



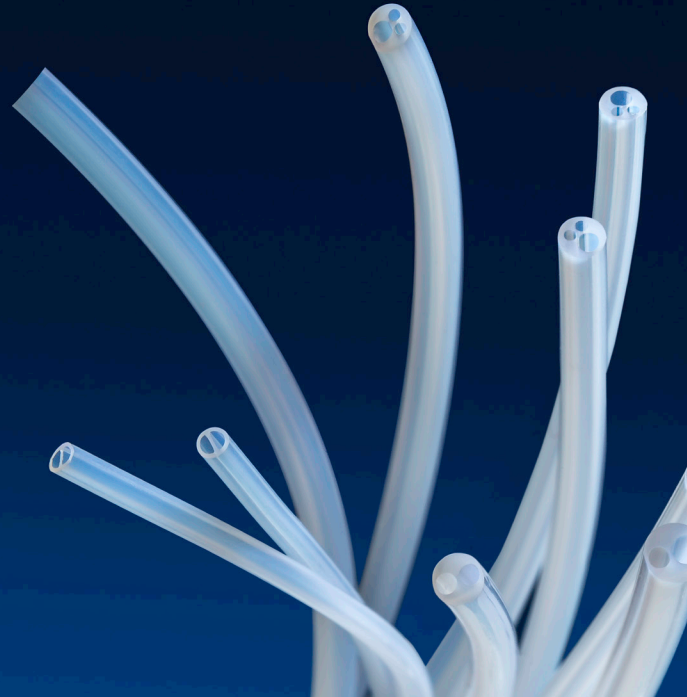
INDUSTRIAL TUBING SOLUTIONS

2020-AUG-28

IN BRIEF

The Optinova Group is a leading global supplier of advanced tubing solutions for the global medical device industry and for challenging industrial applications. We use our experience and knowledge in extrusion, combined with a sustainable business mindset, to develop top quality components which are part of innovative solutions, increasing the quality of everyday life.

