strength of 1 MPa to 50 MPa at 200% elongation at 170°C, and the release film has a xylene gas permeability of 5×10^{-15} (kmol·m/(s·m^2·kPa)) at 170°C.

Citation List

Patent Documents

[0004]

Patent Document 1: JP-A No. 2015-74201

Patent Document 2: WO2008/020543

Summary

Technical Problem

[0005]

The release film is used to facilitate the release of a molded article from a mold, as described above. It is desirable that the release film be easily released from a molded article after resin curing.

[0006]

When a release film is subjected to a high temperature in a mold, a component contained in the release film may move to the surface of the release film, and the component that moves to the surface may contaminate the mold or a molded article. When such contamination occurs, the component is required to be removed from a mold or a molded article. In addition, the component is often difficult to remove. Hence, it is desirable that no contamination of a mold or a molded article with the component occur.

[0007]

A release film not only usable in molding once but also repeatedly usable in molding multiple times can reduce molding costs. In order to repeatedly use a release film in molding multiple times, the release film is required to maintain its properties through multiple molding operations.

[0008]

In view of the above circumstances, the present disclosure is intended to provide a release film that does not contaminate a mold or a molded article. The present disclosure is also intended to provide a release film that does not contaminate a mold or a molded article and can be repeatedly used in multiple molding processes.

Solution to Problem

[0009]

The inventors of the present disclosure have found that a release film having a specific configuration has excellent mold release properties and low contamination properties. The inventors of the present disclosure have further found that the release film can be used in molding multiple times.

[0009a]

In an aspect, there is provided a release film comprising:

a base layer formed of an easily moldable polyethylene terephthalate resin having a glass transition temperature of 60°C to 95°C; and

surface layers laminated on two faces of the base layer and formed of a fluororesin;

wherein the fluororesin that forms the surface layer comprises a

tetrafluoroethylene resin, and

the fluororesin that forms the surface layer on at least one face of the base layer comprises particles having an average particle size of 1 μm to 10 μm determined by laser diffraction particle size analysis.

[0009b]

In another aspect, there is provided a method of manufacturing a release film, the method comprising:

an applying step of applying a fluororesin composition onto two faces of a base layer formed of an easily moldable polyethylene terephthalate resin having a glass transition temperature of 60°C to 95°C; and

after the applying step, a curing step of curing the fluororesin composition;

wherein the cured product formed by curing the fluororesin composition in the curing step comprises a tetrafluoroethylene resin and particles having an average particle size of 1 μm to 10 μm determined by laser diffraction particle size analysis.

[0010]

The present disclosure provides a release film comprising a base layer formed of an easily moldable polyethylene terephthalate resin and surface layers that are laminated on two faces of the base layer and formed of a fluororesin.

The easily moldable polyethylene terephthalate resin may have a glass transition temperature of 60°C to 95°C.

The release film may have a tensile breaking strength of 40 MPa to

curing step of curing the fluororesin composition.

Advantageous Effects

[0012]

According to the present disclosure, a release film having excellent mold release properties and low contamination properties is provided. The release film of the present disclosure can be repeatedly used for molding multiple times.

The effect of the disclosure is not necessarily limited to that described in this paragraph and may be any of the effect described in the present description.

Brief Description of Drawings

[0013]

Fig. 1 is a view showing an example structure of a release film of the present invention.

Figs. 2 are views showing an example usage of a release film of the present invention in transfer molding.

Figs. 3 are views showing an example usage of a release film of the present invention in compression molding.

Fig. 4 is a view showing an FT-IR spectrum.

Figs. 5 are each an electron micrograph of a mold-side surface of a release film after molding.

Fig. 6 is an electron micrograph of a mold-side surface of a release film after molding.

CLAIMS:

1. A release film comprising:

a base layer formed of an easily moldable polyethylene terephthalate resin having a glass transition temperature of 60°C to 95°C; and

surface layers laminated on two faces of the base layer and formed of a fluororesin;

wherein the fluororesin that forms the surface layer comprises a tetrafluoroethylene resin, and

the fluororesin that forms the surface layer on at least one face of the base layer comprises particles having an average particle size of 1 μm to 10 μm determined by laser diffraction particle size analysis.

2. The release film according to claim 1, wherein

the release film has a tensile breaking strength of 40 MPa to 200 MPa as determined at 175°C in accordance with JIS K7127, and

the release film has a tensile elongation at break of 200% to 500% as determined at 175°C in accordance with JIS K7127.

3. The release film according to claim 1 or 2, wherein the release film has an oxygen gas permeability of 5,000 to 50,000 cc/m^2·24 hr·atm as determined at 175°C in accordance with JIS K7126-1.

4. The release film according to any one of claims 1 to 3, wherein the base layer has a tensile breaking strength of 40 MPa to 200 MPa as determined

at 175°C in accordance with JIS K7127.

5. The release film according to any one of claims 1 to 4, wherein the base layer has a tensile elongation at break of 200% to 500% as determined at 175°C in accordance with JIS K7127.

6. The release film according to any one of claims 1 to 5, wherein the fluororesin that forms the surface layer on at least one face of the base layer comprises an isocyanate curing agent.

7. The release film according to any one of claims 1 to 6, wherein the particles are inorganic particles or organic particles.

8. The release film according to any one of claims 1 to 7, wherein the thickness of the surface layer is 1 μm to 10 μm.

9. The release film according to any one of claims 1 to 8, used for transfer molding or compression molding.

10. The release film according to any one of claims 1 to 9, used for molding two or more times.

11. The release film according to any one of claims 1 to 10, wherein the content of a tetrafluoroethylene resin in the fluororesin is 70% by mass or more relative to the total mass of the fluororesin.

12. A method of manufacturing a release film, the method comprising:

an applying step of applying a fluororesin composition onto two faces of a base layer formed of an easily moldable polyethylene terephthalate resin having a glass transition temperature of 60°C to 95°C; and

after the applying step, a curing step of curing the fluororesin composition;

wherein the cured product formed by curing the fluororesin composition in the curing step comprises a tetrafluoroethylene resin and particles having an average particle size of 1 μm to 10 μm determined by laser diffraction particle size analysis.