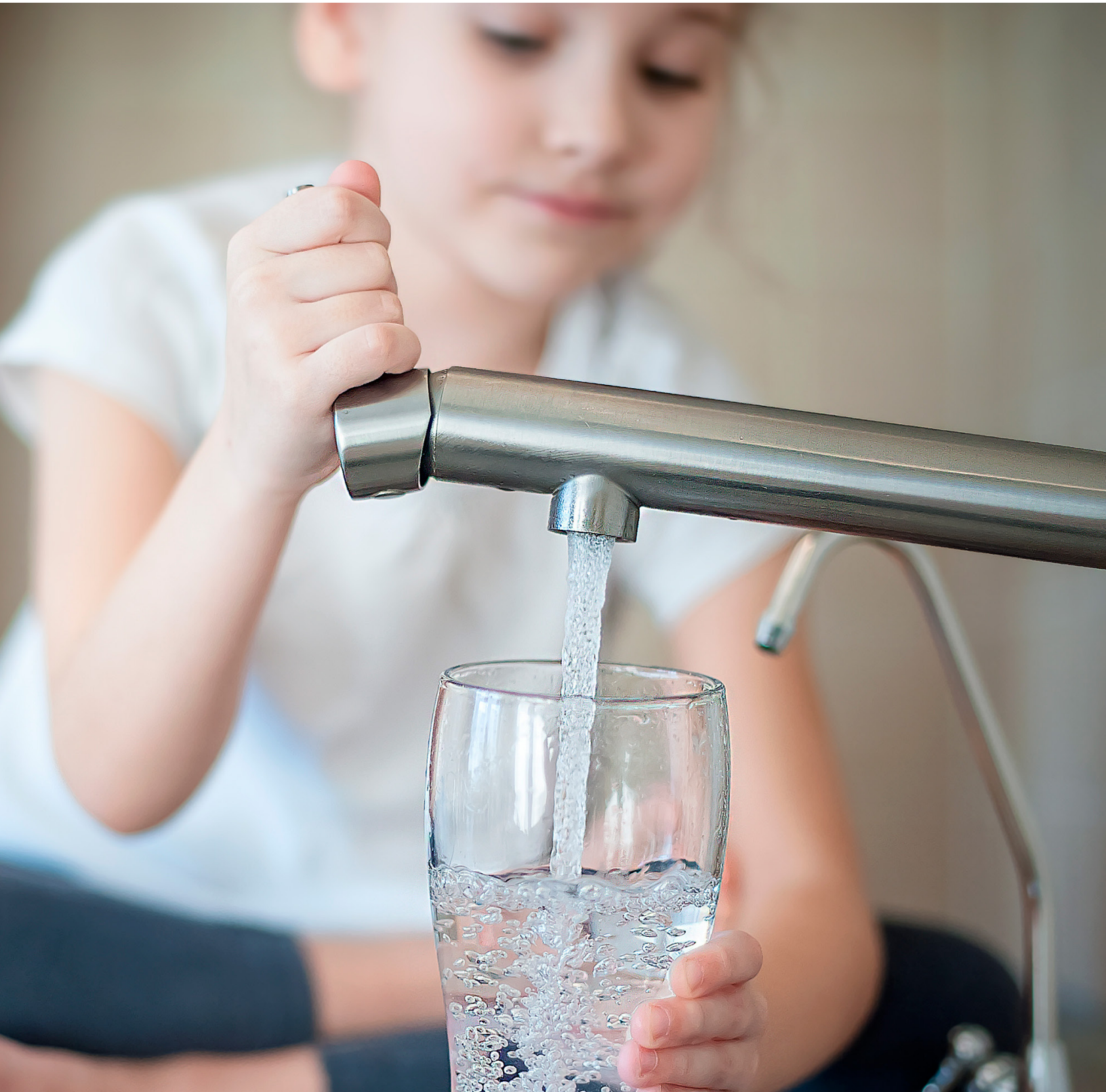
Celanese

# MATERIAL SOLUTIONS FOR THE FOOD & WATER INDUSTRIES



# THE CHEMISTRY INSIDE INNOVATION™

*The foundation of everything we do at Celanese centers around what our customers need. It's not just about the solutions we innovate, but also how we work with our customers.*

*Through our worldwide network of innovation and technical centers, our leading researchers work in close collaboration with customers, from concept to commercialization, using a wide range of processing, prototyping technologies and testing expertise.*

Our company's longstanding history and commitment to innovation enables us to solve all challenges and explore all opportunities in these ever-evolving markets.

We offer a comprehensive range of engineered materials optimized specifically for components that come into contact with potable water and food. Our offerings are built on years of experience of providing polymers for use in a variety of food contact and potable water applications. Each product is available in a spectrum of grades that enable our customers to select the right materials for each project.

# MARKET TRENDS AND CHALLENGES

The food and water industries have trended toward stringent regulations focused on safety—not only as it relates to end-use products and devices, but also as it applies to the assembling, handling and storage stages.

The industries are also increasingly in search of products that are more efficient, reliable and durable—products that, among other requirements, can withstand harsh cleaning agents and perform well in thermal shock environments.

