

1. SCOPE OF THE DOCUMENT

This document defines the overall quality standards for the products manufactured by PERFECT S.A. Printing House.

The document defines both the quality parameters and their acceptance criteria.

2. BASIC TERMS

Functionality and usability for the intended purposes.

In case of a book, a product with no functionality shall be understood to mean:

- a book that is not complete i.e. not having some of the ordered elements;
- a book that cannot be used in the standard way, i.e. read/browsed/leafed through.

Non-compliance – a failure to meet a requirement that does not reduce the product's functionality.

A defect – a failure to meet a requirement that reduces the product's functionality.

Contract Proof – a reference printout that meets the certification requirements under the applicable standards and is intended to imitate most faithfully the deliverable of the printing process. It is the primary colour reference usually produced in Perfekt S.A. CtP Studio, but it can also be provided by the customer.

OK colour sheet – a master sheet selected from production printing as the one rendering the contract proof colours most faithfully and signed by the Customer, the Technologist or the authorized Machine Operator. As comparative material obtained from the printing machine, it is an actual and achievable colour master copy for the operator and a reference for the entire print run.

ΔE – the optical density difference between the master and a sample; it is the averaged value resulting from the differences measured for individual process colours.

Control bar – tonal or multi-colour fields placed on the printing sheet to control printing quality; the control bar enables printing quality checks both visually and by means of appropriate tools (colorimetric measurement).

2.1. REFERENCE MATERIALS

- The printing process is carried out in accordance with ISO 12647-2:2013, certified proofs, the Customer-approved master sheet, a master sample from prior production(s) in Perfekt S.A. Printing House. Perfekt Printing House does not guarantee colour conformity in case of samples from other printing houses.
- The Printing House recommends attaching the contract proof to the production order.
- Contract proofs should be made from the most recent/Customer-approved files.
- Each contract proof should have an Ugra/FOGRA v3 control bar verifying its correct certification.
- The OK colour sheet signed off by the Customer becomes the reference for the other run sheets.
- Where no proof has been provided, printing is based on the primary Lab colours and dot gain values specified in ISO 12647-2:2013 for the relevant paper type. In such cases, the colours can deviate somewhat from the proof made after the printing process.
- If the proof provided by the Customer does not comply with the specifications stated at an earlier stage, it will only serve as preview reference that might lead to colour differences. The

printing house may opt to produce its own certified colour proof to be used as a reliable colour reference in the specific situations where the colour reproduction quality is important.

3. PRINTING PROCESS

3.1. COLOUR MASTER

The certified proof produced in accordance with ISO 12647-2:2013 is the basic colour master copy.

3.2. COLOUR CHECKING METHODS

Visual assessment is the primary colour checking method. Visual assessment of a print should be performed exclusively at a workstation with standardized lighting in accordance with ISO 3664:2009.

Spectrophotometric measurement of the control bar is an auxiliary colour checking method (recommended for verification of visual assessment) to be performed in accordance with the methodology and the values set in ISO 12647-2:2013.

VISUAL ASSESSMENT OF COLOUR

The print colours should render most faithfully those of the contract proof with account of the specific offset printing requirements, the printing substrate quality and other factors affecting the print colours.

The OK colour sheet should be consistent with the proof colours.

The print run sheets should be consistent with the colours of the OK colour sheet.

ACCEPTABLE	UNACCEPTABLE
Colours matching or slightly deviating from those of the master sample	Colours significantly deviating from those of the master sample

The above method is not applied to assess colour consistency of additional Pantone paints.

MEASUREMENT OF FULL COLOUR FIELDS IN THE CONTROL BAR

The measurement should be performed under the specified conditions. Recommended measurement conditions are presented in the table below:

Device	X-Rite eXact Pro
Substrate	White
Illuminant	D50
Standard colorimetric observer	2°
Master whiteness	Absolute
Physical filter	UV Cut (or no filter)

Optical densities of the measured full CMYK fields are calculated so that the measured Lab values are in accordance with ISO 12647:2-2013 on the paper of a given group. Acceptable colour deviations (ΔE) should be within the permissible tolerance range for individual CMYK components according to Lab parameters.

