



Ketron™ CR-S and CR-D PEEK

Specialty PEEK grades
for cryogenic applications





High-performance polymer solutions in cryogenic environments

Polymers play a crucial role in cryogenic applications, where materials are exposed to extremely low temperatures, often below -150°C (-238°F). These polymers, among others PEEK (polyetheretherketone), are chosen for their excellent thermal stability and resistance to brittleness at cryogenic temperatures. Unlike metals, polymers can retain flexibility and mechanical strength, making them ideal for seals, gaskets, and insulation in cryogenic storage tanks and pipelines.

The performance of polymers in cryogenic conditions can vary, so their selection must account for specific temperature ranges and stress factors. Overall, the use of polymers enhances the efficiency, reliability, and safety of cryogenic systems across various industries.

Trends in LNG and Hydrogen

Successful climate protection requires a shift away from fossil fuels to renewable energies. Hydrogen might become the cornerstone of a decarbonized economy. This poses new challenges for industry and materials. Emerging technologies often require new ways of thinking and innovative ways of working. Mitsubishi Chemical Group (MCG) partners with OEMs and engineers to help bring their most ambitious ideas to life.

Growing trends of LNG and Hydrogen have led to the need of new materials that can:

- Extend the range of temperature
- Withstand the extreme conditions
- Offer more reliable sealing by replacing traditional fluoropolymers
- Allow cost savings

Challenges for polymers are growing

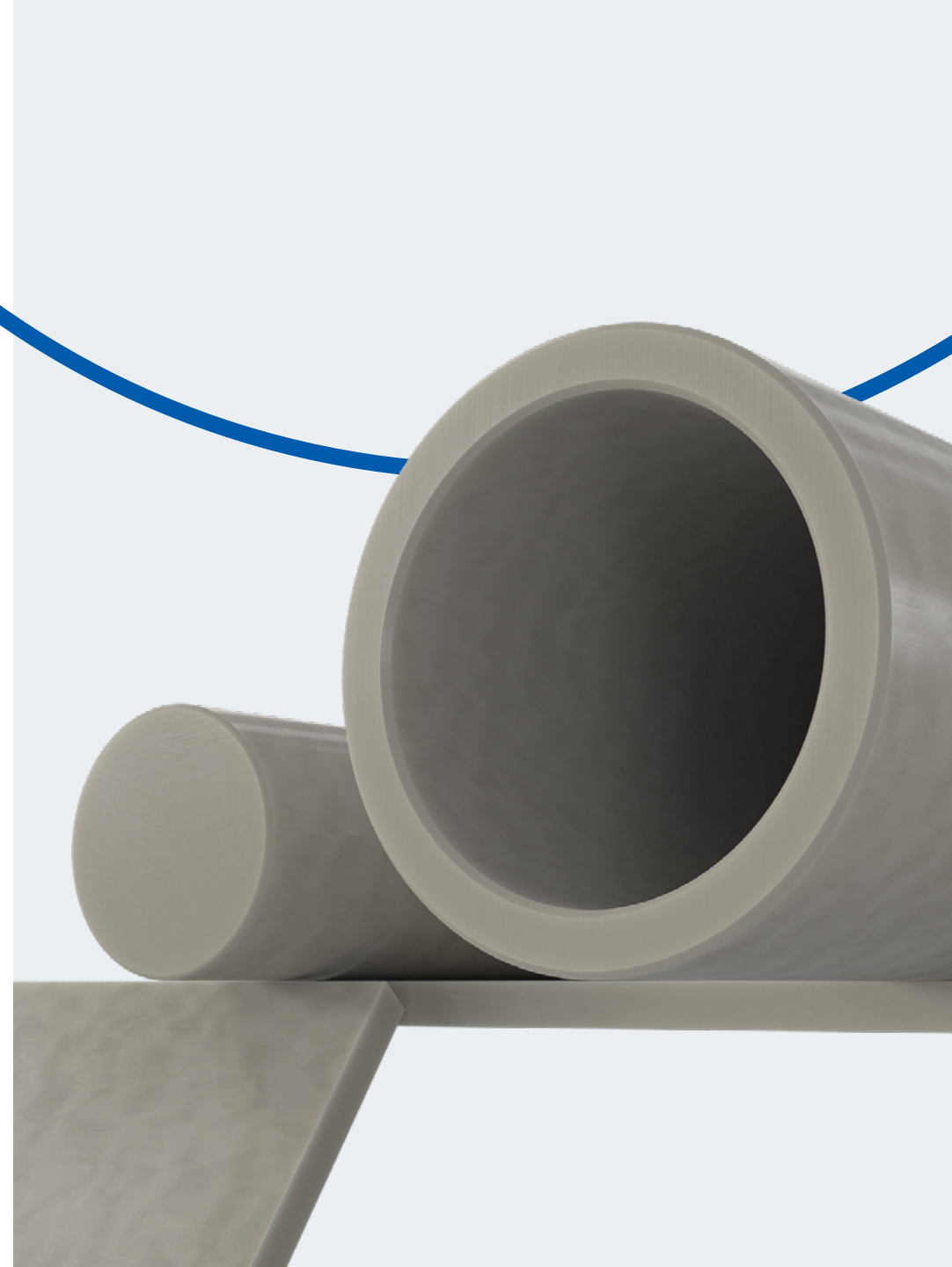
- Working in a broader temperature range (low/high)
- Higher strength
- Better Impact especially at low temperatures
- CLTE (Coefficient of Linear Thermal Expansion)
- Permeability
- Chemical resistance

