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Physical characteristics of e-Passport

Specification of e-Passport booklet

e-Passport MOLDOVA_February_2022_ver. 1.0

Date	Prepared by	Service for:
	PWPW SA	**Public Service Agency**
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> **i** *Below specification lists chief features of the passport booklet. The final specification is to be prepared based on mutual agreements between the Purchaser - PWPW and actual sample passport booklet produced for verification purposes.*

e-Passport booklet description

Introduction

Passports produced by PWPW SA are manufactured in ISO 14298 (Intergraf) certified production plant to meet stringent security measures as required for national level identification documents. Similarly the graphic design is adapted and processed in secure, separated from the Internet environment based on a special software that is available only for authorized users that design and manufacture security documents and banknotes. As such final editable artwork is not available outside PWPW. Only simplified versions in .pdf or .jpg formats are shared with the authorized stakeholders of the project.

Basic physical features:

- Booklet dimensions: 125 x 88 mm, according to ICAO Doc. 9303
- Booklet's construction includes:
    - cover material, with gold blocking on the front
    - end-papers, printed with offset and intaglio
    - polycarbonate data page, printed with offset and silkscreen,
    - 32 inside (visa & remarks) pages, printed with offset
- The passport booklet is equipped with chip module and antenna located in polycarbonate data page
- Passport booklet is prepared for 10 years usage and meets the durability standards as defined and verified according to ICAO Technical Report

Structure of the e-data page

The e-data page is a multi-layered structure made of polycarbonate (PC) material and the hinge material. Particular layers and elements of the data page are bound together by means of hot lamination process. The structure of

the PC data page would entail not less then7 layers (including the inlet layer with a chip and antenna) and DOVID (transparent hologram). Respective layers of the document are overprinted with offset printing with the usage of PANTONE ink colours. The colours composition covers **6 offset inks** on each side of data page (including UV inks). Moreover, optically variable ink (OVI) is applied by silkscreen on the personalisation side.

The polycarbonate e-data page contains a variety of different security features such as guilloche background, rainbow printing, special inks, matt and glossy embossing of the surface, MLI or CLI, OVI, DOVID, clear window, etc. 1st, 2nd and 3rd level security features are available on the data page including ts hinge material.

After binding inside the passport booklet the data page is prepared for electronic (chip encoding) and high resolution graphic laser engraving personalization including possibility of applying tactile (raised 3D) and/or micro perforation features during personalization.

PWPW solution for the hinge of data page

Polycarbonate data pages are manufactured according to PWPW's hinge technology. This unique technology involves attaching the flexible hinge material in between polycarbonate layers with double stitch of security threads embedded within (inside) polycarbonate body of data page.

The page has a flexible hinge made of polyester textile in order to integrate it with the passport booklet. The entire surface of the hinge is covered with multicolour printing which may exhibit special properties under IR light (IR drop-out/IR pair). The hinge material is placed between polycarbonate layers and connected to them by sewing. Seam is made by two threads. Although threads are fully placed inside the laminate structure preventing them against traceless alternation they are visible from outside. Thus they are part of the data page visible image and in the same time they exhibit special properties under UV light and may contain a third level security feature.

The entire surface of the hinge is covered with multicolour printing which may exhibit special properties under IR light (IR drop-out/IR pair).

The hinge solution constitutes both the robust and durable technical element of data page construction as well as a bearer of security features of 1st, 2nd and 3rd levels.

Particular elements of design and construction of the booklet are visible only in UV and/or in IR. The proposal for document artwork and visualization of security features will be presented and agreed with the customer in full compliance with tender and customer's requirements.

Applicable standards

*Passports manufactured by PWPW meet the world standards for travel documents set forth by **ICAO Doc. 9303** recommendations for ID -3 travel documents (passports).*

*Furthermore – passports offered as Type A and Type B are fully compliant with applicable regulations of **European Union** (in particular Council Regulation # 2242/2004 including its amendments and acts following it). Passports offered as Type C may include minor deviations for UE regulations.*

*Electronic properties of the e-Passport and electronic data page are covered by **ISO 7816** and **ISO 14443** group of standards. Please refer to general information on chip in "Applied chip basic characteristics" section below.*

*Moreover the data pages are tested internally in PWPW against the following standards: **ISO 10373** and **ISO 24789** adequately to the intended usage of the e-Passport and applied PC components.*

Technical and security features

The following technical and security features are applied:

Feature	Description
Security paper	UV dull paper, pigmented white (whitish) colour
	Paper composition of wood-pulp and cotton (minimum 60% cotton), with appropriate absorbance and roughness, applicable for inkjet printing.
	Basis weight: 120 gsm (for endpaper) and 90 gsm (for inside pages)
	Chemically reactive paper (samples of chemical sensitizers attached), mandatory for inside pages, optional for endpaper as per customer's decision.
	Selection of security fibres including: - visible security fibres (visible in daylight only) - invisible fibres (visible in UV 365 nm only, excluding UV blue) - special security fibres visible both in daylight and UV (excluding UV blue)
Watermark	Job specific design - dedicated exclusively for Moldova passport project
	Registered multi-tone watermark on inside pages, (page layout as per Figure 1., clause 7.2.22., Tender Requirements, Annex B,)
Security thread in paper	Security thread 1,5 mm width, embedded in paper of inside pages - with microtext REPUBLICA MOLDOVA, direct and mirror reflection - with UV properties
Cover	Acrylic coated outer cover material, in burgundy red colour.
	Contains name of the country, coats of arms, name of the document and biometric document ICAO logo applied with golden foil by hot stamping
Individual graphic design of inside pages	Depending on customer's artwork proposal and requirements regarding the design - each page may include different artwork (may require additional time to be foreseen and accepted by customer in the project and delivery schedule)
Printing / application techniques deployed	The following printing techniques are used during manufacturing process: - offset - intaglio - silkscreen - hot stamping - hot lamination - inkjet - letterpress - laser perforation
Inks	The following inks are used during manufacturing process: - offset (pantone and UV) - intaglio and letterpress - (visible or invisible in daylight) UV, in more than one colour, and Bi-UV - IR visible (intaglio, OVI, letterpress, print on hinge material, optionally also offset,) - IR drop-out/IR pair - anti-stoke (different options of its positioning, subject to arrangements with customer) - iridescent (silkscreen) - isible simultaneously in VIS & UV & IR
Rainbow Printing	At least 2 rainbow colours are used during offset printing of guilloche backgrounds of inside pages, data page and endpapers. Depending on the artwork provided by customer rainbow effect is also possible in VIS and UV or UV only guilloches.

	Rainbow effect can be also achieved in UV
	Rainbow printing is mainly an anti-xeric security feature. Printing of a continuous line with colour transition is not possible to achieve with commercially available ink-jet and laser printers, as well as thermal-transfer printing. Any attempted imitation is easily detectable.
Guilloche background	At least 2 visible colours are used during offset printing of guilloche backgrounds of inside pages, data page and endpapers.
	Depending on the artwork provided by customer guilloches also possible in VIS and UV or UV only.
	Guilloche lines are an anti-copy security feature which prevent from document counterfeiting and altering biographical data. The resolution required to produce sharp, thin and continuous lines is only achievable with offset printing, which is usually unavailable to counterfeiters.
	Creating state of the art guilloches design requires dedicated computer software which is accessible only for authorised security printers.
Relief effect	Depending on the artwork provided by customer guilloches mat also include relief effect in offset print.
Microtexts	Microtext (with the height as small as 0,25 mm) is a text illegible without magnifying glass. It can contain fonts of variable size to hinder unauthorized duplication. The artwork will include both positive and negative microtexts.
Deliberate error	Applied as a deliberate spelling and/or deliberate printing error.
	Deliberate error is a security feature that makes it easier to recognize counterfeit documents. A counterfeiter who does not know the location of such a protection will not apply it in the fake document.
	Deliberate printing error - alternative type of deliberate error, the nature of this feature consists in deliberately misprinting/damaging one of the repetitive elements of the design and thus slightly distinguishing it from other identical elements correctly printed elsewhere in the document
Optically Variable Ink	OVI print (on data page)
	OVI is a special type of security ink that displays a shift of colour when observed at different angles. OVIs of specific colour shifts are not available for non-secure applications and may be applied only by security printers.
UV fluorescent inks	Up to 3 colours, including rainbow effect in UV and bi-fluorescent inks
	Inks that are invisible in daylight and visible in UV are suitable for protecting document's holder data and photo, as well as integration of graphic design. In daylight they do not hinder data and photo verification.
IR absorbent/ transparent inks	On data page and/or end-paper
	A pair of inks with identical colour in daylight but different appearance when observed in IR light (only part of the graphic element appears visible in IR light)
Intaglio print (endpaper)	Up to 4 colours, including IR absorbent/transparent inks on endpaper, with microtexts, microprints and latent image
Hologram / DOVID	Transparent DOVID embedded inside the data page located partly on photo area.
	Recorded in a e-beam high resolution (min. 24 000 dpi) lithography technology, including view angle depending features like kinetic and switch,effects, volume/3d effects, colour coding and images, guilloche fine lines, microprints and nano prints of 1st, 2nd and 3rd level.
	Modern DOVIDs production involves sophisticated and exclusive technologies (e.g. electron beam lithography) which are not commercially available. They offer high resolution security features comprising images, microtexts, nanostructures and advanced optical effects which are very difficult to simulate.

