



Viton™ FreeFlow™ Z150

Fluoroelastomers

Technical Information

Introduction

Viton™ FreeFlow™ Z Technology process aids for polyolefins are designed to greatly contribute to eliminating melt fracture, decreasing die pressure, lowering amperage and torque, and reducing die lip buildup during extrusion processes. When launched, the Z Technology created a revolution in the market and an ultimate breakthrough in the polymer processing aid arena.

The Z Technology takes advantage of proprietary, advanced rheology that controls the particle size delivered to the die and combines it with specific interfacial agents such as polyethylene glycol (PEG) in Z100 and Z110 products and polycaprolactone in Z200 and Z210 products. Z products provide a highly efficient process aid that outperforms amidst a broad range of extrusion conditions, even with the most challenging formulations.

After proving its unique performance, Viton™ FreeFlow™ Z Technology product line has been extended with Viton™ FreeFlow™ Z150, commonly called the “broad capability” processing aid. This new product enhances polyolefin processing in medium to high shear rate and also provides faster coating in shear rate conditions as low as 80 sec⁻¹. Traditional processing aids have limited effect in low shear rate conditions, especially in the presence of antagonists such as anti-blocks. Viton™ FreeFlow™ Z150 can be used in wide die gap film extrusion and in pipe extrusion, even in demanding formulations.

Viton™ FreeFlow™ Z150 uses the Z Technology concept tailored to perform in broader processing windows while retaining key benefits, such as lower dosage, faster melt fracture clearing, reduced die buildup, and lower die pressure, without affecting output.

Figures 1-4 illustrate the effects of Viton™ FreeFlow™ Z150 added at 400 ppm through a 2% masterbatch in a linear low density polyethylene C4 resin (MFR 1 g/10 min, 190 °C [374 °F], 2.16 kg). It is compared to two commercial PPAs: second generation (PPA-A) and third generation (PPA-B), respectively.

The performance is evaluated with a semi-industrial scale blown film line at different shear rates, in clear resin and in the presence of anti-block (talc) added at 3000 ppm with a 20% masterbatch.

Viton™ FreeFlow™ Z150 has been designed to fulfill unmet requirements—not only in challenging formulations, but also to solve issues in much broader processing conditions.

Viton™ FreeFlow™ Z150 is well suited for:

- Direct dosage during production of gas phase LLDPE (1.0 MI or more)
- Dosage during production of solution phase LLDPE (either direct or via masterbatch)
- Low concentration masterbatches (typically, 2% process aid) in LLDPE carrier (5 MI or less); can be up to 4% in highly concentrated masterbatch
- Extrusion that promotes moderate or low mixing conditions, such as high wide die gap or pipe extrusion
- All extrusion processes using 3 MI or less LLDPE, mLLDPE or HDPE, LLDPE/LDPE blends, or LLDPE/LDPE blends, including also high pigment or anti-block loadings



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Low Shear Rate Conditions (119 sec⁻¹)

Viton™ FreeFlow™ Z150 eliminates melt fracture faster, as compared to other PPAs.

In the presence of anti-block, Viton™ FreeFlow™ Z150 eliminates melt fracture faster than other PPAs.

High Shear Rate Conditions (461 sec⁻¹)

Among clear resin, Viton™ FreeFlow™ Z150 eliminates melt fracture more than other PPAs.

In the presence of anti-block, Viton™ FreeFlow™ Z150 makes clear film without affecting the output.

