HUNTSMAN

Enriching lives through innovation

# Materials you can trust

## TPU elastomers for regulated Water and Food Contact applications

# Experts in elastomers

Our polyurethanes business division is a leading developer of polyurethane (PU) and thermoplastic polyurethane (TPU) materials. Combining global reach with decades of experience in material innovation, we are experts in urethane-based elastomers and have in-depth knowledge of their application across a vast range of industries.

## A trusted partner for food and drink producers

A leading global producer of TPU elastomers, we were a pioneer in our sector in the implementation of good manufacturing practice (GMP) procedures. Trusted as an international GMP partner, we have excellent credentials in the food contact materials (FCM) sector and offer a range of high quality IROGRAN® FCM TPU elastomers that comply with the most rigorous safety standards.

**We deliver:**

- A continuously evolving portfolio of GMP elastomer grades
- Fully traceable materials safe for food and drink products
- Certified manufacturing facilities
- Robust quality assurance
- Comprehensive regulatory technical expertise.

**Our materials comply with:**

- FDA and EU Plastics Regulations
- Migration and smell tests from the potable water industry such as NSF / ANSI / CAN 61 standard (National Sanitation Foundation) or KTW guidelines from the Umweltbundesamt.

IROGRAN®

# Full flexibility for every food or drink need

Tough, reliable and extremely versatile, we have a dedicated range of IROGRAN® FCM TPU elastomers that will deliver long-lasting performance in food and drink applications.

Easily processed via technical extrusion (film, sheet, cable, hose, tube), injection molding and calendering techniques, our elastomers deliver a range of benefits to manufacturers throughout the global food and drink supply chain.

**We offer:**

- Polyester-based elastomers for standard food and drink applications
- Specialty polyether-based elastomers for enhanced water and microbial resistance.

# Conveyor belts

Manufacturers producing belts and profiles for food conveyor systems require reliable raw materials from suppliers that have an excellent FCM track record.

Durable thanks to high abrasion, fatigue and hydrolysis resistance, plus tolerant to harsh cleaning conditions, our range of IROGRAN® FCM TPU elastomers are easy to process - bonding well to carrier fabrics rather than the rolls used to process them.

**Benefits:**

- High wear and tear resistance
- Chemical resistance, particularly to fatty substances and cleaning agents
- Low temperature flexibility and ductility.

# Film & sheet

Our specialty IROGRAN® TPU formulations offer good elasticity at low temperatures - meeting the requirements of the frozen food sector - and demonstrate resistance to washing cycles, making cleaning and hygiene control easy. Our IROGRAN® FCM TPUs can also be used as a barrier material in cure-in-place pipes (CIPP) where hydrolysis resistance is a key criteria.

**Benefits:**

- High microbial resistance
- High melt stability
- Good hydrolysis resistance
- High thermal stability.

# Hoses & tubes

Our IROGRAN® FCM TPU elastomers are widely used to manufacture hoses and tubes that dispense both solid and liquid foodstuffs in processing and packaging plants.

Approved for use in potable water applications, our polyether-based elastomers are fully compliant with US Food and Drug Administration standards and are NSF 61 certified. Easy to clean, and with a high tolerance to microbial attack, they offer high transparency and low temperature flexibility.

**Benefits:**

- Excellent hydrolysis resistance, even at high temperatures
- Good abrasion and chemical resistance
- High kink resistance
- High transparency.

# Infinite scope for innovation

Deeply committed to the FCM sector, our IROGRAN® FCM TPU elastomers can be customized to create a variety of items for the food and drink industry. We are also constantly working to extend our portfolio of certified materials according to NSF/ANSI 61 or KTW guidelines for use in potable water applications.