MLI/CLI	MLI/CLI is a tactile security feature which contains fine structure of lenses, that is integrated into the data page surface during the lamination stage of data page production. This feature is a kind of optically variable device, which creates the possibility of implementing viewing angle depending elements, both steady printed during data sheets offset printing (before lamination) or during document issuance.
	In particular MLI enables implementation of individual data or image of passport's holder by means of laser engraving during personalization.
Embossing on the surface of polycarbonate	Obtaining sharp and fine convex shapes on the surface of data page created during lamination process with job specific designed laminating plates.
	This thickness irregularity of data page surface profile protects against adding a foil on top of the data page with the impostor's data or photo substitution by means of scratching and milling. It also allows for easy verification of document authenticity by means of touch.
Booklet binding (sewing)	Booklets are sewed by lock stitch where ends of the thread are hidden inside the book (between the cover and the end paper) and are not accessible without visible damage to the book
	Each ply of the thread has different colour in daylight (blue, yellow and red) and different properties in UV (blue, yellow and red accordingly)
	3 strands thread, each strand with different properties in terms of colurs in daylight and/or in UV light
Booklet serial number	Serial numbering of the passport booklet is performed by:
	1/ Laser perforated holes - conical numbering (located on top or bottom of the page) through all inside paper pages, including or excluding and the back endpaper and cover. Laser perforated number includes special mark (s) - geometric figures (i.e. triangle, square) instead of regular holes in selected place of the number. (Laser engraved serial number on data page to be applied during personalisation of the booklet)
	2/ OCR letterpress number, with UV (green) and IR visible, printed on top of first inside page
	3/ 1D barcode printed with inkjet, IR visible, appearing on the external sticker applied on the back cover ; or alternatively 1D barcode fully integrated with the booklet paper printed inside the booklet (e.g on front or back enpaper, or on first/last paper inside page)
	Consecutive serial numbering is guaranteed.
	For full traceability no booklet without serial number leaves our production plant.

Applied chip basic characteristics

Introduction

MTCOS Pro is a fully interoperable multi-application smart card operating system compliant to ISO/IEC 7816 [1]. It provides public and secret key cryptography and supports a variety of security-sensitive applications like

Travel Documents ICAO application compliant to ICAO Doc 9303 and TR-03110

Common Criteria Certification

MTCOS 2.5 / ST31G480 is subject to the following procedures (EAC: EAL5+, BAC: EAL4+):

Compliant to protection profile	Certification-ID
BSI-CC-PP-0056-V2-2012 (incl. BSI-CC-PP-0068-V2-2011)	BSI-DSZ-CC-1064
BSI-CC-PP-0055-2009	BSI-DSZ-CC-1065

Application Features

Authentication Mechanisms as used for *ePassports*:

Basic Access Control

Password Authenticated Connection Establishment (PACEv2)
- with Generic Mapping (GM) and Chip Authentication Mapping (CAM)
- including PIN and PUK user authentication »New Feature in MTCOS Pro 2.5«

Extended Access Control (EACv1)
- Chip Authentication (DH with key lengths up to 2048 bits and ECDH for key agree-ment with all supported curves and key sizes)
- Terminal Authentication using RSA with key lengths up to 3072 bit and ECDSA with all supported curves and key sizes

Active Authentication
- using RSA with key lengths up to 3072 bit
- ECDSA with all supported curves and key sizes

Security Features

Hardware Functionality The platform ST31G480 is certified according to Common Criteria with an assurance level of EAL5 augmented (certification ID: ANSSI-CC-2019/12).

Technical Details

Communication and File System Features

Communication

Interfaces	Contact based (T=1) according to [11]
	Contactless type A and B according to [12]
APDU	Supporting extended APDUs up to 64 kbytes
	Buffer size up to 2039 bytes
Memory	
NVM size (available for file system)	Up to 188 kbytes
Miscellaneous	
	VHBR support

