

PVC FAUX WOOD BLIND COVERED WITH ASA FILM AND THE MANUFACTURING METHOD THEREOF

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to PVC faux wood blind and more particularly, to a PVC faux wood blind covered with ASA film and a manufacturing method of the PVC faux wood blind covered with ASA film.

2. Description of the Related Art

The PVC (polyvinyl chloride) material is extensively used in the manufacture of blinds, e.g. window blinds, because of its great stretchability and malleability.

In order to further improve the UV resistance, weather resistance, and color stability of the blinds, a composite sheet covered with ASA (acrylonitrile-styrene-acrylate) produced by co-extruding PVC and ASA copolymer is developed.

The manufacturing method of the foregoing composite sheet generally includes the steps of: placing the PVC main material and the ASA cover material into two extruders respectively and co-extruding the PVC main material and the ASA cover material to produce the composite sheet. However, the composite sheet covered with ASA can only be produced when the die head has a temperature of 200 to 260 degree Celsius; therefore, the energy consumption of the conventional manufacturing method is high.

SUMMARY OF THE INVENTION

Accordingly, it is an objective of the present invention to provide a PVC faux wood blind covered with ASA film which has superior heat resistance and deformation resistance.

It is another objective of the present invention to provide a manufacturing

method of the PVC faux wood blind covered with ASA film in which the temperature of die head can be effectively reduced and therefore has the advantage of low energy consumption.

To attain the above objective, the present invention provides a PVC faux wood blind covered with ASA film, which includes a basic layer and a cover layer formed on the outer surface of the basic layer. The basic layer is included in an amount of 81 to 91.5 parts by weight and the cover layer is included in an amount of 8.5 to 19 parts by weight based on 100 parts by weight of the basic layer and the cover layer. The basic layer includes 45 to 46 wt% of polyvinyl chloride resin, 18 to 20 wt% of calcium carbonate powder, 18 to 20 wt% of talcum powder, 1.7 to 2.4 wt% of stabilizer, 2.1 to 3.0 wt% of lubricant, 10 to 12 wt% of foam adjusting agent, 1.8 to 2.0 wt% of light-shielding pigment, and 1.4 to 1.9 wt% of composite blowing agent. The cover layer has a melt index ranging from 11 to 15.5 as determined by ASTM D 1238 and includes 8 to 18 parts by weight of an ASA copolymer and 0.5 to 1 parts by weight of color masterbatch. Further, the melt index of the cover layer of the PVC faux wood blind covered with ASA film provided in the present invention preferable ranges from 12.5 to 15.

According to one embodiment of the present invention, the polyvinyl chloride resin included in the basic layer has an average degree of polymerization of 780 ± 30 .

According to one embodiment of the present invention, the stabilizer included in the basic layer may be 1.2 to 1.5 wt% of methyl tin mercaptide stabilizer, 0.4 to 0.6 wt% of calcium stearate stabilizer, and 0.1 to 0.3 wt% of zinc stearate stabilizer.

According to one embodiment of the present invention, the lubricant included in the basic layer may be 0.8 to 1.2 wt% of glycerin fatty acid ester lubricant, 0.4 to 0.6 wt% of ethylene oxide homopolymer lubricant, and 0.9 to 1.2 wt% of 1-propene, polymer with ethene, oxidized.

According to one embodiment of the present invention, the foam adjusting agent included in the basic layer may be high molecular weight acrylic resin.

According to one embodiment of the present invention, the composite blowing agent included in the basic layer may be 1.0 to 1.3 wt% of endothermic blowing agent of sodium bicarbonate and 0.4 to 0.6 wt% of exothermic blowing agent of azodicarbonamide.

