Singapore
10.06.2002

POLYETHYLENE
Borstar® FB2230
LLDPE FOR FILM

DESCRIPTION
Borstar FB2230 is a high molecular weight liner low density polyethylene film grade combining good and flexible extrusion behaviour, excellent draw down and superior mechanical properties. Film made from **Borstar FB2230** exhibits high dart impact combined with excellent yield and tensile strength and increased stiffness. Its toughness remains also in cold conditions. The film has high seal strength and hot tack force. **Borstar FB2230** contains antioxidant.

APPLICATIONS
Borstar FB2230 is well suited for a wide range of applications due to its unique balance of properties. The superior mechanical properties will improve the functionality of the films or allow for substantial material savings (down gauging) compared to conventional PEs. Some examples are: industrial liners, heavy duty sacks, compressed packs like diapers or insulation material, deep freeze packaging and agricultural applications.

PHYSICAL PROPERTIES	Typical Value*	Unit	Test Method
Density	923	kg/m^3	ASTM 4883
Melt Flow Rate MFR (190°C/2.16 kg)	0.25	g/10 min	ISO 1133
Melt Flow Rate MFR (190°C/5.0 kg)	1.0	g/10 min	ISO 1133
Melt Flow Rate MFR (190°C/21.6 kg)	22	g/10 min	ISO 1133
Melting temperature	124	°C	ISO 311357/03
Vicat Softening Temperature A (10 N)	101	°C	ISO 306
ESCR – 10% Igepal / F50	>5000	Hours	ASTM 1693

* Data should not be used for specification work.

PROCESSING GUIDELINES
Borstar FB2230 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 FB2230** 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 FB2230 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

Singapore
10.06.2002

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 FB2230 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 FB2230 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 represents 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