



Pharmaceutical Excipients & Medical Device Polymers

The Difference is Inside.

When you partner with Lubrizol Life Science Health (LLS Health), our team works with you through every stage of the development process. We specialize in helping clients from idea to execution by offering innovative polymers and excipients, as well as best-in-class contract manufacturing services. Our long history of polymer expertise and continued investment in research and manufacturing means we offer you and your customers a smooth and streamlined approach to innovative healthcare solutions.

History of Expertise

LLS Health is one of the world's largest manufacturer of pharmaceutical grade carbomers, polycarbophil, and thermoplastic polyurethanes (TPU), and has been manufacturing pharmaceutical excipients for more than 35 years. With this longstanding history of polymer proficiency and continued investment in cutting-edge technologies and equipment, we are able to offer a streamlined approach to your project.



Global Reach

The Lubrizol Corporation, a Berkshire Hathaway company, is a worldwide organization with an extensive infrastructure composed of global manufacturing, supply chains, and technical services. Our global presence links you to more opportunities by supporting growth in emerging markets, maintaining global supply and support, and understanding international regulatory requirements.

Technical Solutions & Collaboration

LLS Health supports customer success at all stages of drug product and medical device development with technical centers around the world and knowledgeable technical solutions staff. From research and development, to analytical services and applications testing, we work closely with our partners to identify unique needs and transform challenges into opportunities.

Compliant & Safe Materials

Lubrizol's pharmaceutical-grade polymers are manufactured according to cGMP standards in ISO 9001 certified facilities. We work with all relevant regulatory bodies to establish and maintain the global pharmacopeial status of our pharmaceutical ingredients. Lubrizol excipients are listed in monographs of the international compendia for the US, Japan, and Europe. Additionally, Lubrizol supports its pharmaceutical ingredients with Drug Master Files (DMFs) in the US and Europe.

Lubrizol's medical grade polymers are manufactured in ISO 9001 certified facilities under comprehensive quality systems which include change management and record retention procedures. Biocompatibility information and regulatory support are also available for our portfolio of medical grade TPUs.

Portfolio

Pharmaceutical Excipients: We are the inventors and suppliers of:

- Carbopol® polymers
- Noveon® polycarbophil
- Pemulen™ polymers
- Pathway™ TPU excipients

Our global polymer capabilities allow us to create customizable excipients, for a wide range of dosage forms, that impart essential properties to prescription and over-the-counter formulations.

Medical Device Polymers: LLS Health supports medical device and drug device combination products applications with our comprehensive, customizable, and biocompatible thermoplastic polyurethane (TPU) polymers solutions. Key biodegradable product brands include:

- Pellethane® TPU
- Tecoflex™ TPU
- Tecothane™ TPU
- Isoplast® ETPU
- Carbothane™ TPU

Committed to the Markets We Serve

Oral Treatments

Excipients for oral solids, solutions, and suspensions

Application advantages include:

- Extended drug release
- Taste masking
- Bioadhesion
- Efficient tablet binding and size reduction
- Versatile processing options for solid dosage forms, such as direct compression
- Suspension stabilization



Oral Care

Ingredients for toothpaste, mouthwash, denture adhesives, whitening strips, and anhydrous gels.

Application advantages include:

- Rheology modification
- Improved aesthetics
- Bioadhesion for increased therapeutic efficacy

Our TPUs can also be used in many dental devices, such as clear dental aligners and orthodontic elastics



Ophthalmics

Excipients for eye drops and gels.

Application advantages include:

- Optimal drug absorption via prolonged contact time with the eye (bioadhesion)
- Viscosity modification and dispersion stabilization
- Non-irritating and enhanced lubrication



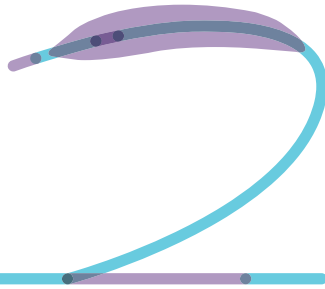
Committed to the Markets We Serve (continued)

Medical & Drug-Eluting Devices

Polymers for short- and long-term implants (vascular catheters and balloons, neurostimulation and pacing devices, vaginal rings and other drug loaded devices), as well as non-implant applications (wound dressings, dental and diagnostic devices)

Versatile chemistry allows application specific customization including:

- Tailored drug release
- Tunable mechanical, chemical resistance, and radiopaque properties
- Biocompatibility and biostability properties

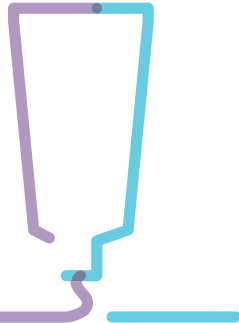


Topical & Transdermal

Polymers for lotions, creams, gels, and ointments

Application advantages include:

- Rheology modification
- Enhanced skin penetration and bioadhesion
- Ideal aesthetics and feel
- Optimal drug dispersion and stability



1928

The Lubrizol Corporation is founded

1959

Engineered plastics are born with BF Goodrich's invention of TPU

1958

BF Goodrich invents Carbopol polymer

1992

BF Goodrich introduces Pemulen TR-1 and TR-2 polymeric emulsifiers

2000

BF Goodrich's former specialty chemicals company becomes Noveon

2003

Noveon acquires Thermedics™ polymer products, enhancing the medical business with several product brands, including Tecothane, Tecoflex, and Carbothane

2004

Lubrizol acquires Noveon, adding BF Goodrich and Thermedics polymer technology portfolios

2009

Lubrizol acquires Dow and SK Chemicals TPU products, expanding the TPU business with several product brands, including Isoplast and Pellethane

2011

Lubrizol becomes a wholly owned subsidiary of Berkshire Hathaway

2014-15

Lubrizol acquires contract development and manufacturing capabilities for complex drug products and medical devices

2019

Lubrizol adds design and manufacturing capabilities for both intravascular and nonvascular devices, including drug-coated balloons, through acquisition of Bavaria Medizin Technologie GmbH (BMT)