

## SECURE LAMINATES TO SECURE DOCUMENTS AND METHOD OF MANUFACTURING THE SAME

### FIELD OF THE INVENTION

The present invention relates to security element, more particularly the present invention relates to plurality of security laminates and method of manufacturing the same, so as to laminate/protect data pages or data cards of documents such as passport, ID card from tampering or alteration.

### BACK GROUND OF THE INVENTION

Conventional security laminates are traditionally used to protect data pages or data cards of documents to ensure that the underlying items are not altered. Security laminates are particularly useful on identification cards such as passports, adhar cards, voter ID and driver's licenses and on other important data pages or data card documents. Five features are particularly important when producing and using security laminates. First, once applied to an article it is important that the laminate is difficult to remove and to ensure that the underlying item is not altered or subjected to tampering. Second, a desirable laminate is difficult if not impossible to duplicate by counterfeiters. Third, if tampering occurs it is important to quickly and accurately recognize an altered or counterfeit laminate. Fourth, it is important that manufacturing costs of the laminates are not prohibitively expensive. Fifth, when used on articles such as identification cards, it is important that the laminate has sufficient durability to withstand harsh treatment.

Security laminates are constructed of various materials. U.S. Pat. Nos. 4,876,123 and 5,082,702 discloses tamper-proof multilayer films which are not transparent. During attempts to tamper, the multilayer constructions are destroyed and both sides of the separated film layers display an originally concealed colored print. Tampering with these constructions is apparent to the unaided eye and the films are also impossible to re-laminate without visible damage. However, laminates having these constructions are not useful on identification documents because they are not transparent.

Another method of manufacturing tamper-proof documents is described in German Patent No. DE-C-29 52 322. A document is coated with a polyethylene film coated with an adhesive which requires cross-linking by ultraviolet irradiation. The resultant laminate provides a high degree of security; however, it is again prohibitively expensive to place

irradiation equipment and the corresponding protection equipment at every document distribution location.

None of the references described above solve the above-mentioned problems with security laminates. Therefore there is a need to provide a security laminate which is transparent, inexpensive to manufacture, difficult to imitate by counterfeiters, readily evidences tampering, and is sufficiently durable to use on identification cards.

#### OBJECT OF THE INVENTION

The primary object of the present invention is to provide an enhanced security of the laminate film for data pages or data cards of documents such as passport, ID card and to make them highly secure so as to prevent any forgery.

Another object of the present invention is to provide a high security laminates over the existing generic or non-complex holographic film laminates, to protect the data on the data page of passport or a security card.

Yet another object of the present invention is to provide a high security laminate which also encompasses overt public features for instant identification.

Yet another object of the present invention is to provide a high security laminates such that it protects the passport holder photo from being replaced incorporated to avoid forging.

Yet another object of the present invention is to provide a high security laminates that is incorporated with covert security feature(s) which are machine readable.

Yet another object of the present invention is to provide a high security laminates which is transparent, with complex holographic complex designs, reasonably inexpensive to manufacture, difficult to imitate by counterfeiters, readily evidences tampering, and is sufficiently durable to use on passports and identification cards.

Yet another object of the present invention is to provide methods of manufacturing enhanced security laminates.

#### SUMMARY OF THE INVENTION

One embodiment of the present invention relates to a security laminate(F) to secure document comprises of ;a carrier liner (A) that forms the base of the security laminates; a release coat (B) coated over the carrier liner (A); a holographic embossed structure (C) is embossed over the release coat (B);Characterized in that; Plurality of security elements (D) are printed/coated over the holographic embossed structure (C), wherein said security elements (D)is further coated with heat sensitive coat or pressure sensitive adhesive coat (E), in order to provide an enhanced security of the laminate film used for data pages or data cards.

Second embodiment of the present invention relates to a security laminate (F<sub>1</sub>) to secure document comprises of; a carrier liner (A) that forms the base of the security laminates; a release coat (B) coated over the carrier liner (A); a holographic embossed structure (C) embossed over the release coat (B);a heat sensitive coat or pressure sensitive adhesive coat (E) coated over the a holographic embossed structure (C),Plurality of security elements (D) are printed/coated over the heat sensitive coat or pressure sensitive adhesive coat (E), in order to provide an enhanced security of the laminate film used for data pages or data cards .

Third embodiment of the present invention relates to method of manufacturing the security laminates (F) as disclosed in fig. 1 and method of manufacturing the security laminates (F<sub>1</sub>) as disclosed in fig. 2.

