Can Plastic Films Damage My Stamps?

Translated from an article by Ib Krarup Rasmussen
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This question has been asked by collectors over the course of time. And one can expand the question more broadly to: How shall I preserve my stamps so they won't be damaged? Starting with an actual discussion on this subject in Germany, I will try to come up with some advice here.

The ordinary collector can't be expected to understand the characteristics of different types of plastic. Most collectors must depend on the claims and information that the producers of the various philatelic products provide about their product's quality and characteristics.

I will argue that unfortunately this is not sufficient. My background for this statement is a little different and more than just that of an editor of a philatelic journal. Probably few know that, before my employment as the office manager for Denmark's Philatelic Society, I was employed for almost 18 years in a medium size plastics company with about 50 employees during which I was the production manager for a number of years. The company produced plastic mounts, ring binders and a great deal of other plastic products, including the so called "red beet colored Danish passport". We worked with many types of plastic and delivered plastic products such as year folders and souvenir folders for the philatelic branch of the Danish Post. I can therefore justify some opinions based on my expertise and experience with different plastic types and their characteristics.

The article series in *Philatelie*

However, to begin with I will start somewhere else. In the German society journal *Philatelie* there was a very lively debate beginning December 2007 about damage to stamps resulting from preserving them in glass clear PVC hard film pockets.

In the December 2007 issue (pages 35 – 40) Peter Feuser writes a long article about lead sulfate damage to classic stamps. The editor of *Philatelie* stated that the article expressed the author's own opinion and does not express the opinions of the journal. They were certainly aware that there was controversial material in the article, especially for the established German album producers.

Peter Feuser states that, as early as 2000, he contacted a producer of album systems and aired his concern that pockets of hard PVC film could be very damaging to classic stamps. He had noted that stamps and covers that were kept in hard PVC pockets (not just the soft PVC pockets that have been banished for many years for preserving stamps and other things) are permanently damaged when stored in the pockets. The damage is especially noticeable for red, blue and green colors which become darker, in extreme cases almost black. He has also claimed that stamps on colored paper show damage as seen on classic German stamps on yellow or rose paper, where the paper is porous and the color becomes partly black.

His observations were categorically dismissed. At the recommendation of the Government Institute for Material Testing which earlier had investigated the preservation of stamps in plastic, he was referred to the Paper Technology Foundation (PTS) in Munich.

PTS declared that the inks in the old stamps contain a lot of lead (in the olden days one frequently used lead in inks) and the hard PVC pockets contain among other things an iron sulfate tin stabilizer. Chemically that causes the lead in the ink to migrate over to the plastic and the tin stabilizer to migrate to the stamp out of the surface. They react producing lead sulfate which is a very readily soluble black heavy metal salt. This warning was published in his auction catalogs.

As a result of these revelations, two producers of stamp albums initiated a suit against Peter Feuser. The expert's opinion was contested. To make a long story short it can be said that Peter Feuser for some years now has been involved in a judicial tug of war, that laconically ended with the court declaring that it can well be that the film causes damage to the stamps, but it can also be that it doesn't. It is only something that long term research can determine. The court costs were divided between the parties.

Peter Feuser states in his article that it is a known fact among stamp experts, researchers and auction participants that this type of damage to stamps takes place.

The producers of PVC pockets made of hard film claim that this damage to stamps can come from other causes such as exposure to a sulfurous atmosphere or inappropriate storage, for example in damp conditions.

They claim that PVC material has been used since the 1950s for, among other things, food products packaging, storage of medicines and blood products, so it is a well proven material. It is claimed that the film is plasticizer free. We will allow this to stand for the moment: that the film is plasticizer free. I will come back to that later as to why

that is not technically possible.

While the *Philatelie* editorial staff was somewhat reserved in the December number, it was completely the opposite in the January 2008 number because in the meantime the editorial staff was overwhelmed by responses from readers reacting to the article. Many collectors have observed the chemical damage to old stamps resulting from their being stored in PVC. Also it was noted that the problem has been discussed in many of the German specialist organizations and that the problem has been known for years.