	C	M	Y	K
Tolerance (ΔE)	5	5	5	5
Tolerance of print run variations (ΔE)	4	4	5	4

It is permissible to exceed the ΔE tolerances specified in the ISO standard where it is necessary to ensure a colour match with the contract proof.

Prints coated with UV varnish, offset varnish or foil can change their colour and thus they cannot be used for comparison with contract proofs.

3.3. IMAGE REGISTER

Colour images are considered well-aligned when the print registrations overlap. Shifting of colour images relative to each other (loss of register) should not exceed the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
Register loss ≤ 0.2 mm	Register loss > 0.2 mm

3.4. IMAGE INCONSISTENCIES AND MECHANICAL INCONSISTENCIES

The printing sheet should be free from image inconsistencies reducing its functionality such as: MOIRÉ / BLURRING / DOUBLING / IMAGE PICKING IMAGE SHIFTS / TONING/ WASHOUT / WATERY INK / CRACKS/ PLATE SCRATCHES / INK RUNS / HOLES / STAINS / GHOSTING EFFECT / SMUDGES / DUST.

The printing sheet should be free from mechanical inconsistencies reducing its functionality such as: DAMAGED EDGES / CRACKS / DOG EARS / "RUNNERS" / CREASES / OVERLAPS / FOLDS / SCRATCHES / STAINS / MIRRORING.

4. SURFACE FINISH

4.1. FOIL (LAMINATION)

Foil (glossy, matte, anti-scratch, soft-touch, textured and other) applied to the sheets should be applied evenly and adhere to the entire surface of the sheet. The sheet surface should remain even and smooth, free from noticeable rough areas after foil application.

Foil-coated sheets should be free from the following defects:

- air bubbles under the foil – there is a risk of small air bubbles appearing under the foil cover when laminating uncoated substrates (offset, Munken, etc.) because of their uneven surface,
- delamination - progressing delamination (peeling) of the foil from the substrate over time,
- mechanical damage - creasing, staining of the foil.

Foil can change in an unpredictable way depending on the manufacturing batch, the printing sheet colours (highly visible on orange, navy blue and additional spot colours, like Pantone)

4.2. UV VARNISH

UV varnish coating (solid, selective, raised, brocade, structural, luminescent) should be solid, uniform, free of mechanical damage (holes, creases, wrinkles, rips, scratches).

Shifting of varnish/print images relative to each other (misalignment of images) should not exceed the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
misalignment <= 0.5 mm	misalignment > 0.5 mm

For UV varnish coating, the following are unacceptable:

- chipping of the varnish when the sheet is folded at an angle of 180° (this does not apply to raised, brocade, structured and luminescent varnish),
- noticeable high porosity of the varnish (other than substrate-caused),
- gaps in the varnish coat,
- insufficiently hardened varnish causing surface scratches,
- for glossy varnish, gloss below 80% (measured in reflected light at an angle of 60°).

4.3. METALLIC/PIGMENT FOIL STAMPING (HOT STAMPING)

Pigment foil coating should be applied evenly to the indicated areas, adhere tightly to the substrate, be free of mechanical damage.

Shifting of foil and print relative to each other (misalignment of images) should not exceed the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
misalignment <= 0.5 mm	misalignment > 0.5 mm

RAISED AND DEPRESSED EMBOSING

Embossing should be as deep as possible, but without causing paper cracks at embossing edges. The embossing surface should be flat, even and uniformly deep on the indicated areas, free of mechanical damage or stains.

For foil embossing on hardcovers over textured (e.g. cloth) covers, local discolorations are allowed (depending on the cover material). Cover surface porosity also depends on the quality and smoothness of the paperboard.

