute.

P

Paper

is the collective term for products made from mechanically or chemically stripped plant fibres, which matt together in aqueous suspension and – with the addition of additives such as →fillers, →colorants or size – are processed to form sheets. A brief overview of different grades of papers and boards is given on page 30 of this brochure onwards.

Peroxide

Peroxide is a chemical, which was previously used as a bleaching agent for the oxidative bleaching of wood pulp. Today, hydrogen peroxide or sodium peroxide are almost always used as alternatives for bleaching wood pulp.

pH value

The pH value scale ranges from 1-14, whereby the neutral pint is 7. All values below 7 mean acidic and above 7 alkali reaction. All →neutrally sized and →non-aging Hahnemühle papers and boards have a pH value of approx. 8.0 (→Frankfurter Requirements, →Certificate). Depending on the test method used, (cold extraction or hot extraction), different pH values can be measured in the same papers.

Photo album board

Hahnemühle board specially suited for use in photo albums. It is particularly fold resistant, strong →fully stock sized and has a high degree of →smoothness.

Photo board

→Mounting board

Printability

Different paper properties are required for each printing process. These involve the →surface, the →absorption performance, the →stiffness and the strength of the paper. All Hahnemühle papers and boards are →stock sized and not surface treated. Hahnemühle's uncoated papers and boards can be printed using all kinds of different printing processes.

Profiles

A profile is an equipment description. It contains information about how a certain device (scanner, monitor or printer) mixes and reproduces colours.

Pulp

The fibre material (→wood pulp, ground wood pulp) gained from the raw materials (wood, straw, linters) together with the →additives and →water form the so-called paper stock (stuff stock, pulp stock) of paper production.

Pulper

Machine used in the paper industry for dissolving →cellulose, →wood pulp or waste paper. The material is so highly dissolved that it can be pumped and added to the fabrication process.

Q/R

Rag (rag content)

Originally paper was made in the Hahnemühle from processed rags. Rags which primarily consist of →fibres containing cellulose are called rags. Nowadays, rags are only used in selected special papers. Today cotton staples, called →linters, are used instead, either mixed with the wood pulp or on their own.

Ream

A quantity of sheets of paper. Standard Hahnemühle packaging unit with a different number of sheets depending on the grade.

RGB

Screens and monitors produce colours from red, green and blue light (RGB). The light intensities produce a certain colour. Scanners also use RGB colours. They scan the fraction of red, green and blue light reflected by an image (or allowed to pass through if you scan transparent images). RGB images contain three components per image element, each with a particular fraction of red, green and blue.

Ribbed (= vergé)

Hahnemühle can produce ribbed papers using a cylinder mould on the →cylinder-paper machine as well as on the Fourdrinier paper machine by means of a →dandy roll. Most Hahnemühle papers can be furnished with this ribbed structure. The closely packed ribbing lines lie parallel to the →machine width. The around 2 cm apart →bonding lines (also →laid (water) lines) on the other hand lie parallel to the →grain.

Ribbing

Ribbed mould-made papers produced by Hahnemühle, as well the Fourdrinier papers have a →fine ribbing or →coarse ribbing depending on their →basis weight. Ribbing is a uniform striped structure, which runs across the grain of a mould paper. Depending on the basis weight it can vary in strength or fineness. It is one of the characteristics of →mould papers.

RIP

A "Raster Image Processor" (RIP) calculates the incoming data of a print job so that it can be implemented by the output machine. The RIP can either be an external unit or part of the output machine itself, for example a PostScript laser printer contains its own RIP.

Rolls

→Jumbo reel

Rough laid

The number of ribbing lines per centimetre determines the type of ribbing. Rough laid Hahnemühle papers have 6 laid (ribbing) lines per centimetre (→Bugra). However, paper with 8 to 9 laid lines per centimetre is called →fine laid paper (→Ingres).

S**Schleicher & Schuell**

From 1927, Hahnemühle was a 100 % subsidiary of Schleicher & Schuell GmbH with its works in Einbeck and Dassel as well as other subsidiaries in various countries. Since 1 July 2002, Hahnemühle FineArt GmbH has been an independent company within the Schleicher & Schuell Group.

Sheet

Papers can be supplied in →rolls or in sheets. The papers produced on the →Fourdrinier paper machine in a continuous web are cut into sheets on →cross cutters. The sheet formats of Hahnemühle's "mould-made" papers and boards with a 4-sided →deckle edge are produced by the →cylinder paper machine during the production process.

Sheet calender

Hahnemühle papers and boards can be treated with subsequent →calendering via a sheet calender (sheet smoother). During this process, a certain number of sheets are placed between special calender boards and passed several times through a steel roll press. The calendering (smoothing) is achieved by the pressure of the rolls and →friction.

Sheet calendering

→calendering (glazing)

Sheet formation

In both manual and mechanical paper production, sheet formation is the formation of a sheet or two-dimensional structure or texture made of fibres and a →filler, i.e. the manufacture of the paper.

Short demy paper

→Deed paper

Short grain (BB)

Depending on the orientation of the fibres in a lengthwise and cross direction during the →sheet formation, both on the →cylinder paper machine as well as on the →Fourdrinier paper machine, the paper is given a →grain. If the longer side of the cut paper sheet runs against the →grain of the continuously produced paper web, the paper is said to be short grain. Vice versa, if the narrower side of the cut paper sheet runs against the →grain of the continuously produced paper web, this is called →long grain.

Sizing

→Cellulose fibre naturally absorbs water eagerly and thus changes its dimensions (becomes larger). In order to slow down this process, it is coated with →additives, such as size (glue), starch, etc. and made water repellent. A basic differentiation is made between →stock sizing and →surface sizing.

Smoothness

A differentiation is made between smoothness produced by compression ("in line" by the →glazing rolls) or by a in combination of →friction and pressure ("off line" using a →calender; see also →calendering).

Special papers

Hahnemühle produces mould-made special papers in the →basis weights of 125 gsm to 230 gsm on its →cylinder mould paper machine. These are used for all kinds of different purposes, including →certificates, guest books and →documents.

Special production

Apart from a wide range of standard papers and boards kept in stock, Hahnemühle reacts with a great deal of →flexibility to special customer wishes. Due to the relatively low →minimum production quantities, customers can realise their special requirements with Hahnemühle.

Spray edge

The spray edge is created by trimming the paper web while it is still in the wet end section. The precisely directed water jets reduce the uncut paper web on the wet wire to a certain format. The remaining edge strips are reused as raw material.

Square cut

On request, all Hahnemühle papers and boards can be cut on a →guillotine type cutter with a precise right-angle cut.

Stiffness

The stiffness of paper and board is defined as the resistance to bending in the elastic range.

Stock sizing

Stock sizing is the name given to the sizing of papers in the →pulp (stock). The sizing agent is added to the pulp in the →pulper or a downstream unit. Apart from stock sizing, →surface sizing can also be used.

Sulphate pulp, kraft pulp

→Wood pulp, which is produced by boiling wood chips in lye containing sulphuric sodium. The alkali boiling enables even woods containing resin to be used, as the resin is saponified during boiling. This enables the long fibres of pinewood favourable for the paper strength to be obtained for use in the paper production. The sulphate method produces a very compact, viscous wood pulp. Sulphate pulp is more difficult to bleach than →sulphite pulp.

Sulphite pulp

is produced if pine and deciduous wood cut into chips is boiled in a solution of calcium or magnesium bisulphite and sulphuric acid. Sulphite pulp has the disadvantage that its fibres are shorter than →sulphate pulp – and consequently produces a lower strength paper – but it is easier to bleach.

Suppleness

Because of the raw material and process used, an outstanding feature of Hahnemühle products are their good workability, especially for

→copperplate printing →hot embossing →all kinds of embossing as well as →oblique edge for →mounting board.

Surface

Hahnemühle is able to produce all kinds of different surfaces on its machines. These are achieved on the one hand using the →glazing rolls, and on the other by the →felts used.

Surface sizing

Sizing, which is applied to the surface of the paper in the size press of the paper machine. This compacts and strengthens the surface, in order to achieve improved →printability and writing properties.

