Engineering Plastic Products

Food contact applications

QUADRANT

You inspire ... we materialize®

Food-processing and -handling industry

Quadrant EPP is the Global leader in Engineering Plastic stock shapes for machining. We have gathered our competence and knowledge in a variety of markets and different applications for over 50 years. Our rapid business expansion in the food-processing and -handling equipment industry has been realised by providing the most innovative and cost effective solutions to our customers.

Quadrant EPP is able to provide its customers with an unmatched Engineering support through its regional business development engineers, global technical service network, technical sales organisation and its qualified distribution and fabrication partners. This enables our customers to obtain the best solutions and bring their products faster to the market.

Quadrant EPP is not only able to provide its customers in the food-processing and handling industry with the best cost / performance solutions, but also in the pharmaceutical, medical and cosmetic industries.

Our product offering includes highly chemical resistant materials like - CESTILENE, KETRON®, TECHTRON®, SYMALIT® PVDF and FLUOROSINT®, but also internally lubricated grades such as NYLATRON® LFG, ERTALYTE® TX, KETRON PEEK-TX and TECHTRON® HPV PPS. Furthermore we can offer a wide range of standard colours in POM (ERTACETAL® C), PE-(U)HMW (CESTICOLOR), and PEEK (KETRON PEEK-1000).

The key assets of our product offering are:

food contact compliant composition

Materials with a food contact compliant composition, meeting a variety of regulations that apply for plastic materials used for the fabrication of finished articles intended to come into contact with foodstuffs (EC, FDA, NSF, 3A Dairy, ….).

broad range of materials

Extensive range of shapes in a broad portfolio of materials produced and stocked in sizes chosen in cooperation with the main players in the market, and available through our global distribution network. This assures quick response, resulting in less cost and shorter lead times at both the OEM and fabricator.

self-lubricating grades

Self-lubricating grades are available for applications where little or no external lubrication can or should be applied. These internally lubricated grades with food contact compliant composition, are available in a wide range of shapes and sizes, and offer lower maintenance costs and good environmental performance.

chemical resistance

Chemical resistance to a wide range of aggressive substances that are used on food-processing equipment during processing, cleaning & sanitizing.

different colours

Different colours in order to secure traceability in the processed foodstuff in case of damage to the plastic parts, but also as component signal colour. The colour “blue” is predominantly positioned, but also other colours are available.

Main application areas in food-processing & -handling

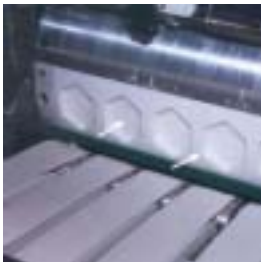
- **bakeries**
  tunnel ovens; forming, kneading, cake filling machinery, bread mills, dough depositors

- **dairy processing & packaging**
  separators; milk, ice-cream, butter & cheese manufacturing & filling machinery, homogenizers

- **meat & sausages processing**
  cutters; grinders; deboning, conveying, sausage filling, shashlik preparation machinery; mixers; cookers

- **confectionary industry**
  forming, blister forming, sealing & box packaging equipment

- **beverage processing & filling**
  centrifuges, separators, bottling & canning lines, decanters, heat exchangers



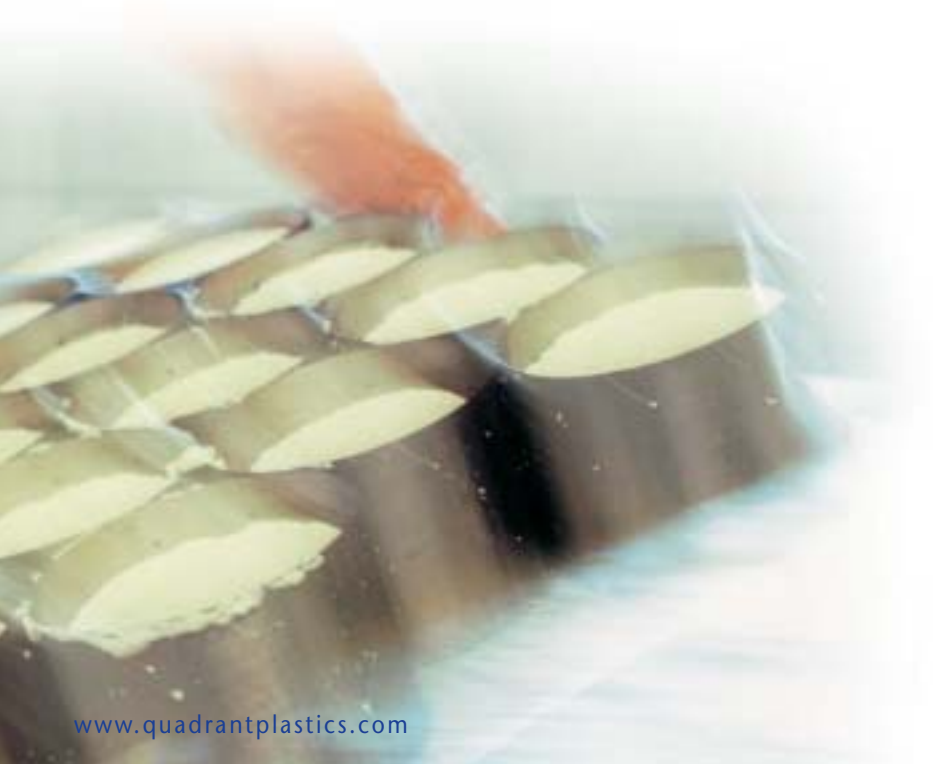
ERTALYTE paste portioning mould and ejector on a bakery machine