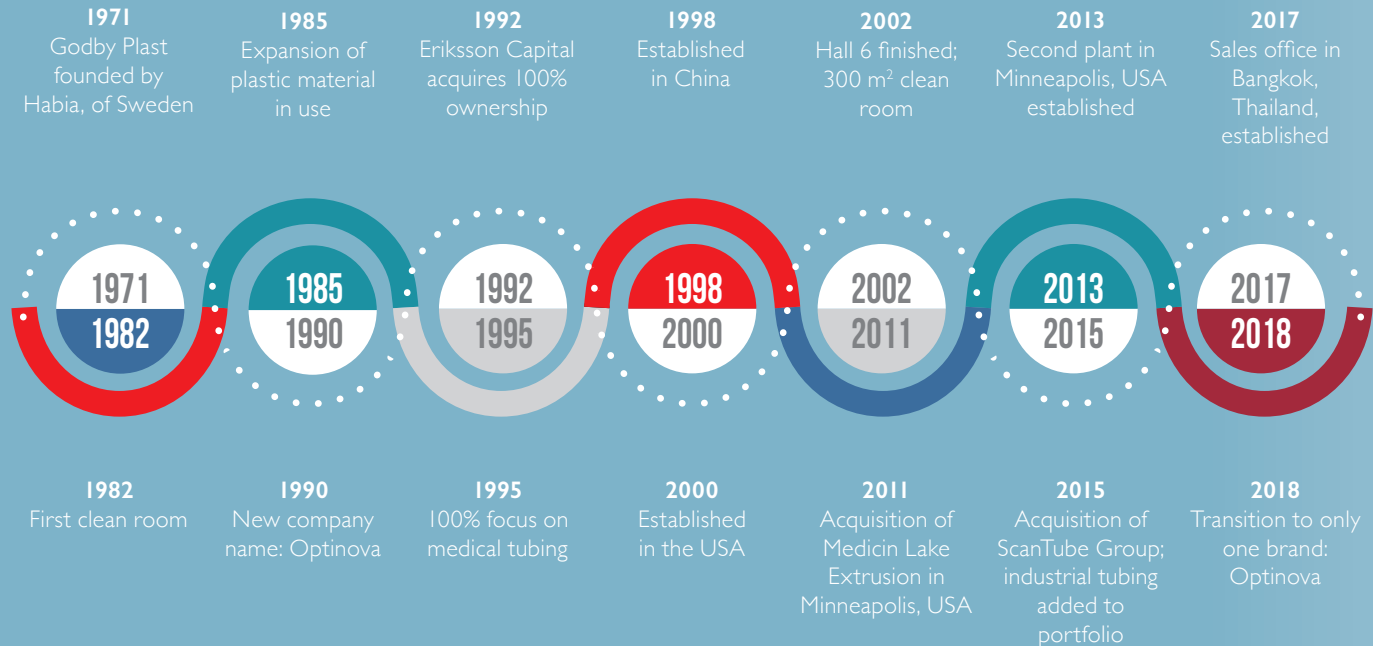
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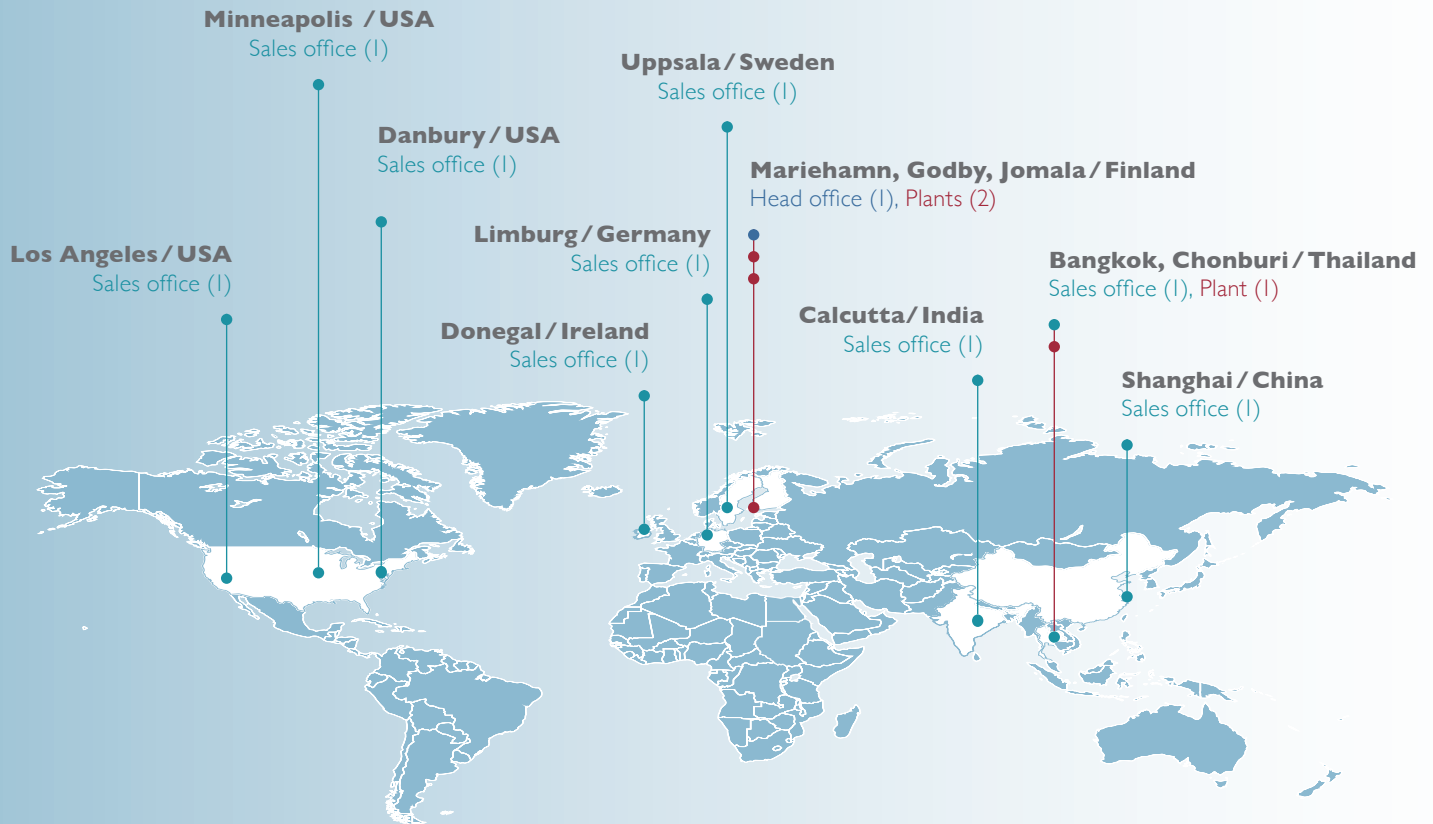


