

State of California  
AIR RESOURCES BOARD

Small Off Road Engine Evaporative Emission System Components

Q-08-006  
SABIC Innovative Plastics  
Innovative Product

WHEREAS, Pursuant to California Health and Safety Code, sections 39600, 39601 and 43013, the California Air Resources Board (ARB) has established a certification process for evaporative emission system components designed to control gasoline emissions from small off-road engines, as described in title 13, California Code of Regulations (13 CCR), section 2767.1;

WHEREAS, Pursuant to California Health and Safety Code, section 43013, ARB has established criteria and test procedures for determining the compliance of evaporative emission system components with the design requirements in 13 CCR, section 2754;

WHEREAS, Pursuant to 13 CCR, section 2767.1, ARB Executive Officer may issue an Executive Order if he determines that the small off-road engine evaporative emission system component conforms to the applicable performance requirements set forth in 13 CCR, section 2754;

WHEREAS, Pursuant to Health and Safety Code, sections 39515 and 39516, ARB Executive Officer issued Executive Order G-05-008 delegating to the Chief of ARB Monitoring and Laboratory Division (MLD) the authority to certify small off-road engine evaporative system components; and

WHEREAS, On November 29, 2007, SABIC Innovative Plastics submitted an application for certification, #007-11-12-versionA, attached as Attachment A and incorporated herein, as an innovative product under 13 CCR, section 2767(c) for Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 material blow molded fuel tanks.

NOW, THEREFORE, I, William V. Loscutoff, Chief of the MLD, find that the SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 material produced following the process and material specifications set out in Attachment A constitute an innovative fuel tank pursuant to 13 CCR, section 2767(c). Fuel tanks produced following SABIC Innovative Plastics process and material specifications are hereby deemed equivalent to those tanks listed in 13 CCR, section 2752(a)(5). This finding is based on SABIC Innovative Plastics demonstration that such tanks have a permeation rate substantially lower than 1.5 grams per square meter per day set forth in 13 CCR, section 2754, when tested at a constant temperature of 40 °C pursuant to TP-901 using an approved test fuel of California Phase II Certification Fuel.

IT IS ORDERED AND RESOLVED that no tank permeation data is required to be submitted in the certification process for equipment using the SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, or Xenoy® X6800BM-RD6D122 resin for an blow molded fuel tank.

IT IS ORDERED AND RESOLVED that all fuel tanks made from SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin with average wall thicknesses equal to or greater than the value listed in Table 1 attached hereto and incorporated herein, and with minimum barrier thickness at any point 64 percent lower than Table 1 values due to molding tolerances, are certified for use in small off-road equipment.

Table 1  
Specifications for SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122  
Fuel Tanks

Average Wall Thickness (mm)
2.4

IT IS FURTHER ORDERED that equipment manufacturers utilizing SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin for fuel tanks shall provide a warranty. The warranty must conform to the requirements of 13 CCR, section 2760.

IT IS FURTHER ORDERED that the certified fuel tank made from SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin shall be installed in accordance with the manufacturer's installation and use instructions. A copy of this Executive Order, fuel tank installation, and use instructions shall be provided to manufacturers purchasing SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin for fuel tanks for installation on small off-road engines and equipment introduced into commerce in California.

IT IS FURTHER ORDERED that fuel tanks listed in Table 1 shall be clearly identified by a permanent identification that allows ARB to identify manufacturer's name, executive order number, and model number.

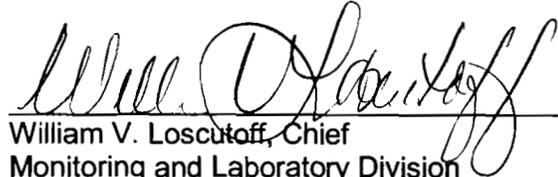
IT IS FURTHER ORDERED that any modification of SABIC Innovative Plastics approved process and material specifications for producing a fuel tank made from Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin hereby are prohibited. Any alteration or modification of the process or material specifications set out in Attachment A of this Executive Order will require the manufacturer to apply for a new Executive Order.

IT IS FURTHER ORDERED that fuel tanks made from SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin shall be compatible with fuels in common use in California at the time of certification and any modifications to comply with future California fuel requirements shall be approved in writing by the Executive Officer or Executive Officer's delegate.

IT IS FURTHER ORDERED that the component certification obtained by testing fuel tanks made from Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin submitted by SABIC Innovative Plastics can be referenced in certification applications for small off-road engines and equipment that use small off-road engines unless the Executive Officer finds that fuel tanks made from SABIC Innovative Plastics Xenoy® X6800BM-1001, Xenoy® X6800BM-BK1066, and Xenoy® X6800BM-RD6D122 resin no longer meet the

performance requirements set forth in 13 CCR, section 2754 when tested pursuant to 13 CCR, section 2765.