ERTACETAL C scrapers in ice-cream production & dosing equipment

Separation disk in meat mixing & cutting equipment made from ERTALON 6 PLA blue

TECHTRON HPV PPS mold for paper bag packaging equipment

Dosing head made of ERTALYTE TX in bottle & glass filling equipment



Food contact compliant materials

Compliance of the raw materials used for the manufacture of the Quadrant EPP "Food Programme" Stock Shapes with respect to their composition as set out in the regulations that apply in the European Union, Germany and the USA for plastic materials used for the fabrication of finished articles intended to come into contact with foodstuffs.

QUADRANT EPP STOCK SHAPES		EUROPEAN UNION Directive 2002/72/EC	GERMANY BfR	USA FDA Code of Federal Regulations (21 CFR)
ERTALON® 6 SA natural	Polyamide	+	+	+
ERTALON® 6 SA blue (RAL 5002)		+	+	+
ERTALON® 66 SA natural		+	+	+
ERTALON® 6 PLA natural		+	+	+
ERTALON® 6 PLA blue (RAL 5002)		+	+	+
NYLATRON® LFG natural		-	+	+
NYLATRON® LFG blue (RAL 5002)		-	+	+
ERTACETAL® C natural	Polyacetal	+	+	+
ERTACETAL® C blue (RAL 5002)		+	+	+
ERTALYTE® natural	Polyethylene terephtalate	+	+	+
ERTALYTE® TX		+	+	+
PC 1000	Polycarbonate	+	+	+
CESTILENE HD 500 natural	Polyethylene	+	+	+
CESTILENE HD 1000 natural		+	+	+
CESTICOLOR HD 500 & HD 1000		+	+	+
KETRON® PEEK-1000 natural	Polyetheretherketone	+	P	+
KETRON® PEEK-1000 black		+	P (+)	+
KETRON® PEEK-TX		+	P (+)	+
TECHTRON® HPV PPS	Polyphenylene sulphide	+	P (+)	+ (*)
PPSU 1000 black	Polyphenylsulphone	+	P (+)	+ (*)
PEI 1000 natural	Polyetherimide	+	P	+
PSU 1000 natural	Polysulphone	+	P	+
SYMALIT® PVDF 1000 natural	Polyvinylidenen fluoride	+	P	+
FLUOROSINT® 207	Reinforced Polytetrafluorethylene	+	+	+

\+ : complies with the requirements of the legislation

\- : does not comply with the requirements of the legislation

p : there is no specific BfR recommendation for this polymer

p (+) : there is no specific Bfr recommendation for this polymer; the colorant used complies with the BfR recommendation IX. "Colorants for the coloration of plastics and other polymers for consumer articles"

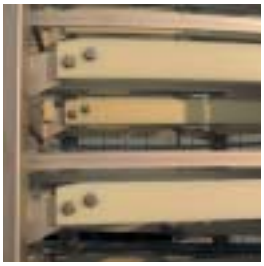
(*) : refers to the FDA Food Contact Notifications (FCN), No. 40 "Polyphenylene sulfide Polymers" (PPS) or No. 83 "Poly (oxy(1,1'-biphenyl) - 4,4'-diyloxy - 1,4-phenylenesulfonyl - 1,4-phenylene)" (PPSU), and other relevant FDA regulations.

