

Processing Guide

Ixef® BXT 2000-0203

BXT 2000-0203 is a grade of Ixef® polyarylamide (PARA) developed by Solvay Specialty Polymers for use in a variety of manufacturing processes. It exhibits excellent fuel barrier properties and good chemical resistance. Ixef® BXT 2000-0203 can be co-extruded with nylon, Santoprene® and other polyolefins. Co-extrusion with other materials will need to be evaluated. Adhesive layers or additives are typically required to ensure a strong bond between BXT 2000-0203 and the parent material.

Processes

Ixef® BXT 2000-0203 can be processed on commercially available equipment in the following processes:

- Multi-layer continuous extrusion blow molding
- Multi-layer accumulator or shot pot blow molding
- Multi-layer reciprocating screw blow molding
- Suction blow molding
- Tube extrusion
- Film extrusion
- Multi-layer sheet extrusion

Table 1: Thermal and rheological properties, ASTM test method

Melting point	230 °C (446 °F)
Crystallization temperature	130 °C (266 °F)
Glass transition temperature	95 °C (203 °F)
Melt index at 240 °C, 2.16 kg	6 g/10 min
Specific gravity	1.12
Density	1.12 g/cc

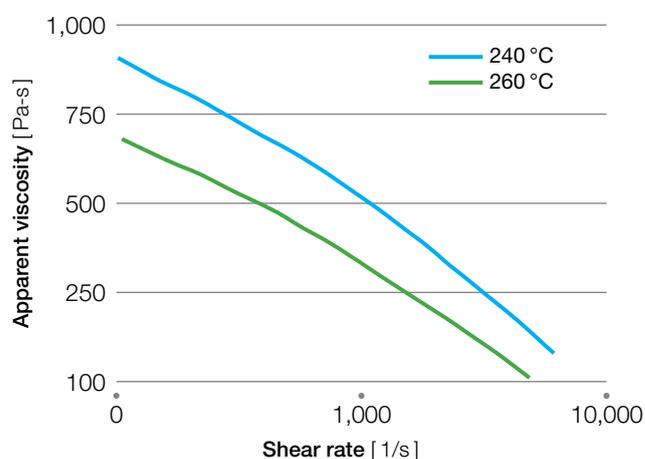
Table 2: Physical characteristics of pellet

Pellet shape	cylindrical
Pellet size	2-mm diameter 2-mm – 3-mm length
Bulk density	650 g/l – 670 g/l

Melt Viscosity Curves

To obtain a good, uniform multi-layer structure, it is important to match the viscosities of the various resins being used as closely as possible. Melt viscosity curves for Ixef® BXT 2000-0203 are shown in Figure 1.

Figure 1: Viscosity of Ixef® BXT 2000-0203



Equipment Recommendations

Ixef® BXT 2000-0203 has been successfully processed on a variety of extruder designs and configurations. For best results, please review the following recommendations:



Barrier and Metering Screws

Barrier screws are preferred over metering screws for extruding Ixef® BXT 2000-0203 as they provide much higher output and better mixing. Plus, they give additional shear to the material, which helps in plasticization. Minimize residence time to prevent resin degradation.

Table 3: Screw design recommendations

	Barrier Screws	Metering Screws
L/D	24/1–30/1	24/1–30/1
Compression ratio	3/1–3.5/1	3/1–3.5/1
Zone distribution		
Feed	6D–7.5D	8D–10D
Compression	12D–15D	8D–10D
Metering	6D–7.5D	8D–10D

Mixing Sections

Not recommended due to their negative effect on extruder output and potential increase in residence time.

Screw Coatings

Special screw coatings are not required to run Ixef® BXT 2000-0203.

Extruder Sizing and Output

Extruder and screw sizing should be sufficient to provide a uniform layer for all manufactured parts. Special consideration should be given to the minimum output required in order to size the extruder to minimize polymer residence time and to ensure that the extruder rotation is sufficient to properly plasticize Ixef® BXT 2000-0203. Extruder rotation should not be slower than 6 RPM. Screw should be sized such that sufficient rotational speed can be achieved at the lowest output.

