Polyurethane ELASTOMERS

INDUSTRIAL COMMERCIAL SUPPLIER

www.danleegroup.co.za

ABOUT US

At Dan Lee Executive Group, we take pride in our expertise and leadership in the realm of polyurethane. With a commitment to excellence, we specialize in delivering cutting-edge solutions through innovative polyurethane chemistry. Our team, driven by passion and knowledge, strives to redefine industry standards.

As a dynamic player in the polyurethane sector, we leverage our experience to provide tailored solutions that cater to diverse applications. From resilient foams to robust coatings, our polyurethane formulations stand out for their versatility and performance.

At Dan Lee Executive Group, we prioritize sustainability, quality, and customer satisfaction. Our dedication to advancing polyurethane technology reflects in our products, ensuring they meet the highest standards of durability, flexibility, and environmental responsibility.
Join us on a journey of excellence in polyurethane chemistry, where innovation meets performance, and where Dan Lee Executive Group continues to be a driving force in shaping the future of this dynamic industry.

DAN LEE EXECUTIVE GROUP PTY LTD

WHAT ARE POLYURETHANE

Polyurethane is a versatile and widely used polymer that belongs to the family of polymers known as polyols. It is a synthetic material with a broad range of applications due to its unique combination of flexibility, durability, and resistance to various environmental factors. Polyurethane is formed through the reaction of diisocyanates with polyols, resulting in a polymer that can be tailored to exhibit a wide spectrum of physical and chemical properties.

One of the key characteristics of polyurethane is its adaptability, allowing for the creation of materials with varying degrees of hardness, elasticity, and strength. This flexibility makes polyurethane suitable for an extensive array of products, ranging from soft foams used in mattresses and upholstery to rigid materials utilized in construction and automotive applications.

The versatility of polyurethane extends to its ability to be molded into different shapes, providing manufacturers with the flexibility to design and produce a diverse range of products. Additionally, it can be combined with other materials to enhance specific properties, such as incorporating additives for flame resistance, UV stability, or improved adhesion.

Polyurethane's resilience and resistance to wear and tear make it a popular choice in the production of coatings, adhesives, sealants, and elastomers. Its excellent insulation properties have also led to its widespread use in the construction industry for insulation materials.

“Transforming Ideas into Resilient Reality – Where Innovation Springs to Life!"

Polyethers:

Recommended For: Applications with dynamic stress, low heat build-up, high resilience, low-temperature performance, and resistance to water attack (hydrolysis).
Advantages: Lower viscosity, lower specific gravity.
P**olyester-Based Urethanes:**

Superior in: Cut, tear, abrasion, oil, and solvent resistance.
MDI (Methylene Diphenyl Diisocyanate) Based Products:

Advantages: Lower isocyanate odor than TDI types, superior hydrolysis resistance, and often higher resilience.
TDI (Toluene Diisocyanate) Based Products:

Notable for: Being less sensitive to moisture, shorter demould times, and user-friendly characteristics compared to MDI products.
Polycaprolactones:

Exhibit: Good cut, tear, load-bearing, and abrasion resistance.
Advantage: Better hydrolysis resistance compared to polyesters.
Aliphatic Systems:

Known For: High resistance to weathering, high chemical resistance, and durability in aggressive environments.
Polyurea Systems:

Characteristics: Fast-reacting amine-terminated systems, commonly used in spray applications.
Advantages: Very good water and chemical resistance.

This guide provides a broad overview of the characteristics and recommended applications for different types of polyurethane, helping users make informed decisions based on their specific requirements.

PROPERTIES OF ELASTOMERS

Polyurethanes compete with various materials, including rubber, plastic, and metals, in diverse applications. Their versatility, durability, and tailored properties make polyurethanes a competitive choice across a wide range of industries. Whether challenging rubber in flexibility, plastics in strength, or metals in weight and corrosion resistance, polyurethanes offer a compelling alternative for numerous applications.

Hardness

Elastomers are available in a wide range of hardness, from 10 Shore A, which is softer than an eraser, to 85 Shore D which is much harder than a golf ball. Hardness measurement is a useful tool, however variation in readings by one or two units can be encountered when measuring most polyurethane and rubbers.

Abrasion Resistance

In severe wear applications, elastomers excel in durability compared to rubbers, plastics, or metals. Emphasizing that abrasion resistance is a nuanced property, choosing the right elastomer is best informed by practical experience or simulated service tests.

Compression Properties

Elastomers surpass conventional ones in load-bearing capacity at the same hardness. Ideal for applications like wheels, industrial tires, feed rollers, and stripper springs, Our elastomers excel in both tension and compression, showcasing remarkable shear load-bearing properties.

Mechanical Properties

Elastomers, even at low hardness, flex under impact. Unlike conventional elastomers that lose elasticity and crack at higher hardness, our elastomers demonstrate excellent impact resistance even at maximum hardness levels, surpassing most plastics. The inherent toughness, combined with other outstanding properties, makes high-hardness elastomers well-suited for various engineering applications.

Tear Strength

Tear strength is a key indicator of toughness and durability. Elastomers have a distinct advantage over conventional elastomers, offering high tear strength that translates to longer service life.

Resilience

Resilience in conventional elastomers is typically tied to hardness, but this is not the case with elastomers. They offer a broad range of resilience options. In shock-absorbing applications, lower rebound compounds (10-40% resilience) are common, while higher resilience compounds (40-65%) are used for quick recovery or high-frequency vibrations. In general, Elastomers enhance toughness through high resilience.