To attain the above objective, the present invention further provides a manufacturing method of the above-mentioned PVC faux wood blind covered with ASA film, which includes the following steps:

a) a basic layer material mixing-introducing step in which polyvinyl chloride resin, calcium carbonate powder, talcum powder, stabilizer, lubricant, foam adjusting agent, light-shielding pigment, and composite blowing agent are well mixed to form a basic layer material and then the basic layer material is introduced into a main channel of a die head at a temperature of 140°C to 180°C;

b) a cover layer material mixing and pre-softening step in which acrylonitrile-styrene-acrylate (ASA) copolymer and color masterbatch are well mixed to form a cover layer material and then the cover layer material is heated for 2 to 3 hours at a temperature of 80°C to 90°C so as to pre-soft the cover layer material having a melt index of from 11 to 15.5 (ASTM D1238);

c) a cover layer material introducing step in which the pro-softened cover layer material obtained in step b) is introduced into a sub channel of the die head at a temperature of 150°C to 165°C. The sub channel is communicated with the main channel and the die head has a temperature of 175°C to 180°C;

d) a molding step in which a sheet having a basic layer and a cover layer formed on the outer surface of the basic layer is extruded from the die head; and

e) a cooling step in which the sheet obtained in step d) is cooled to manufacture

a PVC faux wood blind covered with ASA film.

Further, in the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, the basic layer material is included in an amount of 81 to 91.5 parts by weight and the cover layer material is included in an amount of 8.5 to 19 parts by weight based on 100 parts by weight of the basic layer material and the cover layer material.

Further, in the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, the basic layer material includes 45 to 46 wt% of polyvinyl chloride resin, 18 to 20 wt% of calcium carbonate powder, 18 to 20 wt% of talcum powder, 1.7 to 2.4 wt% of stabilizer, 2.1 to 3.0 wt% of lubricant, 10 to 12 wt% of foam adjusting agent, 1.8 to 2.0 wt% of light-shielding pigment, and 1.4 to 1.9 wt% of composite blowing agent.

Further, in the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, the cover layer material includes 8 to 18 parts by weight of the ASA and 0.5 to 1 parts by weight of the color masterbatch.

Further, in the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, the basic layer material is included in an amount of 81 to 87.5 parts by weight and the cover layer material includes 12 to 18 parts by weight of the ASA copolymer and 0.5 to 1 parts by weight of the color masterbatch.

Further, in the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, the cover layer material has a melt index of from 12.5 to 15 (ASTM D1238).

Further, in the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, the polyvinyl chloride resin included in the basic layer material has an average degree of polymerization of 780 ± 30 . In addition, the stabilizer

included in the basic layer material may be 1.2 to 1.5 wt% of methyl tin mercaptide stabilizer, 0.4 to 0.6 wt% of calcium stearate stabilizer, and 0.1 to 0.3 wt% of zinc stearate stabilizer. The lubricant included in the basic layer material may be 0.8 to 1.2 wt% of glycerin fatty acid ester lubricant, 0.4 to 0.6 wt% of ethylene oxide homopolymer lubricant, and 0.9 to 1.2 wt% of 1-propene, polymer with ethene, oxidized. The foam adjusting agent included in the basic layer material may be high molecular weight acrylic resin. The composite blowing agent included in the basic layer material may be 1.0 to 1.3 wt% of endothermic blowing agent of sodium bicarbonate and 0.4 to 0.6 wt% of exothermic blowing agent of azodicarbonamide.

Further, according to the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, in the cover layer material mixing and pre-softening step (step b), the cover layer material is heated at a temperature of 85°C to 90°C to pre-soft the cover layer material.

According to the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, a paint spraying surface treatment step, after the molding step and before the cooling step, may be further included therein, so that the paint can be covered on the surface of the ASA cover layer and thus a PVC faux wood blind covered with ASA film having various colors can be obtained.

According to the present invention, a PVC faux wood blind covered with ASA film having superior heat resistance and deformation resistance can be provided and a manufacturing method of the PVC faux wood blind covered with ASA film having the advantage of low energy consumption can also be provided.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side schematic view of a die head used to accomplish the manufacturing method of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

To make the present invention more comprehensible, the present invention will be described in further detail below by way of specific embodiments in conjunction with the drawings. It is to be understood that the following embodiments and/or examples are only parts of the embodiments and/or examples of the present invention and are merely illustrative of the present invention. The scope of the present invention is not intended to be limited to the particular embodiments and/or examples disclosed and the present invention covers all modifications, equivalents, and alternatives falling within the spirit and scope of the present invention as defined by the claims.