Executed at Sacramento, California, this 19<sup>th</sup> day of February, 2008.

  
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William V. Loscutoff, Chief  
Monitoring and Laboratory Division

## 2. Overall Material Specification:

Material Manufacturer:	SABIC Innovative Plastics
Material Composition / Description:	Xenoy® X6800BM single homogeneous layer of Polybutylene Terephthalate (PBT) unreinforced impact modified thermoplastic alloy
Barrier Material:	N/A
Colors:	Natural (X6800BM-1001), Black (X6800BM-BK1066) & Red (X6800BM-RD6D122)
Manufacturing Method:	Blow Molding Process (a manufacturing technique for making hollow parts from thermoplastic material). An extruder heats and conveys the plastic resin through the barrel into an accumulator, or in front of a reciprocating screw, where the shot builds to the appropriate size before it is pushed through an annular die creating a parison. The mold halves will close on the parison, and the parison is then expanded to the mold walls with air pressure. Components may be "insert-molded" into the process but attention to material compatibility must be considered depending on the function or application. Flash generated from the blow molding process may be reprocessed to manufacture parts.
Recommended Nominal Wall Thickness:	2.40-mm

### Material Datasheet:

#### Xenoy® Resin X6800BM

#### Americas: COMMERCIAL

TYPICAL PROPERTIES <sup>1</sup>	TYPICAL VALUE	UNIT	STANDARD
<b>THERMAL</b>			
CTE, -40°C to 40°C, xflow	1.7E-04	1/°C	ISO 11359-2
Vicat Softening Temp, Rate B/50	118	°C	ISO 306
Vicat Softening Temp, Rate B/120	115	°C	ISO 306
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	46	°C	ISO 75/Af
<b>PHYSICAL</b>			
Specific Gravity	1.22	-	ASTM D 792
Mold Shrinkage, flow, 0.125"	2.85 - 3.35	%	GE Method
Melt Flow Rate, 265°C/2.16kg	4	g/10 min	ASTM D 1238
Density	0.04	lb/in <sup>3</sup>	ISO 1183
Water Absorption, equilibrium, 73°F	0.1	%	ISO 62
Moisture Absorption (23°C / 50% RH)	0.01	%	ISO 62
Melt Volume Rate, MVR at 265°C/5.0 kg	9	cm <sup>3</sup> /10 min	ISO 1133

THIS APPLICATION SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE APPROVAL OF THE APPLICANT  
DO NOT REPRODUCE IN BLACK AND WHITE

2. Overall Material Specification: *continued*

Material Datasheet: *continued*

**Xenoy\* Resin X6800BM**

**Americas: COMMERCIAL**

Blow moldable, impact modified XENYOY

TYPICAL PROPERTIES <sup>1</sup>	TYPICAL VALUE	UNIT	STANDARD
<b>MECHANICAL</b>			
Tensile Stress, yld, Type I, 2.0 in/min	5000	psi	ASTM D 638
Tensile Stress, brk, Type I, 2.0 in/min	6900	psi	ASTM D 638
Tensile Strain, yld, Type I, 2.0 in/min	11	%	ASTM D 638
Tensile Strain, brk, Type I, 2.0 in/min	238	%	ASTM D 638
Tensile Modulus, 0.2 in/min	245000	psi	ASTM D 638
Flexural Stress, yld, 0.05 in/min, 2 in span	7300	psi	ASTM D 790
Flexural Modulus, 0.05 in/min, 2 in span	239000	psi	ASTM D 790
Tensile Stress, yield, 50 mm/min	31	MPa	ISO 527
Tensile Stress, break, 50 mm/min	38	MPa	ISO 527
Tensile Strain, yield, 50 mm/min	14.4	%	ISO 527
Tensile Strain, break, 50 mm/min	167	%	ISO 527
Tensile Modulus, 1 mm/min	1700	MPa	ISO 527
Flexural Stress, yield, 2 mm/min	48	MPa	ISO 178
Flexural Modulus, 2 mm/min	1420	MPa	ISO 178
<b>IMPACT</b>			
Izod Impact, notched, 73°F	15	ft-lb/in	ASTM D 256
Izod Impact, notched, -22°F	3.4	ft-lb/in	ASTM D 256
Instrumented Impact Total Energy, 73°F	485	in-lb	ASTM D 3763
Izod Impact, notched 80*10*4 +23°C	95	kJ/m <sup>2</sup>	ISO 180/1A
Izod Impact, notched 80*10*4 -30°C	22	kJ/m <sup>2</sup>	ISO 180/1A
Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm	129	kJ/m <sup>2</sup>	ISO 179/1eA
<b>THERMAL</b>			
Vicat Softening Temp, Rate B/50	239	°F	ASTM D 1525
HDT, 264 psi, 0.125", unannealed	116	°F	ASTM D 648
CTE, flow, -40°F to 100°F	4.61E-05	1/°F	ASTM E 831
CTE, xflow, -40°F to 100°F	9.44E-05	1/°F	ASTM E 831
CTE, -40°C to 40°C, flow	8.3E-05	1/°C	ISO 11359-2

