

Description

(19)

The invention relates to a jacket for a floppy disk. Such data carriers are composed of a flexible disk which is coated with magnetisable material, is enclosed in a jacket and executes a rotational movement during use.

5 The jacket is generally composed of a PVC film (cover) facing the outside, which is lined on the inside with a nonwoven fabric (liner). The PVC cover has the function of ensuring that the jacket has the necessary durability and flexibility during use and storage of the disk.

10 Furthermore, it is also intended to guard the data carrier outwardly against mechanical damage. The main function of the liner is to intercept gently and smoothly dust particles occurring on the data carrier during use and to ensure a low, even angular momentum of the magnetic disk

15 in the jacket. Furthermore, this avoids the magnetisable coating coming into contact directly with the PVC material and thus causing scratches on the disk.

Floppy disk jackets with a PVC cover have a temperature resistance of from 10°C to approximately 70°C;

20 these values are dictated by the thermal behaviour of the PVC cover. Difficulties with respect to the temperature resistance of floppy disk jackets (storage and transport in motor vehicles, sunlit workplaces behind glass, leaving on cooling surfaces of office machinery) made it necessary

25 to search for new jacket materials which could replace the PVC cover, at the limit of its heat resistance capacity.

Furthermore, under extreme temperature conditions in the presence of moisture, the lack of porosity in the PVC cover can lead to the undesirable formation of condensation on the floppy disk. Since a perforation in the

30 cover has so far only been of insufficient help, a search for suitable replacement materials was necessary for this reason as well.

It is often desirable to make the cover of the

35 floppy disk jacket suitable for printing or writing on, for example for purposes of advertising or marking. Writing utensils free from organic solvents (conventional felt tip pens, ball point pens and pencils) are not, however, suitable for writing on PVC film. A marking capability

without the use of stickers would result in a considerable improvement with respect to the handling of disks. A placement of the PVC cover is desirable for this reason as well.

5 However, the favourable properties of the liner (nonwoven fabric) are to be retained in all events.

DE-B-23 25 715 describes a jacket for an information carrier, in particular for a video disk, the cover being composed of paper or a plastic not specified in any further detail and the liner being composed of a fibre non-
10 woven layer. Such a jacket is temperature-resistant within broad limits using paper as the cover material. The problem of writability/printability is also solved. However, the outside of this jacket cannot have the mechanical
15 properties necessary for protection of the disk, such as tensile strength and scratch resistance. In addition, the in any case poor moisture permeability of the paper is further reduced when the liner laminate is applied so that the product is again given in this respect virtually the
20 same disadvantageous properties of a PVC cover. This aspect is not so very important if, as described in the publication mentioned, the jacket serves only for the storage and handling of the information carrier and the latter is not in the jacket during operation.

25 However, such a material is unsuitable under these circumstances for a floppy disk remaining in its jacket during recording and playback.

GB-A-20 96 194 describes a jacket of nonwoven fabric for phonographic disks. The possibility of their
30 application for floppy disks is also proposed therein. However, this "sleeve" is electrically conductive and primarily has the function of providing an enveloping protection for the phonographic record against static charging just during storage and handling, in other words when it
35 is not in the recording/playback device. The requirements made are thus completely different here due to the different nature of the intended function, since the "sleeve" is not in the playback unit during operation. Therefore, the perceptions of the above British publication cannot be

applied to jackets for floppy disks.

The invention is based on the object of developing a jacket for floppy disks which avoids the use of a PVC cover, is simple to produce and has a temperature resistance in excess of 80°C. At the same time, the cover is to be fine-pored and of high porosity, in order to ensure an improved moisture exchange. Furthermore, this cover is to be suitable for printing and writing on with customary materials and by suitable methods. The favourable properties of the PVC cover according to the prior art, such as durability, flexibility, wear resistance, weldability and thickness, are to be largely maintained.

The tried-and-tested liner material, nonwoven fabric, has at the same time to serve, as before, as an inner liner.

All these objects are achieved in a simple way by a jacket which is composed entirely of a single-layered or multi-layered nonwoven fabric. It is essential furthermore that the nonwoven fabric has a smooth and wear-resistant, porous outside, which assumes the functions of a cover, and a soft, fibrous inside, which replaces the previous liner. Cover and liner are thus of the same material. The nonwoven fabric is preferably composed of polyester fibres, polyamide fibres, polyolefin fibres, PVC fibres, also in the form of heterofil fibres, or fibre blends.