Ketron™ CR PEEK family: Benefits of a thermoplastic alternative to PCTFE

Ketron™ CR-S PEEK

S = for static applications

- Polyether-ether-ketone material
- Unique properties for static sealing applications in extreme cold, including cryogenic environments
- Extremely durable; improved ductility at -196°C (-320.8°F)
- Higher tensile elongation and slightly lower compressive modulus (e.g. static seals)
- Ketron™ CR-S is tougher than Ketron™ CR-D at low temperature
- **PFAS-free*** formulation, making it an excellent substitute for fluoropolymer sealings
(*PFAS-free raw material as confirmed by resin supplier; no PFAS substances added during stock shapes manufacturing)
- Color: Natural

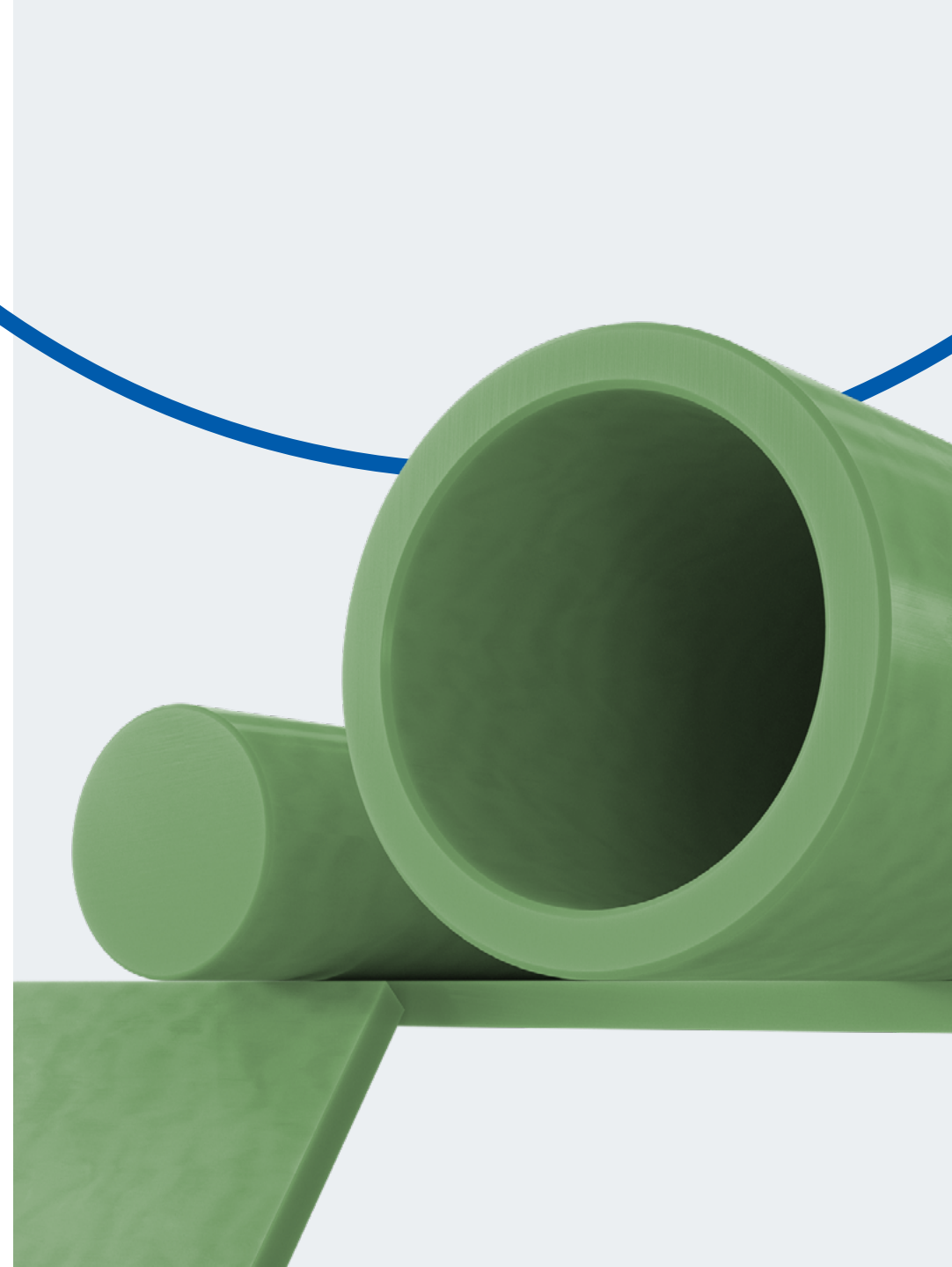


Ketron™ CR PEEK family: Benefits of a thermoplastic alternative to PCTFE

Ketron™ CR-D PEEK

D = for dynamic sealing applications

- Filled polyether-ether-ketone material
- Unique properties for dynamic sealing applications in extreme cold, including cryogenic environments
- Extremely durable, withstands exposure to temperatures of -196°C (-320.8°F)
- No compromise on excellent strength, ductility, toughness and resilience
- Slightly better thermal properties than Ketron™ CR-S, lower thermal expansion and higher thermal conductivity for consistent operation across temperature range
- Lower static and dynamic coefficient of friction which allows lower torque, cost savings in actuators
- Lower leakage rates in valve seat applications
- Ketron™ CR-D is suggested for ball valve seats and inserts, dynamic seals and gaskets at cryogenic temperatures
- Contains minor amounts of PTFE
