



Mühlbauer

High Tech International

Mühlbauer ID Services GmbH

Blanks of identity documents of the national passport system, driving licenses and registration certificates for the period 2024 – 2029

Lot 2: ID-1 Documents

Technical Proposal

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1 Document specification – ID Card

The physical characteristics of the blank identity card including card materials, construction, characteristics and dimension, complies with the ISO/IEC 7810. The following stages will be carried out for manufacturing the card:

- Drawing up of the design (background design, images, texts and captions of data fields) will be carried out by Public Service Agency (PSA)
- Manufacturing of the card and printing the background design, the image of the State Coat of Arms, the name of the State and the document, the caption of the data fields will be carried out by Mühlbauer
- Card personalization will be carried out by Public Service Agency (PSA)
- Chip personalization will be carried out by Public Service Agency (PSA)

The proposed ID card will:

- The form and content of the identity card will comply with minimum standards for travel documents according to provisions of ICAO Doc 9303, Parts 3 and 5
- The identity card will represent a card of ID-1 format (hereinafter - card), having rounded corners and nominal dimensions: 85,60 mm \pm 0,75 mm width, 53,98 mm \pm 0,75 mm height according to ISO/IEC 7810
- The physical characteristics of the card will comply with the requirements set out in ISO/IEC 7810 and Doc 9303, Part 3
- When manufacturing the card, there will be considered substrate material and secondly, its content, i.e. the security background design (security graphic design), elements of state symbols, name of both the state and document
- The management processes of security printing, in compliance with ISO 14298

1.1 General product overview – ID

The identity card will be secured using technics (technologies) and security features that are sufficient at the manufacturing and personalization level, so as not to admit counterfeiting or forgery.

CARD MATERIAL	<ul style="list-style-type: none"> 100% Polycarbonate (synthetic material), without fluorescence under UV light At least 7 layers
CARD CONSTRUCTION	High secure multi-layer construction without any kind of glue
BLANK CARD DIMENSIONS	According to ISO 7810 (ID1)
PERSONALIZATION TECHNOLOGY	Laser engraving
CHIP TECHNOLOGY	Dual Interface Chip (with contacts and contactless) - according to ISO/IEC 7816 and ISO/IEC 14443 parts 1- 4.
CHIP PERSONALIZATION	Will be done according to the Contracting Authority requirements
CARD NUMBER	<ul style="list-style-type: none"> The card number will consist of the series "EA" and 7 Arabic numerals, even if the first digits are "0", and will increase by one for each consecutive card At the manufacturing stage, in order to secure the management of cards movement, each card will be assigned to a sequential number, applied in a ID barcode, placed on the backside of the card The card number of the identity card will be identical to the serial number Specifications for barcode symbology Code 128 according to ISO/IEC 15417 The unidimensional barcode Code 128 with the card number of the card will be laser engraved
SECURITY BACKGROUND DESIGN	<ul style="list-style-type: none"> Front side: <ul style="list-style-type: none"> -8 visible colors (6 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer); - minimum 4 invisible colors with UV /Bi UV fluorescence (3 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) Back side: <ul style="list-style-type: none"> -minimum 8 visible colors (6 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 offset forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer); - minimum 3 invisible colors with UV /Bi UV fluorescence (2 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) Primary colors (CMYK) will not be used

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">SECURITY FEATURE</p>	<ul style="list-style-type: none"> • Semi-transparent DOVID (size 31 x 31mm) consisting of separate elements distributed over a large area of document (smallest one being not bigger than 10 mm² and the biggest one will not exceed 200 mm² and the minimum distance between two graphical elements shall be 0,5 mm). DOVID items will display the following feature: <ul style="list-style-type: none"> - maintained in the same plane and angle of light reflection, the two distinct reflective colors of the DOVID will interchange at any 90° rotation. - by tilting DOVID up and down, part or the entire surface of the two colored reflective areas will simultaneously display animations in opposite directions. - a part of one of the two colored reflective areas forms an object that renders a positive 3D relief effect on the "DOVID" surface. - the DOVID will be applied to a layer of polycarbonate to ensure adhesion with the body of the card, being placed in the structure of the card above the layer of biographical data engraved by laser. • Optically Variable Ink (OVI) with color change with UV fluorescence (located on the side of the card) • CLI/ MLI (with offset pre-printed lenticular effect image (MB SWIFT)) on the back side of the card • Tactile features made by blind embossing (on front and back side of the card) 	<ul style="list-style-type: none"> • Graphic elements in UV fluorescent (365nm and 313nm) with gradual color shift effect (on front and back side of the card) containing micro printing, fine lines in positive and negative • Transparent window (10 x 12mm) with color change (the transparent area will change its color according to the color of the background on which it is viewed, using technology with which the material used will have the effect of optical change): on light background: the window will have a primary color (blue); on dark background: the window will change its hue to a second color (red), and an image will appear as a third color (yellow-green) as an embedded image. The same effect is created when the transparent window is illuminated with an artificial light source (ex. Torch). The embedded image will also be reactive to UV light (yellow-green fluorescence) • Rainbow/ Iris printing (horizontally) • Deliberate error or changing of the symbol in the micro print text of the security background design • Ghost image inside transparent window • Graphic element applied with Iridescent ink (back side) • Guilloches/ Fine lines • Anti-scanning/ copy features (SAM or latent images) • Micro prints
<p>CONTENT OF THE CARD</p>	<p>Content of the ID card will be done in accordance to the Contracting Authority requirements</p>	
<p>CARD PERSONALIZATION</p>	<p>Personalization of the ID card will be done in accordance to the Contracting Authority requirements</p>	
<p>TECHNOLOGIES AND SECURITY FEATURES DURING PERSONALIZATION PROCESS</p>	<ul style="list-style-type: none"> • Laser engraving of data in inner layers • Tactile element, applied by using laser engraving in relief (data of the field data "Nr. documentului/ Document No.", placed on the front side of the card) • Variable laser image of MLI (the secondary image of the holder and the serial number of the document and the Date of expiry) placed on the backside • Use of expansion technologies that provide duplication of the identification data: MRZ, chip • Use of biometric elements: facial image, fingerprints and holder's signature • QR Code symbol specification - in accordance with ISO/IEC 18004 	