A PVC faux wood blind covered with ASA film provided in the present invention includes a basic layer and a cover layer formed on the outer surface of the basic layer, and the basic layer is included in an amount of 81 to 91.5 parts by weight and the cover layer is included in an amount of 8.5 to 19 parts by weight based on 100 parts by weight of the basic layer and the cover layer. In the PVC faux wood blind covered with ASA film, the basic layer includes 45 to 46 wt% of polyvinyl chloride resin, 18 to 20 wt% of calcium carbonate powder, 18 to 20 wt% of talcum powder, 1.7 to 2.4 wt% of stabilizer, 2.1 to 3.0 wt% of lubricant, 10 to 12 wt% of foam adjusting agent, 1.8 to 2.0 wt% of light-shielding pigment, and 1.4 to 1.9 wt% of composite blowing agent; and the cover layer has a melt index ranging from 11 to 15.5 as determined by ASTM D 1238 and includes 8 to 18 parts by weight of an ASA copolymer and 0.5 to 1 parts by weight of color masterbatch.

Basic Layer

The polyvinyl chloride resin included in the basic layer has an average degree of polymerization of 780 ± 30 and is suitable for use as a extruded foamed material.

The talcum powder included in the basic layer contains 58% of silicon dioxide

and 28% of magnesium oxide, and has an average particle size of 5.8 to 8.8 μm and an apparent specific gravity of 0.55 to 0.7 g/cm^3 . When the amount of the talcum powder falls within 18 to 20 wt%, the PVC faux wood blind covered with ASA film of the present invention can have improved hardness and stiffness.

The calcium carbonate powder included in the basic layer has an average particle size of 3.5 to 8.8 μm and an apparent specific gravity of 0.98 to 1.08 g/cm^3 and thus can be homogeneously mixed with the polyvinyl chloride resin.

The preferred embodiment of the stabilizer included in the basic layer contains 1.2 to 1.5 wt% of methyl tin mercaptide stabilizer in which the amount of tin is $18.3 \pm 0.5\%$, 0.4 to 0.6 wt% of calcium stearate stabilizer, and 0.1 to 0.3 wt% of zinc stearate stabilizer. As such, the basic layer material can have improved heat resistance stability, processing stability, and foaming rate stability during the manufacturing process of the faux wood blind.

The preferred embodiment of the lubricant included in the basic layer contains 0.8 to 1.2 wt% of glycerin fatty acid ester lubricant, 0.4 to 0.6 wt% of ethylene oxide homopolymer lubricant, and 0.9 to 1.2 wt% of 1-propene, polymer with ethene, oxidized. As such, the stability of the faux wood blind during the manufacturing process thereof can be improved.

The preferred embodiment of the foam adjusting agent included in the basic layer is 10 to 12 wt% of high molecular weight acrylic resin, or the high molecular weight acrylic resin and a medium and/or a low molecular weight acrylic resin can be used together to well control the foaming of the basic layer material during the manufacturing process of the faux wood blind.

The preferred embodiment of the light-shielding pigment included in the basic layer is 1.8 to 2.0 wt% of titanium dioxide, so that the faux wood blind can have a desired

light-shielding effect.

The preferred embodiment of the composite blowing agent included in the basic layer contains 1.0 to 1.3 wt% of endothermic blowing agent of sodium bicarbonate and 0.4 to 0.6 wt% of exothermic blowing agent of azodicarbonamide, so that the faux wood blind can have a light specific gravity of 0.70 to 0.75.

Cover Layer

The color masterbatch included in the cover layer may contain carrier resins, pigments, and other additives such as dispersing agents usually used in the production of color masterbatch. The foregoing carrier resins may be, but not limited to, acrylonitrile-styrene-acrylate (ASA) copolymer so as to enhance the mixing homogeneity between the color masterbatch and the ASA copolymer. The pigment may be an organic pigment or an inorganic pigment, and in particular, the organic pigment is preferable. The dispersing agent may be, for example, but not limited to, polyethylene wax and stearate, so that the pigment can be dispersed homogeneously to prevent aggregation.

Based on 100 parts by weight of the basic layer and the cover layer, the ASA copolymer is in an amount of about 8 to 18 parts by weight, for example 8 parts by weight, 10 parts by weight, 12 parts by weight, 14 parts by weight, 16 parts by weight, or 18 parts by weight, or any value or range between any two of these values, and in particular, 12 to 18 parts by weight is preferable. If the amount of the ASA copolymer is less than 8 parts by weight, it is hard to control the thickness homogeneity of the melted cover layer, and thus the heat resistance and deformation resistance of the faux wood blind will be decreased. If the amount of the ASA copolymer is higher than 18 parts by weight, the manufacturing cost will be increased.

