

Ketoprix[™] aliphatic polyketones are novel, engineering thermoplastic resins that provide superior toughness, strength, resilience and chemical resistance. Ketoprix[™] polymers exhibit very high permeation resistance to fuels and hydrocarbons. Fuel transport systems can utilize Ketoprix[™] polymers in single layer or as the inner barrier layer in multilayer pipe/tube.

Esprit Ketoprix[™] Fuel Permeation Technical Data Sheet

Natural Grades, EK33, EK63, EK73

Engineered Resins for Fuel Transport Systems

1

POLYKETONE PRODUCT CHARACTERISTICS

Ketoprix[™] resins are thermoplastic aliphatic polyketones containing a 1,4-diketone backbone structure. They are produced from ethylene, propylene and CO and perfectly alternate olefin and CO monomers in the backbone.

The resins are very tough, strong and have high permeation resistance making them perfect for use as barrier layer to fuels and hydrocarbons, including oxygenated fuels.

2

BACKGROUND

The task of designing automotive and retail forecourt (gasoline service station) fuel transport components and systems has been made more difficult by new tighter emissions standards and uncertainty about the composition of future fuels. A variety of oxygenated fuels may be required to reduce exhaust emissions as mandated in many areas throughout the country. Polymers used in fuel system components must be compatible with these new oxygenated fuels.

KETOPRIX[™] polymers have excellent barrier properties to gasoline and oxygenated fuels. As the data on the attached pages show, based on the tests performed, KETOPRIX[™] polymers' performance was superior to nylon-12 in all fuels tested and generally equal to polytetrafluoroethylene (PTFE), even at elevated temperatures.

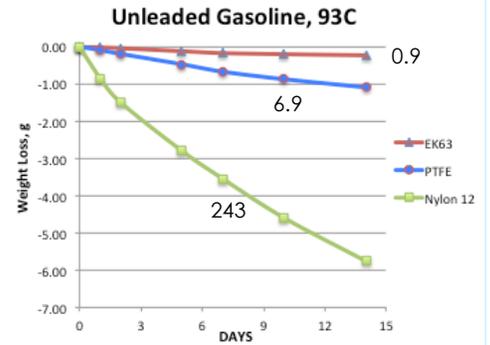
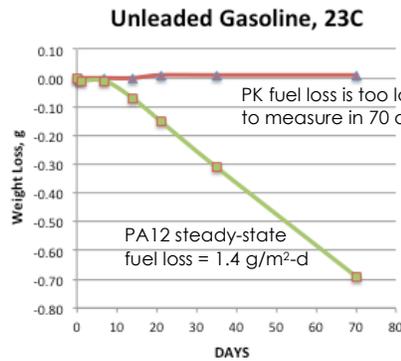
The testing herein has closely followed the procedures outlined by General Motors specification GM 9061-P, "Permeability Test for Fuel Hose and Tubing." The extruded tubing tested had a nominal OD of 8.51 mm (0.34 in.), and a wall thickness of 1.07 mm (0.042 in.). The total effective length of the tubing with both ends plugged was 300 mm (11.8 in.).

Because of the multi-component nature of the new fuel systems, it is difficult to assign a single design permeability coefficient for each of the polymer/fuel systems. However, the relative barrier performances of KETOPRIX[™] polymers, nylon-12, and PTFE in the various fuel systems can be assessed from the attached graphs. The tubing is filled with the target fuel and then maintained at constant temperature, and the weight loss of the fuel/tube system was measured as a function of exposure time.

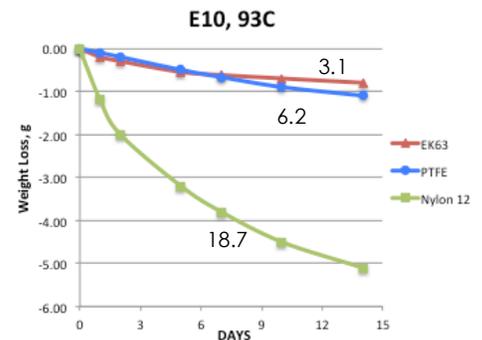
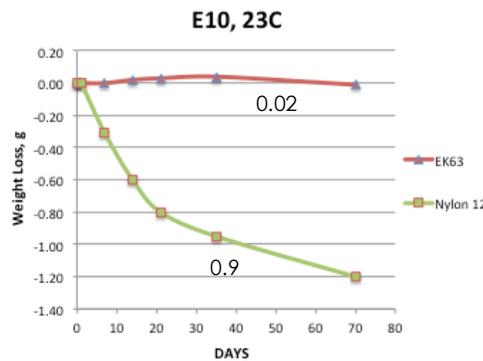
TESTING RESULTS

In Unleaded Gasoline at room temperature, PK performs superior to PA-12 with substantially lower permeability. For UL Gasoline at 93C, PK performs far better than PA-12 and even better than PTFE in terms of fuel permeation resistance.

Values on Figures 1-4 are the steady-state fuel permeation losses for each polymer in $g/(m^2 \cdot day)$. For more information on how these values were estimated, please see our white paper, "Fuel Permeation Resistance of Aliphatic Polyketone", available on our website: <http://www.espritech.com/landing-page/engineering-polymers/>



For E10 Gasoline (10% Ethanol and 90% Unleaded Gasoline) at room temperature, PK again performs superior to PA-12 with substantially lower permeability. For E10 at 93C, PK performs far better than PA-12 and comparable to PTFE in terms of fuel permeation resistance.

ENVIRONMENTAL,
HEALTH & SAFETY

KETOPRIX™ Polyketone resins are not hazardous. For information on handling and storage of KETOPRIX™ Polyketone resins, please consult our Safety Data Sheets, available from Esprich Technologies. For more detailed information, please contact your representative at Esprich Technologies.

REGULATORY

KETOPRIX™ Polyketone resins comply with all regulatory statutes in the USA. For more detailed information on regulatory compliance outside the USA, please contact your representative at Esprich Technologies.

CONTACT US

Esprich Technologies
Cary A. Veith
 cveith@espritech.com
www.espritech.com

7680 Matoaka Road
 Sarasota, FL 34243
 941-355-5100 ext. 100

The data and descriptions listed herein are presented for your information only. These data should not be used to establish specification limits nor used alone as the basis for design. The user of these products should make appropriate tests to determine whether the product(s) are suitable for a given purpose prior to use. Esprich Technologies assumes no obligations or liability for any advice furnished or for any results obtained with respect to this information. No warranties of any kind, either express or implied, including warranties of merchantability or fitness for a particular purpose, product(s) described, designs, or data may be used without infringing the intellectual property rights of others. In no case shall the product(s) described, designs or data provided be presumed to be a part of our terms and conditions of sale. All such advice is given and accepted at the buyer's risk. The disclosure of information herein is not a license to operate under, or a recommendation to infringe, any patent of Esprich or others. Esprich makes no warranties and assumes no liability in connection with any use of this information. Copyright © 2015 Esprich Technologies. All rights reserved.