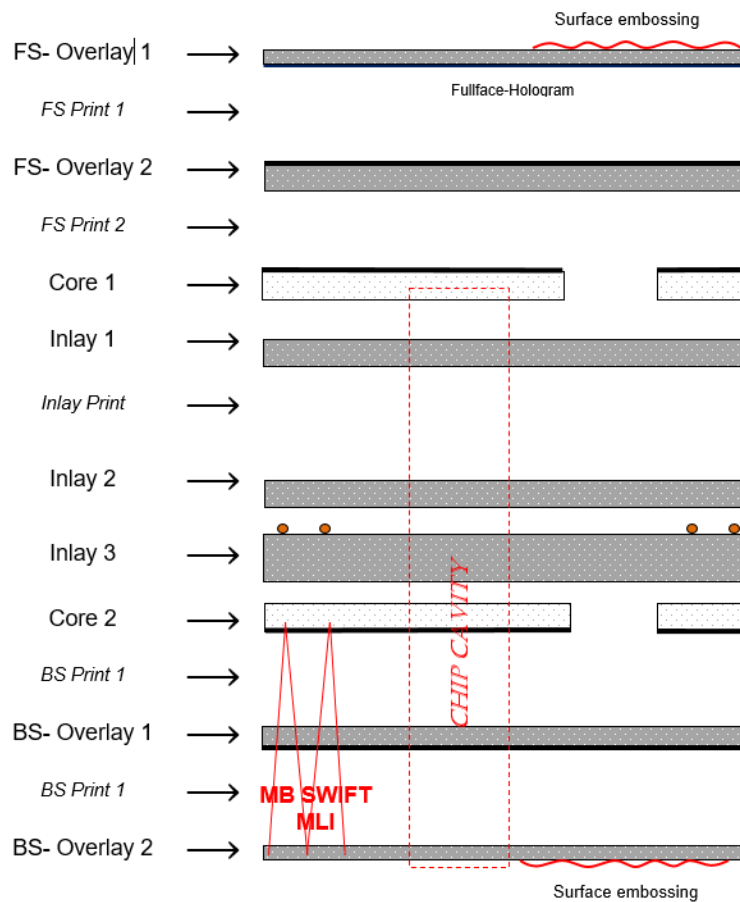
1.2 Test methods

Mühlbauer will perform test methods for determining the general characteristics of the cards - in compliance with ISO/IEC 10373-1 Parts 1, 3 and 6 and for machine readable travel documents (MRTD) and associated devices, in compliance with ISO/IEC 18745, Part 1 and 2.

1.3 Document construction

The polycarbonate substrate will have a multi-layer structure technologically assembled, without adhesive, by hot pressing, which will not allow the layers to separate. The substrate accepts the internal laser engraving of both sides of the card. Once awarded Mühlbauer will share the final document structure with the Contracting Authority.

Example structure of ID card with security features:



The final identification document consists of several synthetic foils, which together form a multi-layer construction. Each of these foils carries different components of the document, for example the antenna, the printed or the personalized part. During the production the different foils are assembled, collated and laminated together under high heat and pressure – without using any kind of glue. The final result is a mono block of polymer which cannot be separated into the original single foils, anymore. Therefore, this multi-layer construction prevents documents from being copied or imitated: any attempt of separating the different document layers or manipulating the data will damage the other layers so that an immediately recognizable evidence is left on the document. The substrate accepts internal laser engraving on both sides of the card. The adjacent layers of the polycarbonate substrate will ensure the insertion of the requested security features.

2 DOCUMENT SPECIFICATION – Residence Card

The physical characteristics of the blank card including card materials, construction, characteristics and dimension, complies with the ISO/IEC 7810. The following stages will be carried out for manufacturing the card:

- Drawing up of the design (background design, images, texts and captions of data fields) will be carried out by Public Service Agency (PSA)
- Manufacturing of the card and printing the background design, the image of the State Coat of Arms, the name of the State and the document will be carried out by Mühlbauer
- Captions of data fields will be laser engraved during personalization process
- Card personalization will be carried out by Public Service Agency (PSA)
- Chip personalization will be carried out by Public Service Agency (PSA)

The proposed RC card will:

- The form and content of the residence card will comply with the recommendations of Doc 9303 and Council Regulation (EC) No 1030/2002 of 13 June 2002 laying down a uniform format for residence permits for third-country nationals (OJ L 157, 15.6.2002, p. 1-7)
- The residence card will represent a card of ID-1 format (hereinafter - card), having rounded corners and nominal dimensions: 85,60 mm ± 0.75 mm width, 53,98 mm ± 0,75 mm height according to ISO/IEC 7810
- The physical characteristics of the card will comply with the requirements set out in ISO/IEC 7810 and Doc 9303, Part 3
- When manufacturing the card, there will be considered substrate material and secondly, its content, i.e. the security background design (security graphic design), elements of state symbols, name of both the state and document
- The management processes of security printing, in compliance with ISO 14298

2.1 General product overview – RC

The resident card will be secured using technics (technologies) and security features that are sufficient at the manufacturing and personalization level, so as not to admit counterfeiting or forgery.

CARD MATERIAL	<ul style="list-style-type: none"> • 100% Polycarbonate (synthetic material), without fluorescence under UV light • At least 7 layers
CARD CONSTRUCTION	High secure multi-layer construction without any kind of glue
BLANK CARD DIMENSIONS	According to ISO 7810 (ID1)
PERSONALIZATION TECHNOLOGY	Laser engraving
CHIP TECHNOLOGY	Dual Interface Chip (with contacts and contactless) - according to ISO/IEC 7816 and ISO/IEC 14443 parts 1- 4.
CHIP PERSONALIZATION	Will be done according to the Contracting Authority requirements
CARD NUMBER	<ul style="list-style-type: none"> • Letters "EB" and a 7 Arabic numerals, even if the first digits are "0", and will increase by one for each consecutive card • At the manufacturing stage, in order to secure the management of cards movement, each card will be assigned to a sequential number, applied in a 1D barcode, placed on the back side of the card • The card number of the residence card will be the same as the serial number • Specifications for barcode symbology Code 128 according to ISO/IEC 15417