Surface structure

All Hahnemühle papers and boards are characterised by their open surface. Depending on the paper machine this is achieved by an appropriate cylinder clothing, →felts, →dandy rolls, and others. The open surface structure gives Hahnemühle products a fine appearance and is particularly resistant to the effects of contaminants in air due to the →buffer effect.

T

TCF

Totally chlorine free. Pulps used to produce these papers are bleached neither elementary chlorine nor with chlorine compounds. They are usually bleached using oxygen and hydrogen peroxide.

Torn edge

The formats of mould-made papers and boards can be too large for the intended further use. In order to nevertheless retain the character of the →mould-made paper, the smaller format is produced by skilful tearing. The resulting →torn edge is similar to the real →deckle edge.

Traditional FineArt (TFA)

The term TFA stands for uncoated papers, which are used for traditional art and painting techniques without additional coating or treatment. Hahnemühle supplies top quality art

papers for traditional painting and printing techniques as well as papers for →Digital FineArt.

U

Unbleached board

All boards produced by Hahnemühle are stock sized and not surface treated products (→sizing).

Unsize papers

Highly absorbent papers or boards kept in stock for special uses, e.g. →blotting board and →filter papers.

V

Veining, mottling

Highly coloured fibres or external fibres (e. g. flax shives) deposit themselves between the other paper fibres and stand out due to their thickness, size or colour. Hahnemühle offers in-grained papers both as →mould-made papers from the cylinder as well as papers from the Fourdrinier-paper machine.

Vellum

The →surface does not have a regular structure, but is plain. Vellum papers are the opposite of vergé, i.e. →ribbed papers.

Vergé

Specially constructed wires or →dandy rolls are used to produce a uniform striped structure in the paper, which can be identified as a →watermark when the paper is looked through.

Volume, bulk

Hahnemühle can produce papers with a max. 1½ fold volume. The specific volume calculated from the density and →basis weight (density in μ /basis weight in gsm) depends on the raw materials used and the processing criteria.

W/X/Y/Z

Water

Hahnemühle has sufficient quantities of soft and very pure water from its own springs, so that the renowned Hahnemühle qualities can be guaranteed for many years to come. This water is used very carefully and tested, because it is an important resource for the Hahnemühle papermakers and must be carefully conserved for environmental protection purposes. In addition, the company's Dassel location lies within an allocated leisure area.

Watercolour board

For watercolour painting you need a non-absorbent, rub-proof board, which can have a matt or structured →surface. Common terms used to describe the surface of watercolour board are matt, rough, extra rough, fine grain, coarse grain and torchon. Hahnemühle offers a wide range of felt marked (→felt marking) watercolour board. Top colour rendering, maximum surface resistance, rubbing and erasure fastness with minimum cockling are their special characteristics. →“Mould-made” watercolour board satisfies even the highest standards, whose →intermatting almost matches the quality of →hand-made papers, due to its production on a cylinder paper machine.

Watermark

A permanent mark in paper which appears in the paper, either due to so-called depletion or enriching of pulps. In sheet formation the watermark is produced on the wire of the →cylinder mould paper machine by protruding parts (= light-coloured watermark) or by recessed parts (= dark or shadow watermark), which causes deliberate differences in the thickness of the paper. In the →Fourdrinier paper machine it is also possible to produce the watermark using a →dandy roll. Here the wire effect described above is achieved at the start of the suction end on the wire in the still very wet paper by the fibres being pressed away by the dandy roll.

Wet end

The part of the paper machine, in which the "sheet formation" is brought about by dewatering the floating pulp (e.g. 99 parts water : 1 part fibrous substance) and compaction (wet pressing).

Wet strength

Wet strength (moisture resistant) papers include label papers, filter papers, and decor papers. These papers are produced by adding wet strength agents to the fibre suspension before the paper machine. After being completely saturated with water, these papers should still have at least 20% of their mechanical strength in an air-dry condition.

Wire side

The paper side lying on the wire (screen) during sheet formation. In Fourdrinier (machine wire web) paper this side is smoother than the top side, in →mould-made papers produced on a cylinder the wire side has the more striking surface structure (→felt side).

Wood free

Without exception, all Hahnemühle papers and boards are made wood free, i.e. they only consist of →wood pulp, →linters or wood free paper residues. Above all, this has a positive effect on the →permanence and the →lightfastness of all Hahnemühle products.

Working width

The maximum width of a paper width or sheet which can be produced on a paper machine, determined by the width of the wire (also called screen). Modern Fourdrinier paper machines, which e.g. produce copy paper, have a working width (machine width) of up to 900 cm. The working width of Hahnemühle's →cylinder paper machine is max.126 cm, that of its →Fourdrinier paper machine max.128 cm.

Wool scale

Various strips of wool which have been dyed with dye stuffs with known varying lightfastnesses are exposed under an electric arc light together with the Hahnemühle paper to be te-

sted to evaluate the →lightfastness of a →dye or colorant. By comparison under various exposure durations, the lightfastness (according to the wool scale) is determined as the point at which the corresponding wool strip No. 1-8 no longer fades. Coloured Hahnemühle papers and boards have an unusually high lightfastness with a wool scale value mostly over 6.

Wood pulp, cellulose

Pulp gains from wood by chemical digestion (i.e. boiling), which is used in a bleached and unbleached form. Apart from cotton, wood pulp is the most natural form of →cellulose and the high quality raw materials used by Hahnemühle are almost completely free of →lignin and hemicellulose.

Yellowing

The cause of the rapid yellowing of paper, especially those containing wood, under the effect of light and oxygen are the undissolved →lignin constituents in the wood chips.

Art printing techniques

Hahnemühle has been producing papers for all the listed art printing techniques for the highest standards for many years.

Letterpress

“Letterpress” printing is the term used to describe all printing methods in which the parts to be printed lie higher than the remaining parts of the image. The basic material used for the printing form can vary greatly; wood, metal and stone can be used. Hobby printers especially like to use linoleum and other plastics. In the letterpress method the raised parts of the printing form are dyed with printer’s black (printer’s ink). A piece of paper placed on a printing form inked in this way is pressed onto the form with pressure. This is done with the aid of a printing press, although principle it is also possible to use the hand, e.g. as for lino cuts. The close contact of the higher, raised parts of the image with the paper transfers the printer’s ink onto the sheet. The resulting image is mirrored.

Woodcut

The woodcut is the oldest letterpress technique. The printing process with wood was used even before the picture printing for the so-called “textile printing”. This involves the decorative design of textiles with the aid of printing models. Several craftsmen still use this technique today (“indigo blue printing”). For woodcuts, the wood must not be too hard, e.g. lime tree wood. Special knives with certain cutting profiles are used to cut out those areas which are not to be printed. Depending on the motif, all kinds of different cutting techniques can be used (area cuts, line cuts, contour cuts, etc.). To print from the woodcut, the ink is rolled onto the block (wood platen); the ink is first rolled out on a sheet of glass or a piece of cardboard, until it has been evenly absorbed into the rubber roller. A sheet of paper is then placed on the inked platen, the paper should overlap at the edges by approx. 5 to 10 cm. A so-called hand print (or hand copy) can be made by a relatively light pressure (e.g. by laying a flat piece

of wood or a squeegee on it). However, to produce uniform, higher quantities, a mechanical letterpress will be needed.

Coloured woodcut

The coloured woodcut technique requires a separate printing block for each individual colour. The difficulty with this printing process is that the individual print colours have to be laid precisely on top of each other, whereby so-called corners or registers are used.

White line cut

From early on, artists tried to develop new creative sides for the very limited woodcut technique. Although the black line technique has never lost its dominant role in woodcutting, in the 16th century the so-called white line cut was also particularly popular. The only difference from black line cut is that the lines of the drawing is not only cut around and the only shape of the image to be cut out, but on the contrary, only the drawing is cut. As only the raised parts of a picture are printed in letterpress, with the white line cut a negative drawing results (white lines on black).

Eye or burin engraving (dot engraving)

The trick with the burin engraving method was to furnish large forms and shapes in a drawing with a grain which uniformly filled out the area and allocated it the same tonal value. While at the beginning, an embossing tool was used to knock each individual grain into the metal with a burin, the work was made much easier with the invention of the so-called roulette (a small roll with teeth). Mechanical dot or burin engraving must not be confused with the dot etching.

