

POLYETHYLENE

Borstar[®] FB2310

MDPE FOR FILM

DESCRIPTION

Borstar FB2310 is a high molecular weight medium density polyethylene film grade combining good and flexible extrusion behaviour, excellent draw down and superior mechanical properties. Film made from **Borstar FB2310** exhibits high dart impact combined with excellent yield and tensile strength and high stiffness. Its toughness remains also in cold conditions. The film has high seal strength and hot tack force. **Borstar FB2310** contains antioxidant.

APPLICATIONS

Borstar FB2310 is well suited for a wide range of applications due to its unique balance of properties. The superior mechanical properties combined with stiffness will improve the functionality of the films or allow for substantial material savings (down gauging) compared to conventional PE's. Some examples are; industrial liners, compressed packs like insulation material, heavy duty sacks, and deep freeze packaging.

| PHYSICAL PROPERTIES* | Typical Value* | Unit | Test Method |
|--------------------------------------|----------------|-------------------|--------------|
| Density | 931 | kg/m ³ | ASTM 4883 |
| Melt Flow Rate MFR (190°C/2.16 kg) | 0.2 | g/10 min | ISO 1133 |
| Melt Flow Rate MFR (190°C/5 kg) | 0.9 | g/10 min | ISO 1133 |
| Melt Flow Rate MFR (190°C/21.6 kg) | 20 | g/10 min | ISO 1133 |
| Melting temperature | 127 | °C | ISO 11357/03 |
| Vicat Softening Temperature A (10 N) | 108 | °C | ISO 306 |
| ESCR – 10% Igepal / F50 | >5000 | Hours | ASTM 1693 |

* Data should not be used for specification work

PROCESSING GUIDELINES

Borstar FB2310 can be processed in most types of blown film equipment, incl. LDPE, LLDPE or even HDPE extruders. The balance of draw down properties and bubble stability is superior to conventional LLDPE and LDPE. Thickness of 10 to >200µm can be processed with good bubble stability. **Borstar FB2310** is well suited for co-extrusion.

Recommended extrusion temperature is 190 - 210°C. Conventional die gaps can be used without shark skin or draw down problems. A gap of 1.0 - 1.5 mm will give the best balance between extruder pressure and physical properties in the film. Wider die gap gives higher machine direction orientation and narrow die gap may give too high extruder pressure.

Borstar FB2310 is sensitive to the orientation obtained by the film blowing conditions like Blow Up Ratio (BUR) and Frost Line Height (FLH). Higher impact can be achieved by rising the FLH to 4DD. High BUR (>2) also results in better mechanical properties and better balance in MD/TD.

As a guideline the following conditions should be used.

FLH: 2 - 4 DD

BUR: 3:1

| FILM PROPERTIES** | | Typical Value* | Unit | Test Method |
|------------------------------|-------|-----------------------|-------------|--------------------|
| Tensile Strength | MD/TD | 50/35 | MPa | ISO 527-3 |
| Tensile Strain at Break | MD/TD | 600/900 | % | ISO 527-3 |
| Tensile Modulus (0.05-1.05%) | MD/TD | 250/300 | MPa | ASTM D 882-A |
| Haze | | 65 | % | ASTM D 1003 |
| Gloss | | 15 | | ASTM D 2457 |
| Dart Drop | | 300 | g | ISO 7765/1 |
| Elmendorf Tear Strength | MD/TD | 3/7 | N | ISO 6383/2 |
| Puncture Resistance, force | | 60 | N | Borealis Method |
| Puncture Resistance, energy | | 5 | J | Borealis Method |

* Data should not be used for specification work.

** Film properties are measure on 40µm blown film produced in a 60 mm W&H extruder with L/D 30 and die 200 x 1.2mm, BUR=3.1, FLH = 2DD. MD = Machine Direction, TD = Transverse Direction.

STORAGE AND HANDLING

Borstar FB2310 should be stored in dry conditions at temperatures below 50°C and protected from UV-light. Improper storage can initiate degradation which results in odour generation and colour changes, and can have negative effects on the physical properties of the product.

SAFETY

Borstar FB2310 is not classified as a dangerous preparation.

Dust and fines from the product carry a risk of dust explosion. All equipment should be properly earthed. Inhalation of dust should be avoided as it may cause irritation of the respiratory system. Small amounts of fumes are generated during processing of the product. Proper ventilation is therefore required.

A Safety Datasheet is available on request. Please contact your Borouge representative for more details on various aspects of safety, recovery and disposal of the product.

RECYCLING

The product is suitable for recycling using modern methods of shredding and cleaning. In-house production waste should be kept clean to facilitate direct recycling.

RELATED DOCUMENTS

The following related documents are available on request, and represent various aspects on the usability, safety, recovery and disposal of the product:

Safety data Sheet, SDS
Environmental fact sheet
Recovery and disposal of Polyolefins
Information on Emissions from Processing and Fires

Liability statements on:

- Compliance to Food Contact Regulations
- Heavy Metals