	<ul style="list-style-type: none"> The unidimensional barcode Code 128 with the card number of the card will be laser engraved
<p>SECURITY BACKGROUND DESIGN</p>	<ul style="list-style-type: none"> Front side: <ul style="list-style-type: none"> -8 visible colors (6 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer); - minimum 4 invisible colors with UV /Bi UV fluorescence (3 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) Back side: <ul style="list-style-type: none"> -minimum 8 visible colors (6 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 offset forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer); - minimum 3 invisible colors with UV /Bi UV fluorescence (2 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) Primary colors (CMYK) will not be used
<p>SECURITY FEATURE</p>	<ul style="list-style-type: none"> Semi-transparent DOVID (size 31 x 31mm) consisting of separate elements distributed over a large area of document (smallest one being not bigger than 10 mm² and the biggest one will not exceed 200 mm² and the minimum distance between two graphical elements shall be 0,5 mm). DOVID items will display the following feature: <ul style="list-style-type: none"> - maintained in the same plane and angle of light reflection, the two distinct reflective colors of the DOVID will interchange at any 90° rotation. - by tilting DOVID up and down, part or the entire surface of the two colored reflective areas will simultaneously display animations in opposite directions. - a part of one of the two colored reflective areas forms an object that renders a positive 3D relief effect on the "DOVID" surface. - the DOVID will be applied to a layer of polycarbonate to ensure adhesion with the body of the card, being placed in the structure of the card above the layer of biographical data engraved by laser. Optically Variable Ink (OVI) with color change with UV fluorescence (located on the front side of the card) CLI/ MLI (with offset pre-printed lenticular effect image (MB SWIFT)) on the back side of the card Tactile features made by blind embossing (on front and back side of the card) Graphic elements in UV fluorescent (365nm and 313nm) with gradual color shift effect (on front and back side of the card) containing micro printing, fine lines in positive and negative Rainbow/ Iris printing (horizontally) Deliberate error or changing of the symbol in the micro print text of the security background design Ghost image inside transparent window Graphic element applied with Iridescent ink (back side) Guilloches/ Fine lines Anti-scanning/ copy features (SAM or latent images) Micro prints
<p>CONTENT OF THE CARD</p>	<p>Content of the RC card will be done in accordance to the Contracting Authority requirements</p>
<p>CARD PERSONALIZATION</p>	<p>Personalization of the RC card will be done in accordance to the Contracting Authority requirements</p>

<p>TECHNOLOGIES AND SECURITY FEATURES DURING PERSONALIZATION PROCESS</p>	<ul style="list-style-type: none">● Laser engraving of data in inner layers● Tactile element, applied by using laser engraving in relief (data of the field data "Nr. documentului", placed on the front side of the card)● Variable laser image of MLI (the secondary image of the holder and the serial number of the document and the Date of expiry) placed on the backside● Use of expansion technologies that provide duplication of the identification data: MRZ, chip● Use of biometric elements: facial image, fingerprints and holder's signature● QR Code symbol specification - in accordance with ISO/IEC 18004
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2.2 Chip

The proposed document will contain a dual interface chip module, which is equipped with the state of the art chip operating system. This multi-application operating system is fully compliant to ISO/IEC 14443 contactless and ISO 7816 contact communication and ensures high interoperability. Applications running on top of that system provide the dedicated functions necessary for electronic machine readable travel document or signature functions

The main features for the communication interfaces are:

- Contactless: ISO/IEC 14443 Type A or B up to 848 kbps
- Contact: ISO 7816
- PC/SC compatible
- Support of extended length APDUs
- Support of secure messaging

The solution is fully compliant to ICAO Doc9303 and therefore supports (secure) data storage in the logical data structure (LDS) as defined by ICAO Doc 9303 (i.e. personal data, biometric data like face, fingerprint or iris images) and controlled access to these data.

The travel application on the chip supports various crypto setups and crypto migration. This includes the following :

- DOC. 9303 & BSI TR03110
- Support of all mandatory and optional DGs
- LDS Version 1.7 & 1.8
- Passive Authentication (PA)
- Basic Access Control (BAC)
- Active Authentication (AA)
- Extended Access Control (EAC)
- Supplemental Access Control (SAC) / PACE

The solution supports the following norms and standards:

- ISO/IEC 7816
- ISO/IEC 14443
- ICAO Doc 9303 "Machine Readable Travel Documents" Eighth Edition
- Technical Guideline TR-03110-1 BSI TR-03110-1 Advanced Security Mechanisms for Machine Readable Travel Documents – Part 1 - Version 2.10,
- Technical Guideline TR-03110-1 BSI TR-03110-3 Advanced Security Mechanisms for Machine Readable Travel Documents – Part 3 - Version 2.10

Additionally the chip solution is evaluated and certified in the Common Criteria scheme:

- the Chip-Hardware is EAL 6+ certified
- travel application with the PACE/EAC configuration EAL 5+

The following cryptographic algorithms and security features are provided:

- ISO/IEC 7816-8 security commands
- DES, 3DES & AES
- RSA up to 4096bit
- Elliptic Curve up to 521bit
- SHA-1 & SHA-2 family
- Chip Authentication
- Terminal Authentication
- De-/Encryption
- True random numbers generation
- Random UID / PUPI

The document will also support a PKI application that can be used as a Qualified Signature Creation Device as well as for user identification and secure email. User authentication towards the will be done via PINs. Additional user data can be stored in the eID application.

With more than 120 KB of memory for personalization the chip provides enough space for mandatory and optional data groups in the Logical Data Structure the signature functionality and eID application as well as future data sets.