Linoleum cut

Soft and yet tough linoleum can be cut relatively well with a knife. As the material is very cheap, it is used above all in school classes. Just like the other letterpress techniques, the drawing is either cut out or on the opposite (as in white line cutting) only the drawing (outline) is cut out. Linoleum is very resistant, however it cannot be used for very fine drawings (risk of blurring) or for large print quantities.

Wood engraving

This method uses harder box wood, which was not cut along the grain but across the fibres as heart wood or cross grain leaf. Instead of the knife, the tool used as a chisel, as for copper engraving; this instrument even allows very fine lines to be made, which in turn enable particularly soft and gradual changes in colour. In white on a black background, the lines are so fine that they are often invisible to the human eye. This results in a very realistic reproduction, which is never possible with woodcutting. The colour gradations were pricked, or better, engraved over the whole area until each part of the picture had the desired light or dark tone.

Zinc etching

As the name says, zinc etching involves an etching technique, however because of the technique used it has to be grouped under the letterpress methods. The required drawing is applied to a zinc platen using asphalt varnish (black japan) and a brush. The platen is then immersed in a bath containing diluted nitric acid and the uncovered parts of the platen become etched. After this process the asphalt varnish is removed from the platen, whereby the parts protected by the varnish (the drawing) is slightly raised compared to the rest of the platen. The drawing now appears as a light relief. If ink is now rolled over this platen only the drawing is transferred onto the paper.

Rotogravure (intaglio printing)

Rotogravure covers all methods in which the print is produced by applying ink to all the recesses made on a smooth metal surface, first by inking the whole surface and then removing the excess ink. In this way the ink only remains in the recesses in the platen (in the drawing). The copy is then printed in a rotogravure press. It is the way in which the drawing (the impressions/recesses) are made in the platen which differentiates the individual types of printing from each other.

Copper engraving

A not too thick copper platen is used for copper engraving and must be completely flat and have a uniform structure. The artist transfers the drawing onto the platen, whereby the composition must of course take into consideration that the finished print (as in almost all printing processes) will be a reverse image. In copper engraving the transfer of the drawing onto the platen is not called "scratching" but "engraving (pricking)". The instrument, the so-called punch, consists of a ball-like knob, which has to sit well in the hand and has different types of ground metal tips. Contrary to a writing implement, the punch is not moved from left to right, but instead the copper platen is held in the left hand and the punch, held in the right hand, is pushed against the platen so that the rhomboid shaped tip cuts into the copper like a plough share. The copper platen is placed on a leather sack filled to the brim with sand, so that the course of the lines can be nuanced with the finest detail, as the sack enables the artist to guide the tool even more precisely. There where the line starts it is as fine as a hair. The more the pressure applied to the punch is the deeper and wider the engraved line, before it becomes thin and fades away again at the end. This way the lines are given the typical characteristic of copper engraving, the lines which swell and recede, also called the waist. From here it would be possible to tell the difference between a copper engraving and for example an etching, if a certain Abraham Bosse had not invented the so-called scorper (scalpel), a small instrument which enabled the characteristic "waist" lines of a copper engraving to be imitated in an etching. It is often difficult for even experts to tell the difference. Unlike an etching, the copper engraving technique requires a composition of uniform straight lines and curves. In addition, there is the problem that the moment the engraver can not longer see the line they are making, which can also be partly explained by the tiring posture required during the engraving. A further problem is the wear of the platen, which is nowhere as extreme as in the cold needle technique say, nevertheless after the first sheet, the quality of the prints from copper engraving steadily falls. An attempt was

later made to correct this deficit by applying an acierage to the copper plates; however this solution has a good side and a bad side: On the one hand any number of copies can be printed from the platen, because the acierage can be renewed; yet on the other hand a general loss in detail had to be accepted with the galvanic coat, because the finest lines of the drawing “grew” during the electroplating process.

Steel engraving (Siderograh)

The relatively fast wear of copper plates during the printing of large number of copies, the printer looked for new metals suitable for artistic processing. After many attempts it was finally decided to use steel. The brittle and hard metal automatically requires much finer workmanship than the copper platen; in this way even finer graduations in shade and colour can be achieved and the lines very close next to each other have a similar surface effect to wood engraving. The strength of the metal allows very high print runs without clear quality loss.

Niello

Ornamental and engraved figures were scratched into a silver platen; in order to be able to see them better, the hollows of the drawing are filled with a black made from a silver and sulphur compound (nigellum = niello) and melted in a fire for a short time. The metal is then polished and this gives it a uniform, flat surface. If a sheet of paper is not placed on this platen and rubbed on, a very light impression of the drawing results. Such drawings are used above all by goldsmiths to help them when they are producing jewellery.

Mezzotint (Mezzotinto)

In mezzotint (half tint) the drawing is modelled all over in light and dark tones and half tones or gradations, instead of the punched lines made in the copper engraving. The starting point is a rouletted copper platen, i.e. a platen which has been covered with a fine network of lines and dots by hand (or later mechanically too) with the aid of a roulette or comb. The roulette is an instrument which consists of around 20 to 40 comb-like teeth, which is pressed into the platen with a cradling motion while applying pressure at the same time; as

the whole platen has to be covered with a uniform pattern. It is easy to imagine that this preliminary work is very tedious. The artist then “scrapes” the drawing out of this dot pattern, whereby compared to engraving their work in precisely the opposite way: From the completely black covered platen they scrape out the “lights” (the white with its grey shades).

Dry point

The dry point technique is very simple. A sharp steel needle is used to directly scratch the drawing directly into a copper platen. These small scratches take up the printer's ink and press them on the paper. Contrary to the punch, the steel needle is held and guided like a pen, which means that its lines are much gentler and more vulnerable than the deep lines of the punch. Together with the soft copper, a combination results which only allows small numbers of prints with a high loss of quality. Applying an acierage to the drawing first can also not be a real solution as this result in a loss of much of the artistic expression. The technique is called dry point or “cold point” to create a contrast to the “hot” etching techniques; because some heat is also produced during the chemical etching of the plates.

Engraving

The smoothed and carefully degreased platen is covered with an etching base, for example an asphalt varnish or a thin coat of wax. Once the top of the platen is fully covered with the protective layer, the back also has to be covered with the protective layer; this is mostly done by blacking the surface with a soot torch. The artist then uses a steel tip, called an etching needle, to scratch their drawing into the etching base. The platen is then etched, whereby the layers covered with the etching base are not etched. There where the artist has scratched (engraved) in their drawing, the caustic bath consisting either of iron chloride solution or nitric acid mixed with concentrated nitric acid (aqua fortis), can attack (corrode) the copper and dig into the platen. The platen is then cleaned of all acid residues and the etching base and can be further processed using a rotogravure method. The most important differen-

ce between engraving and copper engraving is the uniformity of the etched lines; they have absolutely no “waists”, as appear in copper engraving. However, in the mid 17th century, great efforts were made to make the engraving look like a copper engraving, which is why Abraham Bosse (1602-1676) invented the scorper, a small instrument, which enabled the “waist” (tailored) lines to be imitated in the engraving too. Engraved plates are much more sensitive than those engraved with pricking. Therefore the number of copies (print run) for prints without visible quality losses is only around 200 sheets. To enable larger print runs, the acierage technique is used (with all its benefits and disadvantages).

Aquatint (Aquatinta)

One could say that engraving is to copper engraving as aquatint to mezzotint. While in mezzotint the platen is given its granulation by mechanical techniques (roulette), in aquatinting a chemical method is used. This is also indicated by the name: the dark tint of the platen is produced by the etching liquid (aqua fortis). As in mezzotint, the principle in aquatint is that the white drawing is worked out of the originally completely black platen tone; i.e. once again white lights are set in the black background. However, it is not possible to simply etch the whole area, because large recessed areas do not result in a dark platen tone. The aquatint technique is therefore based on first covering the area with an acid resistant dust layer, whereby each individual grain protects the metal beneath it during the etching process and thus a minute metal column remains under each tiny grain. A dust box is used in order to cover the platen with the most uniform acid resistant dust coat possible. In the dust box the finest resin dust is distributed over the platen; gentle heating of the platen enables the dust to lightly melt onto the platen. The tone of the aquatint can be varied by the density of the points, the size of the individual grain and the etching depth, i.e. the darkness of the area. The platen can then be etched. To achieve “washed over” effects, certain parts of the drawing can be covered and etched repeatedly. This achieves fine tone gradations and can almost perfectly imitate a washed drawing.