DAN LEE EXECUTIVE GROUP PTY LTD

PROPERTIES OF ELASTOMERS

Low Temperature Properties

Elastomers maintain flexibility at extremely low temperatures and exhibit exceptional resistance to thermal shock. Their low-temperature resilience has enabled applications even below -50°C.

Flex Properties

Elastomers exhibit resistance to cracking under repeated flexing. Reducing part thickness can decrease the rate of cut growth during flexing. Unlike conventional elastomers, our elastomers can be used in thin sections due to their strength and toughness.

Water Resistance

Polyether elastomers resist the effects of water immersion and maintain excellent long-term stability in water up to 50°C. Continuous use in hot water above 80°C is not recommended for standard systems. With low water absorption (0.3-1.0% by weight) and negligible volume swell, these elastomers operate with close tolerance in water-lubricated bearings without the risk of seizure. While the moisture vapor transmission rate is relatively high, it can be advantageous in specific applications like poromeric shoe upper materials. For guidance on potential disadvantages, consult our Technical Service Department for the suitability of elastomers in specific applications.

Oil, Grease and Chemical Resistance

Elastomers exhibit resistance to a wide range of chemicals, making them versatile in various chemical environments, except for strong acids, alkalis, and certain solvents. While many rubbers and plastics excel in resisting specific substances, actual service testing or closely simulated tests are recommended for accurate assessment of oil and chemical resistance in elastomers.

Tensile Properties

Elastomers stand out with high elongation, tensile strength, and modulus, delivering a unique blend of toughness and durability compared to conventional elastomers. Tensile tests, conducted on a tensometer, reveal the material's stress-strain curve, where a larger area indicates higher toughness. Key points like ultimate tensile strength and elongation showcase the exceptional tensile properties of elastomers.

Dry Heat Resistance

Many elastomers are suitable for continuous operation up to 90°C, with intermittent use up to 120°C possible. Specially formulated materials enable continuous operation up to 120°C or even higher

Electrical Properties

Elastomers typically exhibit excellent insulating properties, making them suitable for applications such as potting and encapsulation.

Oxygen and Ozone Resistance

Products made from elastomers exhibit high resistance to degradation by atmospheric oxygen and ozone. Even after aging over 500 hours in an atmosphere with 3ppm ozone, there is no attack observed, even under 20% strain. This resilience suggests that elastomers, which resist these conditions for extended periods, are virtually immune to normal atmospheric concentrations. This quality makes elastomers highly successful in applications around electrical equipment, avoiding the hardening and cracking often seen with conventional elastomers and many plastics.

PROPERTIES OF ELASTOMERS

Radiation Resistance

Elastomers demonstrate superior resistance to gamma ray radiation compared to conventional elastomers. Even when exposed to gamma radiation, they maintain a high proportion of their original flexibility and toughness.

Mould, Mildew, Fungus Resistance

Well-formulated elastomers, typically polyether-based, resist fungal growth and are generally impervious to such attacks. This quality makes them especially suitable for use in tropical environments.

Bonding to other materials

During the initial molding process and under controlled conditions, elastomers can be effectively bonded to a wide variety of substrates, including most metals, wood, and many plastics. The bond strength often surpasses the tear strength of Erapol elastomers. Notably, the bond strength of Erapol to metal is typically several times higher than that of rubber to metal. While bonding cured Erapol elastomer sheet or molding to other materials is more challenging, specialized techniques have been developed to meet most requirements.

Variable Temperature Testing

Sub-zero temperature testing is primarily designed for foam cryogenic applications, where products are routinely analyzed at temperatures below -165°C. This equipment also enables Era Polymer to test elastomers at elevated temperatures for specific methods, including Tensile, Elongation, Compression, and Angle Tear (Die C).

Fire Resistance

Elastomers can be formulated to meet various self-extinguishing or fire-resistant specifications.

Frictional Properties

Elastomers, like most plastics, exhibit a decrease in friction against non-lubricated surfaces with increasing hardness. High coefficient of friction is beneficial for products like solid industrial tires, feed rollers, and drive rollers. Compounds with high hardness have the lowest coefficient of friction, and formulations with very low values are available. These are commonly used for bushings, bearings, and wear strips, resulting in minimal wear on shafts and mating surfaces, often less than with plastic materials.

Machinability

Elastomers can be machined using conventional equipment, but for more information, it is advisable to consult our Technical Service Department.

APPLICATION

The superior cost advantage and performance of elastomers have resulted in numerous instances where they replace metal, rubber, wood, and plastic. The table below highlights some applications:

Application	Material Replaced
Automotive components	**Metal, Rubber, Plastic**
Industrial rollers	**Metal, Rubber**
Seals and gaskets	**Rubber**
Furniture components	**Wood, Plastic**
Industrial machinery parts	**Metal, Plastic**

Elastomers demonstrate versatility, offering a cost-effective and high-performance solution across various industries and applications.

FUNCTION

The liner serves as a replaceable, cylindrical sleeve typically crafted from robust, wear-resistant materials such as hardened steel or ceramic. Situated within the pump's fluid end housing, it plays a vital role in preserving the seal and sustaining pressure during mud pumping operations.

DAN LEE EXECUTIVE GROUP
PTY LTD

CONTACT INFORMATION

Winny Klopper

+27 82 876 1811

admin@danlexecutivegroup.co.za

Evette Herbst

+27 76 986 0532

info@danlexecutivegroup.co.za

Sanet van den Berg

+27 82 322 8720

accounts@danlexecutivegroup.co.za

Vulcania, Brakpan

www.danleegroup.co.za

"Whoever dwells in the shelter of the Most High will rest in the shadow of the Almighty. I will say of the Lord, "He is my refuge and my fortress, my God, in whom I trust."
Psalm 91