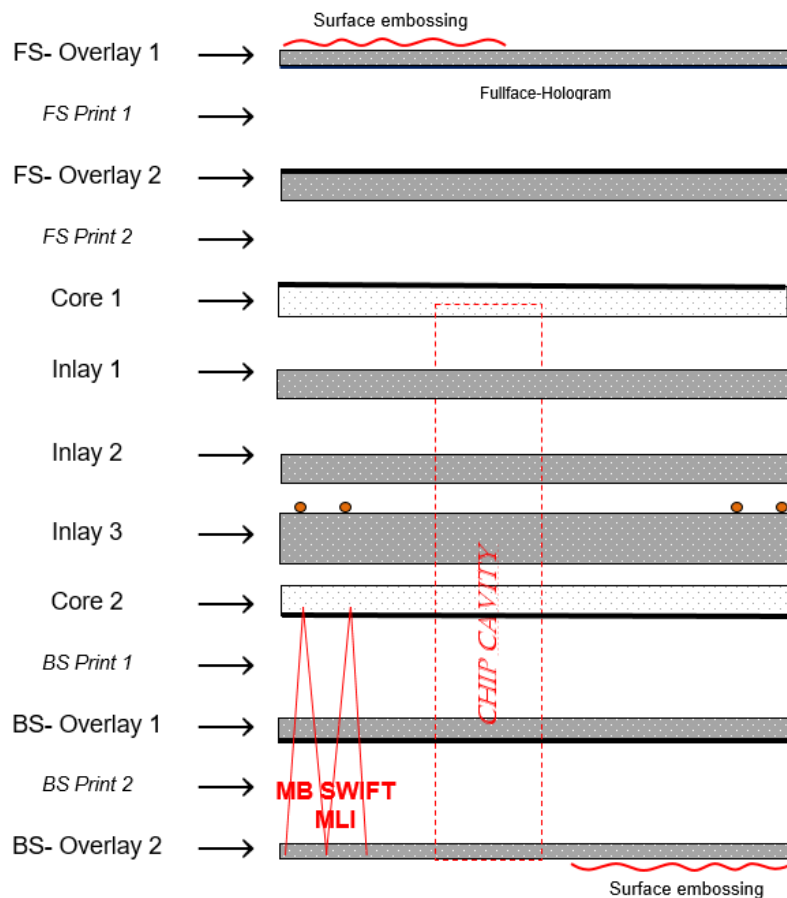
2.3 Test methods

Mühlbauer will perform test methods for determining the general characteristics of the cards - in compliance with ISO/IEC 10373-1 Parts 1, 3 and 6 and for machine readable travel documents (MRTD) and associated devices, in compliance with ISO/IEC 18745, Part 1 and 2.

2.4 Document construction

The polycarbonate substrate will have a multi-layer structure technologically assembled, without adhesive, by hot pressing, which will not allow the layers to separate. The substrate accepts the internal laser engraving of both sides of the card. Once awarded Mühlbauer will share the final document structure with the Contracting Authority.

Example structure of RC card with security features:



The final identification document consists of several synthetic foils, which together form a multi-layer construction. Each of these foils carries different components of the document, for example the antenna, the printed or the personalized part. During the production the different foils are assembled, collated and laminated together under high heat and pressure – without using any kind of glue. The final result is a mono block of polymer which cannot be separated into the original single foils, anymore. Therefore, this multi-layer construction prevents documents from being copied or imitated: any attempt of separating the different document layers or manipulating the data will damage the other layers so that an immediately recognizable evidence is left on the document. The substrate accepts internal laser engraving on both sides of the card. The adjacent layers of the polycarbonate substrate will ensure the insertion of the requested security features.

3 DOCUMENT SPECIFICATION – Driving license

The physical characteristics of the blank card including card materials, construction, characteristics and dimension, complies with the ISO/IEC 7810. The following stages will be carried out for manufacturing the card:

- Drawing up of the design (background design, images, texts and captions of data fields) will be carried out by Public Service Agency (PSA)
- Manufacturing of the card and printing the background design, the name of the State and the document and caption of data fields will be carried out by Mühlbauer
- Captions of data fields will be laser engraved during personalization process
- Card personalization will be carried out by Public Service Agency (PSA)

The proposed DL card will:

- The form, structure and data included in driving license is in compliance with ISO/IEC 18013-1
- The driving license card will represent a card of ID-1 format (hereinafter - card), having rounded corners and nominal dimensions: 85,60 mm ± 0.75 mm width, 53,98 mm ± 0,75 mm height according to ISO/IEC 7810
- The physical characteristics of the card will comply with the requirements set out in ISO/IEC 7810 and Doc 9303, Part 3
- When manufacturing the card, there will be considered substrate material and secondly, its content, i.e. the security background design (security graphic design), elements of state symbols, name of the state and document, captions of data fields, country code (alpha-2), according to ISO 3166-1 and vehicle categories
- The management processes of security printing, in compliance with ISO 14298

3.1 General product overview – DL

The driving license card will be secured using technics (technologies) and security features that are sufficient at the manufacturing and personalization level, so as not to admit counterfeiting or forgery.

CARD MATERIAL	<ul style="list-style-type: none"> • 100% Polycarbonate (synthetic material), without fluorescence under UV light • At least 7 layers
CARD CONSTRUCTION	High secure multi-layer construction without any kind of glue
BLANK CARD DIMENSIONS	According to ISO 7810 (ID1)
PERSONALIZATION TECHNOLOGY	Laser engraving
CARD NUMBER	<ul style="list-style-type: none"> • The card number will consist of 7/ 9 Arabic numerals • Requirements regarding the consecutive numbering of the cards will be stated in the contract of procurement • At the manufacturing stage, in order to secure the management of cards movement, each card will be assigned to a sequential number, applied in a 1D barcode, placed on the back side of the card will ensure the consecutive numbering of the cards • Specifications for barcode symbology Code 128 according to ISO/IEC 15417 • The unidimensional barcode Code 128 with the card number will be laser engraved
SECURITY BACKGROUND DESIGN	<ul style="list-style-type: none"> • Front side: -8 visible colors (6 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer);