#### BRIEF DESCRIPTION OF THE INVENTION

Fig.1 illustrates security laminate cross section of the security laminate as disclosed in the first embodiment of the present invention.

Fig.2 illustrates security laminate cross section of the security laminate as disclosed in the second embodiment of the present invention.

Fig. 3 illustrates the laminated cross section of the security laminate once placed over the data page as obtained in fig.1

Fig. 4 illustrates the laminated cross section of the security laminate once placed over the data page as obtained in fig. 2.

Fig. 5 illustrates the final security laminate obtained, incorporated with various security elements as disclosed in the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

The following detailed description illustrates the invention by way of example and not by way of limitation. The description enables one skilled in the art to make and use the present disclosure, and describes several embodiments, adaptations, variations, alternatives, and uses of the present disclosure, including what is presently believed to be the best mode of carrying out the present disclosure

The present invention relates to security element, more particularly the present invention relates to security laminates to be laminated on valuable documents such as data pages or data cards of documents such as passports, adhar cards, voter ID cards; from tampering or alteration and to provide a security laminate which is transparent, inexpensive to manufacture, difficult to imitate by counterfeiters, readily evidences tampering, and is sufficiently durable to use on identification cards.

Fig.1 illustrates security laminate as disclosed in the first embodiment of the present invention. The security laminate (F) comprises of a carrier liner (A) which forms the base of the security laminate, said carrier liner (A), which forms the base of the security laminate is selected from PET or PET like materials. The carrier liner (A) is coated with a release coat (B), which in turn is embossed with holographic embossed structure/image of varied shape and design (C) by holographic embossing. The holographic embossed structure (C) is further print/ coated with security elements (D), said security elements (D) are further coated with heat activated adhesive coat or pressure sensitive adhesive coat(E) to form the security laminate as disclosed in Fig. 1. Security features (D) may be selected from plurality of security elements (D), such as D<sub>A</sub>, D<sub>B</sub>, D<sub>C</sub> and D<sub>D</sub>.

Fig.2 illustrates security laminate as disclosed in the second embodiment of the present invention. The security laminate (F<sub>1</sub>) comprises of a carrier liner (A) which forms the base of the security laminate, said carrier liner (A), which forms the base of the security laminate is selected from PET or PET like materials. The carrier liner (A) is coated with a release coat (B), which in turn is embossed with holographic embossed structure/image of varied shape and design (C). The holographic embossed structure (C) is further coated with hot adhesive coat or pressure sensitive adhesive coat (E), said hot adhesive coat or pressure sensitive adhesive coat (E) is print/coated with security elements (D), to form the security laminate as disclosed in Fig. 2. Further, security elements (D) may be selected from plurality of print coat security elements (D), such as D<sub>A</sub>, D<sub>B</sub>, D<sub>C</sub> and D<sub>D</sub>.

Print coat security elements (D), such as  $D_A$  may be in the form of secure strip within thin laminated film.

$D_B$  may be in the form of secure colour shift fibre or nano prints on thin film laminates.

$D_C$  may be in the form of holographic structure on thin film laminates.

$D_D$  may be in the form high security multicolor variant type which shows inherent color shift properties.

Release coatings can be thought of as the PSA delivery system, providing a controlled unwind or release force and protecting the adhesive from contamination and unintentional contact until it is applied. The requirements for a release coating include: Providing a release force desired for the intended application. Release coat can be selected from silicon or acrylic. Silicone release coatings are applied at low weights onto a wide range of substrates using many different techniques wherein silicon based release coating form a cross-linked non-stick surface useful in protecting pressure-sensitive adhesives until further use.

Heat activated adhesive coats, unlike pressure sensitive adhesives; remain tack-free until activated by an external heat source. Elevated temperatures – usually 180° F or higher – must be maintained for a specific length of time on the film to achieve adequate bonding. During the cooling process, the microstructure of the adhesive begins to crystallize, significantly increasing the bond strength. Heat activated adhesive coat may be selected from vinyl acetate homopolymer, vinyl acetate copolymer (maleate), acrylic acid vinyl acetate copolymer, ethyl vinyl acetate.

They are typically formulated from natural rubber, certain synthetic rubbers, and polyacrylates. Pressure sensitive adhesives can be supplied dissolved in organic solvents, as an aqueous dispersion, as a hot melt, or coated on release liner as tape. Pressure sensitive adhesives (PSAs) are tacky at room temperature and can be used to bond a variety of materials, including paper, plastic, metal, and concrete. PSAs are best applied in environments with temperatures between 59° F and 95° F. Pressure sensitive adhesives coating may be selected from natural rubber, synthetic copolymer of ethylene, acrylic acid, polysilicones, acrylics, linear polyester, polyether, nitril rubber, styrene copolymer, butyl rubber.