CONTENTS

Decades of advanced tubing _____	4	Pushing the limits of extrusion _____	15
Why we are in the business of extrusion _____	6	We dare to be different _____	16
Sustainability _____	8	Product categories _____	18
Quality commitment _____	10	Industrial solutions _____	22
Why Optinova? _____	12	Applications examples _____	23
Raw materials and additives _____	13	General summary of properties _____	27

DECADES OF ADVANCED TUBING





WHY WE ARE IN THE BUSINESS OF EXTRUSION

The Optinova Group is a leading global supplier of advanced tubing solutions for the global medical device industry and for challenging industrial applications.

Our greater purpose

We use our experience and knowledge in extrusion, combined with a sustainable business mindset, to develop top quality components which are part of innovative solutions, increasing the quality of everyday life.

Our guiding star

All in all, we describe how and what we do with our guiding star:

#feelgoodfactory



INCREASING THE QUALITY
OF EVERYDAY LIFE

SUSTAINABILITY

We strive to be at the forefront by operating in a sustainable way within our industry and society. Our efforts are important for the growth of our employees and our overall business. Together we can contribute to a better world and towards a higher purpose. We invite and encourage everyone at Optinova to promote sustainability at every level.

Diversity

The diversity among Optinova employees is a competitive advantage. We are inclusive with respect to gender, age, nationality, culture and experience. With this we can get plenty of different views, ideas and input to help us make the best decisions.





LEADERSHIP

development at all levels to inspire and create engagement and a meaningful everyday



LOWERING ENERGY

consumption in plants and office spaces



SUSTAINABILITY

social, environmental and financial requirements on suppliers and partners



WATER REDUCTION

reducing fresh water and reuse water



OPTIMIZING VENTILATION

in production areas



BRAND BUILDING

for securing new competence attraction



LOGISTICS FOCUS

to optimize transportation paths, touch points and CO₂ emission



RECYCLING

production materials, primarily plastics

QUALITY COMMITMENT

We are committed to achieving customer satisfaction by supplying superior quality tubing and services that are delivered on time. We accomplish this by continuing to improve our capabilities, complying with requirements, and maintaining the effectiveness of our quality management system.

Category	Certificate	Godby	Jomala	Thailand
Quality	ISO 9001	✓	✓	✓
	ISO 13485	✓		✓
	ISO 14001		✓	✓
Material	REACH	✓*	✓*	✓*
	RoHS	✓*	✓*	✓*
	FDA & USP Class VI	✓	✓	✓
	GB4806.6 / GB4806.7		✓	✓
Clean room	ISO 14644	✓*		✓
Product specific	UL 224		✓	✓
	NSF/ANSI standard 51		✓	
	EU 10/2011		✓	✓
	SEMI F57/F40		✓**	✓**

* Not certified but compliant with self check. ** In progress



Medical Device
ISO 13485



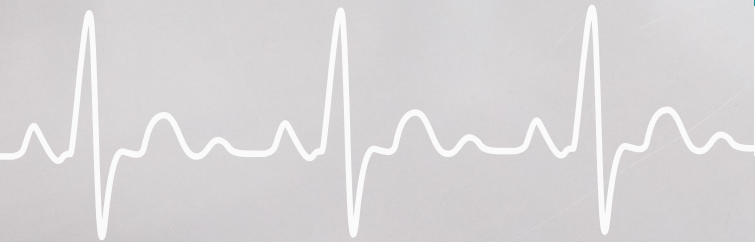
Clean Room
ISO 14644-I,
class 8



**Business
Management**
ISO 9001



Environment
ISO 14001



WHY OPTINOVA?