	<ul style="list-style-type: none"> - minimum 4 invisible colors with UV /Bi UV fluorescence (3 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) • Back side: <ul style="list-style-type: none"> -minimum 6 visible colors (4 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 offset forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer); - minimum 3 invisible colors with UV /Bi UV fluorescence (2 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) • Primary colors (CMYK) will not be used 	
<p>SECURITY FEATURE</p>	<ul style="list-style-type: none"> • Semi-transparent DOVID (size 31 x 31mm) consisting of separate elements distributed over a large area of document (smallest one being not bigger than 10 mm² and the biggest one will not exceed 200 mm² and the minimum distance between two graphical elements shall be 0,5 mm). DOVID items will display the following feature: <ul style="list-style-type: none"> - maintained in the same plane and angle of light reflection, the two distinct reflective colors of the DOVID will interchange at any 90° rotation. - by tilting DOVID up and down, part or the entire surface of the two colored reflective areas will simultaneously display animations in opposite directions. - a part of one of the two colored reflective areas forms an object that renders a positive 3D relief effect on the "DOVID" surface. - the DOVID will be applied to a layer of polycarbonate to ensure adhesion with the body of the card, being placed in the structure of the card above the layer of biographical data engraved by laser. • Feature printed by using the optically variable ink (OVI) that changes the color (representing the country code "MD" placed into an ellipse and graphics in the form of road signs), with fluorescence under UV light, placed on the both side (front/back) of the card • CLI/ MLI (with offset pre-printed lenticular effect image (MB SWIFT)) on the front side of the card 	<ul style="list-style-type: none"> • Tactile features made by blind embossing (on front and back side of the card) • Graphic elements in UV fluorescent (365nm and 313nm) with gradual color shift effect (on front and back side of the card) containing micro printing, fine lines in positive and negative • Rainbow/ Iris printing (horizontally) • Deliberate error or changing of the symbol in the micro print text of the security background design • Transparent window (10 x 10mm) with color change (the transparent area will change its color according to the color of the background on which it is viewed, using technology with which the material used will have the effect of optical change): on light background: the window will have a primary color (blue); on dark background: the window will change its hue to a second color (red), and an image will appear as a third color (yellow-green) as an embedded image. The same effect is created when the transparent window is illuminated with an artificial light source (ex. Torch). The embedded image will also be reactive to UV light (yellow-green fluorescence) • Ghost image inside transparent window • Graphic element applied with Iridescent ink (back side) • Guilloches/ Fine lines • Anti-scanning/ copy features (SAM or latent images) • Micro prints
<p>CONTENT OF THE CARD</p>	<p>Content of the DL card will be done in accordance to the Contracting Authority requirements</p>	
<p>CARD PERSONALIZATION</p>	<p>Personalization of the DL card will be done in accordance to the Contracting Authority requirements</p>	

TECHNOLOGIES AND SECURITY FEATURES DURING PERSONALIZATION PROCESS	<ul style="list-style-type: none"> ● Laser engraving of data in inner layers ● Tactile element, applied by using laser engraving in relief (the serial number of the driving license) ● Variable laser image of MLI (the secondary image of the holder and the serial number of the document and the Date of expiry) placed on the front side ● Use of biometric elements: facial image, holder's signature ● QR Code symbol specification - in accordance with ISO/IEC 18004
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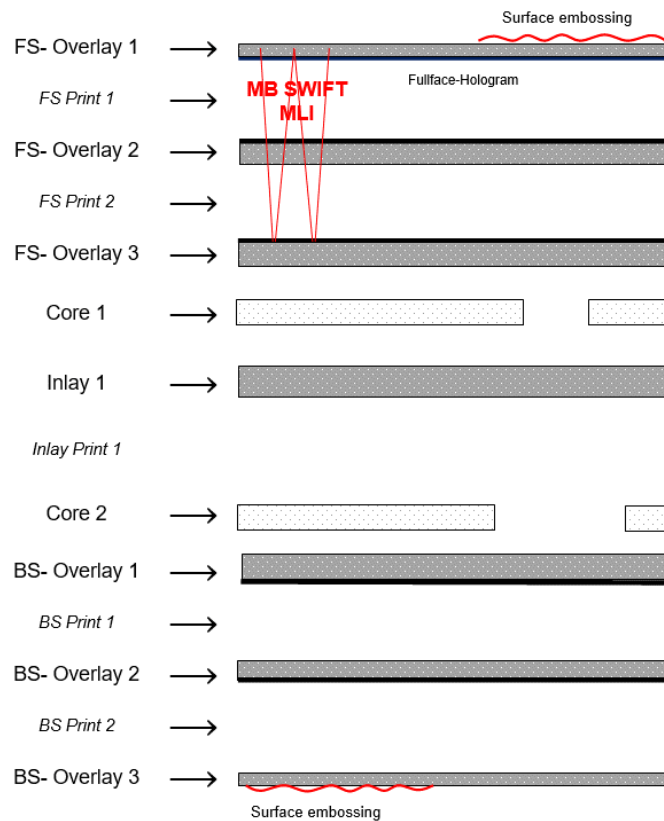
3.2 Test methods

Mühlbauer will perform test methods for determining the general characteristics of the cards - in compliance with ISO/IEC 10373-1 and ISO/IEC 18013-4.

3.3 Document construction

The polycarbonate substrate will have a multi-layer structure technologically assembled, without adhesive, by hot pressing, which will not allow the layers to separate. The substrate accepts the internal laser engraving of both sides of the card. Once awarded Mühlbauer will share the final document structure with the Contracting Authority.

Example structure of DL card with security features:



The final identification document consists of several synthetic foils, which together form a multi-layer construction. Each of these foils carries different components of the document, for example the antenna, the printed or the personalized part. During the production the different foils are assembled, collated and laminated together under high heat and pressure – without using any kind of glue. The final result is a mono block of polymer which cannot be separated into the original single foils, anymore. Therefore, this multi-layer construction prevents documents from being copied or imitated: any attempt of separating the different document layers or manipulating the data will damage the other layers so that an immediately recognizable evidence is left on the document. The substrate accepts internal laser engraving on both sides of the card. The adjacent layers of the polycarbonate substrate will ensure the insertion of the requested security features.

