Claims

1. A polyethylene composition comprising a base resin comprising
a low molecular weight ethylene polymer component and a high molecular weight ethylene polymer component, wherein the high molecular weight ethylene polymer component has a higher weight average molecular weight than the low molecular weight ethylene polymer component,
wherein the base resin has a density of at least 958.0 kg/m³,
and the polyethylene composition a melt flow rate MFR_2 (190°C, 2.16 kg) of from 0.50 to 0.80 g/10 min and a molecular weight distribution being the ratio of the weight average molecular weight and the number average molecular weight, Mw/Mn, of from 10.0 to 15.0.

2. The polyethylene composition according to claim 1, wherein the low molecular weight ethylene polymer component is a low molecular weight ethylene homopolymer component and the high molecular weight ethylene polymer component is a high molecular weight ethylene copolymer component comprising comonomer units selected from at least one alpha-olefin having from 4 to 8 carbon atoms.

3. The polyethylene composition according to claim 2, wherein the comonomer units are selected from 1-butene and 1-hexene.

4. The polyethylene composition according to any one of the preceding claims, wherein the weight ratio between the low molecular weight ethylene polymer component and the high molecular weight ethylene polymer component in the base resin is in the range of from 40 : 60 to 48 : 52.

5. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a melt flow rate MFR_5 (190°C, 5 kg) of from 2.0 to 3.5 g/10 min, a melt flow rate MFR_{21} (190°C, 21.6 kg) of from 30 to 50 g/10 min and a flow rate ratio being the ratio of MFR_{21}/MFR_5 of from 10 to 25.

6. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a weight average molecular weight

Mw of from 90 to 130 kg/mol, a number average molecular weight Mn of from 7 to 10 kg/mol and a z average molecular weight Mz of from 400 to 800 kg/mol.

7. The polyethylene composition according to any one of the preceding claims having a melt flow rate MFR_{21} (190°C, 21.6 kg) of from 32 to 48 g/10 min.

8. The polyethylene composition according to any one of the preceding claims having a number average molecular weight Mn of from 7.5 to 9.5 kg/mol.

9. The polyethylene composition according to any one of the preceding claims having a weight average molecular weight Mw of from 95 to 125 kg/mol.

10. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a shear thinning index $SHI_{5/200}$ of from 8 to 18, a shear thinning index $SHI_{2.7/210}$ of from 10 to 20, a dynamic viscosity $eta_{0.05}$ of from 10000 to 25000 Pa·s, a dynamic viscosity eta_{300} of from 500 to 1000 Pa·s and a viscosity at a constant shear stress of 747 Pa, eta_{747}, of from 10000 to 30000 Pa·s.

11. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a tensile stress at yield of from 26 to 32 MPa, a tensile strain at yield of from 7 to 10 % and a flexural modulus of from 1200 to 1800 MPa.

12. The polyethylene composition according to any one of the preceding claims having an environmental stress crack resistance (F50, 10% Igepal) of at least 72 hours.

13. A process for producing a polyethylene composition according to any one of the preceding claims comprising the steps of:
    a) polymerizing ethylene in the presence of a polymerization catalyst in a first polymerization reactor for producing a first intermediate material comprising the low molecular weight ethylene polymer component;
    b) transferring the first intermediate material into a second polymerization reactor;

~~c) polymerizing ethylene and at least one comonomer selected from alpha-olefins having from 4 to 8 carbon atoms in the presence of the first intermediate material for producing a base resin comprising the low molecular weight ethylene polymer component and the high molecular weight ethylene polymer component;~~

~~d) compounding the base resin to obtain the polyethylene composition.~~

~~14. An article comprising the polyethylene composition according to any one of the preceding claims.~~

~~15. The article according to claim 14 being a film or a blow molded article.~~

~~16. The article according to claims 14 or 15 being a blown film, cast film or at least one layer of a multi-layered film.~~

~~17. The article according to any one of claims 14 to 16 being a film with at least one of the following properties:~~

- ~~Tensile modulus in machine direction (TM-MD) and in transverse direction (TM-MD) both of at least 1000 MPa;~~
- ~~Elongation at break in machine direction (EB-MD) of at least 400 %;~~
- ~~Elmendorf Tear Strength in transverse direction (ETS-TD) of at least 6.5 N;~~
- ~~Puncture resistance energy of at least 0.50 J;~~
- ~~Water vapour transmission rate at 100% RH of not more than 10 g/m²/day;~~
- ~~Oxygen transmission rate of not more than 3100 cm³/m²/day; and~~
- ~~not more than 35 gels/m² of 301-600 µm diameter and not more than 140 gels/m² of 100-300 µm diameter.~~