A printing of the nonwoven fabric on its cover side is possible, for example, by conventional textile printing methods. Furthermore, due to its light colour and its porosity, this surface is also outstandingly suitable for writing on with ink, a ball point pen or felt tip pen. To make it easier to print on or write on, to increase rigidity, for colouring or making antistatic, the outside may be provided with the usual finishes for nonwoven fabrics. Due to its high porosity over its entire thickness, the jacket has a high moisture permeability. The formation of condensation is thus reliably avoided. The temperature resistance of the jacket is fully ensured under all realistic operating conditions, due to the fibre material used. Last but not least, the jacket according

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to the invention is distinguished by high rigidity values - figures for which are given in the example.

According to the invention, the jacket may be of single-layered or preferably multi-layered design: the
5 number and sequence of the individual layers can be adjusted selectively in the case of this embodiment, depending on the required wear and rigidity values.

In its multi-layered version, the jacket according to the invention is preferably spot-welded in order to ensure good moisture permeability and high flexibility on the
10 one hand and firm cohesion of the individual layers on the other hand.

To avoid disturbances of an electrostatic nature, such as frequently occur in the operation of magnetic data
15 carriers, it is usual to provide cover and/or liner of floppy disk jackets with electrically conductive materials. This is accomplished in a particularly elegant way in the case of the embodiment according to the invention if some of the fibres in the nonwoven fabric used are electrically
20 conductive. By using such fibres, it is possible to produce a jacket in a particularly preferred embodiment, the electrical surface resistance R_{0T} of which (measured in accordance with DIN 54345, part 1) and volume resistance R_D of which (measured in accordance with DIN 53482), do
25 not exceed a value of $10^9 \Omega$, or preferably even $10^6 \Omega$, irrespective of humidity and even at temperatures in excess of 100°C . Particularly suitable fibres of this type are described in DE-A-33 26 597. The fibres concerned are polypropylene fibres, polyester fibres and/or
30 viscose fibres, which contain 20 to 40% by weight, referred to the total weight of these fibres, of spun-in carbon black in finely disperse form.

This dispenses with the subsequent finishing of the nonwoven fabric with an antistatic.

35 A floppy disk jacket according to the invention and its production are illustrated as an exemplary embodiment in the drawings, in which:

Fig. 1 shows a single-stage production process for a multi-layered jacket,

Fig. 2 shows the jacket material in cross-section,
Fig. 3 shows the finished jacket with the floppy disk.

The following example, along with Figures 1 to 3,
is intended to clarify design and characteristics of a
5 preferred multi-layered embodiment of the jacket according
to the present invention, without restricting in any way
its scope established in the claims.

Example

A fibre blend of 100% thermally activatable bonding
10 fibres, preferably polyester/copolyester based heterofil
fibres having a denier of 3.3 dtex and a melting point of
225°C, is laid into a nonwoven fabric 5 by means of a
carding machine 1, 2, 3 on a conveyor belt 6. (Figure 1).
Consolidation takes place in a hot-air oven 7 with subse-
15 quent calibration in a compression unit 8 for forming a
fine-pored nonwoven fabric. The nonwoven fabric thus
obtained has a weight of 200 g/m² and forms the wear-
resistant outside 5a (cover) of the jacket.

A fibre blend of 100% polyester-homofil fibres
20 having a denier of 1.7 dtex is laid inline onto this non-
woven fabric 5a by means of a carding machine 4 on a con-
veyor belt 9 to form into a nonwoven 10. The nonwoven has
a weight of 30 g/m². Consolidation and bonding takes place
here by the spot-welding technique in a calender 11 with a
25 smooth steel roll 13 and an engraved roll 12. The applied
nonwoven is thereby formed in such a way that it is equiv-
alent to a liner material and forms the inside 10 of the
jacket. The finished material, having a weight of 230 g/m²,
is rolled up by the take-up roller 14. The material is
30 structured as shown in Figure 2. From this material in
web form, a jacket 16 according to the invention can be
punched out (Figure 3), folded together and provided with
a floppy disk 15.

The jacket 16, having a weight of 230 g/m², pro-
35 duced in the way described, has the same characteristic
rigidity values as a corresponding jacket material based
on a PVC cover (approximately 300 g/m²) with a nonwoven
fabric liner (approximately 35 g/m²) which is usually
used for this purpose.

In order to express the rigidity in measured values, both samples were measured under the following conditions by the rigidity tester 58963 of Messrs. Frank, Birkenau (Table 1):

5 Sample size: 30 x 70 mm
 Bending angle: 30°
 Bending interval: 10 mm
 Measuring range: 5 N

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Table 1

15	Sample	Clamping direction	Bending side	Bending force $\bar{X}$ [N]
15	Nonwoven fabric jacket according to the invention	Longitudinally	Outside	0.63
			Liner	0.70
		Transversely	Outside	0.66
			Liner	0.70
20	PVC jacket with Liner	Longitudinally	cover	0.73
			liner	0.93
		Transversely	cover	0.64
			liner	0.76