4 DOCUMENT SPECIFICATION – Vehicle Registration Certificate

The physical characteristics of the blank card including card materials, construction, characteristics and dimension, complies with the ISO/IEC 7810. The following stages will be carried out for manufacturing the card:

- Drawing up of the design (background design, images, texts and captions of data fields) will be carried out by Public Service Agency (PSA)
- Manufacturing of the card and printing the background design, the name of the State and the document and the document, captions and codes of data fields and their decipherment will be carried out by Mühlbauer
- Captions of data fields will be laser engraved during personalization process
- Card personalization will be carried out by Public Service Agency (PSA)

The proposed VP card will:

- The form and content of the vehicle registration certificate – in compliance with the Directive 1999/37/CE
- The vehicle registration certificate will represent a card of ID-1 format, having rounded comers and nominal dimensions: 85,60 mm ± 0.75 mm width, 53,98 mm± 0,75 mm height according to ISO/IEC 7810
- The physical characteristics of the card will comply with ISO/IEC 7810
- When manufacturing the card, there will be considered substrate material and secondly, its content, i.e. the security background design (security graphic design), country code (alpha-2), according to ISO 3166-1 applied in an ellipse, the name of the document and state, captions of data fields, codes of data fields and their decipherment (on the backside)
- The management processes of security printing, in compliance with ISO 14298

4.1 General product overview – VP

The vehicle registration certificate will be secured using technics (technologies) and security features that are sufficient at the manufacturing and personalization level, so as not to admit counterfeiting or forgery.

CARD MATERIAL	<ul style="list-style-type: none"> • 100% Polycarbonate (synthetic material), without fluorescence under UV light • At least 7 layers
CARD CONSTRUCTION	High secure multi-layer construction without any kind of glue
BLANK CARD DIMENSIONS	According to ISO 7810 (ID1)
PERSONALIZATION TECHNOLOGY	Laser engraving
CARD NUMBER	<ul style="list-style-type: none"> • The serial number of the registration certificate will consist of 9 Arabic numerals • At the manufacturing stage, in order to secure the management of cards movement, each card will be assigned to a sequential number, applied in a 1D barcode, placed on the back side of the card and will ensure the consecutive numbering of the cards • The card number will consist of 7 Arabic numerals, even if the first digits are "0" , and will increase by one for each consecutive card • Specifications for barcode symbology Code 128 according to ISO/IEC 15417 • The unidimensional barcode (1D) Code 128 with the card number will be laser engraved
SECURITY BACKGROUND DESIGN	<ul style="list-style-type: none"> • Front side: -8 visible colors (6 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer);

	<ul style="list-style-type: none"> - minimum 3 invisible colors with UV /Bi UV fluorescence (2 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) • Back side: <ul style="list-style-type: none"> -minimum 8 visible colors (6 offset forms including iris printing, metameric Ink Pair and Pantone with UV fluorescence (2 offset forms with shift colors effect to A-B-A)) on the first layer (all in one polycarbonate layer); - minimum 3 invisible colors with UV /Bi UV fluorescence (2 offset forms including rainbow printing (with shift colors effect to A-B-A)) on the second layer (all in one polycarbonate layer) • Primary colors (CMYK) will not be used
<p>SECURITY FEATURE</p>	<ul style="list-style-type: none"> • Semi-transparent DOVID (size 31 x 31mm) consisting of separate elements distributed over a large area of document (smallest one being not bigger than 10 mm² and the biggest one will not exceed 200 mm² and the minimum distance between two graphical elements shall be 0,5 mm). DOVID items will display the following feature: <ul style="list-style-type: none"> - maintained in the same plane and angle of light reflection, the two distinct reflective colors of the DOVID will interchange at any 90° rotation. - by tilting DOVID up and down, part or the entire surface of the two colored reflective areas will simultaneously display animations in opposite directions. - a part of one of the two colored reflective areas forms an object that renders a positive 3D relief effect on the "DOVID" surface. - the DOVID will be applied to a layer of polycarbonate to ensure adhesion with the body of the card, being placed in the structure of the card above the layer of biographical data engraved by laser. • Feature printed by using the optically variable ink (OVI) that changes the color (representing the country code "MD" placed into an ellipse and graphics in the form of road signs), with fluorescence under UV light, placed on the front side of the card • Tactile features made by blind embossing (on front and back side of the card) • Graphic elements in UV fluorescent (365nm and 313nm) with gradual color shift effect (on front and back side of the card) containing micro printing, fine lines in positive and negative • Rainbow/ Iris printing (horizontally) • Deliberate error or changing of the symbol in the micro print text of the security background design • Graphic element applied with Iridescent ink (back side) • Guilloches/ Fine lines • Anti-scanning/ copy features (SAM or latent images) • Micro prints
<p>CONTENT OF THE CARD</p>	<p>Content of the VP card will be done in accordance to the Contracting Authority requirements</p>
<p>CARD PERSONALIZATION</p>	<p>Personalization of the VP card will be done in accordance to the Contracting Authority requirements</p>
<p>TECHNOLOGIES AND SECURITY FEATURES DURING PERSONALIZATION PROCESS</p>	<ul style="list-style-type: none"> • Laser engraving of data in inner layers • Tactile element, applied by using laser engraving in relief (registration certificate number, IDNV number (vehicle code in SVR)) • Use of expansion technologies that provide duplication of the identification data of vehicle in the PDF417 barcode

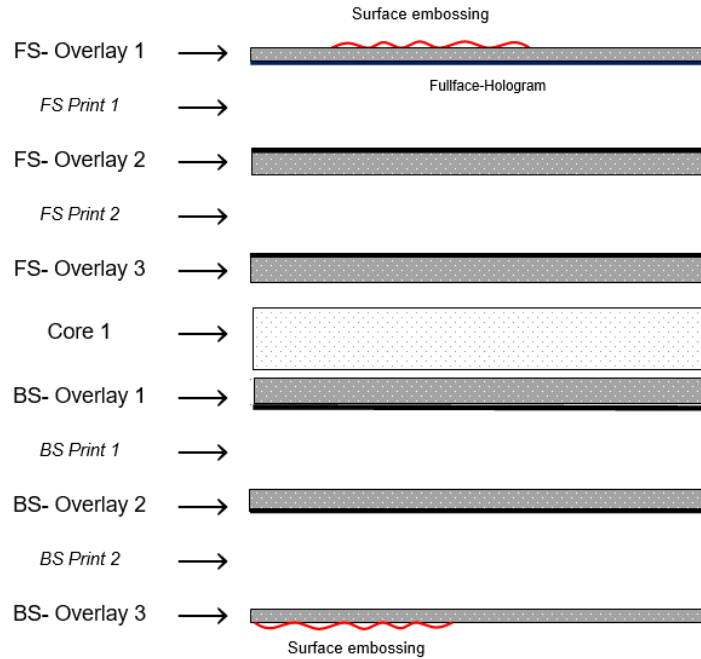
4.2 Test methods

Mühlbauer will perform test methods for determining the general characteristics of the cards - in compliance with ISO/IEC 10373-1.