Figure 1. Viton™ FreeFlow™ Z150 vs. Other PPA

Shear rate: 119 sec⁻¹ Resin: LLDPE C4 1 MI
Active PPA content: 400 ppm

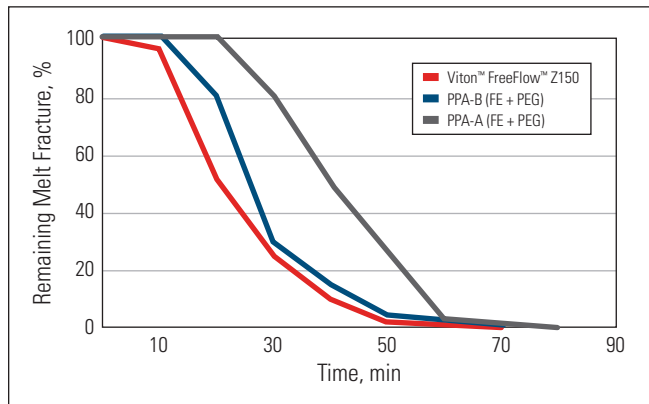


Figure 3. Viton™ FreeFlow™ Z150 vs. Other PPA

Shear rate: 461 sec⁻¹ Resin: LLDPE C4 1 MI
Active PPA content: 400 ppm

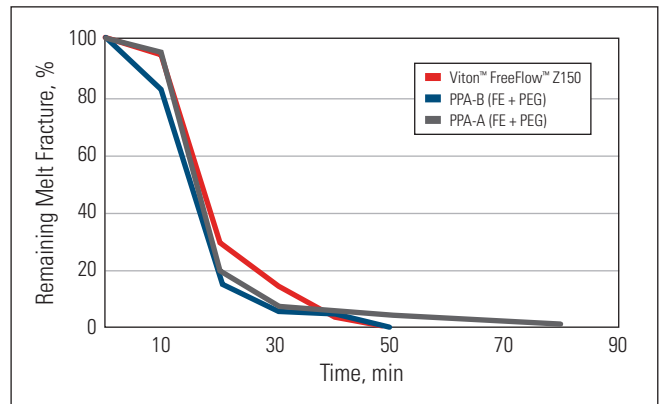


Figure 2. Viton™ FreeFlow™ Z150 vs. Other PPA

Shear rate: 119 sec⁻¹ Resin: LLDPE C4 1 MI
Active PPA content: 400 ppm Talc anti-block: 3000 ppm

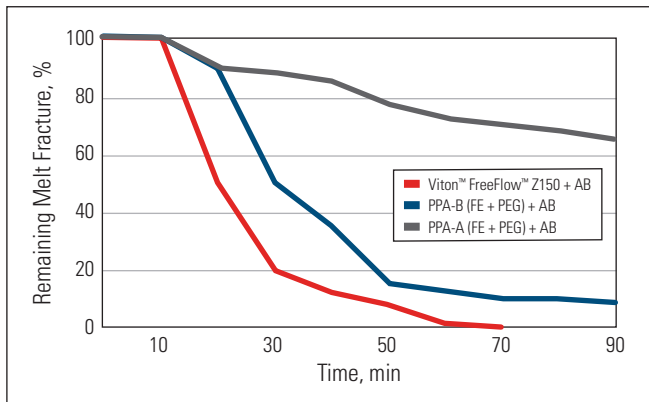
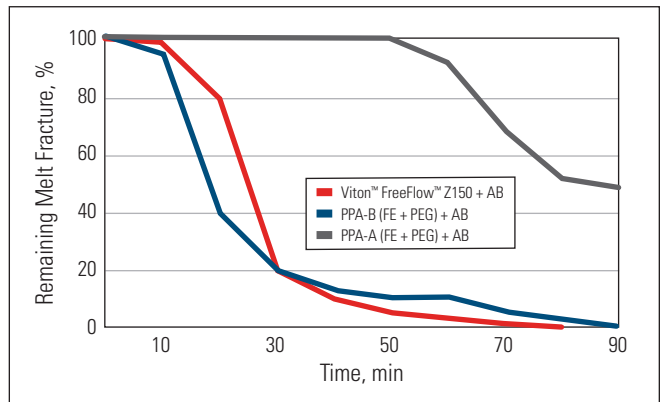


Figure 4. Viton™ FreeFlow™ Z150 vs. Other PPA

Shear rate: 461 sec⁻¹ Resin: LLDPE C4 1 MI
Active PPA content: 400 ppm Talc anti-block: 3000 ppm



Advantages

- Improved rates of conditioning during start-up of new formulations on clean dies or purged systems
- Improved performance on difficult lines, where other process aids require high levels in the broadest range of shear rate
- Improved additive efficiency, particularly on lines where frequent formula changes are made or in formulas containing multiple additives
- Improved economics
- Extended running time between die cleanings
- Approved for many food contact uses* and suitable for potable water appliances**

* Manufacturer or marketer of products or articles in contact with food must meet applicable food contact regulations. Contact Chemours for details regarding suitability of Viton™ FreeFlow™ products in specific food contact applications.

** Appliance manufacturer or marketer is responsible for ensuring appliance meets requirements for potable water use.

Formulation Guidelines

To assist in resin formulation, the following can be used as a general guide:

Elimination of Sharkskin Melt Fracture, ppm

| | |
|-------------------------------------|---------|
| In standard film resins | 400-600 |
| In heavily filled or pigmented film | 600-900 |
| Reduction of die buildup, ppm | 100-200 |

Levels are parts per million Viton™ FreeFlow™ Z150.

These numbers are intended to be starting points for formulation. The actual level required will depend on a multitude of factors.

Typical Physical Properties

| | |
|----------------|----------------------------|
| Appearance | White, free-flowing powder |
| Packaging | 20-kg bag |
| Shelf Life, yr | 4* |

*Normal storage conditions—dry, unopened, temperature below 27 °C (80 °F)

Safety and Handling

Viton™ FreeFlow™ Z150 is considered safe material to handle. It is stable at the temperatures at which polyolefins are formulated and processed. However, prior to the use of Viton™ FreeFlow™ Z150 in polyolefins, review the Safety Data Sheet (SDS) and follow the recommendations in the Chemours technical bulletin, “Guide for Concentrate Preparation and Handling of Viton™ FreeFlow™ PPAs.”

For more information, visit Viton.com

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