EcoPaXX®, a high performance polyamide for faucet system components

As the quest for new material solutions for metal replacement in drinking water contact is becoming stronger and stronger and lead limits in drinking water have been strengthened, DSM is innovating the materials to make it possible.

DSM's EcoPaXX offers a completely lead-free solution for faucet system components. Leading industry players already are successfully using EcoPaXX Q-DWX10, a 50% glass-fiber-reinforced polyamide 410, for faucet mixing valves because of its outstanding performance. This material enables the design of faucet mixing valves with lower risk of part failure and water leakage, a key focus for the industry.

- Lead-free
- Superior stiffness and toughness
- High strength
  Static pressure › 500 psi
  Bending strength › 61 N.M.
- No water leakage in lifetime cycle test up to 1 million cycles
- High screw thread strength
- Superior hydrolysis resistance: extremely low decrease in strength after 60°C and 90°C water contact
- Passes all major drinking water approvals, like NSF61, KTW, W270 etc.
- High dimensional stability

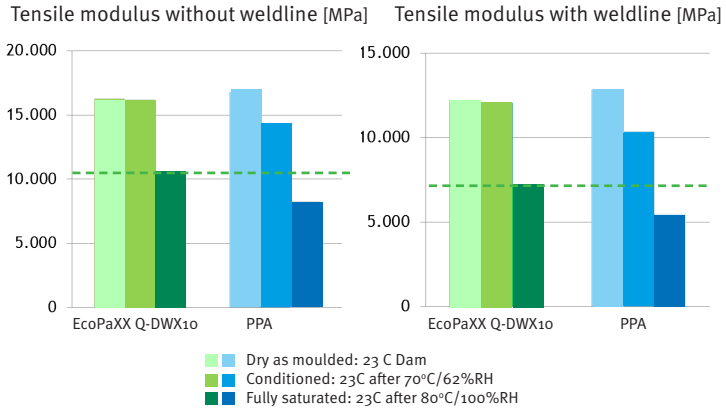
Plastic is the new metal

The water management market is looking for high-performance polymers that are able to withstand the stringent requirements of hot-water contact, while still meeting all major drinking water approval schemes.

Legislation also has been driving replacement of metals in applications that involve direct contact with drinking water. Brass and other metals traditionally have been used for such applications as faucets, water-meter and boiler components. Lead contamination in drinking water is a major concern worldwide, leading to more stringent regulation on lead limits in drinking water. This has driven the industry to look for alternatives, and engineering plastics such as EcoPaXX offer a completely lead-free solution, and fully comply with those regulations.

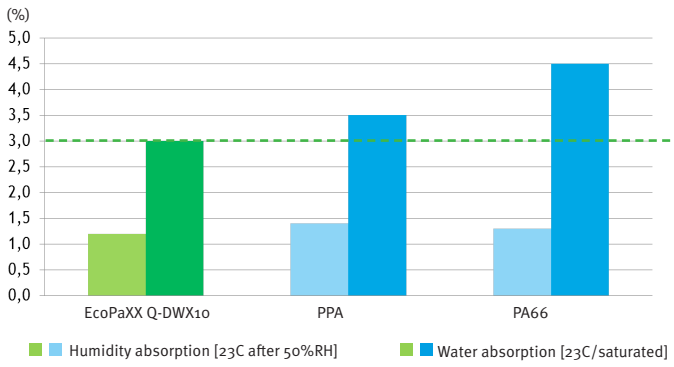
Faucet mixing valves need to provide long-term durability and perform reliably when in contact with both warm (60°C) and hot water (90°C). EcoPaXX offers superior toughness, better hydrolysis resistance and dimensional stability than other polyamide-based materials. It is not only lead-free, but also yields improved torque and bending strength, even after extended exposure to boiling water. EcoPaXX absorbs 30% less water and offers superior chemical resistance, which is especially important when in contact with chlorinated water. It passed more than 1 million lifetime cycles testing in varying water temperatures, and fully complies with all major drinking water certifications, such as NSF61 and KTW.