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2. Overall Material Specification: *continued*

Material Datasheet: *continued*

PROCESSING PARAMETERS	TYPICAL VALUE	UNIT
<b>Extrusion Blow Molding</b>		
Drying Temperature	210 - 220	°F
Drying Time	3 - 4	hrs
Drying Time (Cumulative)	12	hrs
Maximum Moisture Content	0.01 - 0.03	%
Melt Temperature (Parison)	490 - 510	°F
Barrel - Zone 1 Temperature	480 - 500	°F
Barrel - Zone 2 Temperature	480 - 500	°F
Barrel - Zone 3 Temperature	490 - 500	°F
Barrel - Zone 4 Temperature	490 - 510	°F
Adapter - Zone 5 Temperature	490 - 510	°F
Head - Zone 6 - Top Temperature	490 - 510	°F
Head - Zone 7 - Middle Temperature	490 - 510	°F
Head - Zone 7 - Bottom Temperature	490 - 510	°F
Screw Speed	15 - 50	rpm
Extruder Feed Zone Temperature	490 - 510	°F
Accumulator Temperature	490 - 510	°F
Mold Temperature	120 - 200	°F
Die Temperature	490 - 510	°F

THIS APPLICATION SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE APPROVAL OF THE APPLICANT  
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## 2. Overall Material Specification: *continued*

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### **Limits for Proper Functioning:**

#### LIMITS FOR PROPER FUNCTIONING:

- Use moderate-slow screw speeds to keep melt temperature in suggested range. Suggested screw speed: 15-50 rpm. Actual rpm should be adjusted for desired output.
- Processing Temperature must be measured with a hand-held probe as opposed to an internal-head probe.
- A reverse barrel profile may increase output while maintaining the melt temperature.

#### THESE PROPERTY VALUES ARE NOT INTENDED FOR SPECIFICATION PURPOSES

- (1) Typical values only. Variations within normal tolerances are possible for various colors. All values are measured after at least 48 hours storage at 23°C/50% relative humidity. All properties, except the melt volume and melt flow rates, are measured on injection molded samples. All samples tested under ISO test standards are prepared according to ISO 294.
- (2) Only typical data for selection purposes. Not to be used for part of tool design.
- (3) This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.
- (4) Internal measurements according to UL standards.

#### Disclaimer:

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2. Overall Material Specification: *continued*

**Manufacturing Method Parameters:**

Extrusion Blow Molding (EBM) Processing Profile Template  
 - Minimum Processing Data Requirements

PARAMETER TITLE	PRODUCT NAME	Xenoy		
	GRADE NAME	X6800BM		
	UNIT	FROM	TO	
Drying Temperature	deg F	210	220	
Drying Time (-20F dew point; dehumidifying dryer)	Hr	3	4	
Drying Time Maximum	Hr	12		
Moisture Content (range)	%	0.01	0.03	
Moisture Content Maximum	%	0.03		
Melt Temperature (Parison)	deg F	490	510	
Barrel - Zone 1	deg F	480	505	
Barrel - Zone 2	deg F	480	505	
Barrel - Zone 3	deg F	490	505	
Barrel - Zone 4	deg F	490	510	
Adapter - Zone 5	deg F	490	510	
Head - Zone 6 - Top	deg F	490	510	
Head - Zone 7 - Bottom	deg F	490	510	
Head - Zone 8 - Die	deg F	490	510	
Mold Temperature	deg F	120	200	
<b>PROCESSING PROFILE SPECIFIC NOTES</b>				
Purging recommendations:				
Cautions - (i.e., avoid long residence times, do not over dry, etc...)				
Melt temperature as measured using a hand held pyrometer.				
Reground use to be determined by molder based on application performance required.				
Purge with HDPE or polycarbonate.				
<b>GRADE SPECIFIC NOTES - Items that apply to ONE grade but not necessarily to ALL grades in the profile</b>				
For long downtimes, lower dryer temperature to 150° F.				
Shrinkage (flow) - 2.9-3.5% or 0.029- 0.035 in/in				
Shrinkage (cross-flow) - 2.2-2.8% or 0.022- 0.028 in/in				