Note: To the best of our knowledge, we believe the above information, based on raw material supplier data, to be reliable. However, Quadrant Engineering Plastic Products makes no guarantee of results and assumes no obligation or liability whatsoever in connection with this information.
It remains the customers responsibility to assess the final suitability of the chosen plastics material for the food contact application he has in mind (checking if the physical properties of the material make it suitable for the intended application, checking compliance of the finished article with the relevant migration limits and max. permitted quantities of residual substances, checking influence of the plastics material on odour or taste of the food, etc. …)

New product offering

NYLATRON® LFG natural (ivory) / blue (PA6 + oil)

This internally lubricated cast nylon 6, is available in both natural and Quadrant blue colour. NYLATRON LFG (Lubricated Food Grade) is self-lubricating in the real meaning of the word, and has a FDA food contact compliant composition. The NYLATRON LFG has been specially developed for non-lubricated, highly loaded and slowly moving parts in food contact applications. It yields a considerable enlargement of the application opportunities compared to standard cast nylons, because of its reduced coefficient of friction (up to 50% lower) and vastly improved wear resistance (up 10 times better). This provides lower maintenance costs and longer life in service.
Main applications: packaging equipment, automatic handling, milk/cheese processing.



NYLATRON LFG wearstrips in food drying towers

ERTALYTE® TX [pale-grey] (PET + solid lubricant)

ERTALYTE TX is a thermoplastic polyester (polyethylene terephtalate) stock shape which incorporates a uniformly dispersed solid lubricant. This material has a food contact compliant composition and is available in a pale grey colour only. Its specific formulation makes it a premium internally lubricated bearing-grade. ERTALYTE TX has an outstanding wear resistance and offers an even lower coefficient of friction and higher Pressure-Velocity capabilities than the standard ERTALYTE grade.
Main applications: cutters and grinders, beverage filling, butter packaging equipment.

ERTALYTE TX in dough dosing equipment

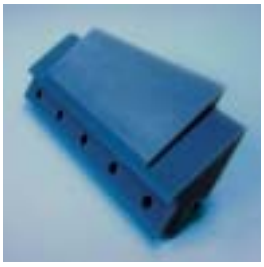
TECHTRON HPV PPS [deep blue] (PPS + solid lubricant)

This reinforced, internally lubricated polyphenylene sulphide grade demonstrates an excellent combination of properties, including wear resistance, load-bearing capabilities and dimensional stability, when exposed to chemicals and high temperature environments.
Thanks to the uniformly dispersed internal lubricant, TECHTRON HPV PPS exhibits excellent wear resistance and a low coefficient of friction. Without basically changing the composition and hence the physical properties of the material, the formulation of TECHTRON HPV PPS has now been fine-tuned to also offer food contact compliance, in this way substantially broadening its application possibilities.
Main applications: filtering drums, meat & dairy forming equipment, extraction installations, cheese processing, heating & drying equipment.

Shaft holder made of TECHTRON HPV PPS in cheese packaging equipment

KETRON PEEK-TX [blue] (PEEK + solid lubricant)

KETRON PEEK-TX is a new member of the KETRON PEEK family of materials which is based on genuine VICTREX® PEEK™ polymers. The semi-crystalline PEEK exhibits a unique combination of high mechanical properties, temperature resistance and excellent chemical resistance making it the most popular advanced plastics material.
Like KETRON PEEK-1000, this new internally lubricated material has a food contact compliant composition, but offers far superior wear and frictional performance, making it especially suitable for a wide variety of wear applications in the 100 to 200°C service temperature range.
Main applications: cooking equipment, heat exchangers, fermentation & brewery equipment, high speed big cutters.



Scraper in a vacuum cooker made of KETRON PEEK-TX

Cleaning and sanitizing

To safeguard public health, cleaning and sanitizing procedures are very important in the food-processing and -handling industries. Detailed procedures are developed and rigorously established for food-product contact surfaces (equipment, utensils, etc.) and for non food-product contact surfaces (shields, walls, ceilings, etc.).

The goal of these surface cleaning and sanitizing procedures is to remove nutrient sources which bacteria need for growth, and to kill those bacteria that are already present.
Cleaning is the first step aiming at complete removal of unwanted matter (food soils) from the surface, at the same time also removing part of the bacteria present.
The second step is called sanitizing and is aiming at killing residual bacteria that are capable of causing diseases (pathogenic organisms). Most of the bacteria that remain after cleaning can be destroyed by sanitizing with hot water, steam or chemicals under specific conditions with respect to temperature, concentration and contact time.

Quadrant EPP has products that can withstand different cleaning and sanitizing procedures applied by means of systems such as CIP (Clean-In-Place), COP (Clean-Out-of-Place) and SIP (Sterilization-In-Place) – see table below. The choice of the most suitable plastics material depends on available chemical resistance data and practical experience, but often preliminary testing of the finished plastics part under actual service conditions (right chemical, concentration, temperature and contact time, as well as loading conditions) is required to assess its final suitability for the given application.