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Somewhat more rigid PVC films are often also used for the cover of floppy disk jackets. The rigidity of the nonwoven fibre jacket according to the invention may also be varied by changing the fibre composition, without increasing the weight per square metre. With a fibre blend of 70% polyester-heterofil fibres (3.3 dtex) and 30% polyester-homofil fibres (1.7 dtex), equivalent values were achieved in a rigidity test to those of a more rigid PVC film having a weight per square metre of 350 g (Table 2):

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Table 2

	Sample	Clamping direction	Bending side	Bending force $\bar{X}$
				[N]
5	Nonwoven fabric jacket according to the invention	Longitudinally	Outside	0.93
			Liner	0.95
		Transversely	Outside	0.92
			Liner	1.09
10	PVC film (cover) without Liner	-	smooth	0.99
			embossed	1.00

List of reference numerals

- 1 to 4 Carding machines
- 5 Nonwoven fabric layer from 1, 2 and 3
- 5a Consolidated nonwoven fabric serving as cover
- 6, 9 Conveyor belt
- 7 Hot-air oven
- 8 Compression unit
- 10 Nonwoven fabric layer serving as liner
- 11 Calender
- 12 Engraved roll
- 13 Smooth steel roll
- 14 Take-up roller
- 15 Floppy disk
- 16 Jacket



1. A jacket for a floppy disk, characterized in that it is entirely composed of a single-layered or multi-layered non-woven fabric liner which has a thermally smoothed and wear-resistant, porous outside (5a) and a soft, fibrous inside (10) facing the magnetic layer of the floppy disk.
2. A jacket according to claim 1, characterized in that polyester fibres, polyamide fibres, polyolefin fibres, PVC fibres also in the form of heterofil fibres, or fibre blends, are used.
3. A jacket according to claim 1 or 2, characterized in that it is made up of more than one liner layer and that the layers are spot-welded to one another.
4. A jacket according to one or more of the preceding claims, characterized in that both its electrical surface resistance R_{0T} , measured in accordance with DIN 54 345, part 1, and its volume resistance R_D , measured in accordance with DIN 53 482, do not exceed a value of $10^9 \Omega$.
5. A jacket according to Claim 4, characterized in that the liner includes fibres filled with an electrically conductive material.
6. A jacket according to one or more of the preceding claims, characterized in that its outside (5a) has a finish.

As printed.



Claims

1. A jacket for a floppy disk, characterized in that it is entirely composed of a single-layered or multi-layered non-woven fabric liner which has a thermally smoothed and wear-resistant, porous outside (5a) and a soft, fibrous inside (10) facing the magnetic layer of the floppy disk.
2. A jacket according to claim 1, characterized in that polyester fibres, polyamide fibres, polyolefin fibres, PVC fibres, also in the form of heterofil fibres, or fibre blends, are used.
3. A jacket according to claim 1 or 2, characterized in that it is made up of more than one liner layer and that the layers are spot-welded to one another.
4. A jacket according to one or more of the preceding claims, characterized in that both its electrical surface resistance R_{OT} , measured in accordance with DIN 54 345, part 1, and its volume resistance R_D , measured in accordance with DIN 53 482, do not exceed a value of $10^9 \Omega$.
5. A jacket according to claim 4, characterized in that the liner includes fibres filled with an electrically conductive material.
6. A jacket according to one or more of the preceding claims, characterized in that its outside (5a) has a finish.

Revendications

1. Enveloppe complète pour un disque souple (Floppy disc), caractérisée en ce qu'elle est entièrement constituée d'un tissu non tissé à une ou plusieurs couches comportant une face extérieure poreuse (5a) lissée thermiquement et résistant à l'abrasion, ainsi qu'une face intérieure (10) souple, fibreuse et tournée vers la couche magnétique du disque souple.
2. Enveloppe complète selon la revendication 1, caractérisée en ce qu'on utilise des fibres de polyesters, de polyamides, de polyoléfines, de chlorure de polyvinyle, ainsi que des fibres à hétérofilaments ou des mélanges de fibres.
3. Enveloppe complète selon la revendication 1 ou 2, caractérisée en ce qu'elle est constituée de plus d'une couche de voile et en ce que les couches sont soudées l'une à l'autre par points.
4. Enveloppe complète selon une ou plusieurs des revendications précédentes, caractérisée en ce que tant leur résistance électrique superficielle R_{OT} , mesurée selon la norme DIN 54 345, folio 1, que leur résistivité spécifique R_D , mesurée selon la norme DIN 53 482, ne dépassent pas une valeur de $10^9 \Omega$.
5. Enveloppe complète selon la revendication 4, caractérisée en ce que le tissu non tissé contient des fibres chargées d'une matière conductrice de l'électricité.
6. Enveloppe complète selon une ou plusieurs des revendications précédentes, caractérisée en ce que leur face extérieure (5a) comporte un apprêt.