



# EcoPaXX®

Robust and reliable coolant expansion tanks

As OEMs continue to downsize high-performance engines, cooling systems need to be smaller and more efficient. Coolant expansion tanks contain a volume reserve to compensate for volume differences of the liquid and cooling components due to thermal expansion. The coolant expansion tank is also known as the coolant reservoir, or overflow canister.

As the engine heats up, the coolant inside it expands. Without the expansion tank, the coolant would flow out of the overflow tube and be lost from the cooling system onto the street. Instead, the coolant flows into the expansion tank and remains in the system. The requirements for the materials used in these parts are high.

#### The material must withstand:

- Under-the-hood temperatures of 105°C to 150°C
- Exposure to water glycol
- Internal coolant temperatures of 120°C to 137°C
- Internal pressure levels of more than 2.3 bar
- Vibration from the chassis or engine

The material must also demonstrate good welding properties, with high strength at the weld line at under-the-hood temperatures. Under these conditions, materials such as polypropylene (PP) and polyamide 66 (PA66) are at the limit of their performance capabilities. Manufacturers using these materials have increased wall thicknesses to meet the higher specifications required for

the part. As the specifications for the materials continue to increase with smaller spaces and higher engine temperatures, manufacturers can no longer improve the part's performance by increasing wall thicknesses, as the materials have reached their limit due to manufacturing constraints.

#### A drop-in solution when PA66 fails

EcoPaXX® is a bio-based high-performance polyamide 410 (PA410) that provides outstanding performance across a broad range of applications. EcoPaXX can be used as a drop-in solution without the need for retooling or costly tool modifications in cases where PA66 fails to meet changing requirements. EcoPaXX demonstrates superior chemical stability and weld-line strength after aging, resulting in a part that lasts up to three times longer, with higher safety margins. This eliminates the need to replace the part during the lifetime of the vehicle, and reduces the risk of hazardous or explosive failure.

#### Designing for EcoPaXX

When the coolant expansion tank is designed for production in EcoPaXX, it can be optimized to fulfil functionality and application requirements at the lowest possible weight and cost. The material's superior performance, especially for weld-line stability, is so high that the part can be produced with thinner walls, resulting in a 30% reduction in weight and 50% reduction in cooling times versus PA66. This thinner, lighter part design is technically superior, yet cost neutral compared with PA66.

## EcoPaXX vs. PA66

- High strength after aging enables thin-walled parts that reduce weight by 30% over PA66
- Reliable weld line for tanks that live up to three times longer
- Cost neutral compared with PA66 for a tank designed for production in EcoPaXX

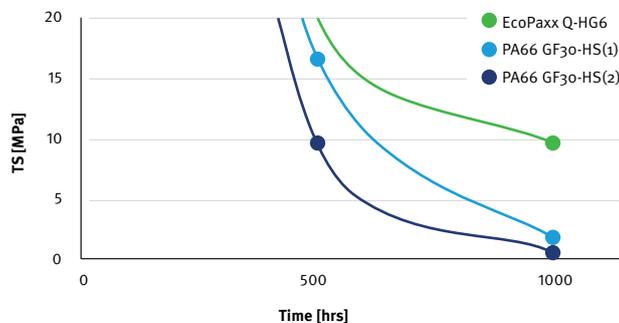


Figure 1 — Tensile strength at weld line after 135°C aging in a 50% mixture of water/G13

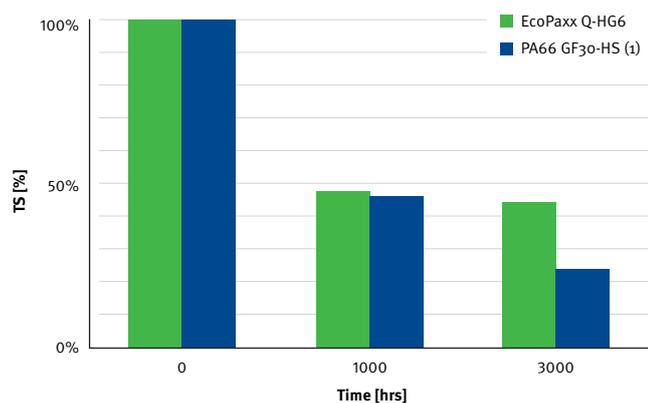


Figure 2 — Tensile strength after 120°C aging in a 50% mixture of water/G13

## EcoPaXX vs. PPA

- Unlike PPA, EcoPaXX can be used as a drop-in solution for PA66, using the same tools and processing settings

## EcoPaXX

- Reduces carbon footprint by more than 60%
- Weight reduction achieves a savings of more than €6 per vehicle in saved CO<sub>2</sub> penalties
- Drop-in solution for PA66-GF tooling if PA66 fails to meet requirements

60%

Reduction of carbon footprint



Weight reduction achieves more than

€6

per vehicle in saved CO<sub>2</sub> penalties



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