The German journal requested that the producers of pockets made of hard PVC give a product declaration which warns of the damage that they can cause. The declaration should read (here only an extract is presented):

"This PVC film has been processed by the German plastisc industry for many years. It is, according to information from the producer, free from plasticizers and acid free and is suitable for storage under normal room, light, temperature and humidity conditions. Letters, stamps, and documents can be safely stored by this system.

The pockets however, do not protect against direct sunlight nor high humidity, water, fire or mechanical damage.

It cannot be excluded that there are stamps, especially those produced prior to 1900, that are in danger of oxidation in PVC pockets. Noticeable color changes may appear soon, or after months or years. Why that happens is currently not scientifically explained."

After that it is noted that some stamps are especially susceptible, and that stamps after 1900 can also be damaged; similarly, red cancels and red labels can be damaged.

As yet we have not seen that the pockets have been provided with these "User Directions", but perhaps they will be in the future. It will almost certainly drive away customers!

But should we use PVC pockets at all?

The article in *Philatelie* number 1 - 2008 concludes with a large number of reader contributions offering one frightening story after another. Among these are some Swedish red stamps from the 1920s that have severe color changes.

The *Philatelie* editorial staff notes that items must be exhibited in plastic pockets according to regulations. What should one do then?

Discussions continue in following issues of *Philatelie*. Wolfgang Maasen, editor of the journal gives an excellent discussion of the different types of plastic in the February issue. The March issue reports a long list of opinions from the society and producers. In the following months the series addresses the question about the influence of paper on preservation in general. That is an interesting topic, but plastic was the main concern, and that is what I will focus on below.

Do not use PVC in any form for long term storage of stamps.

First of all, based on my background and expertise, I advise against the use of PVC for some applications for storage of stamps.

Hard PVC pockets are used widely in Denmark. Many stamp dealers use PVC pockets for displaying letters and post cards in their cases. The film is clear and stiff which supports the material well and is suitable for short term storage by dealers. Many auction lots are stored in hard PVC pockets. In this application the film is glued to cardboard where stamps or covers can be viewed easily from both sides. Most auction firms write on the cardboard. PVC films are not suitable for long term storage of stamps – that recommendation should be taken very seriously!

Why do we talk about hard and soft PVC?

Soft PVC is found in many applications: beach balls, ring binders, sleepover pillows, self adhesive pockets and, in the old days, also stock sheets for ring binders. The soft film that is used here contains a plasticizer (for example DEHP, DOP, or others, there are many different types) that is a liquid which is mixed with PVC granules during the calendering of the plastic mass into a film. It can typically make up 30 to 40% of the film's mass. (Yes, you read correctly – over a third of the film is plasticizer liquid.)

There are also other materials in the film which in most cases are factory secrets. Besides the dyes if it is a colored film, the film can contain heavy metal based stabilizers. Heavy metals are of concern for environmental issues, so film producers have experimented with a lot of different stabilizers.

Plasticizers also differ in that the molecular structure can be short or long chained. The short molecules easily migrate; the long molecules also migrate, but take longer.

Migration proceeds until it reaches equilibrium. For example if two films with different plasticizer content are

put together, the plasticizer from the film with the most plasticizer will wander over to the film with the least. The latter expands or curls and the former shrinks. Plastic pockets usually stick together. A photo copy placed into a soft PVC mount will stick fast. Certainly all of us have experienced that phenomenon and plasticizer migration is to blame.

It was stated above that producers claim hard PVC films to be free of plasticizer. That is not true! If they are described as plasticizer free, it should be understood that they are "nearly plasticizer free." In order to manufacture them in high frequency welders, a minimum content of plasticizer is required, perhaps 1%. Among other things a small amount of plasticizer is necessary to prevent the film from cracking.

The PVC films are welded together using a special manufacturing process called high frequency welding. Radio waves with a particular frequency are sent through the films whereby the chlorine molecules in the PVC begin to vibrate, producing heat and melting. The melting occurs inside the material which welds the films together. Relatively expensive machines are used for this, and they use special molds made of iron and brass. Neither machine nor mold can be used for other types of plastic, with some exceptions which are irrelevant here.