Third embodiment of the present invention relates to method of manufacturing the security laminates (F) as disclosed in fig. 1 and method of manufacturing the security laminates (F<sub>1</sub>) as disclosed in fig. 2.

The method of manufacturing the security laminates (F) as disclosed in fig. 1 of the present invention comprises the step of:

- Coating the carrier liner (A) with a release coat (B); said carrier liner (A), that forms the base of the security laminate is selected from PET materials;

- embossing the release coat (B) with holographic embossed structure/image of varied shape and design (C) by holographic embossing technique;

- Printing/ coating the holographic embossed structure (C) with security elements (D), wherein security elements (D) may be selected from plurality of security elements (D), such as D<sub>A</sub>, D<sub>B</sub>, D<sub>C</sub> and D<sub>D</sub> ; and

- Coating with security elements (D) with hot adhesive coat or pressure sensitive adhesive coat (E) to form the security laminate, which can be further used to laminate data pages or data cards of documents such as passport, adhar cards, voter ID from tampering or alteration.

The method of manufacturing the security laminates (F<sub>1</sub>) as disclosed in fig. 2 of the present invention comprises the step of:

- Coating the carrier liner (A) with a release coat (B); said carrier liner (A), that forms the base of the security laminate is selected from PET materials;

- embossing the release coat (B) with holographic embossed structure/image of varied shape and design (C), with holographic embossing;

- Coating with holographic embossed structure/image of varied shape and design (C) with hot adhesive coat or pressure sensitive adhesive coat (E); and

- Printing/ coating the hot adhesive coat or pressure sensitive adhesive coat (E) with security elements (D), wherein security elements (D) may be selected from plurality of print coat security elements (D), such as D<sub>A</sub>, D<sub>B</sub>, D<sub>C</sub> and D<sub>D</sub> to form the security laminate.

The present invention discloses various combination to incorporate the security elements, to provide an enhanced security of data pages/data cards, wherein said security elements makes it difficult to counterfeit. The process of print coating the security elements to form the security laminate are as follows:

D<sub>A</sub> that may be in the form of secure strip within thin laminated film, may further be selected from D1 which forms the LCD strip, D2 which forms the black print or coat (in register), D3 which forms the metal + print coat (in register), D4 which forms the black, like carbon based ink or graphite based enhanced ink, like but not limited to graphene, having additional properties like electro-magnetic values, D5 which forms the translucent white/clear heat seal (in register) to give security threads window effects and D6 which forms the translucent white/clear heat seal (in register) with fluorescence U.V light for higher security purpose. The print coat security element D<sub>A</sub> is selected to enhance the security feature of the security laminate and also to encompasses overt public features for instant identification.

Similarly, D<sub>B</sub> that may be in the form of secure colour shift fibre or as nano prints on thin film laminates, is print coated by applying a thin coat of liquid crystal layer which forms the clear print of discrete designs followed by in registration of black coat via print coat; said black coat formed is again print coated by in registration of metallic coat; said metallic coat is optionally in registered by heat sealing or pressure sensitive adhesive coat. The print coat security element D<sub>B</sub> is selected to form a multi colour liner or thin chips which are commonly known as security threads.

Likewise, D<sub>C</sub> that may be in the form of holographic structure on thin film laminates, comprises of first applying a release coat over the carrier liner (PET film), said release coat is print coated with lacquer coat; said lacquer coat is incorporated with holographic structure by holographic embossing; said holographic structure in turn is print coated with nano structure; said nano structure is finally coated with adhesive coat to form the security laminate. The print coat security element D<sub>C</sub> is selected to enhance the security feature of the security laminate

Further D<sub>D</sub> may be in the form high security multicolor variant thin film laminates which shows inherent color shift properties. D<sub>D</sub> application comprises of Printing blue green LCD over the carrier film; said blue green LCD is further coated with dry solvent and is subjected to UV curing; said cured film is print coated with red-gold in register; said film

is coated with dry solvent which is again subjected to UV curing; after subjecting the film to UV curing the second time, is again print coated with metal coat (in register) on the blue to green and Red to Gold LCD films, so as to create a complex LCD colour shift design. The print coat security element  $D_D$  is selected to create a complex LCD colour shift design and to protect replacement of the photos of the holder on the data page.