4.3 Document construction

The polycarbonate substrate will have a multi-layer structure technologically assembled, without adhesive, by hot pressing, which will not allow the layers to separate. The substrate accepts the internal laser engraving of both sides of the card. Once awarded Mühlbauer will share the final document structure with the Contracting Authority.

Example structure of VP card with security features:



The final identification document consists of several synthetic foils, which together form a multi-layer construction. Each of these foils carries different components of the document, for example the antenna, the printed or the personalized part. During the production the different foils are assembled, collated and laminated together under high heat and pressure – without using any kind of glue. The final result is a mono block of polymer which cannot be separated into the original single foils, anymore. Therefore, this multi-layer construction prevents documents from being copied or imitated: any attempt of separating the different document layers or manipulating the data will damage the other layers so that an immediately recognizable evidence is left on the document. The substrate accepts internal laser engraving on both sides of the card. The adjacent layers of the polycarbonate substrate will ensure the insertion of the requested security features.

5 Technical Data Sheets for PC Material



Makrofol® ID 6-2 laserable

Description and Application Information

Makrofol® ID 6-2 is available as a laserable film in two different colour grades (750059, 750061). Due to its outstanding optical properties it is the top choice for overlay-materials in cards. With Makrofol® ID 6-2, text as well as images can be lasered in high resolution and contrast. The surface structure is one side fine velvet one side very fine matte.

Available in various standard thicknesses from 30 microns to 680 microns as roll and sheets.

Typical applications are identity cards, driving licences and passports.

Guide data*

General properties			
Property	Value	Unit of measurement	Method
Density	1,2	g/cm ³	ISO 1183, 20°C method C
Gloss, 60° top side	1,5 to 4,5	Digits	ISO 2813
Gloss, 60° reverse side	≤ 15	Digits	ISO 2813
Mechanical properties			
Property	Value	Unit of measurement	Method
Tensile Modulus	≥ 2000	MPa	ISO 527-1,-3
Tensile strength at break, parallel	≥ 50	MPa	ISO 527-1,-3
Tensile strength at break, across	≥ 50	MPa	ISO 527-1,-3
Elongation at break, parallel	≥ 50	%	ISO 527-1,-3
Thermal properties			
Property	Value	Unit of measurement	Method
Coefficient of linear thermal expansion, parallel 20 to 120°C	70	10 ⁻⁶ /K	following DIN 53752
Coefficient of linear thermal expansion, across 20 to 120°C	70	10 ⁻⁶ /K	following DIN 53752
Shrinkage, parallel 130°C, 1 h	< 0,3	%	following IEC 60674-2
Shrinkage, across 130°C, 1 h	< 0,3	%	following IEC 60674-2
Optical properties			
Property	Value	Unit of measurement	Method
Light transmittance	80	%	ISO 13468-2, following DIN 5036
Other properties			
Property	Value	Unit of measurement	Method
Water absorption (saturation)	0,2	%	following ISO 62

* These values provide general information and are not part of the product specification.

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Edition 2015-09-02

Replaces edition dated 2014-01-14





Makrofol® ID 4-4 160016

Description and Application Information

Makrofol® ID 4-4 160016 is a film specially designed for the inlay of cards and passports. It offers at 50 µm an opacity level of 100 µm standard white films. The surface structure of Makrofol® ID 4-4 160016 is both sides fine matte. It is available in standard thicknesses 30 microns, 50 microns and 100 microns, other thicknesses on request. Available as roll and sheets. Typical applications are identity cards, credit cards, driving licences and passports.

Preliminary guide data

General properties

Property	Value	Unit of measurement	Method
Density	1,58	g/cm ³	ISO 1183, 20°C method C
Gloss, 60° top side (50 µm thickness)	≤ 20	Digits	ISO 2813
Gloss, 60° reverse side (50 µm thickness)	≤ 20	Digits	ISO 2813

Mechanical properties

Property	Value	Unit of measurement	Method
Tensile Modulus	≥ 2000	MPa	ISO 527-1,-3
Tensile strength at break	≥ 45	MPa	ISO 527-1,-3
Elongation at break	≥ 8	%	ISO 527-1,-3

Optical properties

Property	Value	Unit of measurement	Method
Transmittance (50µm thickness)	≤ 15	%	ASTM D1003

Thermal properties

Property	Value	Unit of measurement	Method
Shrinkage, parallel 130°C, 1 h	< 0,3	%	following IEC 60674-2
Shrinkage, across 130°C, 1 h	< 0,3	%	following IEC 60674-2

Labeling and REACH applications

This product data sheet is only valid in conjunction with the latest edition of the corresponding Safety Data Sheet.

Any updating of safety-relevant information – in accordance with statutory requirements – will only be reflected in the Safety Data Sheet, copies of which will be revised and distributed. Information relating to the current classification and labeling, applications and processing methods and further data relevant to safety can be found in the currently valid Safety Data Sheet.

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Edition 2020-02-07

Replaces edition dated 2018-08-03



Preliminary Product Datasheet



Makrofol® ID298 6-2 750061 (Antidust laserable)

Description and Application Information

Makrofol® ID298 6-2 750061 is a transparent extrusion film based on Makrolon polycarbonate of Covestro for card applications.

This Antidust card overlay material is available as laser engravable type. The material comprises a special anti-dust formulation, which offers the following advantages:

- reduced contamination by dust particles
- reduced adhesion between sheets due to less electrostatic charges during card production
- substantially better homogeneity in printing ink application

The surface combination is fine velvet/very fine matte (6-2).

Makrofol® ID298 6-2 750061 is available in standard thickness 100 microns. Other thicknesses and surface structures on request.

Preliminary guide data

General properties

Property	Value	Unit of measurement	Method
Density	1,2	g/cm ³	ISO 1183, 20°C, Method C
Thickness laserable	100	µm	ISO 4593, 23°C

Mechanical properties

Property	Value	Unit of measurement	Method
Tensile Modulus	≥ 2000	MPa	ISO 527-1,-3
Tensile strenght at break	≥ 50	MPa	ISO 527-1,-3
Elongation at break	≥ 50	%	ISO 527-1,-3

Labeling and REACH applications

This product data sheet is only valid in conjunction with the latest edition of the corresponding Safety Data Sheet.