However, aquatint can always be differentiated from a drawing by the small, close together spots, which can be found in the dark areas. Aquatint plates are very sensitive. Therefore it is hardly possible to produce 100 prints without clear loss of quality. Acierage is also an option here however the delicateness of the drawings’ lines suffers from this treatment.

Vernis mou

In this method, a soft etching base is worked on instead of a hard etching base, and the drawing is scratched into (as in the engraving). This soft etching base is applied to the metal platen; for this reason, a rough and relatively grained drawing paper is used. The artist now draws their composition directly on this drawing paper with a light pressure. They can use a pencil or a piece of chalk, which allows a wide range of artistic freedom. There where the drawing implement presses on the paper, the soft etching base on the metal platen beneath it moves apart slightly and exposes the metal. The chemical etching is carried out as before, after the etching base has hardened. The attractive aspect of vernis mou is the spontaneity and liveliness of the lines drawn.

Crayon method, chalk method

In the crayon method (crayon method) the hard etching base on the metal platen is worked on using various small drawing instruments, which are intended to imitate a chalk or crayon drawing. These include the roulette (a wide wheel with teeth), the scorper (a wide engraving pen) and the matoir (a small rasp or grater like toothed hammer). All these implements can be used to draw a line which looks very much like a crayon line at first glance. More precise inspection under a magnifying glass shows however that even small areas are filled with a relatively uniform dot pattern, which are due to the use of the toothed instruments.

The dot (stippled) method

People repeatedly confuse burin engraving and the dot method. Everything which involves directly working on the metal platen (burin, granulation, etc.), comes under the term burin engraving. In the dot method on the ot-

her hand, the etching base is pricked with fine needles to obtain certain colour shadows; the closer the circular dots are to each other, the darker the tone; the further they are apart, the lighter the tone. After the picture has been pricked (engraved) in this way, the platen is etched, the etching base then completely removed and the platen prepared for printing. Sheets produced using the dot (stippled) method are particularly delicate; the objects depicted can achieve a very high good three-dimensional quality.

Colour print (colour cast, colour engraving)

In the history of print graphics there have been many different approaches to making coloured prints. Colour cast, where several mezzotint plates are printed in various colours, was the first real multi-coloured method. The fine shadows of the mezzotint method in conjunction with various colours enables particularly fine colour nuances, which made colour cast the preferred medium for reproducing aquarelles oil paintings.

Flatbed print, plain print

Different to the letterpress or rotogravure, flatbed printing deals with a phenomenon where the drawing (i.e. the parts of the area to be printed) are neither higher nor lower than the parts of the platen which are to remain free. All flatbed print variants are based on the same principle – the ejection of water and grease. In lithography, the commonest flatbed print method, the image is drawn on a stone, the ink contains grease. The whole stone is then inked with a printing ink containing grease. Then the stone is cleaned with water, whereby the printing ink remains on the drawing (the greasy areas). Finally the drawing is transferred to paper on a litho press. Here too the resulting picture is a mirror image.

Lithography (“stone print”)

The lithographic method is based on two facts: 1. Stone can be etched and 2. Ink containing grease can be fixed on the stone with the aid of a chemical process. First the litho stone (Solnhofen slate) is ground and granulated. Care must be taken to produce an extremely

uniform surface. However, nowadays very few artists prepare their own stones; they are available from artists' suppliers in all possible shapes and sizes. After the grinding, the platen (the stone) is first deacidified; this is done using alum or aluminium acetate. The platen prepared in this way is now very absorbent, and the artist can apply their drawing. Depending on the drawing instrument used, a differentiation is made between feather, brush, chalk/crayon drawing, cutting/engraving methods or the spray method (reservage). After the drawing has been applied the stone platen is etched; this makes the surface of the stone inaccessible for all further drawing. This etching is carried out using a solution made from gum Arabic in diluted nitric acid. All parts of the platen which are not drawn on are etched and so are made particularly hydrophilic (high affinity for water), in addition, this process covers them with a thin layer of gum Arabic, which is especially swellable and can easily absorb water. This nitric acid also chemically changes the greasy constituents of the drawing and firmly bonds them with the pores of the limestone. To make the stone ready for a new drawing again at this stage, it first has to be deacidified (see above). After the etching and an additional rinsing off (with an asphalt solution, which reinforces the greasy properties and with turpentine, which washes off the ink) the plate is ready for printing.

Transfer printing (autography)

The main difficulty artists have with lithography (as in most other printing processes), is that they always have to design and think of their drawing in a mirror image. A solution to this problem has now been found with the transfer printing (autography) method: In the transfer print the drawing is first drawn onto paper using lithographic chalk, crayon or ink and from there it is transferred to the actual litho platen (stone) (transfer printed). To do this, the drawing paper is laid on the stone mirror-inverted, softened with water, pressed on and later washed off. As in a transfer picture the greasy colour or ink remains on the stone while the paper fibres can be easily washed out. The transfer printing method brought many advantages for artists, who no longer had to

work on a stone, but instead could pay all their attention to the composition of their work on paper; corrections were also no longer a problem. The only disadvantage of the transfer printing method is the quality of the drawing; because the pressing and squeezing of the drawing often results in unforeseeable effects, which were possibly not intended by the artist. Crushed paper grains are also still visible in the subsequent lithography and impair the general impression.

Metal platen print

Through appropriate preparation (granulation and photochemical coating), metal platens can also be given the property of being able to take a greasy drawing and to reject water at those points. Fitted with appropriate register marks, multi-coloured prints can also be easily produced on the copperplate printing and litho presses.

Offset printing

Simplified, in the offset printing method the paper is not printed directly from the metal platen but is printed with the aid of a rotating rubber roll, onto which the ink is first transferred. Offset presses usually consist of three cylinders arranged one above the other. The uppermost cylinder is the printing cylinder with the inking system, on which the metal platen is fixed. The middle cylinder is the rubber cylinder, on which the drawing is transferred. The paper is pressed through between this cylinder and the last (counter pressure cylinder), whereby the ink is transferred to the paper. This printing process only plays a minor role in art printing.

Screen printing, porous printing

Porous printing is really more of a stencilling technique than a printing process. Ink is pressed through a close meshed net with a colour ductor, whereby the shape of the template determines, where the colour reaches the paper and where not. The most important porous printing method is screen printing.

Screen printing (serigraphy)

Screen printing is based on the principle of ink being pressed through a close meshed screen with a colour ductor and is thus transferred to the paper beneath it. A negative (reversed) drawing is placed on the screen first, so that the ink can only pass through the places on the screen where there is no drawing. The artist is free to choose how the negative template (drawing) is applied to the screen: The templates can be cut out and stuck on, or the drawing can be applied to the screen with glue or schellack. Furthermore, the template can also be applied to the screen using photochemical methods, by first covering the screen with a light sensitive coat in a dark room, and then exposing it (e.g. with a negative of a photo) and then washing out the unexposed emulsion. Of course people began to experiment with several screens and colours at an early stage. Adjusted and printed on top of each other with precise register marks, very attractive multi-coloured prints can be created in this way.

Other methods

Apart from the classic printing processes in the letterpress, rotogravure, and flatbed classes, with all their various sub-forms, there are of course numerous other techniques used by artists or even developed by them. And new methods are still being found today, which make this sector of art a very interesting group.

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A Short Encyclopaedia of “Paper – Board – Cardboard”

A

Air mail paper

Lightweight, thin, primarily wood free writing paper for airmail.

AP paper

Abbreviation for paper grades, which wholly or mainly comprise waste (recycled) paper. Traditionally, these include many of the paper, board and cardboard grades intended for packaging purposes (above all corrugated base papers) as well as part of the sanitary papers produced in the Federal Republic of Germany. In addition, printing and writing papers are also produced from waste papers. Newsprint paper produced in the Federal Republic of Germany Deutschland is mainly made from waste paper.

Art paper

High quality and relatively heavy printing paper coated on both sides with a smooth (closed) surface. The reproduction of finely rastered single and multi-coloured images requires that the paper has an even, closed surface and uniformly absorbs the printing ink. To this end, the irregular fibre structure of the base paper (→ uncoated paper) used for art paper production is covered with a coating slip (→ slip coated paper).