To speak of PVC as acid free is also meaningless. The concept of acid free is used as a description for paper which has a neutral pH-value (i.e. it is neither acidic nor basic). pH it is not used for plastic.

Users can easily confirm that hard plastic pockets contain plasticizers: take a fresh PVC pocket, open it and sniff it. If a pocket smells of plastic, it is the plasticizer which is a liquid. The plastic odor is due to the plasticizer vapor which you can smell. Plasticizer can migrate over to objects that are in the pockets.

In the discussion in *Philatelie* it was claimed several times that hard PVC is plasticizer free. But gradually as more and more philatelists well informed in chemistry took the stand, the editors acknowledged:

*"When PVC marketers say that their hard PVC films are "plasticizer free" it does not mean that they are fully free of plasticizer, but they are justified in using this description because of the very small amount of stabilizer and plasticizer they contain. According to Wolfgang Maasen. PVC material completely without plasticizer does not exist" (*Philatelie, *April 2008, page 54).*

So besides metal stabilizers that clearly can affect dyes in stamps and covers, there is a weak plasticizer influence. It was much worse in the old days with the soft PVC pockets, where the gold printing on Christmas seals stuck to the pockets.

In my opinion the only place for PVC pockets is in the garbage can. Oops! We can't do that either, because the burning of PVC makes acid salts which produce acid rain. PVC waste should go into the chemical waste bins at the recycling station.

Why do PVC pockets exist?

But why do producers continue to market PVC products so diligently?

There are many important reasons for this and they are primarily economical: One has invested in expensive machinery and tooling, but the main reason is that PVC films can be purchased readily in any desired quantity. There are many producers, and they can be bought in small lots. Also production quantities do not have to be large for a specific product.

In Denmark there are many welding machines in 25 factories in various locations around the country, and in all can make either large or even small lots for an order. There are many small operations so that special sizes also can be produced.

This is not the case for the alternatives that I discuss below. The factories that can process the alternative materials are few and large, they must produce large lots, production costs are high and the price of the products is therefore also high.

The hobby market is not an expanding market, so album producers are not able to make the investments that would be necessary to change to alternative materials. At the same time we should also recognize that album producers have acted in good faith. They have been convinced that hard PVC pockets are safe and the best solution under the given circumstances.

So what does one do now?

There are alternatives, but it is never easy to obtain the desired quality and format.

Polypropylene (PP)

A very popular substitute for PVC for sheet protectors is polypropylene(PP). But very large machines are required that are more expensive than high frequency welding machines used for PVC production.

The film that is used must be bought in quantities of 1000 to 2000 kg at a time. Production is automated and rolls of film must be purchased in specified widths for a particular order: For example for production of A3 sheet protectors, rolls are bought in a width that is not suitable for processing A4 sheet protectors. Therefore the startup costs are high. Conversion of the machines for different sizes is also costly. Currently the machines are mostly used to produce the A4 format.

If album producers should change from PVC to PP, they must start by throwing out all their machines and tools. At the same time they would be required to invest massive sums in new equipment. As a result their production lots would be very large, product storage larger, etc.

PP pockets are probably not as nice as PVC pockets. They are a little softer and not so clear.

There are two welding methods – a spot welding where the weld is a series of points as in the case of ordinary office sheet protectors. There is also the so called Tearseal welding method, where the weld is complete resembling the PVC weld, but because the temperatures it welds with are high, the film may shrink a bit and the product may not be completely flat. Stamp collectors are too critical to have that. They should look nice.

A PP product is the kind you usually buy for office use. These products are actually very suitable for storing stamps, sheets, postcards etc. The problem is to find a very high quality product. There is a lot of competition in this area.

It can be difficult to find pockets of a satisfactory thickness. It can also be difficult to find glass clear pockets. They can be found and can be made, but there is a significant overabundance of the standard product.

Other formats than A4 can also be difficult to find. Special orders for other formats, for example for an old album page, cannot be obtained unless the buyer is willing to order 200,000 units. Few West European producers are able to compete with producers in East Europe or Asia, so one has to go far away to have their orders filled.