## CELANESE SOLUTIONS

Based on our offering of the broadest portfolio of engineered polymers available, Celanese has proven to be a reliable and innovative material supplier for the food and water industries.

Celanese engineered polymers, for example, provide global food packaging solutions that guarantee endurance through shipping, handling and storage, offering protection from external elements such as heat and contamination.

With Crastin® PBT and Rynite® PET, Zytel® polyamides and Hytrel® TPC-ET, Celanese offers a comprehensive range of resins optimized specifically for demanding markets.

All below listed Celanese materials are manufactured in accordance with Good Manufacturing Practice (GMP) principles and are supported in food contact applications in Europe (EU 10/2011) and the USA (Federal Food, Drug and Cosmetic Act) with limitations. Some grades are also recommended for potable water contact according to NSF 61, WRAS, ACS, KTW/KTW-BWGL as well as W270.

# PRIORITIZING SUSTAINABILITY

Celanese makes it easy for customers to pursue both their short- and long-term sustainability goals. Our innovation culture embraces green chemistry principles, which guide everything we do in pursuit of our purpose—to empower the world with the essential innovations to thrive.

RENEWABLE GRADES OF ZYTEL® PA ARE AVAILABLE WITH FOOD AND WATER CONTACT APPROVAL.

The United Nations 17 Sustainable Development Goals served as guiding principles for Celanese's nine ambitious and measurable sustainability goals, to be achieved by 2030. Our annual sustainability report details our progress: celanese.com.


# APPLICATIONS

## WATER

- Sanitary ware
- Plumbing
- Pumps, impellors and housing
- Filtration
- Meters

## FOOD

- Food processing – appliances, equipment (mixers, bearings, wheels); professional utensils
- Food handling – conveyors, brushes, crates, kitchenware (utensils), shovels
- Food packaging – closures, capsules, casings, containers, dispensers

# OUR PRODUCTS

## CRASTIN® PBT

Designers, engineers, and manufacturers rely on Crastin® PBT for stiffness and toughness and exceptional surface finish. Crastin® PBT is also preferred for its excellent dimensional properties and stability versus moisture, as well as its heat resistance. Celanese Crastin® PBT also offers manufacturers the advantage of superior flow qualities.

| Portfolio Category | Product | Color | Food Contact | | | Potable Water Contact | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | FDA | EU10/2011 | GMP (EC) 2023/2006 | U.S. | | U.K. | | France | Germany | |
| | | | | | | NSF 61 | | WRAS | | ACS | KTW-BWGL | DVGW |
| | | | | | | 23°C | 82°C | 23°C | 85°C | 23°C | 23°C | W270 |
| **Unreinforced PBT, medium/high viscosity** | Crastin® PBT FG6130 | NC010 | √ | √ | √ | | | | | | | |
| **Unreinforced PBT, low viscosity** | Crastin® PBT FG6131 | NC010 | √ | √ | √ | | | | | | | |
| **Unreinforced PBT, medium/high viscosity** | Crastin® PBT FG6134 | NC010 | √ | √ | √ | | | | | | | |
| **Unreinforced PBT, high viscosity** | Crastin® PBT FGS600F10 | NC010 | √ | √ | √ | | | √ | | √ | √ | |
| **Unreinforced PBT, low viscosity** | Crastin® PBT FGS600F40 | NC010 | √ | √ | √ | | | | | | | |
| **Unreinforced PBT, low viscosity** | Crastin® PBT FGS600F40 | BK594 | √ | √ | √ | | | | | | | |

√ = Meets standard

## HYTREL® TPC-ET

This plasticizer-free thermoplastic elastomer combines the flexibility of rubber with the strength and processability of thermoplastics. Manufacturers and designers prefer parts made with Hytrel® TPC-ET for their resilience, heat and chemical resistance, as well as their tear and fatigue resistance.

Hytrel® TPC-ET is available in a full range of Shore D hardness, offering a freedom for part design and processing.

| Portfolio Category | Product | Color | Food Contact | | | Potable Water Contact | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | U.S. | | U.K. | | France | Germany | |
| | | | FDA | EU10/ 2011 | GMP (EC) 2023/ 2006 | NSF 61 | | WRAS | | ACS | KTW-BWGL | DVGW |
| | | | | | | 23°C | 82°C | 23°C | 85°C | 23°C | 23°C | W270 |
| **Low modulus, 40D hardness** | Hytrel® TPC-ET 4053FG | NC010 | √ | √ | √ | | | | | | | |
| **Low modulus, 40D hardness with fatty food approval** | Hytrel® TPC-ET 4053FGF | NC010 | √ | √ | √ | | | | | | | |
| **Low modulus, 40D hardness** | Hytrel® TPC-ET 4068FG | NC010 | √ | √ | √ | | | √ | √ | √ | √ | √ |
| **Medium modulus, 50D hardness** | Hytrel® TPC-ET 5033FG | NC010 | √ | √ | √ | | | | | | | |
| **Medium modulus, 55D hardness** | Hytrel® TPC-ET 5553FG | NC010 | √ | √ | √ | | | | | | | |
| **Medium modulus, 63D hardness** | Hytrel® TPC-ET 6359FG | NC010 | √ | √ | √ | | | √ | √ | | | |