We strive to create value and celebrate your success #feelgoodfactory



Material knowledge

We possess in-dept knowledge of raw materials, having our own polymer experts (PhD level), as well as, laboratories for research. We combine this with external partner collaborations that ensure our expertise in polymers and raw-material processing.

Magical world of polymers

It all starts in the magical world of polymers. Our PhD-level polymer scientists provide in-depth knowledge of raw material experience in polymer processing. Material properties and purity are investigated in our own polymer laboratory. Can we share some polymer magic with you?



Extrusion specialist

We know extrusion inside and out; the core of our business with over 100 extrusion lines globally, making us the biggest in the world. We continue to push the limits and develop our processes with new innovations.



Secondary operations

We provide secondary operations according to our partners' needs, many times custom made just for them. Our Innovation Center provides valuable consultancy, and we've even created the robots needed to make the operations as automatic and efficient as possible.



RAW MATERIAL AND ADDITIVES





**We dig deeper where
we are really good**

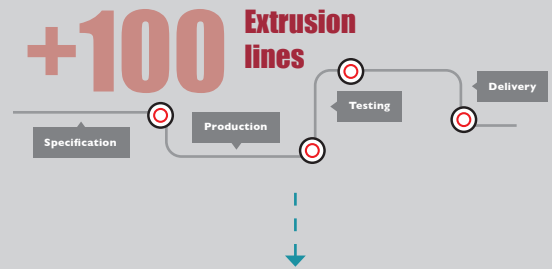
PUSHING THE LIMITS OF EXTRUSION

Extrusion is our passion and our core competence. We have several decades of experience across 100 extrusion lines globally, which has enabled us to accumulate data within our unparalleled knowledge library.

Come feel the passion



push the limits with us



WE DARE TO BE DIFFERENT

Engineering is the basis for customization and creating true value. Automating customization is unbeatable for handling high volume production to meet a wide varying market needs. Creating difference is fun...



Striped



Etching



Flanging



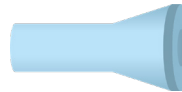
Ring marking



Tapering



Spiral forming



Flaring



Skiving



Chamfering



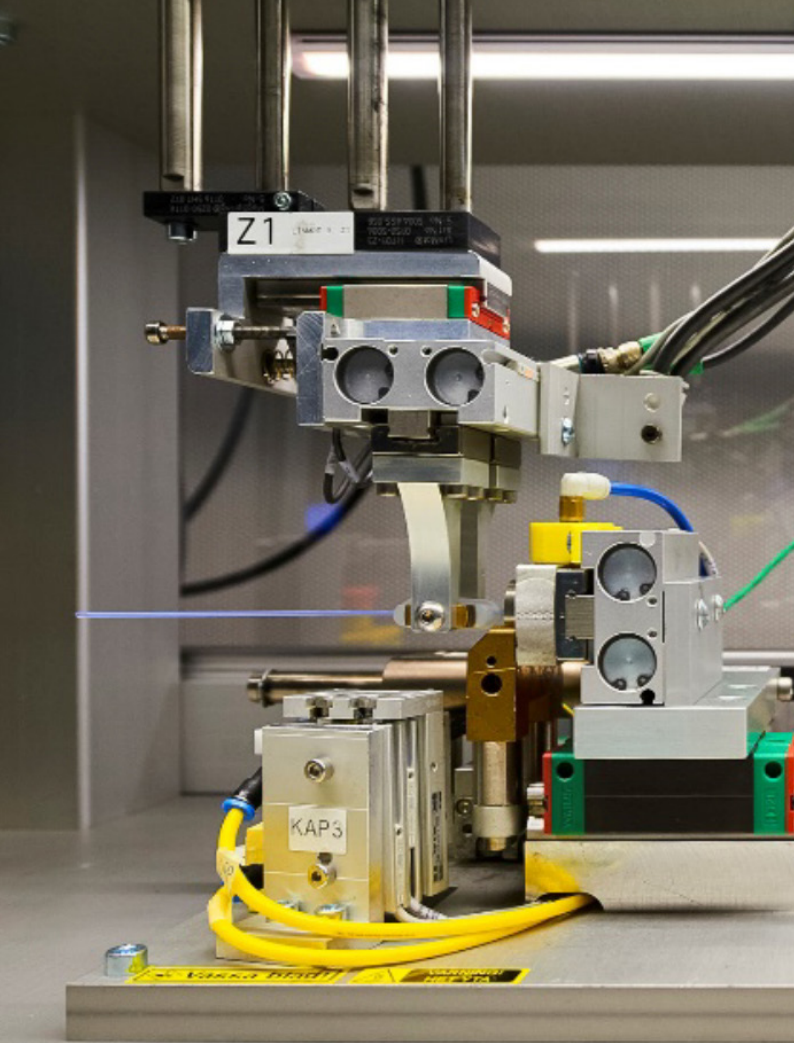
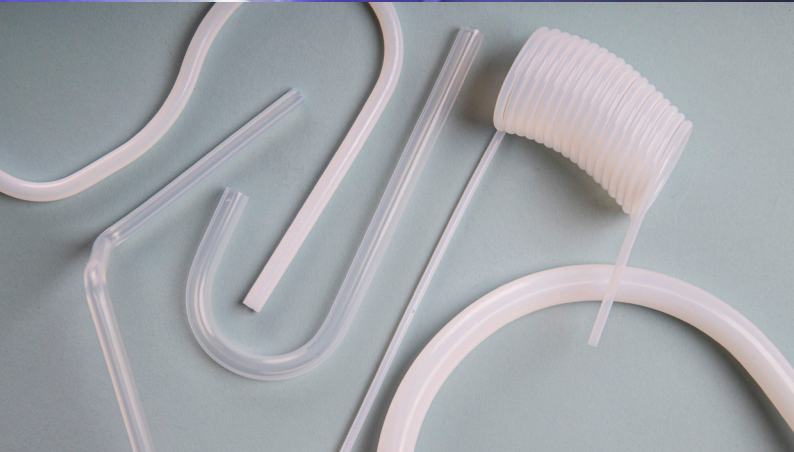
Forming/Fabrication