Tensile modulus without and with weldline (50% GF compounds)



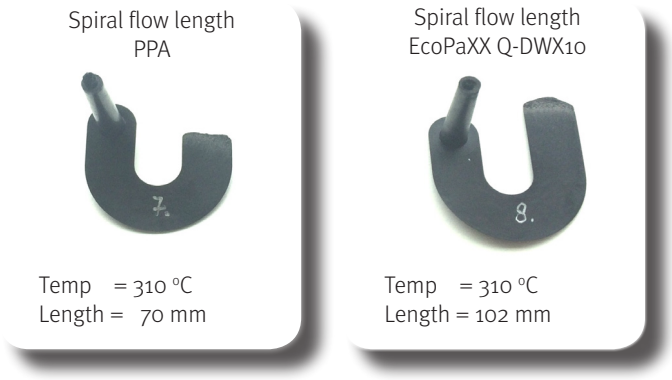
EcoPaXX Q-DWX10 exhibits a 30% higher tensile modulus vs. PPAs, even when fully saturated in water. This is confirmed by customers, who see an extremely low decrease in torque strength of faucet mixing valves made from EcoPaXX after long-term 90°C water contact. High tensile modulus even at the weldline, allows design of complex parts.

Low moisture absorption in combination with excellent hydrolytic stability (50% GF compounds)



EcoPaXX absorbs 30% less moisture than other polyamide based materials in combination with excellent hydrolitic and dimensional stability. Thanks to its long aliphatic chains EcoPaXX offers superior chemical resistance, which is especially important when in contact with chlorinated water. It has passed more than 1 million lifetime cycles testing in varying water temperatures.

Processability • Spiral Flow Length



EcoPaXX has wide processing window which makes it easy to process and suitable for large mass production. EcoPaXX enables superb "bonding" performance in over-mold design. Compared to PPAs, EcoPaXX superb flow and slow crystallization speed enables excellent surface quality even up to 60% GF reinforcements. Superb flow means better over-mold stability/bonding , less internal stress, more design freedom for faucet system manufacturers.

Properties EcoPaXX Q-DWX10

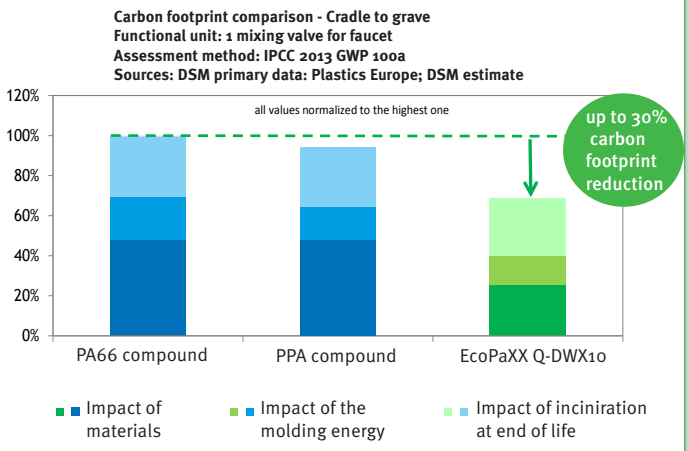
Mechanical properties	50% GF dry/cond	Unit	Test method
Tensile modulus	16500 / 16000	MPa	ISO 527-1/-2
Stress at break	240 / 210	MPa	ISO 527-1/-2
Strain at break	3 / 3.3	%	ISO 527-1/-2
Flexural strength	370 / -	MPa	ISO 178
Charpy impact strength (+23°C)	100 / -	kJ/m²	ISO 179/1eU
Charpy notched impact strength (+23°C)	16 / -	kJ/m²	ISO 179/1eA
Rheological properties	dry/cond		
Molding shrinkage (parallel)	0.15 / -	%	ISO 294-4
Molding shrinkage (normal)	0.5 / -	%	ISO 294-4
Other properties	dry/cond		
Water absorption	3.0 / -	%	SIM. To ISO 62
Humidity absorption	1.2 / -	%	SIM. To ISO 62
Density	1560	kJ/m³	ISO 1183

EcoPaXX a green polymer for faucet systems

EcoPaXX is a bio-based polymer, helping the industry to reduce the environmental footprint of their products.

- 70% of the polymer is bio-based, ASTM certified
- EcoPaXX polymer is carbon neutral from cradle to gate, externally validated
- EcoPaXX has 30% lower carbon footprint compared to benchmark materials with similar function (faucet mixing valve)
- DSM has an industry leading in house Life Cycle Assessment (LCA) expertise, to help customer quantify the environmental impact of their products

EcoPaXX LCA on faucet mixing valve:
30% lower carbon footprint than benchmark materials



Think together

Innovative materials are only part of the picture. We also know how to apply them, working hand-in-hand with the world's leading brands and OEMs in detailed application design and development.

Our material science centers include not only a team of people who know the products (and how they are manufactured) inside-out. It supports them with technology and equipment that delivers huge efficiencies and synergies for customers –from designing and testing components together with molders. No matter what the product is, we continue to work with the industry to use the right material in the right way at the right price.

Let's connect.

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