√ = Meets standard

## RYNITE® PET

With its lightweight, glass-reinforced composition, dimensional stability, durability, heat resistance and high-gloss finish, Celanese Rynite® PET is preferred across a wide range of applications, particularly for metal replacement. Its high fluidity facilitates thin parts filling.

| Portfolio Category | Product | Color | Food Contact | | | Potable Water Contact | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | U.S. | | U.K. | | France | Germany | |
| | | | FDA | EU10/ 2011 | GMP (EC) 2023/ 2006 | NSF 61 | | WRAS | | ACS | KTW-BWGL | DVGW |
| | | | | | | 23°C | 82°C | 23°C | 85°C | 23°C | 23°C | W270 |
| **PET, 30% glass reinforced** | Rynite® PET FG530 | NC010 | √ | √ | √ | | | | | √ | √ | √ |

√ = Meets standard

# ZYTEL® PA

Available in a spectrum of grades, Zytel® PA products enable our customers to select the right materials for each project. Toughness for impact resistance, excellent hydrolysis resistance for long term water exposure, excellent aging performance at high temperature.

Zytel® Long Chain Polyamides (LCPA) include PA10.10, PA6.10 and PA6.12 produced in standard and renewably sourced (RS) options. Zytel® LCPA grades give lower moisture pick up and offer excellent thermal, flexible, chemical and hydrolysis resistance properties. Zytel® LCPA is a suitable alternative to Nylon 11 & 12.

Zytel® HTN high performance polyamide resin is the choice for reducing weight, improving strength, enhancing durability and increasing thermal performance in more severe environments.

| Portfolio Category | Product | Color | Food Contact | | | Potable Water Contact | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | US | | UK | | France | Germany | |
| | | | FDA | EU10/ 2011 | GMP (EC) 2023/ 2006 | NSF 61 | | WRAS | | ACS | KTW-BWGL | DVGW |
| | | | | | | 23°C | 82°C | 23°C | 85°C | 23°C | 23°C | W270 |
| **PA66, high viscosity** | Zytel® FG42A | NC010 | √ | √ | √ | √ | √ | √ | | | | |
| **PA66, high viscosity** | Zytel® FG50 | NC010 | √ | √ | √ | | | | | | | |
| **PA66, very high viscosity** | Zytel® FG53 | NC010 | √ | √ | √ | | | | | | | |
| **PA66, lubricated** | Zytel® FG101L | NC010 | √ | √ | √ | √ | √ | √ | | | | |
| **PA66, lubricated** | Zytel® FG133F1 | NC010 | √ | √ | √ | | | | | | | |
| **PA66, 30% glass reinforced, heat stabilised, Hydrolysis resistant** | Zytel® FG70G30HSR2 | BK309 | √ | √ | √ | | | √ | √ | √ | √ | √ |
| **PA66, 30% glass reinforced, heat stabilised, Hydrolysis resistant** | Zytel® FG70G30HSR3 | BK309 | √ | √ | √ | | | √ | √ | √ | √ | √ |
| **PA66,33% glass reinforced** | Zytel® FGFE5171 | | √ | √ | √ | √ | √ | | | | | |
| **PA6,12** | Zytel® FG151L | NC010 | √ | √ | √ | | | | | | | |
| **PA6,12** | Zytel® FG158 | NC010 | √ | √ | √ | | | | | | | |
| **PA6,10, 50% glass reinforced, Renewably sourced** | Zytel® RS FG30G50L | BK595 | √ | √ | √ | √ | √ | √ | √ | √ | | |
| **PPA, 35% glass reinforced, heat stabilised** | Zytel® HTN FG52G35HSLR | BK011 | √ | √ | √ | | | √ | √ | √ | √ | √ |
| **Amorphous transparent nylon, good barrier properties** | Zytel® HTN FG301 | NC010 | √ | √ | √ | | | | | | | |

√ = Meets standard

## ENGINEERED MATERIALS

*Celanese Engineered Materials (EM) delivers a broad range of technology-based products and solutions to the consumer goods, industrial, transportation, electronics and healthcare markets. EM partners with customers to drive innovation by utilizing its expertise and knowledge in polymer and materials science. EM works with customers throughout the value chain to enable material systems solutions for demanding applications and environments. For additional information about Celanese Engineered Materials, visit [celanese.com](celanese.com).*

# GLOBAL CAPABILITY. LOCAL SOLUTIONS.

### Innovation Centers

Mainland China
Japan
Russia
Switzerland
Taiwan
Turkey
United States
- Arburn Hills, MI
- Silicon Valley, CA
- Wilmington, DE

### Major R&D Centers

Canada
Mainland China
Japan
Korea
Switzerland
Taiwan
United States
- Wilmington, DE
- Marlborough, MA
- Midland, MI
- Silicon Valley, CA



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