

April 24, 2008

## **Daikin to Market DAI-EL™ FluoroTPV new fluorochemical material to meet new environment regulation of automobile industry**

Daikin Industries, Ltd. will market DAI-EL™ FluoroTPV, a newly developed fluorochemical material which features flexibility to withstand bending and twisting, and low permeability of hydrocarbons contained in automobile fuel, in late May.

This fluorochemical material is mainly used on rubber for automobile fuel hose application. It reduces permeation of air-polluting hydrocarbons and is therefore effective as a means to meet regulation to prevent fuel evaporation\*<sup>1</sup>, one of environmental regulations for the automobile industry. It can be overlaid on and molded with rubber materials which are currently used in the market without using any adhesive, reducing their permeability without affecting flexibility.

Currently, heat-resistant fluoroelastomers are used in components of automobile engines. In addition to exhaust emission regulation, regulation on evaporation of hydrocarbons in automobile fuel is being introduced in the U.S. and other countries. There are also moves to promote introduction of automobiles with zero emission of polluting substances. A new material which has excellent lower permeation property than the currently used fluoroelastomer was required.

Daikin established the technology to uniformly compound fluoro resin and fluoroelastomer, making use of the fluoro technology developed over the years, and developed a new fluorochemical material which has both flexibility and low permeability. Compared with Daikin's conventional fluoroelastomer, the new material reduces permeation of automobile fuel to about one twentieth\*<sup>2</sup>. Samples provided to Japanese, U.S. and European automobile parts suppliers have received favorable response. Daikin is also developing materials with even lower permeability for automobile fuel hose application which we expect growth in demand as well as for electric wire coating and sealing, targeting sales of ¥5 billion in 2015.

\*1, \*2: Please see below.

### **【Main features of DAI-EL™ FluoroTPV】**

1. Flexibility and low permeability
  - Has flexibility to withstand bending and twisting and low permeability of hydrocarbons contained in automobile fuel. Ideal for rubber for automobile fuel hoses.
2. Easy adhesion and molding with other materials
  - When it is used on laminated rubber hoses to prevent evaporation of

hydrocarbons, it can be attached to other rubber layers without the use of adhesive.

- It can be molded easily by heating. No post-processing (vulcanization) to improve strength and heat resistance is required.
3. Excellent heat resistant property and chemical resistant property, which are the features of fluorochemical materials.
- Excellent heat resistance – effective in the high-temperature environment around the engine.
  - Excellent chemical resistance – prevent corrosion- and degradation.

\*1 The Partial-Credit Zero Emission Vehicle (PZEV) regulation in California, USA requires that a certain percentage of the vehicles an automaker sells shall be pollution-free vehicles. The percentage shall be 10% till the end of 2008, and part of it can be ultralow-pollution vehicles such as fuel cell and hybrid cars. A standard for an ultralow-pollution vehicle is evaporation of hydrocarbons not to exceed 0.054 g per vehicle, so automakers are required to take steps to reduce evaporation.

\*2 Comparison of permeability of automobile fuel (measured by Daikin)

Permeation of automobile fuel per day through a piece of film 1 cm<sup>2</sup> in surface area and 1 mm in thickness

[New product] DAI-EL™ FluoroTPV: 0.0008 g

[Conventional product] Daikin's fluoroelastomer: 0.015 – 0.03 g

\* The lower the value, the lower the permeability.

Tested with imitation fuel (45% toluene, 45% isooctane and 10% ethanol on a volume basis) with temperature of 60°C.

### **【Examples of forming of DAI-EL™ FluoroTPV】**

- Fuel hose around automobile engine, for which heat resistance and low fuel permeability is required under high-temperature condition.

Three-layer structure Inner layer: Fluoroelastomer

Intermediate layer: DAI-EL™ FluoroTPV

Outer layer: Nitrile rubber or epichlorhydrin rubber

- Fuel hose around fuel tank, for which low fuel permeability is required.

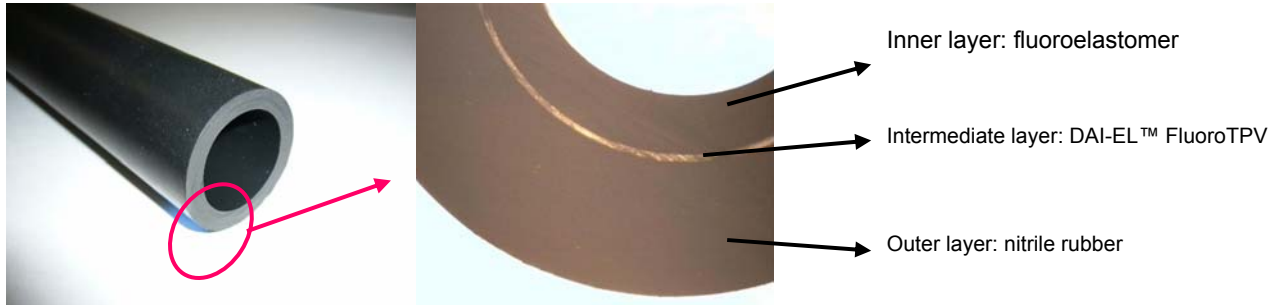
Three-layer structure Inner layer: Nitrile rubber

Intermediate layer: DAI-EL™ FluoroTPV

Outer layer: Nitrile rubber

Photo: Three-layer fuel hose using fluoroelastomer

Cross section of fuel hose



\* Conventional product: Two-layer structure without the intermediate layer

● Contact information for inquiries regarding the product

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