Auto panel board

Auto panel board is a bulky, bitumen coated cardboard made from waste paper. It is used for the inner panelling of vehicles, for dampening sound, for covering and as hard board for construction elements.

B

Bank paper, bond paper

Bank paper (bond paper) is high-quality, wood free writing and typewriter paper, often with a watermark.

Banknote paper

High strength, durable, non-ageing paper suitable for multi-coloured printing with a real watermark and other “counterfeit prevention measures” e.g. an integrated metal thread. In the Federal Republic of Germany banknote paper is primarily made from combed cotton fibres (2-4 mm long fibre waste from the cotton processing).

Banknote paper, security paper

Wood free, partially containing rags, always very high-quality material paper with a real, multi-stage watermark, to prevent counterfeiting.

Bible paper

Special printing paper, wood free, sometimes containing rags, mostly with a high filler content, with a low mass per unit area. Bible paper must have very good mechanical properties and a high permanence.

Board

Single layer board is so to say a thick paper. Multi-layered grades, which are often made from layers with different raw materials, are pressed together on several wet paper webs (couched), so that they stick to each other without adhesive. In the general, multi-layered → folding boxboard the front side is coated or uncoated. In addition, there is also a multi-layered board, whose layers are glued together (pasted board). If the weight per unit area is considered (150 – 600 gsm), board extends both into the paper sector and into the cardboards. Apart from folding boxes, they are also used to make high quality packaging, fancy boxes, book covers, displays, record sleeves, paper cups as well as milk and juice packaging.

Book end paper

White or coloured tinted paper, also ribbed or embossed, which is glued into the inside of the front and back of the book cover, to cover the cover material of the book cover.

Book paper

Book papers are printing papers which are wood free or contain wood, are mostly used according to their volume, i.e. thickness and basis weight. They are also called book printing papers or jobbing paper.

Book printing paper, jobbing paper

Paper for producing books. There are wood free book printing papers and book printing papers with wood. Depending on the volume, more or less fillers are added to the papers. Frequently the volume plays an important role in jobbing paper, the ratio of the thickness of the paper to its mass, which defines whether a paper is highly distributing or dense. The designations 1.5-; 1.75-; 2.0-; 2.2- and 2.5 fold volume exist. To produce distributing papers, spruce, eucalyptus and esparto sulphate pulps are used.

C

Cable paper

→ Electrical insulating paper

Calendered paper

Paper glazed, smoothed and compacted between the rolls of a calender and thus with a more or less glossy surface (sharp or matt glazed) paper, e.g. → illustration print paper. The glazed effect produced in the calenders is based on the interaction of friction, temperature and pressure.

Capacitor paper

→ Electrically insulating paper

Carbon paper

Mostly wood free paper in the weight range from 30-40 gsm for producing duplicates of letters.

Carbon paper

Carbon paper is a thin paper coated with wax for producing duplicates on typewriters and other office machines. The carbon base paper is a → tissue paper made from wood pulp.

Carbonless copy paper

Paper, which can duplicate without requiring an interim paper which gives off ink. The paper is prepared so that pressure causes an ink reaction or the ink transfer takes place. Carbonless copy papers are used above all for the production of endless form sets, concealed wage and salary slip, vouchers which can be sent by post and for pre-printed payment transaction forms. In the USA and several other countries, carbonless copy paper is called "NCR-paper".

Cardboard

Cardboard essentially differs from paper and →board due to its higher weight per unit area (>600 gsm), its greater thickness and thus its higher physical properties. As it is technically difficult and uneconomical to make a single layered non-woven adequately thick for cardboard in one work operation, several thin layers are pressed together while still moist. Cylinder board machines, in which the non-woven formed is wound wet around a so-called mould roll until the required thickness is reached, are used to produce "wet machine board". Cutting open the cardboard cylinder produces a sheet, which used to be removed by hand (hand-made cardboard). "Machine-made cardboard" usually consists of layers with varying compositions, whereby the liners are usually made from the higher quality material. Machine-made cardboard is produced by pressing several simultaneously produced non-wovens together on cylinder and/or Fourdrinier board machines. The cardboards are frequently named according to the raw material used: e.g. wood board (made from wood pulp), grey board (made from waste paper). Or according to their use: (e.g. box board, → roofing board, book grey board, auto panel board, deco board). The term "millboard" differentiates "solid" boards from → corrugated board (multi-layered

cardboard, consisting of one or several layers of smooth and corrugated paper webs sized together).

Cast coated paper

Cast coated papers are coated papers, which have a high gloss, not from calendering, but from moulding the still or re-moistened coat surface on the jacket of a highly polished, chromed drying cylinder.

Chlorine free paper

Abbreviated and insofar misleading name for papers made from celluloses/pulps, which are not bleached with chlorine compounds. The paper itself is not bleached. The worldwide offer of chlorine free bleached sulphate celluloses is still currently limited for process engineering reasons, however will rise during the next few years.

Chromo board

Chromo board is a multi-layered board, whose liner is made from wood pulp or wood free waste paper and is coated. Chromo board is used for folding boxes, display boxes, decorations, record sleeves or book and brochure bindings.

Chromo imitation board

Chromo imitation board is a multi-layered board, which is lined, wood free, on one or both sides and is smooth on one side. Between the two liners, of which at least one is made from bleached wood pulp, there are interleaves and inserts (middle of board) made of wood pulp or waste paper (light-coloured cardboard box wastes).

Chromo paper

→ Label paper

Cigarette paper

The lightweight, unsized paper (18-24 gsm) consists of linen and hemp fibres, which are today being increasingly replaced by special types of pulp. The paper has a special finish to increase the smouldering capacity, most cigarette papers have a filler content of approx. 30 %.

Coated paper

Uniform application of coating slip achieves an improved, levelled, closed surface in printing papers – suitable for reproducing finely rastered image copy. The coating slip is mostly applied in separate slip coating machines; in some cases a pre-coat is applied in the paper machine. The market differentiates between coated papers containing wood, low wood content and wood free qualities with one and two-sided coating (→ Label paper, → rotogravure paper, → illustration printing paper, → art print paper → offset paper).

Coloured paper

Collective term for paper, which is colour coated, printed, lacquered, marbled, or has another type of pattern on it. Very different techniques are used to produce coloured papers. Glossy paper: with wax additive, colour coated and calendered when dry using agate stone or friction glazing calenders. Chintz paper: produced using a print coating method, similar to wall-papers. Pasted paper: mixed with ink and coated with bookbinding paste by hand; combs, hairs feet, brushes, sponges, etc. are used to give the paper its pattern. Other speciality coloured papers: leather, marble, batik, wrinkled, brocaded, and velour papers.

Continuous printing paper

Paper suitable for continuous printing (form printing) with edge perforations for precise paper transport. It is used for text and data processing.

Copy paper

Copy paper is uncoated paper, in wood free or wood qualities, white and coloured in formats DIN A 4 and DIN A 3.

Corrosion proof paper

→ Wrapping paper, impregnated or coated with corrosion inhibiting additives, which inhibits or prevents rusting of iron parts, tarnishing of silverware, etc. The effect of the papers, also called vapour phase inhibitors (VPI) is based on the gaseous compounds given off by the additives, which block oxidation reactions on the surface of the metal.

Corrugated board

Corrugated board is a paper-processing product. It was invented in the USA in 1871. Due to its good packaging properties the new material quickly became used worldwide. Corrugated board is produced by passing a paper web, the so-called corrugated paper, between two corrugated rolls and at the same time applying pressure and heat to press it into a corrugated form. This corrugated paper is then glued on one or both sides with a smooth paper web (top coat paper) in the same machine. In Germany corrugated board is primarily made from recycled papers (→ Schrenz, → Test liner, → corrugated paper).

Corrugated paper

Generic name for papers, which are primarily used as a corrugated web in the production of → corrugated board.