Shifting of the embossed image relative to the print (misaligning of the images) should not exceed the permissible tolerance range.

ACCEPTABLE	UNACCEPTABLE
misalignment <= 0.5 mm	misalignment > 0.5 mm

5. CUTTING

Refers to cutting of the product to the net format with high precision cutting machines such as a three-knife cutter.

5.1. FORMAT

The cutting format is specified in the technology sheet: It sets the physical dimensions (length and width) of the product in millimetres.

Format deviation between the actual product and its intended net format should be within the permissible tolerance range.

ACCEPTABLE	UNACCEPTABLE
format deviation \leq 1.0 mm	format deviation $>$ 1.0 mm

5.2. RECTANGULARITY

Perpendicular cut margins of the product should form an angle of 90 degrees. Deviations from rectangularity should be within the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
deviation \leq 1 mm per 100 mm	deviation $>$ 1 mm per 100 mm

The finished product should be free of uncut pages, tattered edges or burrs (double knifing).

6. FOLDING

Signature folds should go along the marked folding marks. Permissible horizontal and vertical fold misalignments should be within the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
misalignment \leq 1.0 mm	misalignment $>$ 1.0 mm

Additional unacceptable folding inconsistencies: tattered edges, burrs (double knifing), paper cracks, other mechanical inconsistencies.

7. DIE-CUTTING

Shifting of the die-cut element relative to the indicated area should not exceed the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
misalignment \leq 1.0 mm	misalignment $>$ 1.0 mm

8. PERFORATION

Perforation must go along the indicated perforation line.

Perforation misalignments relative to the indicated line should not exceed the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
misalignment \leq 1.0 mm	misalignment $>$ 1.0 mm

Additional unacceptable perforation inconsistencies: paper tearing beyond the perforation line when ripping, inability to rip along the perforation line, loss of perforation integrity, locally torn perforation.

9. ARRANGING BOOK PARTS

Parts of the book must be arranged correct, i.e. in the correct order, with correct positioning and alignment of the signatures and other additional elements (glued inserts, overlays, stickers, inserts, endpaper, cover).

ACCEPTABLE	UNACCEPTABLE
Correct part arrangement	Incorrect part arrangement

10. WIRE-STITCHING

10.1. STAPLE POSITIONING

Generally, two book staples should be positioned at an equal distance ($1/4$ to $1/5$ of the net height) from the top and the bottom at the fold line (measured from the book feet and head). Staples should not extend beyond the fold line.

Vertical and horizontal misalignment of staples should be within acceptable tolerance.

ACCEPTABLE	UNACCEPTABLE
vertical misalignment \leq 5 mm	vertical misalignment $>$ 5 mm
horizontal misalignment \leq 1 mm	horizontal misalignment $>$ 1 mm

Additional unacceptable stapling inconsistencies: too tight staple clamp (cutting the paper), too loose staple clamp (pages falling out), staple arms overlapping, or the distance of more than 3 mm between the ends of the arms.

10.2. DURABILITY OF WIRE STITCHED BINDING

ASSESSMENT BY HAND

The durability of a stitched binding is considered satisfactory when the two middle pages will only fall out when pulled hard. The durability is considered unsatisfactory if the two middle pages cannot carry the weight of the book when shaken with moderate force.

11. GLUING

11.1. SIDE GLUING

The standard width of side gluing is:

- 6 mm for softcovers,
- 7 mm for endpapers,

This value can vary, however, depending on the product characteristics, such as the layout of the image on the cover/endpaper joint or on the first/last page of the book unit. Regardless of the set target value, deviations of this parameter within a single copy should remain within the acceptable tolerance range.

ACCEPTABLE	UNACCEPTABLE
deviations within one copy ≤ 1 mm	deviations within one copy > 1 mm

11.2. BACK GLUING

The spine glue thickness may vary depending on the characteristics of the product in glued binding. The acceptance criterion for this parameter is good adhesive durability (see section 11.3)

11.3. GLUING DURABILITY

ASSESSMENT BY HAND

The durability is considered satisfactory if chosen pages from the beginning, middle and end of the copy only fall out when pulled hard, while repetitive page turning does not result in durability loss.

