Claims

1. A polypropylene composition suitable for pipe applications comprising

a propylene random copolymer (A) with at least one comonomer selected from alpha-olefins with 2 or 4 to 8 carbon atoms and a comonomer content in the range of 4.5 to 9.5 mol%

comprising at least a propylene random copolymer having a low molecular weight (low molecular weight (LMW) fraction) and a propylene random copolymer having a high molecular weight (high molecular weight (HMW) fraction), wherein the weight average molecular weight of the low molecular weight fraction is lower than that of the high molecular weight fraction, and

a nucleating agent (B),

wherein the polypropylene composition has a polydispersity index (PI) of from 2.0 to 7.0, a melt flow rate MFR_2 (2.16 kg, 230°C) of from 0.05 to 1.0 g/10 min, determined according to ISO 1133, and a Charpy Notched Impact Strength at 0°C of at least 4.0 kJ/m², determined according to ISO 179/1eA:2000 using notched injection moulded specimens.

2. The polypropylene composition according to claim, wherein the propylene random copolymer (A) does not contain an elastomeric polymer phase dispersed therein.

3. The polypropylene composition according to either claim 1 or 2, wherein the polypropylene composition has a flexural modulus of at least 750 MPa to an upper limit of not more than 1400 MPa, determined according to ISO 178 at a test speed of 2mm/min and a force of 100N on test specimens having a dimension of 80x10x4.0

mm³ (length x width x thickness) prepared by injection moulding according to EN ISO 1873-2.

4. The polypropylene composition according to any one of the preceding claims, wherein the polypropylene composition has a tensile stress at yield of at least 15 MPa, determined according to ISO 527-2:1996 using type 1A injection moulded test specimens prepared according to ISO 527-2:1996.

5. The polypropylene composition according to any one of the preceding claims, wherein the polypropylene composition has a Charpy Notched Impact Strength at 23°C of at least 30 kJ/m², determined according to ISO 179/1eA:2000 using notched injection moulded specimens.

6. The polypropylene composition according to any one of the preceding claims, wherein the polypropylene composition has a Charpy Notched Impact Strength at 0°C of at least 5 kJ/m², determined according to ISO 179/1eA:2000 using notched injection moulded specimens.

7. The polypropylene composition according to any one of the preceding claims, wherein the polypropylene composition has a content of xylene cold solubles (XCS) of from 1.0 to 15.0 wt%, determined at 25°C according to ISO 16152.

8. The polypropylene composition according to any one of the preceding claims, wherein the propylene random copolymer (A) is a propylene random copolymer with ethylene comonomer.

9. The polypropylene composition according to any one of the preceding claims, wherein the comonomer content of the propylene random copolymer (A) is in the range of 5.0 to 9.0 mol%.

10. The polypropylene composition according to any one of the preceding claims, wherein the propylene random copolymer having a high molecular weight (high molecular weight (HMW) fraction) has

a higher content of comonomer than the propylene random copolymer having a low molecular weight fraction (LMW fraction).

11. The polypropylene composition according to any one of the preceding claims, wherein the propylene random copolymer having a low molecular weight is present in the propylene random copolymer in an amount of 30 to 50 wt%, based on the total amount of the propylene random copolymer (100wt%), and propylene random copolymer having a high molecular weight fraction is present in the propylene random copolymer in an amount of 70 to 50 wt%, based on the total amount of the propylene random copolymer (100wt%).

12. The polypropylene composition according to any one of the preceding claims comprising from 0.1 to 10000 ppm by weight of the nucleating agent (B).

13. The polypropylene composition according to any one of the preceding claims, wherein the nucleating agent (B) is a polymer of vinyl compound according to the following formula

$$CH_2=CH-CHR^1R^2 \qquad (I)$$

wherein R^1 and R^2 together form a 5- or 6-membered saturated, unsaturated or aromatic ring, or independently represent an alkyl group comprising 1 to 4 carbon atoms, or are independently selected from C_1 to C_4-alkyl groups whereby in case R^1 and R^2 form an aromatic ring the hydrogen atom of the $-CHR^1R^2$ moiety is not present.

14. The polypropylene composition according to claim 13, wherein the alkyl group comprising 1 to 4 carbon atoms contains substituents.

15. The polypropylene composition according to either claim 13 or 14, wherein the amount of the polymeric nucleating agent is not more

than 500 ppm by weight, based on the total weight of the polypropylene composition (100 wt%).

16. A process of producing a polypropylene composition according to any one of the preceding claims, wherein the propylene random copolymer is polymerized in a multistage polymerization process in the presence of

(I) a solid catalyst component comprising a magnesium halide, a titanium halide and an internal electron donor; and

(II) a cocatalyst comprising an aluminium alkyl;

the multistage process comprising the steps of

(a) continuously polymerizing propylene together with a comonomer selected from alpha-olefins with 2 or 4 to 8 carbon atoms, in a first polymerization stage by introducing streams of propylene, hydrogen and said comonomer into the first polymerization stage at a temperature of 60 to 80°C and a pressure of 3000 to 6500 kPa to produce a first propylene random copolymer, wherein said first propylene random copolymer has a melt flow rate MFR_2 (2.16 kg; 230°C; ISO 1133) of from 0.2 to 3.0 g/min;

(b) withdrawing from the first polymerization stage a stream comprising said first propylene random copolymer and transferring said stream into a second polymerization stage;

(c) polymerizing propylene together with a comonomer selected from alpha-olefins with 2 or 4 to 8 carbon atoms, in said second polymerization stage by introducing streams of propylene and said comonomer into said second polymerization stage at a temperature of 70 to 90°C and a pressure of 1000 to 3000 kPa to produce a propylene random copolymer (A) of said first propylene random copolymer and a

second propylene random copolymer with a comonomer content in the range of 4.5 to 9.5 mol%;

(d) continuously withdrawing a stream comprising said propylene random copolymer (A) from the second polymerization stage; and

(e) extruding said propylene random copolymer mixture into pellets, which have a melt flow rate MFR_2 (2.16 kg; 230°C; ISO 1133) of from 0.05 to 1.0 g/min,

wherein the nucleating agent (B) is either introduced to the multimodal propylene random copolymer (A) during the polymerisation process of the multimodal propylene random copolymer (A) as component (III) or is incorporated to the multimodal propylene random copolymer (A) in form of a masterbatch (MB).

17. The process according to claim 16, wherein the multistage process comprises a further step (aa) preceding step (a), wherein

(aa) polymerising a vinyl compound of the formula (I) as defined in claim 13 in the presence of a catalyst system comprising the solid catalyst component (I) to obtain a modified catalyst system which is the reaction mixture comprising the solid catalyst component (I) and the produced polymer of the vinyl compound of formula (I), and wherein, the weight ratio (g) of the polymer of the vinyl compound of the formula (I) to the solid catalyst component (I) is up to 5 (5:1), and the obtained modified catalyst system is fed to polymerisation step (a) of the multistage process for producing the multimodal propylene copolymer (A).

18. The polypropylene composition according to any of claims 1 to 15 obtained by the process according to either claim 16 or 17.

19. An article comprising the polypropylene composition according to any of claims 1 to 15 or claim 18.