Hole punching



Spiral cut



PRODUCT CATEGORIES

Industrial applications contain demanding specifications to meet today's markets requirements. Our industrial product categories are designed to solve your design challenges.

- Beading, monofilaments, profiles
- Liners (inner jackets)
- Heat shrink tubing, spiral Heatshrink
- Single- and multi-lumen tubing
- Multi-layer tubing, co-extrusions
- Secondary operations
- Property enhancements
- e-PTFE solutions (Coltex™)



Beading, monofilaments and profiles

Stable rod, multi-purpose profiles.

- Materials: PTFE (sintered and un-sintered, natural or filled), PFA, FEP, ETFE, PVdF
- Natural or colored
- Enhanced filled or virgin

Liners, inner jackets

Thin wall liners, liners for high pressure hoses.

- Materials: PTFE, PFA, FEP, ETFE
- For high pressure hoses
- For liquids or gases under metal braid or rubber hose construction



Heatshrink tubing, spiral heatshrink tubing

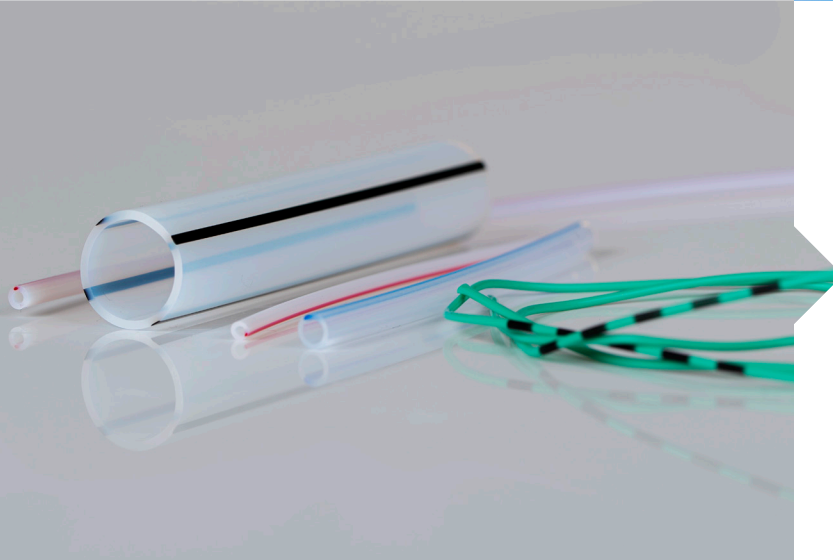
Heat-induced shrinking tube.