- Color: Green



Ketron™ CR PEEK family – Key properties, processing and geometries




Property	Ketron™ CR-S PEEK	Ketron™ CR-D PEEK
Density	1,31 kg/l	1,41 kg/l
Tensile strength	110 Mpa	72 Mpa
Tensile strain at yield	5%	7%
Tensile strain at break	20%	8%
Tensile modulus of elasticity	4300 Mpa	3200 Mpa
Dynamic coefficient of friction (COF)		0,19 – 0,47 Lower static and dynamic COF allows lower torque.
Wear rate		Interestingly low: <10 µm/km

Processing technology	Geometry	Geometry
Extrusion	Plate, rod, tube	Plate, rod, tube
Compression molding	Tubular billets	Tubular billets

Benefits

- Ketron™ CR plastics can provide superior ductility and lower sealing force compared to commonly used polymers for cryogenic applications.
- For static sealing applications, Ketron™ CR-S provides high levels of low temperature ductility.
- For dynamic sealing, Ketron™ CR-D combines superior low temperature properties with ambient temperature tribological performance to provide an alternative polymer system with wider operating temperature range.
- The latest Material and Equipment Standards and Code (MES-C) SPE 77-302 (valves-general requirements) and SPE 77-200 (valves in low temperature and cryogenic service) by Shell include CRYO PEEK as a designated material for cryogenic valve applications.

Available geometries

 Rods	diam. 6-100 mm, length 1000 and 3000 mm diam. 40 + 70 mm are made to stock
 Tubes	outer diam. 43 – 535 mm available upon request
 Plates	available upon request

Please consult us for more dimensions and stock availability.

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