PULL-TESTER ASSESSMENT

ACCEPTABLE	UNACCEPTABLE
Hot Melt glue ≥ 4.5 N/cm	Hot Melt glue < 4.5 N/cm
PUR glue ≥ 5.5 N/cm	PUR glue < 5.5 N/cm
Dispersion glue ≥ 5.5 N/cm	Dispersion glue < 5.5 N/cm

12. BINDING WITH THREAD SEWING

12.1. THREAD SEWING QUALITY

The thread sewing line should be distributed evenly over the entire height of the book spine. The stitch edges should end at least 10 mm from the expected cutting line. The number of stitches used depends on the book height.

Unacceptable sewing inconsistencies:

- too strong thread tension (the spine curves inwards),
- too loose thread tension (the signatures shift relative to each other),
- hanging threads after the book unit is sewn (uneven spine line after gluing),
- too large thread holes (spine glue seeping inside the book unit).

12.2. DURABILITY OF THREAD-SEWN BINDING

ASSESSMENT BY HAND

The thread sewing durability is considered satisfactory if the book unit weight can be carried by a single sewn-in signature while the book is shaken with moderate force.

13. BOOKMARK (RIBBON) GLUING

The ribbon glued into the block should be of the customer-ordered colour and width; its length should allow free transfer between pages, and its end should not be tattered.

Due to press pressure when gluing the book unit into the cover (hardcover), a slight deformation of the block sheet may occur in the place where the ribbon is attached.

A ribbon bookmark that can be easily pulled out from the book unit is unacceptable.

14. HARDBACK BINDING QUALITY

The hardback book cover can be produced from different materials and be of various constructions. Regardless of the shape of the spine, these are classified as:

- full binding covers: consisting of two identical paperboard (or paperboard with foam) base cases and a spine board that are bound with a finished covering (paper or a covering material such as cloth),
- cardboard binding covers: consisting of two identical cardboard base cases and a spine board that are bound with a finished covering paper or a covering material such as cloth);
- half binding covers: consisting of two identical paperboard (or paperboard with foam) base cases, a spine board and two finished coverings (materials similar to the above-mentioned) – a spine and a face with lining,
- integrated binding covers: consisting of one type of finished material, i.e. cardboard or chalk coated paper, die-cut and glued in a specific way.

To achieve adequate durability of the cover for hardcover binding, the raw material of the paper or integrated binding cover should be **finished with (any type of) foil**. The Printing House disclaims any responsibility for the durability of binding covers without such finish, as the durability of covers is then significantly reduced in areas exposed to wear during use, i.e. backsides and edges.

The dimensions of the assembled cover ready for binding should be in accordance with the digital model. Deviations from these dimensions should be within the permissible tolerance range.

ACCEPTABLE	UNACCEPTABLE
Deviation from binding cover format ≤ 1 mm	Deviation from binding cover format > 1 mm
Paperboard thickness deviation ≤ 0.5 mm	Paperboard thickness deviation > 0.5 mm
Vertical misalignment of cover image ≤ 1 mm	Vertical misalignment of cover image > 1 mm
Horizontal misalignment of cover image ≤ 1 mm	Horizontal misalignment of cover image > 1 mm

15. HALF (HARD) BINDING COVER

A hardbound book consists of two parts joined together by means of an endpaper (either external or own): a block (insert) and a cover for half (hard) binding. The quality standards for the block (insert) are similar to those for a glue-bound book (Section 11) or a thread-bound book (Section 12). Please refer to Section 14 for the quality standards for a hardcover.