## IROGRAN® TPUs: Key products

| Physical properties | | | A 80 P 5039 FCM | A 85 P 5054 FCM DP | A 85 P 4394 FCM | A 85 P 4441 FCM | A 90 P 5055 FCM | A 92 P 4637 FCM |
|---|---|---|---|---|---|---|---|---|
| | Norm | Unit | IROGRAN® ether-based | | | | | |
| **GENERAL** | | | | | | | | |
| Hardness | ISO 7619 | Shore A | 80 | 84 | 85 | 87 | 88 | 92 |
| Hardness | ISO 7619 | Shore D | 29 | 33 | 36 | 38 | 34 | 39 |
| Density | ISO 1183-1 | g/cm³ | 1,1 | 1,12 | 1,12 | 1,11 | 1,12 | 1,13 |
| **MECHANICAL** | | | | | | | | |
| Tensile strength | DIN 53504 | MPa | 32 | 28 | 45 | 40 | 30 | 45 |
| Elongation @ break | DIN 53504 | % | 720 | 620 | 640 | 650 | 600 | 600 |
| Tensile stress @ 100% elongation | DIN 53504 | MPa | 4,6 | 6 | 7 | 7,3 | 7 | 9,1 |
| Tensile stress @ 300% elongation | DIN 53504 | MPa | 8,7 | 9,3 | 12 | 11 | 11 | 15,9 |
| Tear strength | ISO 34-1 | N/mm | 45 | 43 | 60 | 60 | 60 | 74 |
| Compression set 70h @ 23°C | ISO 815 | % | 23 | - | 20 | 24 | 25 | 25 |
| Compression set 24h @ 70°C | ISO 815 | % | 43 | - | 40 | 42 | 45 | 41 |
| Abrasion | ISO 4649 | mm³ | 30 | 35 | 25 | 35 | 35 | 30 |
| **THERMAL** | | | | | | | | |
| TMA low melt range | Huntsman | °C | 145 | 150 | 150 | 155 | 150 | 160 |
| TMA high melt range | Huntsman | °C | 155 | 160 | 170 | 175 | 170 | 170 |
| **OTHER FEATURES** | | | | | | | | |
| Transparent | | | x | | | | | x |
| **PROCESSING** | | | | | | | | |
| Injection molding | | | | | x | x | | x |
| Extrusion | | | x | | x | x | | x |
| Calendering | | | | x | | | x | |
| **MARKET APPLICATIONS** | | | | | | | | |
| Compounding | | | | | | | | |
| Film & sheet – Flat-die extrusion | | | x | | x | x | | x |
| Film & sheet – Blown-film extrusion | | | | | x | x | | x |
| Belting - Conveyor belts | | | | x | | | x | |
| Extruded parts - Hoses, tubes & profiles | | | x | | x | x | | x |

Further technical data about individual products plus best practice advice for handling and processing our elastomers is available by contacting your local sales representative or by visiting our online product finder tool:
**http://www.huntsman-tpu.com/**

| CA 9068-201 FCM | A 85 E 4993 FCM | PS 440-200 FCM | A 92 E 5670 FCM | A 92 E 5068 FCM DP | | | Physical properties |
|---|---|---|---|---|---|---|---|
| IROGRAN® ester-based | | | | | Unit | Norm | |
| | | | | | | | **GENERAL** |
| 73 | 86 | 88 | 90 | 91 | Shore A | ISO 7619 | Hardness |
| 25 | 36 | 42 | 38 | 38 | Shore D | ISO 7619 | Hardness |
| 1,17 | 1,21 | 1,22 | 1,21 | 1,21 | g/cm³ | ISO 1183-1 | Density |
| | | | | | | | **MECHANICAL** |
| - | 35 | - | 40 | 40 | MPa | DIN 53504 | Tensile strength |
| - | 600 | - | 570 | 590 | % | DIN 53504 | Elongation @ break |
| - | 5,9 | - | 7,8 | 8,2 | MPa | DIN 53504 | Tensile stress @ 100% elongation |
| - | 11,2 | - | 14,9 | 15,3 | MPa | DIN 53504 | Tensile stress @ 300% elongation |
| - | 65 | - | 80 | 80 | N/mm | ISO 34-1 | Tear strength |
| - | 25 | - | 26 | - | % | ISO 815 | Compression set 70h @ 23°C |
| - | 50 | - | 46 | - | % | ISO 815 | Compression set 24h @ 70°C |
| - | 25 | - | 25 | 25 | mm³ | ISO 4649 | Abrasion |
| | | | | | | | **THERMAL** |
| 112 | 145 | 159 | 145 | 150 | °C | Huntsman | TMA low melt range |
| 131 | 160 | 173 | 160 | 160 | °C | Huntsman | TMA high melt range |
| | | | | | | | **OTHER FEATURES** |
| x | x | | | | | | Transparent |
| | | | | | | | **PROCESSING** |
| | | x | | | | | Injection molding |
| x | x | x | | | | | Extrusion |
| | x | | x | x | | | Calendering |
| | | | | | | | **MARKET APPLICATIONS** |
| x | x | | | x | | | Compounding |
| | x | x | | | | | Film & sheet — Flat-die extrusion |
| | | | | | | | Blown-film extrusion |
| | x | | x | x | | | Belting - Conveyor belts |
| | | x | | | | | Extruded parts - Hoses, tubes & profiles |

# Global elastomers experts

**Committed to customers:** We build partnerships with our customers and work across an international network of R&D and manufacturing locations to help solve complex challenges and deliver the highest levels of technical support and customer care.

**Committed to quality:** Wherever we are, whatever we are doing, we prioritize environmental, health and safety protection, and we are always rigorous about quality control and assurance.

**Committed to innovation:** We keep pace with the most innovative trends in plastics processing by using the latest equipment and making regular investments in our formulation, manufacturing and R&D capabilities.

**Committed to sustainability:** We create solutions that contribute to a more sustainable society by helping to conserve energy, preserve natural resources and reduce our overall carbon footprint.

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**About Huntsman:**
Huntsman Corporation is a publicly traded global manufacturer and marketer of differentiated and specialty chemicals with 2018 revenues of more than $9 billion. Our chemical products number in the thousands and are sold worldwide to manufacturers serving a broad and diverse range of consumer and industrial end markets. We operate more than 75 manufacturing, R&D and operations facilities in approximately 30 countries and employ approximately 10,000 associates within our four distinct business divisions.