

State of California  
AIR RESOURCES BOARD

Small Off-Road Engine Evaporative Emission System Components

Executive Order Q-11-020  
LG Chem America, Incorporated  
Innovative Product

WHEREAS, Pursuant to California Health and Safety Code (CH&SC), 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 California Code of Regulations (CCR), title 13, section 2767.1;

WHEREAS, Pursuant to CH&SC, section 43013, ARB has established criteria and test procedures for determining the compliance of evaporative emission system components with the design requirements in CCR, title 13, section 2754;

WHEREAS, Pursuant to CCR, title 13, section 2767.1, ARB Executive Officer may issue an Executive Order if he determines that the small off-road engine evaporative emission system component or innovative product conforms to the applicable performance requirements set forth in CCR, title 13, section 2754 and 2755;

WHEREAS, Pursuant to CH&SC, 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 innovative products; and

WHEREAS, On July 13, 2011, LG Chem America, Incorporated submitted an application for certification as an innovative product under CCR, title 13, section 2767(c) for Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks.

NOW, THEREFORE, I, Alberto Ayala, Chief of MLD, find that fuel tanks produced using LG Chem America, Incorporated Hyperier IP 1106 black colored resin material and following the process and material specifications set out in Attachment A constitute innovative fuel tanks pursuant to CCR, title 13, section 2767(c). Fuel tanks produced following LG Chem America, Incorporated process and material specifications are hereby deemed equivalent to those tanks listed in CCR, title 13, section 2752(a)(5). This finding is based on LG Chem America, Incorporated's demonstration that such fuel tanks have a permeation rate substantially lower than 1.5 grams per square meter per day set forth in CCR, title 13, section 2754, when tested at a constant temperature of 40° C pursuant to test procedure TP-901 using an approved test fuel of Phase II California Reformulated 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 LG Chem America, Incorporated Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks.

IT IS ORDERED AND RESOLVED that all fuel tanks made from LG Chem America, Incorporated Hyperier IP 1106 black colored resin with minimum barrier and nominal wall thicknesses equal to or greater than the value listed in Table 1 attached hereto and incorporated herein, are certified for use in small off-road equipment.

Table 1  
Specifications for LG Chem America, Incorporated Hyperier IP 1106 Black Colored Resin Fuel Tanks

Min. barrier thickness (mm)	Nominal overall tank thickness (mm)
1.8	2.8

IT IS FURTHER ORDERED that LG Chem America, Incorporated shall provide a warranty to equipment manufacturers purchasing their Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks. The warranty must conform to the requirements of CCR, title 13, section 2760.

IT IS FURTHER ORDERED that the certified Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks shall be installed in accordance with the manufacturer's installation and use instructions for the tanks. A copy of this Executive Order and the fuel tanks' installation and use instructions shall be provided to manufacturers purchasing LG Chem America, Incorporated Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks for installation on small off-road engines and equipment introduced into commerce in California.

IT IS FURTHER ORDERED that LG Chem America, Incorporated Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks 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 LG Chem America, Incorporated approved process and material specifications for producing Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks 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 the LG Chem America, Incorporated Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks 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 innovative product certification of the LG Chem America, Incorporated Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks 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 the LG Chem America, Incorporated Hyperier IP 1106 black colored resin extrusion blow molded fuel tanks no longer meet the performance requirements set forth in CCR, title 13, section 2754, when tested pursuant to CCR, title 13, section 2765.

Executed at Sacramento, California, this 16<sup>th</sup> day of September 2011.

  
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Alberto Ayala, Ph.D., M.S.E.  
Chief, Monitoring and Laboratory Division

**2. Overall Material Specification:**

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Material Manufacturer:	LG Chem
Material Distributor:	LG Chem America, Inc.
Material Composition / Description:	HYPERIER IP 1106 consists of a nylon nanocomposite and a compatibilizer additive
Barrier Material:	HYPERIER IP 1106 acts as the permeation barrier in HDPE matrix
Blend Ratio to manufacture tanks	HYPERIER IP 1106 22% + HDPE 78%
Color(s):	Black
Manufacturing Method:	Extrusion blow molding, where molten resin is extruded into a parison (similar to a balloon). Two halves of a metal mold, with the shape of the desired container etched
Recommended Minimum Wall Thickness:	1.8-mm

ARB Executive Order Q-11-020 Attachment A, page 1 of 3

Processing information includes resin and processed fuel tank material and blend ratios that are provided by LG Chem

2. Overall Material Specification: *continued*

**Limits for Proper Functioning:**

**Limits for proper functioning**

- Set a moderate or slow screw speed to keep the melt temperature within the suggested range. Actual rpm may be adjusted for desired output.
- Processing temperatures, except the melt temperature of the parison, should be measured using internal temperature probes.
- Maximum allowable regrind percentage: 50 weight %  
Regrind can be used by dry-blending it with virgin material which consists of HYPERIER and HDPE.

**Extrusion Blow molding processing profile template**

Processing Requirements			
Parameter Title	Unit	From	To
Melt Temperature Of Parison	°C	220	240
Barrel - Zone 1 Temperature	°C	170	230
Barrel - Zone 2 Temperature	°C	180	240
Barrel - Zone 3 Temperature	°C	180	240
Barrel - Zone 4 Temperature	°C	180	240
Adaptor - Zone 5 Temperature	°C	200	240
Head - Zone 6 - Top Temperature	°C	200	240
Head - Zone 7 - Middle Temperature	°C	200	240
Head - Zone 8 - Bottom Temperature	°C	200	240
Screw Speed	HPM	10	80
Mold Temperature	°C	10	80
Accumulator Temperature	°C	200	240
Die Temperature	°C	200	240

**Disclaimer**

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ARB Executive Order Q-11-020 Attachment A, page 2 of 3

**3. Certification Component Specifications:**

Material Manufacturer:	LG Chem
Material Distributor:	LG Chem America, Inc.
Material Composition / Description:	HYPERIER IP 1106 consists of a nylon nanocomposite and a compatibilizer
Color:	Black
Minimum Wall Thickness:	1.8-mm
Maximum Wall Thickness:	3.8-mm
Nominal Wall Thickness:	2.8-mm
Barrier Material:	HYPERIER IP 1106 acts as the permeation barrier in HDPE matrix
Minimum Barrier Thickness:	N/A
Manufacturing Method:	Extrusion blow molding, where molten resin is extruded into a parison (similar to a balloon). Two halves of a metal mold, with the shape of the desired container etched into the matching halves, close around the parison. Air pressure in the parison forces the wall of the parison onto the cavity of the mold to form the container, which is ejected from the mold after the resin has solidified.
Method to determine Nominal Wall Thickness:	The measurements noted under "Component Thickness" have been derived from 40-point thickness measurements around the test component employing an ultrasonic thickness gauge.

ARB Executive Order Q-11-020 Attachment A, page 3 of 3