The parts glued together (block, endpapers, cover) should adhere to each other over the entire glued surface without visible air bubbles, delamination of the substrate or stains. The top and bottom squares should be even, and the front square should be at least as wide as the top and bottom squares. The glue used for binding is water-based, allowing for the possibility of slight waviness of the block (insert) and the endpapers.

The hinge fold forming should be permanent, even, as deep as possible without any imprinting between the pages of the block and without destroying the cover material or delaminating the foil.

In the case of covers with foam, slight deformation and unevenness of the cover surface is permissible due to the unstable surface of the base cases (deflection of the foam surface) in the offset area.

The parameters of the finished book should be in accordance with the customer's specifications. Deviations from these specifications should be within the permissible tolerance ranges, as regulated in the table below.

ACCEPTABLE	UNACCEPTABLE
spine shape as customer-indicated	spine shape not as customer-indicated
deviation of block position in the cover ≤ 1 mm	deviation of block position in the cover > 1 mm
colour of headbands (if any) as customer-indicated	colour of headbands (if any) not as customer-indicated

16. INSERTS (INCLUDING CD TRAY INSERTS)

Leaflets, envelopes, booklets, CDs, etc. inserted into the book should be positioned in accordance with the customer's instructions. Unacceptable insertion errors:

- lacking or excessive inserts,
- positioning of an insert other than indicated in the customer's order,
- insertion method other than indicated in the customer's order,
- soiling of the insert/copy pages with glue,
- damaged insert/copy,
- insufficiently durable gluing of the insert into the book: the insert falls out by itself when the copy is browsed.

17. FILM WRAPPING OF COPIES

The strength of the seal is verified by hand. The seal strength is deemed adequate if both sealed edges are able to carry the weight of the whole package when shaken with moderate force. Unacceptable defects of individual seals:

- mechanical damage to the copy,
- mechanical damage to the foil,
- lack of seal continuity (weld gap).

18. PACKAGING OF FINISHED PRODUCTS

The packaging method should be adapted to the type of product so as to ensure protection against possible damage during storage and transportation. The pallets with the finished products should be marked in a way enabling their unambiguous identification.

Finished products should be packaged as indicated in the customer's order. In the absence of such indications, the following criteria apply:

- foil (shrink film) for parcels up to 10 kg (cardboard box for hardcover with integrated cover, cardboard and cardboard with foam products),
- EURO-size pallet for shipments with a gross weight of up to 700 kg and/or height of up to 140 cm,
- pallet edges secured with corrugated cardboard corners,
- machine wrapping of the pallet with stretch film,
- pallet with a wooden or cardboard top cover, sealed with polypropylene tape.

Shrink film and strapping should not cause damage to the finished products. After packaging, parcels and pallets should be free of mechanical damage (rips, folds) and soiling that cause damage threats to the finished products. After packaging, the pallet should be marked with (at least) a master label showing the item title and the number of copies.

The finished products may be packaged in the following manner (with the rules for bulk pallets as above):

- bulk on a pallet - a stack of copies up to 10 kg placed loosely on the pallet,
- paper parcels - a stack of copies up to 10 kg packaged in paper, bound with polypropylene tape (mosca) or adhesive tape and placed on the pallet,
- cardboard boxes - a stack of copies up to 10 kg packaged in cardboard boxes for bulk shipment, bound with adhesive tape and placed on a pallet.

19. ADDITIONAL OPERATIONS (OUTSOURCING)

Perfekt S.A. offers certain non-standard additional operations, which are to be agreed in detail with the Customers. These operations are outsourced according to the outsourcer's quality specifications or guidelines. Below is an indicative list of such operations:

- cutting of registers,
- hole drilling,
- colouring and gilding book edges,
- rivet-fastening of the elastic band,
- spiral binding,
- binding in straps,
- CD production,
- rounding of book corners,
- production of cases,
- calendering of prints,
- holographic varnish coating,
- lamination with structured foil,
- scratch-off labels,
- preparation for the market/assembling of parts, e.g. placing copies into cases,
- customisation.