Some basic requirements for plastic food contact parts used on food-processing and -handling equipment:

- suitable physical properties for the given application in terms of strength, stiffness, impact resistance, dimensional stability, temperature resistance, tribological properties (wear and friction), ….
- food contact compliance,
- chemical resistance against the particular foodstuff(s) and cleaning/sanitizing agents,
- smooth surfaces that are free of cracks, pin holes or other surface imperfections that may impair cleaning and sanitizing effectiveness.

The table below gives the resistance ratings of the Quadrant EPP materials against some cleaning agents that are commonly used in the food-processing and -handling industries.

CHEMICALS	Concentration (%)	Temperature (°C)	ERTALON®/NYLATRON® (PA)	ERTACETAL® C (POM-C)	ERTALYTE® (PET)	PC 1000	CESTILENE/ CESTICOLOR (PE-HD)	KETRON® PEEK	TECHTRON® HPV PPS	PPSU 1000	PEI 1000	PSU 1000	SYMALIT® PVDF 1000 (**)	FLUOROSINT® (PTFE)
Hydrogen peroxide	1	RT	C	A	A	A	A	A	A	A	A	A	A	A
Nitric acid	1	RT	B	C	A	A	A	A	A	A	A	A	A	A
Nitric acid	5	80	C	C	C	C	B	B	B	A	B	A	A	A
Phosphoric acid	1	RT	B	C	A	A	A	A	A	A	A	A	A	A
Phosphoric acid	5	80	C	C	B	C	B	A	A	A	A	A	A	A
Sodium hydroxide	1	RT	A	A	A	B	A	A	A	A	A	A	A	A
Sodium hydroxide	5	80	C	A	C	C	B	A	A	A	B	A	C	A
Sodium hypochlorite (300 ppm active chlorine)		20	B	B	A	A	A	A	A	A	A	A	A	A
Steam sterilisation (single autoclaving)	UD	134	A	A	A	A(*)	NA	A	A	A	A	A	A	A
Steam sterilisation (repeated autoclaving) - (***)	UD	134	C	C	C	C	NA	A	A	A	A	A	A	A
Sulphuric acid	1	RT	B	A	A	A	A	A	A	A	A	A	A	A
Sulphuric acid	3	60	C	C	A	A	A	B	A	A	A	A	A	A
Water	UD	60	A	A	A	A	A	A	A	A	A	A	A	A
Water	UD	80	B	A	B	B	B	A	A	A	A	A	A	A
Water	UD	95	C	B	C	C	C	A	B	A	A	A	A	A

Legend to the table:
Resistance ratings:
A: Resistant. Little or no change in weight. Small effect on mechanical properties. In general acceptable service life.
B: Partially resistant. In course of time, there is a distinct deterioration in mechanical properties and a change in weight. In many cases a short term exposure or limited number of cleaning cycles may be considered allowable (to be evaluated by practical testing).
C: Non-resistant. After a short time, the material is seriously affected (considerable reduction of the mechanical strength and changes in weight). Using the material under these conditions is not recommended.
NA: Not applicable for this material

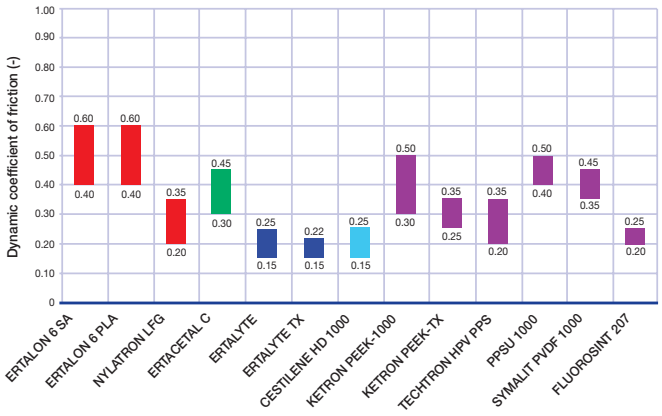
Concentration (%):
A number, e.g. 5, indicates "5 g of solute per 100 g of aqueous solution" (5 % by weight).
UD: Undiluted (technically pure chemical)

Temperature (°C):
RT: Room temperature (15 – 25°C)

(*): for this material, the max. sterilisation temperature is limited to 121°C
(**): it has to be pointed out that stress cracking can occur on SYMALIT PVDF 1000 parts when simultaneously exposed to mechanical stress and to an environment with pH ≥ 12, or when operating in a medium which is likely to generate atomic chlorine.
(***): considering the different inherent properties of these plastics, the influence of design of the plastic parts, cycle times and chemical environment (boiler feed water additives, etc.), the allowable number of sterilisation cycles is to be determined by the user under practical operating conditions.
Note: The ratings given in the table above - derived from raw material supplier data, literature related to the chemical resistance of plastics, and own experience - are intended as a guide only and refer to unstressed parts. It has to be pointed out that particularly the amorphous thermoplastics (PC, PSU, PEI and PPSU) are sensitive to "stress cracking", meaning that environments which are completely harmless to unstressed parts, may cause stress cracking when in contact with stressed parts.