~~18. The use of a polyethylene composition according to any one of claims 1 to 13 for the production of a film.~~

1. A polyethylene composition comprising a base resin comprising

a low molecular weight ethylene polymer component and a high molecular weight ethylene polymer component,

wherein the high molecular weight ethylene polymer component has a higher weight average molecular weight than the low molecular weight ethylene polymer component,

wherein the base resin has a density of at least 958.0 kg/m^3,

and the polyethylene composition has a melt flow rate MFR_2 (190°C, 2.16 kg) of from 0.50 to 0.80g/10 min, a melt flow rate MFR_{21} (190°C, 21.6 kg) of from 32 to 48g/10 min, and a molecular weight distribution being the ratio of the weight average molecular weight and the number average molecular weight, Mw/Mn, of from 10.0 to 15.0.

2. The polyethylene composition according to claim 1, wherein the low molecular weight ethylene polymer component is a low molecular weight ethylene homopolymer component and the high molecular weight ethylene polymer component is a high molecular weight ethylene copolymer component comprising comonomer units selected from at least one alpha-olefin having from 4 to 8 carbon atoms.

3. The polyethylene composition according to claim 2, wherein the comonomer units are selected from 1-butene and 1-hexene.

4. The polyethylene composition according to any one of the preceding claims, wherein the weight ratio between the low molecular weight ethylene polymer component and the high molecular weight ethylene polymer component in the base resin is in the range of from 40: 60 to 48: 52.

5. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a melt flow rate MFR_5 (190°C, 5 kg) of from 2.0 to 3.5 g/10 min, a melt flow rate MFR_{21} (190°C, 21.6 kg) of from 30 to 50 g/10 min and a flow rate ratio being the ratio of MFR_{21}/MFR_5 of from 10 to 25.

6. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a weight average molecular weight Mw of from 90 to 130 kg/mol, a number average molecular weight Mn of from 7 to 10 kg/mol and a z average molecular weight Mz of from 400 to 800 kg/mol.

7. The polyethylene composition according to any one of the preceding claims having a number average molecular weight Mn of from 7.5 to 9.5 kg/mol.

8. The polyethylene composition according to any one of the preceding claims having a weight average molecular weight Mw of from 95 to 125 kg/mol.

9. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a shear thinning index $SHI_{5/200}$ of from 8 to 18, a shear thinning

index $SHI_{2.7/210}$ of from 10 to 20, a dynamic viscosity $eta_{0.05}$ of from 10000 to 25000 Pa·s, a dynamic viscosity eta_{300} of from 500 to 1000 Pa·s and a viscosity at a constant shear stress of 747 Pa, eta_{47}, of from 10000 to 30000 Pa·s.

10. The polyethylene composition according to any one of the preceding claims having at least one, preferably all of the following properties: a tensile stress at yield of from 26 to 32 MPa, a tensile strain at yield of from 7 to 10 % and a flexural modulus of from 1200 to 1800 MPa.

11. The polyethylene composition according to any one of the preceding claims having an environmental stress crack resistance (F50, 10% Igepal) of at least 72 hours.

12. A process for producing a polyethylene composition according to any one of the preceding claims comprising the steps of:

a) polymerizing ethylene in the presence of a polymerization catalyst in a first polymerization reactor for producing a first intermediate material comprising the low molecular weight ethylene polymer component;

b) transferring the first intermediate material into a second polymerization reactor;

c) polymerizing ethylene and at least one comonomer selected from alpha-olefins having from 4 to 8 carbon atoms in the presence of the first intermediate material for producing a base resin comprising the low molecular weight ethylene polymer component and the high molecular weight ethylene polymer component;

d) compounding the base resin to obtain the polyethylene composition.

13. An article comprising the polyethylene composition according to any one of the preceding claims.

14. The article according to claim 13 being a film or a blow molded article.

15. The article according to claims 13 or 14 being a blown film, cast film or at least one layer of a multi-layered film.

16. The article according to any one of claims 13 to 15 being a film with at least one of the following properties:

- Tensile modulus in machine direction (TM-MD) and in transverse direction (TMMD) both of at least 1000 MPa;
- Elongation at break in machine direction (EB-MD) of at least 400 %;
- Elmendorf Tear Strength in transverse direction (ETS-TD) of at least 6.5N;

- Puncture resistance energy of at least 0.50J;
- Water vapour transmission rate at 100% RH of not more than 10 $g/m^2/day$;
- Oxygen transmission rate of not more than 3100 $cm^3/m^2/day$; and
- not more than 35 $gels/m^2$ of 301-600 µm diameter and not more than 140 $gels/m^2$ of 100-300µm diameter.

17. The use of a polyethylene composition according to any one of claims 1 to 12 for the production of a film.