- Materials: PTFE, FEP, Dual wall PTFE/FEP
- Shrink ratio PTFE 2:1 and 4:1
- Shrink ratio FEP 1.3:1 and 1.6:1

Single- and multi-lumen tubing

Various polymer properties extruded in single- or multi-lumen, short and/or long tubes.

- Materials: PTFE, FEP, PFA, ETFE, PVdF, MFA, PEEK
- Available in long length as well as short cut to length pieces



Multi-layer tube/co-extrusions/ striped tubing

Multiple layers or stripes with colors or additives.

- Materials: PTFE, FEP, PFA, PVdF, PEEK
- Full colored, bicolored or (multiple) color stripes
- Antistatic stripes and layers
- Other additives upon request

Property enhancements

Enhanced properties by adding additives and fillers:

- Enhanced antistatic properties
- Better heat transfer
- Excellent abrasion resistance
- Better bonding with other materials
- X-ray contrast



e-PTFE solutions (Coltex™)

Mono- and bidirectional expanded PTFE tubing or profiles.

- Sealing tape for flanges (Coltex™)
- e-PTFE tubing made according to customer specifications
- e-PTFE rods and monofilaments

INDUSTRIAL SOLUTIONS

TRANSPORTATION

- Insulation, harnesses, bowden cables
- Seal rings for valves
- Liner for high pressure hydraulics and pneumatics
- On-board communication wires, cables, and sensing



FOOD & BEVERAGE PROCESSING

- Packing and filling machines
- Coffee machines
- UV lamp protection
- Handling of corrosive fluids
- Distribution of cleaning agents
- Dosage systems and robots
- Analytical equipment in quality assurance



SUSTAINABLE ENERGY SOLUTIONS

- Liquid cooling for batteries
- Electrolyte circulation in redox-flow batteries
- Generator hoses for wind power plants
- Fluid handling for solar panels
- Heat exchanger tubing for photovoltaic solutions



SEMICONDUCTORS, ELECTRONICS & CABLES

- Handling of process and waste fluids
- Fiber optic protection
- HV cables
- Robotics
- Pneumatics and hydraulics



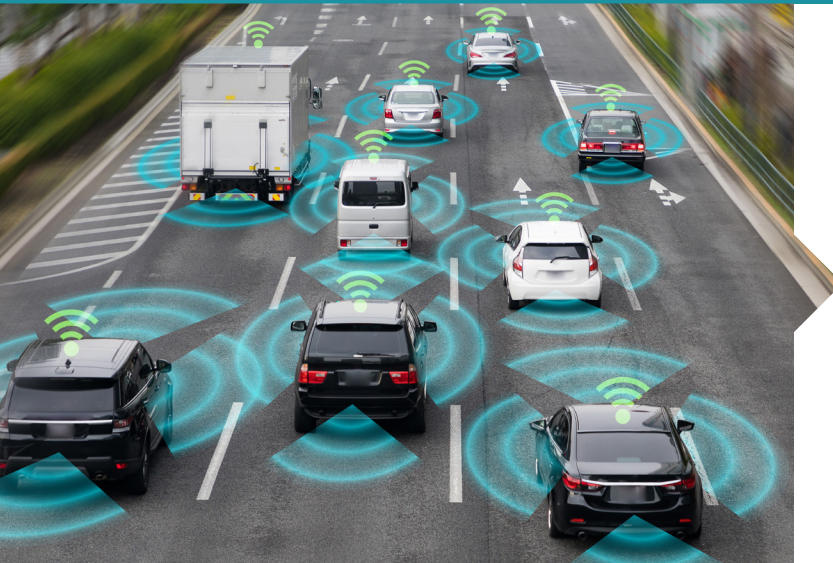
CHEMICAL PROCESSING

- Water purification
- Heat exchangers
- Chlorine salt processing
- Pharmaceutical processing
- HPLC
- Fluid handling
- Dispensers, burettes, pipettes



APPLICATIONS EXAMPLES

We are a world leader in precision tubing extrusions for industrial applications. We have developed a world-wide reputation of fulfilling customer expectations; not only with fluoropolymer extrusions but also with a wide variety of thermoplastics.