It is preferable that the melt index of the cover layer ranges from 12.5 to 15, so that the thickness homogeneity of the melted cover layer can be easily controlled.

On the other hand, a manufacturing method of the PVC faux wood blind covered with ASA film provided in the present invention includes the following steps:

a) a basic layer material mixing-introducing step in which polyvinyl chloride resin, calcium carbonate powder, talcum powder, stabilizer, lubricant, foam adjusting agent, light-shielding pigment, and composite blowing agent are well mixed to form a basic layer material and then the basic layer material is introduced into a main channel of a die head at a temperature of 140°C to 180°C;

b) a cover layer material mixing and pre-softening step in which acrylonitrile-styrene-acrylate (ASA) copolymer and color masterbatch are well mixed to form a cover layer material and then the cover layer material is heated for 2 to 3 hours at a temperature of 80°C to 90°C so as to pre-soft the cover layer material having a melt index of from 11 to 15.5 (ASTM D1238);

c) a cover layer material introducing step in which the pre-softened cover layer material obtained in step b) is introduced into a sub channel of the die head at a temperature of 150°C to 165°C. The sub channel is communicated with the main channel and the die head has a temperature of 175°C to 180°C;

d) a molding step in which a sheet having a basic layer and a cover layer formed on the outer surface of the basic layer is extruded from the die head; and

e) a cooling step in which the sheet obtained in step d) is cooled to manufacture a PVC faux wood blind covered with ASA film.

Referring to FIG. 1, when implementing the manufacturing method of the present invention, the well mixed basic layer material is placed in a basic layer material extruder with a barrel temperature of 140°C to 180°C so that the basic layer material can be fed into a main channel 14 through a feed inlet 12 of a die head 10 at the temperature of 140°C to 180°C. The pre-softened cover layer material is placed in a cover layer

material extruder with a barrel temperature of 150°C to 165°C so that the pre-softened cover layer material can be fed into a sub channel 16 of the die head 10 at the temperature of 150°C to 165°C. In this way, at a junction of the main channel 14 and the sub channel 16, the cover layer material is covered on the outer surface of the basic layer. Finally, a sheet having the basic layer and the cover layer formed on the outer surface of the basic layer is co-extruded from an outlet 18 of the die head 10.

Further, if the color of the cover layer of the co-extruded sheet is not white, a paint spraying surface treatment step, after the molding step and before the cooling step, may be further included in the manufacturing method of the present invention, so that a paint can be covered on the surface of the ASA cover layer and thus a PVC faux wood blind covered with ASA film having various colors can be obtained.

In the step a) the basic layer material mixing-introducing step, a normal mixing method can be used to obtain the basic layer material. For example, the polyvinyl chloride resin, calcium carbonate powder, talcum powder, stabilizer, lubricant, foam adjusting agent, light-shielding pigment, and composite blowing agent are introduced and mixed in a high speed mixing machine and heated to 150°C to obtain the well mixed basic layer material. After that, the well mixed basic layer material is introduced into a cool mixing barrel and then cooled to 80°C. Finally, the cooled basic layer material is placed in the basic layer material extruder.

In the step b) the cover layer material mixing and pre-softening step, a normal mixing method can be used to obtain the cover layer material. For example, the ASA copolymer and the color masterbatch are introduced and mixed in a high speed mixing machine to obtain the well mixed cover layer material having a melt index of from 12.5 to 15, such that the melt fluidity of the melted cover layer material, at a condition that the temperature is 150°C to 165°C and the temperature of the die head is 175°C to 180°C, is

improved and the thickness homogeneity can be easily controlled, thereby improving the processing stability. As a result, the faux wood blind thus manufactured can have superior heat resistance and deformation resistance.

In the step e) the cooling step, the sheet extruded from the die head is then subjected to a cooling and a molding processes. The cooling method is not particularly limited and, for example, the cooling may be realized by using water spraying, gas spraying, or a combination thereof.

