

RILSAN®

PRODUCING LOW WASHOUT HIGH PERFORMANCE IN-TANK MONOLAYER LINES FOR HYBRID CARS AND BEYOND WITH RILSAN® PA 11



SUMMARY

OBJECTIVES

Arkema's target is to provide to the automotive industry a complete range of new high performance plastic extrusion grades for fluid transfer. This development supports the strategies of major global car makers in the implementation of cost-effective, low extractible fuel lines on hybrid vehicles. Proposed solutions are extremely competitive without any technical compromise. And they are bio-based!

PARTNER

Leading global automotive car makers & fuel line producers

INDUSTRY

Automotive

APPLICATION

In-tank lines of plug-in hybrids

PRODUCTION PROCESS

Tube extrusion, smooth or corrugated

MATERIAL

Rilsan® Polyamide 11

CASE STUDY

INTRODUCTION

The rapid electrification of the automotive industry comes with many technical challenges. One of them is that, when **Hybrid vehicles** are operated on the Electric "zero emission" mode, the fuel remains within fuel lines without flowing for several days or weeks. This increases the extraction of leachable components from the plastic line. In addition to insoluble oligomers, soluble content may be extracted at a level that may become detrimental to the engine (fuel injector clogging). Carmakers are searching for competitive "**low washout**" **monolayer solutions** to be implemented on hybrid vehicles to solve this issue and to help accelerate the growth of environmentally virtuous vehicles.



RILSAN® PA11

CHALLENGE

DESIGNING COST-EFFECTIVE GLOBAL SOLUTIONS

Rilsan® polyamide 11 is a reference material in corrugated low oligomer (insoluble component) fuel delivery modules and other in-tank fuel transport tubing. To achieve **low extractible performance** (soluble and insoluble components), only expensive multilayer solutions were previously proposed (including fluorinated or aromatic polymer outer and inner layers, for instance) with narrower processing windows and performance limitations (fragility). **Offering a monowall solution** allows Arkema's customers to optimize cost and adapt to more stringent designs and specifications.

Designing a low-washout solution with high performance after fuel soaking

Fuel lines are usually made of plasticized polyamides. Plasticizers are traditionally needed to bring flexibility and limit swelling with gasoline. However, they are easily extracted when fuel penetrates the polyamide. A **low extractible product** must adopt a creative flexibilization strategy that doesn't wash out, and meet the high temperature or long-term resistance (creep) requirements of the line.

SOLUTION

Based on its **proprietary multi-polymer alloying technology** and expertise, Arkema has developed a new **low washout high performance polyamide 11** grade, **Rilsan® BESN Black P024 TL**. This grade shows an unequalled balance of low extractible performance and limited loss of mechanical properties during fuel soaking. As with other Rilsan® polyamide 11 grades, Rilsan® BESN Black P024 TL has **excellent processability and its dry modulus** is maintained at a sufficiently low value not to raise any assembly issues at tiers or OEMs.

"Arkema's low washout monowall solution for in-tank is being chosen by a growing number of customers versus several other possibilities because it offers the **best combination of performance, ease of processing and total cost of ownership**" says Arkema's business development engineer for fuel system solutions in Europe.

OUTCOME

On-going and upcoming serial productions are global, mainly in Europe, China and North America. They already represent an annual output of several hundred meters of high performance in-tank lines on most recent hybrid vehicles.

Arkema is currently finalizing its **new production plant in Singapore** at a cost of over €400 million that will be dedicated to polyamide 11 production (monomer + polymer). Complementing its traditional manufacturing assets in Europe, this will represent the **biggest integrated bio-factory in the world** for advanced polymers, and will enable Arkema to satisfy its strategy of business continuity assurance. Rilsan® polyamide 11 is **100% sourced from renewable castor beans**. There is no competition with food and there is no resultant deforestation. Arkema is highly involved in the driving of more sustainable castor farming as well as open and closed loop recycling systems (via its custom **Virtucycle® program**). Arkema promotes this range under the ABC (Advanced Bio-Circular) offering, which demonstrates a strong proven legacy in the global automotive and transportation segment.

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