Any updating of safety-relevant information – in accordance with statutory requirements – will only be reflected in the Safety Data Sheet, copies of which will be revised and distributed. Information relating to the current classification and labeling, applications and processing methods and further data relevant to safety can be found in the currently valid Safety Data Sheet.



Makrofol® ID 4-4 010207

Description and Application Information

Makrofol® ID 4-4 010207 white is the top choice inlay-material in cards. The surface structure is both sides fine matte.

It is available in various standard thicknesses between 80 microns to 650 microns, other thicknesses on request. Available as roll and sheets.

Typical applications are identity cards, credit cards, driving licences and passports.

Guide data*

General properties

Property	Value	Unit of measurement	Method
Density	1,34	g/cm ³	ISO 1183, 20°C method C
Gloss, 60° top side	≤ 11	Digits	ISO 2813
Gloss, 60° reverse side	≤ 11	Digits	ISO 2813

Mechanical properties

Property	Value	Unit of measurement	Method
Tensile Modulus	≥ 2000	MPa	ISO 527-1,-3
Tensile strength at break, parallel	≥ 50	MPa	ISO 527-1,-3
Tensile strength at break, across	≥ 50	MPa	ISO 527-1,-3
Elongation at break, parallel	≥ 10	%	ISO 527-1,-3

Thermal properties

Property	Value	Unit of measurement	Method
Shrinkage, parallel 130°C, 1 h	< 0,3	%	following IEC 60674-2
Shrinkage, across 130°C, 1 h	< 0,3	%	following IEC 60674-2

* These values provide general information and are not part of the product specification.

Labeling and REACH applications

This product data sheet is only valid in conjunction with the latest edition of the corresponding Safety Data Sheet.

Any updating of safety-relevant information – in accordance with statutory requirements – will only be reflected in the Safety Data Sheet, copies of which will be revised and distributed. Information relating to the current classification and labeling, applications and processing methods and further data relevant to safety can be found in the currently valid Safety Data Sheet.

6 Packaging, Storage and Delivery of cards

6.1 Packaging and storage

ID, RC, DL and VR cards on polycarbonate substrate will be packaged 500 (five hundred) cards in corrugated cardboard inner boxes. Four inner boxes will be packed and sealed in an outer box of reinforced corrugated cardboard. A label containing product identification and information will be applied to each box.

The label on inner box will contain the following information:

- Manufacturer (abbreviation or Logo)
- Name of goods (or the code)
- Box number (digits + barcode)
- Quantity
- Range numbers of identity cards contained in the box

The label on outer box will contain the following information:

- Careful when transporting (sign will be displayed on box)
- Do not throw (sign will be displayed on box)
- Store in a dry place (sign will be displayed on box)
- Manufacturer (name and address)
- Origin country
- Name of goods
- Box number (digits + barcode)
- Quantity
- Range numbers of cards contained in the box

Inscriptions on labels will be displayed in English.

Boxes of polycarbonate cards will be stored under normal conditions on smooth and horizontal surfaces, which will ensure that the properties of the cards are intact. An optimal temperature and humidity regime will be ensured during storage, the indoor microclimate will be maintained within:

- Temperature from 18°C to 22°C
- Humidity of 50% +/- 10%
- Neutral environment: no acid, alkaline, organic and inorganic solvents

6.2 Delivery

Contracting Authority is entitled to modify the delivery timing during the reference year with the Mühlbauer Group's consent.

No.	Type	Quantity	Expected deadlines
1	Card on polycarbonate base support with dual interface embedded chip - Identity Card (ID) - (serial number EA 0000000)	1000	Within 30 calendar days from the date of the Buyer's final approval of the assembled blank models
	Card on polycarbonate base support with dual interface embedded chip - Residence Card (RC) - (serial number EB 0000000)	500	
	Card on polycarbonate base support – Driving license (DL)	1000	
	Card on polycarbonate base support – Vehicle registration certificate (VP)	1000	
2025			
2	Card on polycarbonate base support with dual interface embedded chip - Identity Card (ID)	300 000	During 2025, within 45 calendar days from the date of the Buyer's order submission
	Card on polycarbonate base support with dual interface embedded chip - Residence Card (RC)	10 000	
	Card on polycarbonate base support – Driving license (DL)	85 000	
	Card on polycarbonate base support – Vehicle registration certificate (VP)	160 000	
2026			
3	Card on polycarbonate base support with dual interface embedded chip - Identity Card (ID)	270 000	During 2026, within 45 calendar days from the date of the Buyer's order submission
	Card on polycarbonate base support with dual interface embedded chip - Residence Card (RC)	14 000	
	Card on polycarbonate base support – Driving license (DL)	115 000	
	Card on polycarbonate base support – Vehicle registration certificate (VP)	200 000	
2027			
4	Card on polycarbonate base support with dual interface embedded chip - Identity Card (ID)	250 000	During 2027, within 45 calendar days from the date of the Buyer's order submission
	Card on polycarbonate base support with dual interface embedded chip - Residence Card (RC)	15 000	
	Card on polycarbonate base support – Driving license (DL)	130 000	
	Card on polycarbonate base support – Vehicle registration certificate (VP)	210 000	
2028			
5	Card on polycarbonate base support with dual interface embedded chip - Identity Card (ID)	250 000	During 2028, within 45 calendar days from the date of
	Card on polycarbonate base support with dual interface embedded chip - Residence Card (RC)	15 500	

	Card on polycarbonate base support – Driving license (DL)	130 000	the Buyer's order submission
	Card on polycarbonate base support – Vehicle registration certificate (VP)	210 000	
2029			
6	Card on polycarbonate base support with dual interface embedded chip - Identity Card (ID)	180 000	During 2029, within 45 calendar days from the date of the Buyer's order submission
	Card on polycarbonate base support with dual interface embedded chip - Residence Card (RC)	16 000	
	Card on polycarbonate base support – Driving license (DL)	120 000	
	Card on polycarbonate base support – Vehicle registration certificate (VP)	175 000	



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