According to the present invention, a PVC faux wood blind covered with ASA film having superior heat resistance and deformation resistance can be provided and a manufacturing method of the PVC faux wood blind covered with ASA film having the advantage of low energy consumption can also be provided.

The present invention is further described by the following non-limiting examples. The PVC faux wood blinds covered with ASA film of the examples 1 to 38 and the comparative examples 1 to 2 are manufactured in accordance with the steps of the manufacturing method of the present invention based on the basic layer materials and the cover layer materials listed in the below Table 1. As to the comparative example 3, although a sheet covered with ASA film can be successfully extruded from the die head having a temperature of 175°C to 180°C through the manufacturing method of the present invention, the cover layer and the basic layer of the extruded sheet cannot be tightly connected to each other because the melted cover layer has poor thickness homogeneity. That is to say, the cover layer is easily separated from the basic layer. It is apparent that when the amount of the ASA copolymer and/or the color masterbatch included in the cover layer material is not within the specific ranges as defined in the present invention and thus the melt index of the cover layer does not range from 11 to 15.5, a sheet having a cover layer tightly connected to a basic layer cannot be co-extruded from the die head

with a temperature of 175°C to 180°C.

Table 1

	Basic Layer Material ¹ (parts by weight)	Cover Layer Material (parts by weight)			
		ASA ²		Masterbatch ³	Melt Index
		WE-830	WE-830M		
Example 1	91.5	-	8.0	0.5	15.03
Example 2	91.0	-	8.0	1.0	15.16
Example 3	91.5	4.0	4.0	0.5	13.04
Example 4	91.5	6.0	2.0	0.5	12.12
Example 5	89.5	10.0	-	0.5	11.01
Example 6	89.0	10.0	-	1.0	11.32
Example 7	89.5	-	10.0	0.5	15.03
Example 8	89.0	-	10.0	1.0	15.08
Example 9	89.5	4.0	6.0	0.5	13.40
Example 10	89.5	6.0	4.0	0.5	12.68
Example 11	89.5	8.0	2.0	0.5	11.86
Example 12	89.0	4.0	6.0	1.0	13.58
Example 13	89.0	6.0	4.0	1.0	12.78
Example 14	89.0	8.0	2.0	1.0	11.98
Example 15	87.5	12.0	-	0.5	11.67
Example 16	87.0	12.0	-	1.0	11.35
Example 17	87.5	-	12.0	0.5	15.00
Example 18	87.0	-	12.0	1.0	15.06
Example 19	87.5	4.0	8.0	0.5	13.52
Example 20	87.5	6.0	6.0	0.5	12.95
Example 21	87.5	8.0	4.0	0.5	12.20
Example 22	87.5	10.0	2.0	0.5	11.73
Example 23	87.0	4.0	8.0	1.0	13.78
Example 24	87.0	6.0	6.0	1.0	13.04
Example 25	87.0	8.0	4.0	1.0	12.42
Example 26	87.0	10.0	2.0	1.0	11.88
Example 27	85.5	6.0	8.0	0.5	13.14
Example 28	85.5	8.0	6.0	0.5	12.38
Example 29	85.5	10.0	4.0	0.5	12.08
Example 30	85.0	6.0	8.0	1.0	13.35
Example 31	85.0	8.0	6.0	1.0	12.78
Example 32	85.0	10.0	4.0	1.0	12.18
Example 33	83.5	8.0	8.0	0.5	12.80
Example 34	83.5	10.0	6.0	0.5	12.33
Example 35	83.0	8.0	8.0	1.0	13.00
Example 36	83.0	10.0	6.0	1.0	12.50
Example 37	81.5	10.0	8.0	0.5	12.58
Example 38	81.0	10.0	8.0	1.0	13.05
Comparative Example 1	93.5	4.0	2.0	0.5	12.50
Comparative Example 2	93.0	4.0	2.0	1.0	12.96
Comparative Example 3	92.0	8.0	-	-	10.92

Remark 1) basic layer material:

- 45 to 46 wt% of polyvinyl chloride resin (S-60, obtained from Formosa Plastics Corporation)
- 18 to 20 wt% of calcium carbonate powder (PG06, obtained from Nhật Mỹ Phát company)
- 18 to 20 wt% of talcum powder (PG08, obtained from Nhật Mỹ Phát company)
- 1.2 to 1.5 wt% of methyl tin mercaptide stabilizer (WINSTAB TM-1990, obtained from Winspring Corporation)
- 0.4 to 0.6 wt% of calcium stearate stabilizer (calcium stearate stabilizer-light, obtained from Kwang Cheng Co., Ltd.)
- 0.1 to 0.3 wt% of zinc stearate stabilizer (zinc stearate stabilizer-light, obtained from Kwang Cheng Co., Ltd.)
- 0.8 to 1.2 wt% of glycerin fatty acid ester lubricant (TL-G60, obtained from Ching Chain Enterprise Co., Ltd.; or PASFLOW 7302, obtained from Patech Fine Chemicals Co., Ltd.)
- 0.4 to 0.6 wt% of ethylene oxide homopolymer lubricant (TL-629A, obtained from Ching Chain Enterprise Co., Ltd.; or A-C-629A, obtained from Honeywell)
- 0.9 to 1.2 wt% of 1-propene, polymer with ethene, oxidized (HK-220MP, obtained from Mitsui Chemicals, Inc.)
- 10 to 12 wt% of high molecular weight acrylic resin (P-530, obtained from Shandong Ruifeng Chemical Co., Ltd.)
- 1.8 to 2.0 wt% of titanium dioxide light-shielding pigment (ATR-312 Rutile Titanium Dioxide, obtained from Anhui Annada Titanium

Industry Co., Ltd.; or BA01-01 anatase titanium dioxide, obtained from Nachan HK Industrial Co., Ltd.)

- 1.0 to 1.3 wt% of endothermic blowing agent of sodium bicarbonate (ET-007, obtained from Dongguan Ronghe Chemical Co., Ltd.)
- 0.4 to 0.6 wt% of exothermic blowing agent of azodicarbonamide (AC-3000F, obtained from Kum Yang Co., Ltd.)

Remark 2) ASA copolymer (WE-830 or WE-830M, obtained from Formosa Plastics Corporation)

Remark 3) color masterbatch (PG-503, PG-504, PG-505, PG-506, PG-507, SKU-491, SKU-492, SKU-493, obtained from Janie Color Works Ltd.)

Evaluation Test of Heat Resistance and Deformation Resistance

Each of the sheets of the examples 1 to 38 and the comparative examples 1 to 2 was cut into a specimen 21 inches long and 2 inches wide. Two long rope holes extending radially and being parallel to each other are formed in the specimen for the ladder cord to pass through. A perpendicular distance between a center line of the long rope hole and the short side of the specimen adjacent to the long rope hole is about 4.5 inches.

The procedure of the evaluation test is described as follows.

1) Each of the specimens is placed in the ladder cord of a Bow Test Rack. A slotted aluminum slat is placed in the ladder cord above the specimen. A digital depth gage (Mitutoyo Digimatic Depth Gage, Model VDS67-6"PM) is sequentially placed in the left edge, the center, and the right edge of the slotted aluminum slat to obtain the depth between the left edge of the specimen and the left edge of the slotted aluminum slat, the depth between the center of the specimen and the center of the slotted aluminum slat, and the depth between the right edge of the specimen and the right edge of the slotted

aluminum slat. The average of these depths thus obtained are defined as the “reference value”.

2) Set the temperature of an oven (Mettler Universal Oven Model #ULE-700) to a predetermined temperature and maintain the oven at that temperature. The Bow Test Rack with the specimen is placed in the oven for 30 minutes. After that, the depth between the left edge of the specimen and the left edge of the slotted aluminum slat, the depth between the center of the specimen and the center of the slotted aluminum slat, and the depth between the right edge of the specimen and the right edge of the slotted aluminum slat are obtained according to the manner mentioned in the above procedure 1). The average of these depths thus obtained are defined as “the test value”. The aforesaid predetermined temperatures are 48°C, 53°C, 59°C, 64°C, 70°C, 76°C, and 81°C.

3) The deflection of each specimen is determined by the difference between the reference value and the test value and the results are shown in the following table 2. The heat resistance and the deformation resistance of the specimen is evaluated by the deflection.