Safe and intelligent transportation

Where there was solely metal piping before, now light weight high-performance materials like fluoropolymers are coming into place due to their outstanding properties. Independent if it's a combustion engine or EV, motorcycle, truck or bus; many applications such as brake systems, cable harnesses, encapsulated sensors, high-speed data transmission, fuel components and fire protection systems are using Fluoropolymer components. On the road, at sea, in the air, and even in space.

A good day starts with a good cup of coffee

Almost everyone enjoys a cup of coffee or espresso during the day. In premium coffee machines you will find food grade approved fluoropolymer tubing to maintain the excellent quality in the brewing process. These kinds of tubing are also used in the production/filling of other beverages and liquid foods; even as fabricated tubing solutions.



Green energy for a sustainable future

Our tubing is the ideal choice for energy that needs to be generated, stored and transported. Fluoropolymers are unaffected by UV light, very high (+260°C) and very low temperatures (-200°C), weather or corrosion so they are the perfect fluid handling solution for all outdoor installations due to both the low maintenance and low life cycle cost while maintaining excellent performance without degradation.

At the speed of light through a tube

Independent if we talk autonomous driving, IoT, 5G or different types of sensors or measurement equipment; fiber-optical based communication is the basis for high speed data transfer and secure data storage for today's environment. The sensitive glass fibers must be protected and shielded and here Optinova tubing solutions made of PTFE, FEP or PVdF are used by major cable manufacturers globally.



Corrosion protection for save work environment

This is one of the major challenges within the Chemical Processing Industry. Due to outstanding chemical resistance, fluoropolymer tubing solutions from Optinova are used in a variety of chemical process plants. Applications like heat exchangers, steam handling, chlorine generation, toxic gas monitoring or the distribution of hot adhesives or paints wouldn't be safe without fluoropolymers.

Working under pressure to save lives

High pressure hoses are designed not to explode under pressure. The high-quality tubing liner encloses fluids or gases that support passenger safety during transportation. Independent if used for hydraulics, brakes, fire extinguishing systems or engine parts they are all reinforced with high pressure hoses; the quality of the liner is the guarantee for safety.



Water – an essential source for life

Different types of water are used to enhance the quality of our Life. Independent if it is drinking water, in beverages, the water we swim in, ultrapure water for enhanced manufacturing of computers or phones or process water for different industrial processes; tubing helps with the transport water. Optinova PTFE or PFA tubing is the primary choice choice when harsh environments should not affect the quality of the water used.

General summary of properties

Feature		Fluoropolymers						
		PTFE	Thermoplastic Fluoropolymers					
			FEP	PFA	ETFE	PVDF	MFA	PEEK
Tensile strength at break	MPa	20–34	20–28	25–30	40–47	35–50	25-30	90-100
Elongation at break	%	200–400	300–325	300	230	15–50	300	50
Flexural modulus	MPa	275–620	550–700	590–700	1200	2100	590-700	4000
Hardness	Shore D	55–65	55–60	55–64	63–75	75–78	59	R-126
Density	g/cm ³	2,17	2,15	2,15	1,7	1,8	2,15	1,32
Coefficient of friction		0,10	0,25	0,21	0,23	0,30	0,27	0,25
Transparency	See note	***	****	*****	***	*	****	*
Melting point	°C	330	257–275	300–310	270	175	285	334
Min/max service temp.	°C	–240/+260	–200/+200	–200/+260	–190/+150	–60/+150	–150/240	–70/+250
Water absorption	%	<0,01	<0,01	<0,03	0,02	0,04	0,03	0,50
Chemical resistance	See note	*****	****	*****	*****	*****	*****	*****
ETO		✓	✓	✓	✓	✓	✓	✓
Steam		✓	✓	✓	✓	✓	✓	✓
Radiation		—	—	—	✓	✓	–	✓

Notes: The property data are taken from different sources and are not necessarily typical for any specific grade. This table is unsuitable for specification, since all values are indicative and for guidance only. Optimova Ab takes no responsibility for data given in the table. Excellent: ***** Poor: *



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