Therefore album producers fight for their PVC pockets. Only with great difficulty can they come up with an alternative. It would be especially difficult to provide the same assortment of many different sizes and types: holders for postcards, telephone cards, coins, etc. In the case of coin holders, they are rarely made of PP and are most frequently made of soft PVC so you are at your own risk using them!!

I mentioned above that PP pockets were an attractive alternative. That is true, but not for long term storage. They are okay for exhibiting at an exhibition, but, like other plastic types, PP pockets also contain various fillers. These can be stabilizers and lubricants, dyes (even in clear pockets) and perhaps other substances.

In 1988 The German Institute for Material Research conducted a large investigation of stamps stored in various materials. In the case of PP there was some transfer onto the plastic film, particularly in the case of early phosphorescent stamps. This is, however, not a problem one would have with most stamps. If the film is clear the contents can be copied without being removed. The film has one disadvantage though: it attracts dust like a magnet.

It is not certain that PP film is safe for long term storage such as archiving or museum storage. But under proper conditions it is the best alternative. For example, I use only glass clear PP pockets for the storage of my postal history collection, and in a long article, Ralph Ebner, who is the representative of collectors of revenues in Germany, emphasizes that PP pockets are outstanding for archiving. (*Philatelie*, February 2008, page 74).

The pockets that I use are produced from 100 microns (0.1 mm) thick clear film. Ordinary pockets today are about half that thickness. We made them at the factory from film left over from some large orders for the American market. These can be found on the market today, but one has to hunt for them. Currently it appears that the firm of Malling Beck markets a mount (product number 2051-08) that is clear and 120 microns thick at a price of 85 Danish kroner plus value added tax for 100 units. These are pockets that are suitable for exhibiting. Fil-Engros and Samlern market a similar mount, and they can also be obtained on order elsewhere. On the other hand the ordinary pockets with patterned surface (called orange peel surface) are definitely not suitable. However they are the type that is most easily obtained.

If you use PP pockets, make sure not to use very thin pockets. Sixty micron pockets are nearly useless for mounting in exhibition frames. I myself have tried to mount collections for others that were in that kind of mount – it was hell.

PP film is also used for photo corner pockets. The factory 3L on the island of Fyn produces them for the whole world, and they use only PP film. It can be said that Bantex and Fil-Engros photo corner pockets that come from that factory are okay. The latter are preferred the best because they have trimmed corners.

PP pockets are recommended for storage of stamps within certain practical limits.

PE or polyethylene

Polyethylene (PE) is familiar as it is used to make plastic bags. An ordinary freezer bag is made of PE. It is suitable for storing postcards or covers in sales bins. However, the pockets are very soft and a little limp. There are many producers because the material is used for so many different package formats. The film is produced by machine from granules, so it is only available from the producers. Also, smaller lots than 200,000 to 300,000, depending on the format, are rarely made. Because the film is so soft it can neither be used for ring binder protector sheets nor for exhibition panes. But as noted it is an attractive possibility for cover and postcard protectors for use by dealers and shopkeepers. In addition Polyethylene film is combined with Polyester film to produce a very interesting type of film: Mylar D, which is used by the British Museum.

PE film can be used for stamps and covers, but has significant limitations due to its characteristics.

Polyester (PES)

This film is glass clear and very appropriate for producing sheet protectors. For years the USA market has used it for protector sheets for ring binders closed on the sides and open above and below sometimes with a black paper inset. Unfortunately it appears that DuPont and ICI, companies that produced the film have ceased production for the time being. Polyester is also dust susceptible and a relatively expensive film.

The sheet protectors than one can buy in the USA also have a different format. Americans do not use the European DIN format, for example A4 = 210 mm x 297 mm. The corresponding paper size called letter size is: 8.5" x 11" = 215 mm x 280 mm. The holes in the ring binder are also different – instead of the 4 holes with ring spacing of 80 mm, Americans use a 3 ring system with a hole spacing of 108 mm. If American sheet protectors were to be used in Europe the paper size and ring binders would have to be changed accordingly.