Crepe paper

Crepe paper is paper which is creped. Creping shortens the paper web and thus increases the extensibility of the paper in the grain. The paper thus becomes more flexible and insensitive to mechanical impacts. In wet crepe paper the crepe folds are made on a cylinder with a crepe ductor, which bunches the still moist paper web (with a dry content of 40 to 80 %), before it is removed and dried. Man Crepe is used for decorative purposes (crepe tissues, gardening crepe); for packaging purposes (wrapping crepe); for filtering purposes (coffee filters); for covering while painting and decorating, as well as for hygiene (→ crepe sanitary paper).

Crepe sanitary paper

Crepe sanitary papers, mostly single-ply, containing wood and/or with recovered fibres, and contrary to → tissue sanitary papers, they are creped while moist at approx. 80/85 % dry content. The crepe factor is max. 20 %. The fibre bonding remains workable and the paper simultaneously gains its strength. Subsequent drying fixes the creping. The most important areas of use: Toilet paper, paper hand towels.

D

Décor paper

Wood free, white or plain coloured paper, which is further processed in several stages. Before being impregnated with synthetic resin, it is often printed with various décors, e.g. wood grain. The end products are then laminated panels or directly coated chipboards, which are used in furniture manufacturing and interior fitouts.

Drawing paper

The range includes wood free qualities as well as those containing wood, whose properties are designed to satisfy certain drawing and painting techniques, e.g. → aquarelle paper and papers for technical drawings. Drawing papers are sized in the pulp and mostly on the surface too; they are not very show-through (opaque), eraser proof and frequently also wipe proof.

Duplex board

Duplex board consists of two layers of material, mostly made from waste paper.

E

Electrical insulating paper

Strong, mostly impregnated with synthetic resins, pore-free paper made from wood pulp – sometimes with rags added too. Electrical insulating paper must not contain fillers or conducting contaminations (metal, carbon, etc.), salts or acids. The paper is made pore-free by finely grinding (finishing) the cellulose fibres. For use as so-called cable paper, which is wound in a spiral around conducting wires, electrical insulating papers are produced with high longitudinal strength. Electrical insulating papers also include electrolyte papers, which are characterised by their high absorption and high degree of purity. Extremely thin capacitor paper with a thickness of 0.006 to 0.0012 mm (mass per unit area 6-7 gsm) must be uniformly thick and pore-free. It is one of the most expensive papers available.

Envelope paper

Envelope paper is made wood free and containing wood, smooth or glazed (super-calendered) on one-side, white and coloured for envelopes. It must be opaque, be able to be written on, printable and fold resistant. Waste paper material is used to a large extent for the manufacture of envelope paper.

F**Facsimile paper**

Coated, thermo-sensitive papers, which are suitable for printing out text and drawings via telephone services (→ Thermo papers).

Fine board

Fine board (hard board) is characterised by its high bending strength, plybond (interlaminar) strength and surface hardness. It is produced as hand made board and press-rolled board from better grades of waste paper, celluloses/pulps, textile wastes, and more seldom from mechanical wood pulp without or with only a little filler. Plastic emulsions are added to increase the strengths and watertightness. Often they are then post-treated with glazing/calendering, lacquering and embossing. The fine boards also include bookbinding board, fire resistant board, jacquard board, sealing board, trunk board, and shoe board, glazed insulating pressboard and stamping board.

Fine paper

Quality designation for a large number of high quality, wood free quality papers, also produced with rag added or completely from rags. The highest standards are set for fine paper with respect to uniform look-through, surface properties as well as non-aging and lightfastness properties.

Flameproof paper

Flameproof paper can catch fire, but must immediately extinguish again, whereby it carbonises. The paper is given this property by impregnation with additives, which develop a

protective gas in the heat, which expels the air. Other chemicals, e.g. water glass, increase the ignition temperature.

Folding box board

A single or multi-layered board made from primary and/ or secondary fibres, partially with a coated front side, which can be fluted and grooved and which has the stiffness required for packaging purposes.

G**Glassine paper**

To a large extent a greaseproof paper made from finely beaten wood pulp. Its high tolerance comes from very sharp calendering between rolls. As a chocolate wrapping paper the paper must be able to be frequently embossed and printed. Areas of use: Cover sheets in photo albums, wrapping paper for tinned fished cans, protective sleeves for books, envelope windows, etc.

Glossy paper

→ Coloured paper

Graphic recycled paper

→ Recycled paper

Greaseproof paper

The greaseproof property is achieved either by finely grinding the cellulose/pulp for a longer time and pore-free sheet formation on the Fourdrinier paper machine (→ imitation parchment, glassine paper) or by "parchmenting" an absorbent cellulose paper (→ real parchment). In addition, the greaseproof property of the paper can be achieved by adding special additives/auxiliary agents.

Grey board, chipboard

Board made from waste paper, rough or smooth on one-side, also lined on one or both sides, or unlined. Grey board is used for cardboard blanks, calendar backing sheets, Backing paper for letter and drawing blocks, etc.

Grey cardboard, chip cardboard

Grey cardboard is made from waste paper. It is used as book board, as moulded board for boxes, tins and other containers as well as a general packaging material.

H

Hand-made paper, Mould-made paper

Until the paper machine was introduced in the 1st quarter of the 19th century, paper was “scooped” sheet for sheet by hand from the mould. Today this process is now only used for a few special papers. In hand made paper the so-called mould (frame, over which a wire is stretched) is dipped into the fibre suspension and shaken a little when removed so that the fibres are evenly distributed, while the water runs through the mesh of the wire back into the mould. A removable rabbeted frame (“cover”) prevents the suspension from escaping from the sides. The wet sheets, laid between felts are stacked and dewatered in the press and then dried. Hand made paper always has the characteristic “real” deckle edge, which form on the inner edges of the frame cover. Depending on the structure of the wire used the paper can be ribbed or appear uniform (vellum) when looked through. If they are held up against the light, moist mould-made papers have a so-called watermark. Wire is bent and fixed to the screen wire to make the watermark. As the fibres deposit on the wire watermark shape in a thinner layer than in the surrounding area, the watermark appears lighter when looked through. Watermarks can also be made by indentations in the screen wire (banknote paper).

Hard post paper

Hard post papers are high quality wood free typewriter papers, processed with a hard tone, with uniform look-through, often with a watermark. Best qualities also have rags added to the wood pulp.

I/J

Illustration print paper

Uncoated paper, mostly containing wood with fillers, which is suitable for reproducing image copy (including finely rastered images). The surface smoothness required for this is achieved by high calendering (→ calendered paper). Illustration print paper is used above all in magazines made by rotary machine printing (→ magazine papers).

Imitation parchment paper

Wood free paper, which is produced by fine and lengthy beating of certain types of pulp and/or adding special additives; “wet” beating causes the fibre structures to homogeneously close. Imitation parchment paper is similar in appearance and its properties (above all with respect to its greaseproof properties) to real parchment, however it is not waterproof and boilable. Areas of use for imitation parchment paper are e.g. wrapping material for meat and sausage products as well as corrugated paper for cake and biscuit packets.

Impregnated paper

By impregnating paper with impregnating agents – which can be upgrading products such as solutions, dispersions or melts – water-repellent, sealing, corrosion proofing, hardly flammable and other special papers can be produced.

Index board

Wood free board and board containing wood for office and administrative purposes.

K

Kitchen towels

Kitchen towels are made from creped paper, produced on the basis of wood pulp or waste paper. They are used in private households and as wiper cloths in industry.

Kraft liner

Kraftliner is a paper with basis weights from 120 gsm, primarily made from bleached or unbleached sulphate pulp, for the top liners of corrugated board.

Kraft paper

Packaging paper made from bleached or unbleached, long fibre coniferous sulphate pulp (kraft pulp) or equivalent fibres with a high mechanical strength and suppleness. Kraft paper is suitable e.g. for the manufacture of paper sacks, as it withstands the batch wise loading in filled sacks. Crêped kraft papers are characterised by their high extensibility. The term “kraft tissues“ is used to denote thin kraft papers, smooth on one side, with multiple ribs with a weight of less than 30 gsm; they are used e.g. to wrap sensitive objects such as silver cutlery, metal goods and above all glass. In additional work process, kraft papers can be bitumen coated or plastic coated depending on their intended use.

L**Label papers**

Papers mostly coated on one side, which have to be multi-colour printable in offset and partly in rotogravure too. The paper can generally be lacquered, bronzed and punched – sometimes too → moisture resistant and lye resistant, to ensure that the labels are removed in the washers e.g. of the breweries. Depending on the coating technique and recipe, a differentiation is made between machine coated and chromo papers as well as the high gloss, cast coated papers.