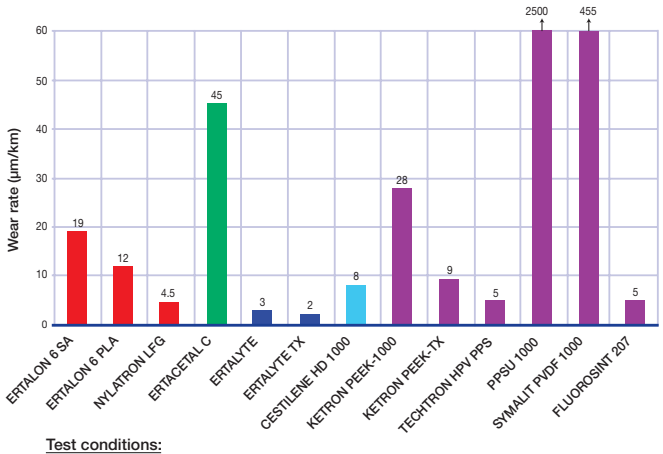
Technical information

DYNAMIC COEFFICIENT OF FRICTON
(measured on a "plastics pin on rotating steel" disk - tribo system)



Test conditions:
- pressure: 3 MPa
- sliding velocity: 0.33 m/s
- surface roughness of the C35 steel mating surface: Ra = 0.70 - 0.90 µm
- total distance run: 28 km
- normal environment (air, 23°C/50% RH)
- unlubriciated operation

WEAR RESISTANCE
(measured on a "plastics pin on rotating steel disk" - tribo system)



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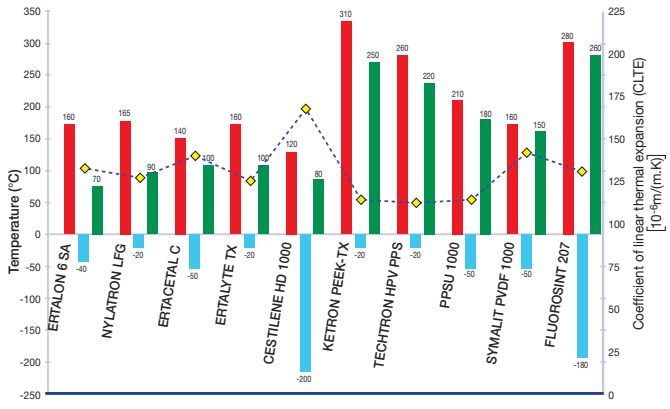
- total distance run: 28 km
- normal environment (air, 23°C/50% RH)
- unlubriciated operation

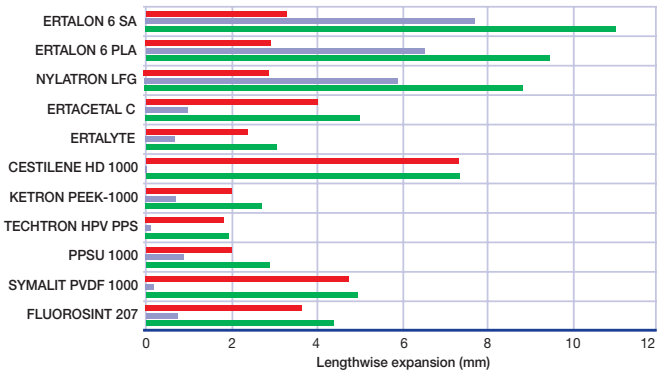
MINIMUM AND MAXIMUM SERVICE TEMPERATURE IN AIR
COEFF. OF LINEAR THERMAL EXPANSION (average value 23-100°C)



- Max. allow. temperature for short periods (few hours)
- Max. continuously allowable temperature (20,000 h)
- Minimum service temperature
- CLTE

DIMENSIONAL STABILITY
(Influence of water absorption and temperature increase)

Expansion of a 1000 mm long, originally dry strip when stored in air of 60°C/50% RH



- expansion due to water absorption at equilibrium with the air
- expansion due to the temperature increase from 23 to 60°C
- TOTAL EXPANSION

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