

CLAIMS

1. A bimodal polyethylene composition having:
 - a density (ρ) from 0.952 g/cm³ to 0.957 g/cm³ when measured according to ASTM D792-08, Method B;
 - a high load melt index (I_{21}) from 1.0 to 10 dg/min when measured according to ASTM D1238 at 190 °C and a 21.6 kg load;
 - a peak molecular weight ($M_{p(GPC)}$) defined by the equation: $M_{p(GPC)} < -2,805.3 \times MWD + 102,688$, wherein MWD is a molecular weight distribution defined by the equation: $MWD = M_{w(GPC)} / M_{n(GPC)}$, $M_{w(GPC)}$ is a weight average molecular weight of the bimodal polymer composition, and $M_{n(GPC)}$ is a number average molecular weight of the bimodal polymer composition, and wherein $M_{p(GPC)}$, $M_{w(GPC)}$, and $M_{n(GPC)}$ are measured using gel permeation chromatography (GPC);
 - a z-average molecular weight ($M_{z(GPC)}$) greater than 3,200,000 to 5,000,000 g/mol as measured using GPC; and
 - a ratio of the ($M_{z(GPC)}$) to the $M_{w(GPC)}$ is from 8.5 to 10.5.
2. The bimodal polyethylene composition of claim 1, wherein the bimodal polyethylene composition is a polymerized reaction product of an ethylene monomer and at least one C₃-C₁₂ α -olefin comonomer.
3. The bimodal polyethylene composition of any one of claims 1 and 2, wherein the $M_{n(GPC)}$ is greater than 28,000 g/mol.
4. The bimodal polyethylene composition of any one of claims 1 to 3, wherein the $M_{w(GPC)}$ is greater than 380,000 g/mol.
5. The bimodal polyethylene composition of any one of claims 1 to 4 having:
 - a secant modulus (E_s) defined by the equation: $E_s > -2,622 + 2,822 \times \rho + 2.5 \times MFR_5$, wherein MFR_5 is a ratio of the high load melt index (I_{21}) to a melt index (I_5) of the bimodal polyethylene composition measured according to ASTM D1238 at 190 °C and a 5.0 kg load;
 - a secant modulus (E_s) defined by the equation: $E_s > -4,570.6 + 4,883 \times \rho + 3.1 \times MWD$;
 - or both.
6. The bimodal polyethylene composition of any one of claims 1 to 5, wherein the $M_{w(GPC)}$ is from 380,000 g/mol to 500,000 g/mol.

7. The bimodal polyethylene composition of any one of claims 1 to 6, wherein the MFR_5 is from 20 to 32, wherein MFR_5 is a ratio of the high load melt index (I_{21}) to a melt index (I_5) of the bimodal polyethylene composition measured according to ASTM D1238 at 190 °C and a 5.0 kg load.
8. The bimodal polyethylene composition of any one of claims 1 to 7, wherein the $M_{n(GPC)}$ is from 28,000 g/mol to 40,000 g/mol.
9. The bimodal polyethylene composition of any one of claims 1 to 8, wherein the $M_{p(GPC)}$ is from 55,000 g/mol to 65,000 g/mol.
10. The bimodal polyethylene composition of any one of claims 1 to 9, wherein a secant modulus (E_s) of the bimodal polyethylene composition is greater than 965 MPa
11. The bimodal polyethylene composition of any one of claims 1 to 10 having an environmental stress-cracking resistance F_{50} greater than 150 hours when measured according to ASTM D1693, Procedure B, 10% Igepal.
12. An article manufactured using the bimodal polyethylene composition of any one of claims 1 to 11.
13. The article of claim 12, wherein the article is a blow molded article.
14. A method for producing the bimodal polyethylene composition of any one of claims 1 to 11, comprising polymerizing via gas-phase polymerization ethylene and at least one C_3 - C_{12} α -olefin comonomer in the presence of a main catalyst and a trim catalyst in a single reactor to produce the bimodal polyethylene composition.