Table 2

	heat resistance	deformation resistance		heat resistance	deformation resistance
Example 1	△	△	example 22	○	○
example 2	△	△	example 23	◎	◎
example 3	△	△	example 24	◎	◎
example 4	△	△	example 25	◎	◎
example 5	△	△	example 26	◎	◎
example 6	○	○	example 27	◎	◎
example 7	○	○	example 28	◎	◎
example 8	○	○	example 29	◎	◎
example 9	◎	◎	example 30	◎	◎
example 10	○	○	example 31	◎	◎
example 11	○	○	example 32	◎	◎
example 12	○	○	example 33	◎	◎
example 13	○	○	example 34	◎	◎
example 14	○	○	example 35	◎	◎
example 15	○	○	example 36	◎	◎

example 16	○	○	example 37	◎	◎
example 17	◎	◎	example 38	◎	◎
example 18	◎	○	Comparative Example 1	×	×
example 19	◎	◎	Comparative Example 2	×	×
example 20	◎	◎	Comparative Example 3	×	×
example 21	◎	◎			

Remarks:

- As to the heat resistance:
 - ◎: the deflection is less than 1 mm at the temperature of 81°C.
 - : the deflection is less than 1 mm at the temperature ranging between 59°C to 76°C.
 - △: the deflection is less than 1 mm at the temperature ranging between 48°C to 59°C.
 - ×: the deflection is greater than 1 mm at the temperature ranging between 48°C to 59°C.
- As to the deformation resistance (at the temperature of 81°C):
 - ◎: the deflection is in a range between 0 mm to 1 mm.
 - : the deflection is in a range between 1 mm to 2 mm.
 - △: the deflection is in a range between 2 mm to 5 mm.
 - ×: the deflection is greater than 5 mm.

As shown in the above Table 2, it is apparent that all of the specimens of the examples 1 to 38 have superior heat resistance and deformation resistance. Specifically, the specimens of the examples have almost no deflection at the temperature of 76°C and only have slight deflection, still suitable for use as louver blades, in a range of 1 mm to 5 mm at the high temperature of 81°C.

In conclusion, the present invention provides a PVC faux wood blind covered with ASA film which has superior heat resistance and deformation resistance. Further, in

the manufacturing method of the PVC faux wood blind covered with ASA film of the present invention, because the temperature of the die head can be effectively reduced to 175°C to 180°C, the present invention has the advantage of low energy consumption in comparison with the prior art.

WHAT IS CLAIMED IS:

[Claim 1]

A PVC faux wood blind covered with ASA film comprising:

a basic layer comprising polyvinyl chloride resin, calcium carbonate powder, talcum powder, stabilizer, lubricant, foam adjusting agent, light-shielding pigment, and composite blowing agent; and

a cover layer formed on the outer surface of the basic layer and comprising 8 to 18 parts by weight of an ASA copolymer and 0.5 to 1 parts by weight of color masterbatch and the cover layer having a melt index ranging from 11 to 15.5 as determined by ASTM D 1238;

based on 100 parts by weight of the basic layer and the cover layer, the basic layer being comprised in an amount of 81 to 91.5 parts by weight and the cover layer being comprised in an amount of 8.5 to 19 parts by weight.

[Claim 2]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the basic layer comprises 45 to 46 wt% of polyvinyl chloride resin, 18 to 20 wt% of calcium carbonate powder, 18 to 20 wt% of talcum powder, 1.7 to 2.4 wt% of stabilizer, 2.1 to 3.0 wt% of lubricant, 10 to 12 wt% of foam adjusting agent, 1.8 to 2.0 wt% of light-shielding pigment, and 1.4 to 1.9 wt% of composite blowing agent.

[Claim 3]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the cover layer has a melt index ranging from 12.5 to 15 as determined by ASTM D 1238.

[Claim 4]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the basic layer is comprised in an amount of 81 to 87.5 parts by weight and the cover layer comprises 12 to 18 parts by weight of the ASA copolymer and 0.5 to 1 parts by weight of the color masterbatch.

[Claim 5]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the polyvinyl chloride resin comprised in the basic layer has an average degree of polymerization of 780 ± 30 .

[Claim 6]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the stabilizer comprised in the basic layer includes 1.2 to 1.5 wt% of methyl tin mercaptide stabilizer, 0.4 to 0.6 wt% of calcium stearate stabilizer, and 0.1 to 0.3 wt% of zinc stearate stabilizer.