Fig. 3 illustrates the cross sectional view of the security laminate as obtained in fig.1 when once placed over the data page, when the security laminate as disclosed in fig.1 is laminated over the data page or data card of interest, wherein the hot adhesive coat or pressure sensitive adhesive coat (E), first comes in contact with the upper surface of the data page or data card of interest. The security elements (D) is positioned between the hot adhesive coat or pressure sensitive adhesive coat (E) and the holographic embossed structure (C). Once the lamination process is completed the release coat (B) along with the base carrier liner (A) is removed.

Fig. 4 illustrates cross sectional view of the security laminate as obtained in fig.2, when the security laminate is laminated over the data page or data card of interest, wherein the security elements (D), first comes in contact with the data page or data card of interest. The hot adhesive coat or pressure sensitive adhesive coat (E) is positioned between the security elements (D) and the holographic embossed structure (C). Once the lamination process is completed the release coat (B) along with the base carrier liner (A) is removed.

Fig. 5 illustrates the top view of the final security laminate obtained, when laminated over a data page/data card, incorporated with various security elements as disclosed in the present invention. Fig .5 illustrates the top view of the security laminate over the data page/data card that are print/coat with plurality of security elements to increase the complexity. Fig. 5 discloses plurality of print coat security elements (D), such as  $D_A$ ,  $D_B$ ,  $D_C$  and  $D_D$  to form the security laminate, over the plurality of layers as formed in Fig. 1 and Fig. 2.  $D_A$  that may be in the form of secure strip within thin laminated film, may further be selected from D1 which forms the LCD strip, D2 which forms the black print or coat (in register), D3 which forms the metal + print coat (in register), D4 which forms the black, like carbon based ink or graphite based enhanced ink, like but not limited to graphene, having additional properties like electro-magnetic values, D5 which forms the translucent white/clear heat seal (in register) to give security threads window effects and D6 which forms the translucent white/clear heat seal (in register) with fluorescence U.V

light for higher security purpose. The print coat security element  $D_A$  is selected to enhance the security feature of the security laminate and also to encompass overt public features for instant identification.

Similarly,  $D_B$  that may be in the form of secure colour shift fibre or as nano prints on thin film laminates, is print coated by applying a thin coat of liquid crystal layer which forms the clear print of discrete designs followed by in registration of black coat via print coat; said black coat formed is again print coated by in registration of metallic coat; said metallic coat is optionally in registered by heat sealing or pressure sensitive adhesive coat. The print coat security element  $D_B$  is selected to form a multi colour liner or thin chips which are commonly known as security threads.

Likewise,  $D_C$  that may be in the form of holographic structure on thin film laminates, comprises of first applying a release coat over the carrier liner (PET film), said release coat is print coated with lacquer coat; said lacquer coat is incorporated with holographic structure by holographic embossing; said holographic structure in turn is print coated with nano structure; said nano structure is finally coated with adhesive coat to form the security laminate. The print coat security element  $D_C$  is selected to enhance the security feature of the security laminate

Further  $D_D$  may be in the form high security multicolor variant thin film laminates which shows inherent color shift properties.  $D_D$  application comprises of Printing blue green LCD over the carrier film; said blue green LCD is further coated with dry solvent and is subjected to UV curing; said cured film is print coated with red-gold in register; said film is coated with dry solvent which is again subjected to UV curing; after subjecting the film to UV curing the second time, is again print coated with metal coat (in register) on the blue to green and Red to Gold LCD films, so as to create a complex LCD colour shift design. The print coat security element  $D_D$  is selected to create a complex LCD colour shift design and to protect replacement of the photos of the holder on the data page.

Addition of various combination of security elements ( $D_A$  TO  $D_D$ ) makes it difficult to counterfeit the data page/data cards. Further, the present invention discloses various combination to incorporate the security elements as disclosed in Fig. 1 And Fig. 2, to provide an enhanced security of data pages/data cards, wherein said security elements makes it difficult to counterfeit. Further the present invention provides a security laminate

which is transparent, inexpensive to manufacture, difficult to imitate by counterfeiters, readily evidences tampering, and is sufficiently durable to use on identification cards.

The above description is intended to describe the preferred embodiments of the invention in sufficient detail to enable those skilled in the art to practice the invention. The above description is intended to be illustrative and should not be interpreted as limiting the scope of the invention. Those skilled in the art to which the invention relates will appreciate that many variations of the described example implementations and other implementations exist within the scope of what has been described herein.