LWC Paper

LWC = light weight coated, double sided coated, printing paper in reels containing wood with a weight per unit area of less than 72 gsm, which is used for magazines, mail order catalogues, etc., and is mostly produced using rotogravure or rotary offset methods (→ coated paper).

M**Machine coated paper**

→ illustration printing paper, → label papers

Machine-made board

Machine-made boards are produced as continuous webs on a board machine from waste paper. On the other hand, → wet machine boards, are made on special machines.

Machine-made cardboard

Group of cardboard grades, primarily used to produce boxes.

Magazine paper

The selection of printing papers suitable for magazines essentially depend on the circulation and the quality standards (reproduction of photos, external appearance, advertising capacity). High circulation magazines are mostly produced using rotogravure, offset printing or letterpress printing on uncoated or coated web printing papers (above all → LWC). Magazines with medium and smaller circulations are generally produced in sheets – offset print or – letterpress printing; All kinds of different papers containing wood and wood free, uncoated and coated.

Marbled paper

Effect paper with different surface colours and dyed with irregular patterns. This kind of coloured papers are used as → book end paper for books.

Metal paper

Paper upgraded on one or both sides with a top layer made of metal foils.

Mill board

Generic term for all solid boards.

N**Newsprint paper**

Newsprint paper has a high wood content, is machine calendered or smoothed rotation paper (40-56 gsm). The raw materials used are

wood pulp, mechanical wood pulp and increasingly waste paper. According to their use as a short-lived information carrier, the standards set for newsprint paper – compared with others, e.g. coated print papers – are lower with respect to their optical properties and printability. It is accepted that in general only photo reproduction with a large raster are possible. Under the influence of light and oxygen, the paper tends to yellow quickly. In the print machine, newsprint papers have to have good running properties: The present day modern printing techniques demand a paper with good tear strength, so that the production sequence of the fast running rotary printing machines is assured. Newsprint paper is used for daily newspapers, weekly newspapers and advertising papers. They are processed using letterpress or offset printing methods.

NCR paper

→ carbonless copy paper

O

Offset paper

Generic term for printing papers, which have properties especially matched to offset printing. The paper should e.g. not give off any dust when being processed, it must be pick resistant and dimensionally stable. Offset paper, which can be wood free or contain wood, coated (matt, glossy, embossed) or uncoated, is produced and used both in sheets as well as on the roll.

Oiled paper

Today oiled paper is usually used to describe papers impregnated with wax or paraffin (→ wax paper). Earlier the base paper was impregnated with dry oils such as linseed oil and caraway seed oil. Oiled papers are watertight and water repellent.

P/Q

Paper containing wood

This paper (abbreviated h'h) contains more than 5 % percentage weight ligneous fibres. Apart from bleached or unbleached wood pulp, it also contains wood pulp (mechanically pulped wood in the form of mechanical wood pulp, also called ground wood pulp, TMP – thermo mechanical wood pulp or CTMP – Chemo thermo mechanical wood pulp). The fractions of wood pulp/wood pulp are varied depending on the intended use. Papers with a high proportion of wood, for example, newsprint papers, yellow faster than wood free papers under the influence of light and oxygen, so that they are primarily used for short-lived products. In printing papers the wood pulp has a favourable effect on the opacity (reduces the amount by which the printed back of the page shines through, e.g. in books).

Paper mâché

Ductile hobby compound, which is made by dissolving paper fibres in water (paste or sizing is usually added to increase the strength). Shaped by hand or as a moulding material it is used to produce three-dimensional objects, which harden on drying.

Parchment paper

→ Real parchment

Photo paper

A mostly moisture resistant, dimensionally stable, chemically neutral cellulose paper, which must be free of contaminations, e.g. iron or copper traces is used as the base paper for photo paper manufacture; such foreign substances would cause the metallic silver to precipitate, which would be undesirable. Today, papers coated on both side with a thin polyethylene foil have mostly taken the place of baryta paper. The coating prevents chemicals and water from penetrating the base paper during development of the photos; this has also reduced the washer and drying times.

Postcard board

Postcard board is either lightweight containing wood or wood free and glazed. The prescribed minimum basis weight is 170 gsm, whereby the postcards issued by the post office have a basis weight of 190 gsm.

Poster paper

Poster paper has a high wood content, is highly filled, mostly coloured and made weatherproof by sizing. The poster formats are based on 1/1 sheets, which equates to DIN A 1.

Printing paper

The term printing paper covers all printable papers, both containing wood and wood free, which serve as the carrier of printed information. Apart from uniform, rapid ink acceptance and drying (printability), dimensional stability, adequate opacity (the rear side of the paper does not show through) and smoothness, a certain degree of strength and stiffness is also required, so that the paper can quickly and faultlessly pass through the machine (printability). Many printing papers are coated to improve their printability (→ coated paper). Depending on the coating method used and the quantity of coating applied, the irregular surface structure of the base paper can be partially or fully levelled and smoothed. The lightweight printing papers include, above all, telephone, course and address book papers (containing wood, glazed, for web printing, with a weight range less than 45 gsm), → LWC and → bible paper.

R

Rag paper

Pure rag paper is exclusively made from rags (previously from linen rags, today cotton wastes from the textile industry). However, nowadays plant fibres made of cellulose are mostly used for rag paper production, e.g. cotton, linen, hemp and ramie (China grass). Rags are the finest raw material used in papermaking; paper produced in this way is frequently stronger and has a higher permanence than papers made from bleached wood pulp. Rag papers and papers containing rags added wood pulp

are used for bank notes, certificates, documents, ledgers, maps and copper engravings as well as valuable writing and aquarelle paper and in special technical applications.

Real parchment

Real parchment, frequently also called parchment paper, is a highly pure, wrapping material, greaseproof as well as having particularly dry and wet strengths, made from an absorbent, pure, bleached wood pulp. It is produced in a special process using concentrated sulphuric acid. The residual acid is then washed out, and the real parchment is neutralised. Real parchment – also in combination with aluminium foil or plastic coated – is used for packaging butter, margarine and other fats as well as cheese and other food industry products. Industrial real parchment is used, silicon coated, in various industries as a separating layer or interleaving paper.

Recycled paper

Name for graphic papers and boards as well as for hygiene papers made from pulp produced from 100 % waste paper.

Roofing paper

Cardboard, which is impregnated with tar, bitumen and/or natural asphalt. To produce sanded roofing papers, the so-called naked roofing paper is covered with an impregnating agent and covered with sand. Contrary to other paper products roofing paper usually has an additive of regenerated wool.

Rotogravure paper

Paper mostly containing wood, highly calendered (glazed) with high ash content, which are produced → coated and uncoated. It must guarantee uniform ink absorption at high printing speeds: In order to be able to absorb or take up the ink from the deep etched or engraved pattern cups of the rotogravure rolls, the rotogravure papers must have a certain softness and suppleness. Areas of use: Illustrated magazines, other magazines, mail order and travel catalogues, brochures and high circulation supplements.

S

Sack paper

→ Kraft paper

Sanitary papers

The sanitary papers group includes cellulose wadding, tissue and crepe paper, made from waste paper and/or wood pulp – including with mechanical wood pulp added. The high importance achieved by tissue paper in today's world has led to this name becoming a collective term for sanitary papers in international language. They are used for making toilet papers and numerous other sanitary products such as paper handkerchiefs, kitchen towels, hand towels and cosmetic cloths.

SC paper

SC stands for super-calendered. It is a glazed uncoated paper, with fillers and containing wood (see also → Illustration print paper).

Schrenz, grey chip paper

Old name for papers mainly made from mixed waste papers.

Security papers

Papers secured against misuse and counterfeit. The partly chemical security measures during the paper production are strictly secret.

Shoe boards

Shoe boards are strong and supple hard boards made from wood and filler free waste papers, which are used as insoles, for caps and shanks in cheap shoes.

Silicon paper

Silicon paper is used to prevent sizing, paste or other adhesive substances from sticking. The silicon coats produce "ab-hesive" papers, whose surface repels most substances. Areas of use: Cover material for self-adhesive papers and foils, e.g. in label manufacture.