Cryptography

Symmetric	
DES/3DES	ECB or CBC mode with CBC-MAC (Retail-MAC) or CMAC
AES-128, -192, -256	ECB or CBC mode with CBC-MAC or CMAC
Asymmetric	
EC (ECDH, ECDSA)	Key generation is supported
	Supported EC-curves: Brainpool P160r1, Brainpool P192r1, Brainpool P224r1, Brainpool P256r1, Brainpool P320r1, Brainpool P384r1, Brainpool P512r1, NISTP192 (SEC P192r1), NISTP224 (SEC P224r1), NISTP256 (SEC P256r1), NISTP384 (SEC P384r1), NISTP521 (SEC P521r1)
RSA	Key generation is supported
	Private key operations (CRT) with a maximum key length of 3072 bits
	Public key operations with a maximum key length of 3072 bits
DH	Maximum key length of 2048 bits
Hash functions	
	SHA-1, SHA-224, SHA-256, SHA-384, SHA-512

Due to tough situation on the chip market and to ensure documents issuance continuity as an option we reserve the right, after consultancy with ePP issuer, to use any of the following alternative Hardware platform for MTCOS 2.5 such as:

2.1 MTCOS 2.5 in P71D352 (N7121)
Certification: BSI-CC-PP-0056-V2-2012-MA-02 (incl. BSI-CC-PP-0068-V2-2011) : **BSI-DSZ-CC-1147**
BSI-CC-PP-0055-2009: **BSI-DSZ-CC-1048;**

or

2.2 MTCOS 2.5 on IFX SLE78C(L)FX40xxPH(M)
Certification: BSI-CC-PP-0056-V2-2012-MA-02 (incl. BSI-CC-PP-0068-V2-2011): **BSI-DSZ-CC-1033 certificate date: 2019-07-23**
BSI-CC-PP-0055-2009: **BSI-DSZ-CC-1034 certificate date: 2019-07-23**

Quality control in PWPW plant

The quality control is accomplished based on the PN-ISO-2859-1 standard.

A PLAN OF THE ACCEPTANCE INSPECTION OF A LOT ACCORDING TO THE PN-ISO 2859-1 STANDARD

The quality inspection of each production lot or delivery lot of passport booklets is performed in accordance with the acceptance inspection plan and sampling plan appropriately for each feature selected for inspection and agreed in accordance with specification level (premium, standard or basic) of passport booklet. If the number of nonconformities for an inspected feature do not exceed the acceptable number (i.e. AC), the feature fulfils the quality criteria. If the AC acceptable number for any characteristic is exceeded, the lot does not fulfil the requirements.

Checking the quality of execution of passport booklets is performed according to Quality acceptance plan and criteria respectively for each of the evaluated elements. Existing non-compliance are not summed for comparison with number of eligible AC. Exceeding the number of eligible AC is checked only for each properties alone.
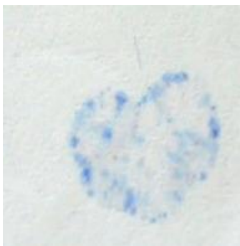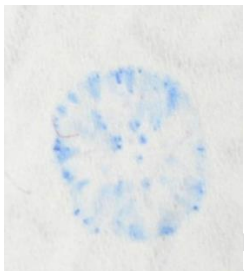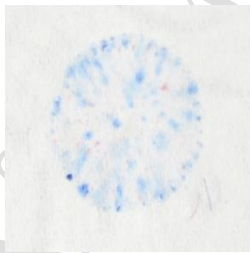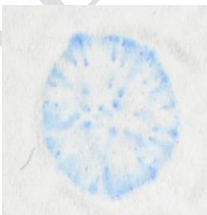
Packing methods
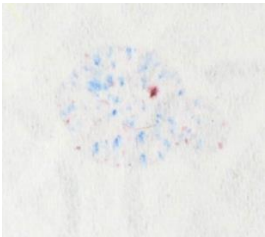
Basic packaging includes standard card board boxes containing 100 passports each.

Boxes of 100 passports are packed into larger cases/containers according to selected shipment mode and Customer's warehousing conditions. Further details - to be agreed

Packaging of ready-made booklets for delivery: inner card boxes with 100 passports each, with the content information label on the box. 10 boxes of 100 passports each are placed in large outer cardboard box with a hoop strap fastening, numbered seal and anti-humid foil apply. All placed on pallet. Alternatively (if larger boxes are accepted by customer) - a wooden box with sealed plastic bag inside and metal enforced edges and corners to protect against mechanical damage is used, fits either 5 000 or 10 000 passports. Both pallets and wooden boxes are accessible from all sides by forklift. Wooden boxes are stackable (2up) to optimize warehousing.

Packaging units and methods are agreed with the customer taking into account both secure and durable packaging and optimal production process in the relevant customer sites and is a part of passport technical data sheet.

CHEMICAL SENSITIZERS IN PASSPORT PAPER

Bleach	Base	Acid	Acetone	Ethanol
tetrahydrofuran	Trichloroethylene	Toluene	chloroform	Xylene