On the other hand, as mentioned above, a special film type, Mylar D, has been developed - it consists of polyester with a superimposed layer of polyethylene. As mentioned above it is used by many museums for archive purposes and is recommended by, among others, David Leach in his article about archiving stamps in *The London Philatelist* and *FFE* number 9. I will try to get permission to publish this article in DFT. Mylar D products are marketed by the English firm, Secol. Their only inconvenience is that they can be difficult to obtain and the price is relatively high - 50 A4 sheets are reported to cost 70 Euros - that would mean about 10 Danish kroner each. I have asked the factory for details, but haven't received any yet.

Polyester is absolutely recommended and the special polyester film with polyethylene coating (Mylar) is highly recommended. There are some problems with the American products which have a different format than the European formats. Secol products are difficult to obtain and are rather expensive.

Polystyrene (PS)

This material is used in stamp mounts among other things and is recommended for use with stamps – luckily!

Hawid, which has produced stamp mounts for many years, claims for example in a press release published in *Philatelie*, June 2008, that they make the film for the mounts only from pure polystyrene granules and that they do not add any form of additives, neither plasticizer nor stabilizer. Polystyrene film is therefore not suitable for making pockets. It would require much preparation and the product would be expensive.

It is also sufficient to use PS mounts on album pages. On the other hand one must not place album pages with PS mounts in PVC sheet protectors. This combination can cause the mount to break. In the German society's home page there is discussion about how that can cause a micro climate in the mount when it is surrounded by the PVC sheet protector. For long term storage of stamps in mounts on album pages, it is recommended to use instead an ordinary ring binder with paper and mounts, or if one absolutely must put them in a protector, use a glassine pocket or bag. Naturally this cannot be used for exhibiting – it is, in any case, difficult to see the stamps through them.

Stamp mounts are therefore approved – phew! However they absolutely must not be made of hard PVC.

Glassine (Pergamin)

I mentioned glassine above. Glassine is a paper made from pure cellulose. It is pH neutral (acid free) and chlorine free. Glassine envelopes are suitable for long term storage of stamps. Glassine received the highest grade in the investigation by the German Institute for Material Testing mentioned above. Glassine is also used for strips in stock books and for interleaving pages. The use of these products is completely safe. It is wise to use interleaving pages in stock books and albums to prevent the stamps from interfering with each other. Also it is important to know what kind of cardboard material is used in stock books. However, that is a whole other

matter that we should come back to in the future. Glassine envelopes are also used for storing photographs. However, one should be careful when using older glassine envelopes. Earlier glassine was produced by a different method than today. I do not have more precise information about these differences, but old glassine envelopes are less suitable. So check through your archive drawers and swap out envelopes once in awhile. The old ones are easy to recognize. They become brown and are unfit for use.

To my surprise I have found that museum people are not completely in agreement about long term storage of photographs in glassine. However for ordinary use by philatelists, glassine is a splendid possibility.

Glassine envelopes and stock books with glassine strips are also approved.

Cellophane

Pure cellophane, which consists of cellulose impregnated with glycerin, can also be used for covers and the like. Cellophane is used for packaging food products, but the use of cellophane has been extended to some products by including thin layers of other plastic types. In these products plasticizers may be involved and caution is advised for their use. I am not sure if cellophane is used for strips in some types of stock books. If it is, it is critical to make sure that pure cellophane is used.

Stock books with cellophane strips are only conditionally approved. Caution is advised.

Conclusion

I hope that I have not overly frightened stamp collectors with this article. In the meantime it is a very important problem that has been put forth in Germany and discussed here. *DFT* will certainly follow the matter up in the future.

There are elements that have not been addressed here. For example the use of the correct paper for album pages and other paper that may come into contact with philatelic items is important. The idea of acid free paper is an equally important parameter as plasticizer free plastic. I will address this in the future.

For those who would like to know more about the particular systems, I can refer them to the home pages of individual album producers. Some give very detailed information about what their pages and albums consist of, while others are less detailed.

I am certain that the information that has been put forth here may be surprising for many stamp collectors. It is very necessary to clear up these matters.

As usual we welcome reactions from the readers.