Sized paper

Sizing reduces the absorbency of the paper and thus creates, among other things, the prerequisite for the writing properties with ink. Sized

paper is also used for many other purposes (printing, coating, gluing, etc.), whereby the sizing agents must fulfil a range of tasks. E.g. they control the absorption of water and increase the water and printing ink "withstand" capacity (picking resistance).

Soft boards

Soft boards are soft, bulky cardboards with a felty character. They are used as cover boards, roofing felts, beer mat boards, packaging boards or matrix boards.

Special papers

The group of special papers includes numerous types and grades of paper, whose main characteristics are their special properties, which they have to provide. In order to achieve these, it is often necessary to use special raw materials.

Surface sized paper

Paper usually sized on the surface of the sheet usually with the aid of a size press in the paper machine.

Synthetic fibre papers

Paper, which is made from synthetic fibres such as polyamide and polyester, from viscous staple fibre and partly with the use of fillers. The fibres are mostly held together by binders. Durable synthetic fibre papers are used, among other things, in the production of maps and important documents, e.g. driving licences and vehicle documents.

T/U

Tea bag paper

A differentiation is made between hot sealable and non-hot sealable tea bag papers depending on the type of processing. They are made e.g. from Abaca-(Manila-)fibres with high alpha pulp added, must be highly porous, moisture resistant and be neutral in taste and have basis weights preferably between 12 and 15 gsm.

Test liners (Testliner)

Strong papers or boards with a pulp composition which is not stipulated but is primarily made from waste paper, which is used as a smooth top coat for corrugated board or as a top coat for millboard; often processed as duplex paper (two layers). The weight per unit area lies above 125 gsm.

Thermo papers

Thermo-reactive papers, coated on one side, used to printout text and graphics with facsimile machines, thermo plotters (e.g. for technical drawings) and thermo printers (e.g. for labels, tickets, till receipts and other receipts).

Thinprint, thin printing paper

Thin print paper or → bible paper was first used for bible printing over 100 years ago. It is a paper with a low basis weight made of rags and bleached kraft pulp and is e.g. used for advertising printing (catalogues, brochures, mailings, etc.), job printing (newspapers, brochures, enclosures, forms, etc.).

Tissue paper

Collective term for papers which differ depending on their intended use and composition, however they are always thin and have a weight per unit area of less than 30 gsm. They are primarily used for packing sensitive objects: as bottle tissue for wrapping wine bottles, as fruit tissues for packing oranges or moisture resistant as flower tissues. Furthermore, they are also used as base paper for carbon paper manufacture, as lining tissues for envelopes and as lining and laminating papers (e.g. with aluminium foil for cigarette packaging). The extremely thin Japan tissue papers are partly produced with basis weights of 6 to 8 gsm.

Tissue sanitary paper

Tissue is a sanitary paper made from wood pulp or waste paper, partly with wood pulp added, with a closed structure, which is only slightly creped. It is so thin that it is seldom used 1-ply. Depending on the requirements the number of layers are therefore increased. The creping takes place at a dry content of over 90

%. Contrary to crepe sanitary papers, dry creping and the low weight per unit area of a tissue layer provide the high softness of tissue products. It is usually produced with two or more layers for consumer goods. The supply and very absorbent product is primarily made from wood pulp and/or de-inked waste paper – partly with an addition of mechanical wood pulp – and depending on the intended use with a moisture resistant finish. Areas of use: Face cloths, paper handkerchiefs, serviettes, kitchen towels, paper towels, toilet paper.

Toilet papers

→ Tissue sanitary papers, → Crepe sanitary papers.

Transparent paper

Long and as gentle as possible beating of high quality fibres (hard pulp types, rags) produces a raw material, from which show-through paper can be produced. Additional surface sizing makes transparent drawing paper better to write on, less sensitive to finger prints, eraser proof and dimensionally stable. Transparent paper can also be made by subsequent impregnation or “parchmenting” (→ real parchment).

Triplex board

Board, one side smooth, consisting of the following three layers: front liner made from wood pulp and/or waste paper, an intermediate layer made from waste paper and an underlay made from wood pulp and/or wood pulp and/or waste paper. **Typewriter paper**

Trunk board

Sized, dense, elastically flexible and strong fine board, which is generally water repellent on both sides due to its surface treatment. It can be pressed, folded, moulded, bent, riveted and sewn. Thickness: 1-3 mm.

Typewriter paper

Typewriter paper (bank post, hard post, fine post) is frequently wood free, usually sized, eraser-fast, seldom coloured, with and without a watermark, also embossed.

Uncoated paper
Uncoated paper

V

Vellum paper

Round about the middle of the 18th century finely woven wire sieves were produced, which were first used in England for the production of hand made mould papers (→ mould papers, → handmade papers). The paper sheets produced were significantly more uniform in their structure than those previously produced with the ribbed wire → Vergé paper. Vellum paper (lat. vellum = fur, parchment) met the wish of printers for a uniformly thick, parchment like paper, without the wire lines seen in the look-through. All paper grades produced on Fourdrinier machines have the characteristics of vellum paper – due to the fine meshed wires commonly used today (if they are not deliberately embossed with a ribbed structure with a dandy roll).

Vergé paper

Before fine wire fabrics appeared in the middle of the 18th century, the mould wires were made of thicker support wires and – transverse closely laid thin ribbed wires. When the paper was scooped out these wires formed a pattern on the non-wovens, so that the finished sheets showed the wire (screen) structure when held against the light as light-coloured lines (French. vergé = striped, ribbed). Today this ribbed wire pattern is imitated for certain types of paper, either by pressing it into the wet non-woven on the Fourdrinier machine with a dandy roll or by producing it in the cylinder mould machine with an appropriately designed wire cylinder (→ hand-made paper, → mould paper → Ingres paper).

W/X/Y/Z

Wall base paper

Collective term for papers, suitable for making wallpapers. These papers can be single or multi-layered (simplex / duplex), wood free or contain wood, uncoated or coated, even lined, pre-pasted and removable.

Watermark paper

→ Hand-made paper → mould paper.

Wax paper

Virtually wood free papers, which are impregnated with paraffin, wax or wax/paraffin/plastic mixes. Depending on the temperature during impregnation and cooling, papers can be produced with are only coated on one surface or are fully impregnated. The former are above all water repellent; moisture can be absorbed to a certain extent. The latter only have a little wax on the surface and are watertight. Depending on the impregnation agent and method used, the product can be matched to a specific use: For example: for wrapping bread and sweets; wrappings for razor blades.

Wet machine board

Millboard, produced by winding one or several wet pulp webs onto a deckle or mould roll.

Wet strength and lye resistant paper

Adding alkali-resistant wet strength agents to the fibre suspension produces papers, which still have a considerable strength even when wet.

Wrapping paper, packaging paper

Generic name for papers with all kinds of different pulp compositions and properties, whose only common property is their intended use. The selection and mix of the pulps depends on the requirements made of the paper. Important properties to be considered are, among other things, tensile, bursting, wrinkle, and abrasive resistance as well as elasticity and stiffness. In addition, good printability is also frequently required (packaging as advertising carriers). For special purposes, packaging paper can also be made moisture resistant, wa-

ter repellent as well as aroma and water vapour tight. To achieve this, either special additives are added to the pulp or the paper is coated, impregnated or combined with plastic and/or metal foil. Thin packaging papers with a weight range of less than 30 gsm are called wrapping tissue papers (→ tissue papers). tissue papers).

Writing paper

Uncoated paper suitable for writing with ink on both sides; the writing must neither run nor show through. The always fully → sized and also suitable for printing writing paper can contain wood or be wood free depending on the intended use. Filler additives make it less show-through. In order to ensure that the paper does not prevent the movement of pen nibs, its surface is glazed (smoothed). Wood free writing papers have particularly diverse possible uses: typewriter paper, form paper for computer printers, photocopiers and duplicating paper, document reader papers, wood free writing papers (→ fine papers).

Wood board

Board with a light-coloured or grey “middle of board” or interleaving, primarily made from wood pulp.

Wood free paper

Paper made from wood pulp fibres (abbreviated to h'fr). Apart from a permitted percentage weight of 5% , it does not contain any ligneous fibres.

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