[Claim 7]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the lubricant comprised in the basic layer includes 0.8 to 1.2 wt% of glycerin fatty acid ester lubricant, 0.4 to 0.6 wt% of ethylene oxide homopolymer lubricant, and 0.9 to 1.2 wt% of 1-propene, polymer with ethene, oxidized.

[Claim 8]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the foam adjusting agent comprised in the basic layer is a high molecular weight acrylic resin.

[Claim 9]

The PVC faux wood blind covered with ASA film as claimed in claim 1, wherein the composite blowing agent comprised in the basic layer includes 1.0 to 1.3 wt% of endothermic blowing agent of sodium bicarbonate and 0.4 to 0.6 wt% of exothermic blowing agent of azodicarbonamide.

[Claim 10]

A manufacturing method of PVC faux wood blind covered with ASA film comprising the steps of:

well mixing polyvinyl chloride resin, calcium carbonate powder, talcum powder, stabilizer, lubricant, foam adjusting agent, light-shielding pigment, and composite blowing agent to form a basic layer material and then introducing the basic layer material into a main channel of a die head at a temperature of 140°C to 180°C;

well mixing acrylonitrile-styrene-acrylate (ASA) copolymer and color masterbatch to form a cover layer material and then heating the cover layer material for 2 to 3 hours at a temperature of 80°C to 90°C so as to pre-soften the cover layer material having a melt index in a range of 11 to 15.5 as determined by ASTM D 1238;

introducing the pre-softened cover layer material obtained in step b) into a sub channel of the die head at a temperature of 150°C to 165°C, the sub channel being communicated with the main channel and the die head having a temperature of 175°C to

180°C;

extruding a sheet having a basic layer and a cover layer formed on the outer surface of the basic layer from the die head; and

cooling the sheet to manufacture a PVC faux wood blind covered with ASA film;

wherein the basic layer material is 81 to 91.5 parts by weight and the cover layer material is 8.5 to 19 parts by weight based on 100 parts by weight of the basic layer material and the cover layer material.

[Claim 11]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the basic layer material comprises 45 to 46 wt% of polyvinyl chloride resin, 18 to 20 wt% of calcium carbonate powder, 18 to 20 wt% of talcum powder, 1.7 to 2.4 wt% of stabilizer, 2.1 to 3.0 wt% of lubricant, 10 to 12 wt% of foam adjusting agent, 1.8 to 2.0 wt% of light-shielding pigment, and 1.4 to 1.9 wt% of composite blowing agent.

[Claim 12]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the cover layer material has a melt index ranging from 12.5 to 15 as determined by ASTM D 1238.

[Claim 13]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the basic layer material is 81 to 87.5 parts by weight and

the cover layer material comprises 12 to 18 parts by weight of the ASA copolymer and 0.5 to 1 parts by weight of the color masterbatch.

[Claim 14]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the polyvinyl chloride resin comprised in the basic layer material has an average degree of polymerization of 780 ± 30 .

[Claim 15]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the stabilizer comprised in the basic layer material includes 1.2 to 1.5 wt% of methyl tin mercaptide stabilizer, 0.4 to 0.6 wt% of calcium stearate stabilizer, and 0.1 to 0.3 wt% of zinc stearate stabilizer.

[Claim 16]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the lubricant comprised in the basic layer material includes 0.8 to 1.2 wt% of glycerin fatty acid ester lubricant, 0.4 to 0.6 wt% of ethylene oxide homopolymer lubricant, and 0.9 to 1.2 wt% of 1-propene, polymer with ethene, oxidized.

[Claim 17]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the foam adjusting agent comprised in the basic layer material is a high molecular weight acrylic resin.

[Claim 18]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the composite blowing agent comprised in the basic layer material includes 1.0 to 1.3 wt% of endothermic blowing agent of sodium bicarbonate and 0.4 to 0.6 wt% of exothermic blowing agent of azodicarbonamide.

[Claim 19]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, wherein the cover layer material is heated at a temperature of 85°C to 90°C to pre-soft the cover layer material.

[Claim 20]

The manufacturing method of PVC faux wood blind covered with ASA film as claimed in claim 10, further comprising a paint spraying surface treatment step in which a paint is sprayed on the cover layer of the sheet, before cooling the sheet.