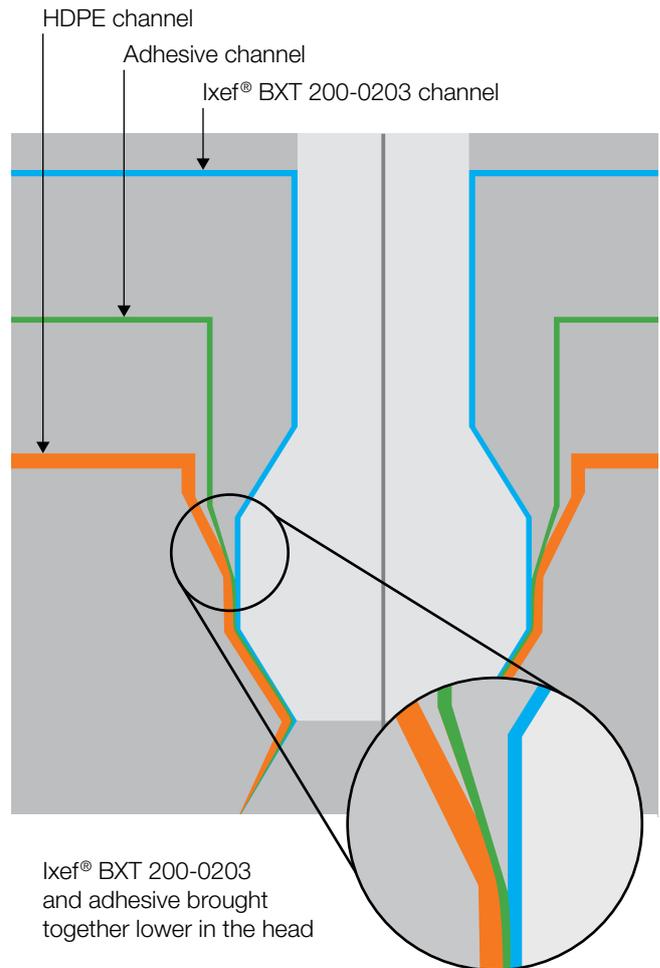
Die/Head Design

Ixef® BXT 2000-0203 should be introduced into the die/head as late as possible to minimize the reaction between resin and adhesive (see Figure 2). The channel in the die/head should be sized appropriately for the desired range of Ixef® BXT 2000-0203 layer thicknesses (see Figure 3).

Melt Path

Melt paths should be designed to eliminate all dead zones in which the resin can degrade. Degraded resin will be yellow to brown in color.

Figure 2: Recommended die/head design for 3-layer system



Processing

The extrusion system must have good temperature control and temperature zone feedback. Recommended set points for extruding Ixef® BXT 2000-0203 are shown in Table 4. If there are additional zones, the settings should be such that the melt is 255 °C (491 °F).

Table 4: Extruder temperature settings

Zone	Section	Temperature
Zone 1	Feed section	220 °C (428 °F)
Zone 2	Compression	230 °C (446 °F)
Zone 3	Metering	240 °C (464 °F)
Zone 4	Melt	255 °C (491 °F)

Maximum recommended processing temperature is 290 °C (554 °F). Exceeding the maximum recommended temperature can result in degradation of the polymer which will result in a yellowing of the polymer as well as severely reduced mechanical properties.

Minimum recommended processing temperature is 240 °C (464 °F). If the processing temperatures are too low, the material will freeze off or have unmelted in the layer. In addition, there may be a pink color to the material.



This will also result in severely reduced mechanical properties. Processing Ixef® BXT 2000-0203 below the minimum recommended temperature can result in irregular layer thickness, a non-continuous barrier layer, and/or the material freezing off in the head.

Co-extrusion with other polymers may result in Ixef® BXT 2000-0203 coming in contact with melt streams that are lower than the minimum extrusion temperature of Ixef® BXT 2000-0203. As long as the contact time is minimized, this should not pose a problem.

Ixef® BXT 2000-0203 does not require purging for operational stoppages up to 4 hours. If downtime is longer than 4 hours, it is recommended to purge out the Ixef® BXT 2000-0203 with a suitable purging compound (PP, LDPE, HDPE, etc.) However, there is no risk to the equipment if the polymer is left in the extruder for longer periods of time. The polymer will degrade, but will not freeze up the extruder.

A screen pack is optional for successfully processing Ixef® BXT 2000-0203.

Adhesive Resins

An adhesive resin is typically required for co-extrusion with polyolefins. The adhesive can be either a concentrate that is dry blended into the polyolefin or a distinct layer. Anhydride-modified linear low density PE and high-density PE adhesives are recommended.

Moisture Absorption

Ixef® BXT 2000-0203 will absorb moisture over time if the bag or gaylord shipping container remains exposed to the atmosphere. Drying the resin prior to use is recommended. The resin can be dried in a hot air or desiccant dryer. Drying at 70 °C to 80 °C (160 °F to 180 °F) for 3 to 4 hours should be sufficient. Moisture levels of 1,200 ppm or less are required for proper processing.

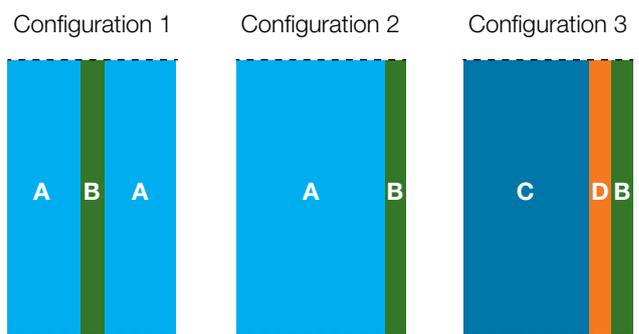
Layer Configurations and Thickness Recommendations

Ixef® BXT 2000-0203 has been successfully extruded in 2-layer and 3-layer structures. Recommendations for each of these structures are detailed below.

Configuration 1 is recommended for all articles that have a pinch line and are required to meet stringent impact requirements (e.g. -40 °C article drop, -20 °C ball drop, etc.).

Configurations 2 and 3 should be considered for non-pinch articles or articles that have a minimum pinch line.

Figure 3: Layer configurations



Layer	Material	Minimum Thickness
A	HDPE with 5 % to 20 % adhesive concentrate and up to 50 % regrind	As required
B	Ixef® BXT 2000-0203	200 microns
C	HDPE	As required
D	Adhesive	3 % - 5 %

Tooling Requirements

For all articles having a pinch, special considerations in pinch line design must be addressed and the tool must incorporate a multi-layer pinch design.

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