WILLIAM JOHNSTON
& COMPANY LIMITED

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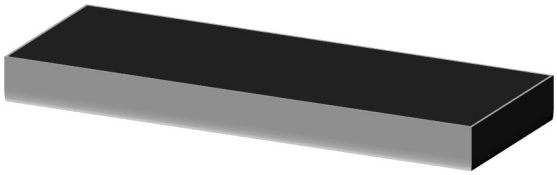
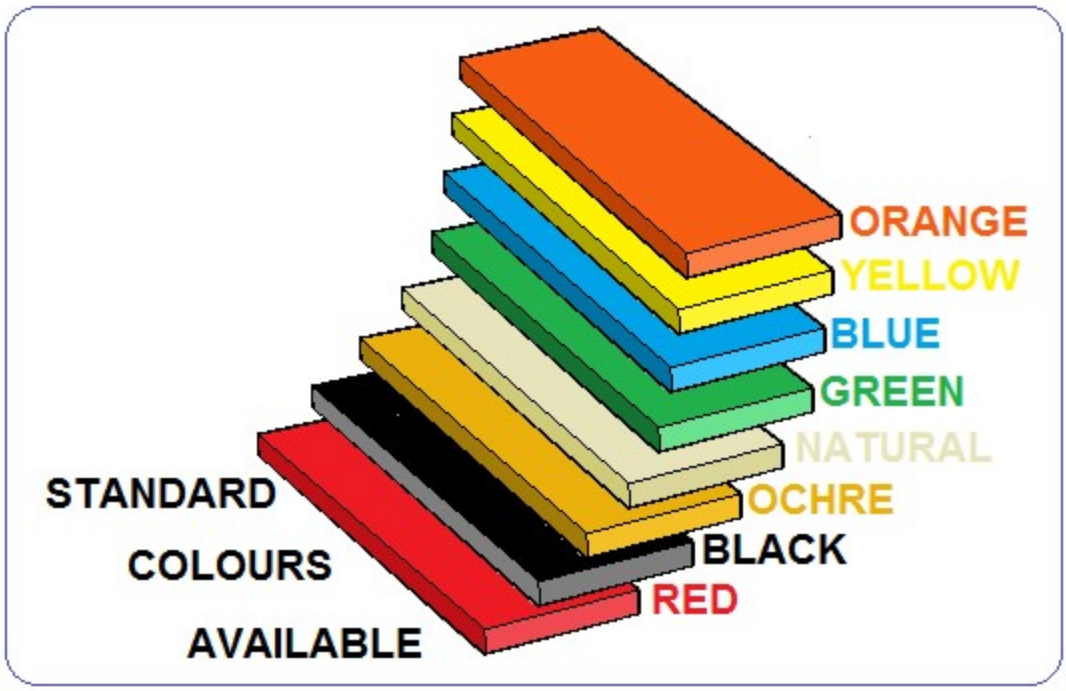


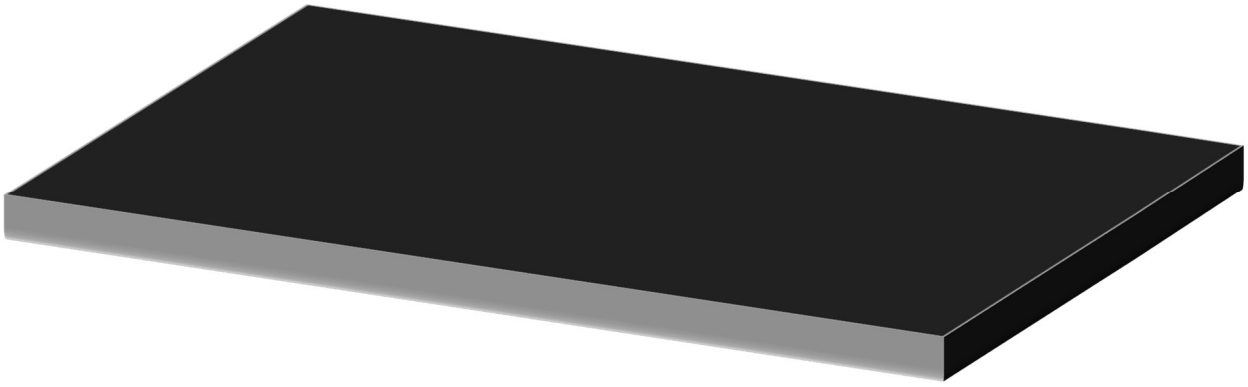
Polyurethane hot table cast sheets are available in a shore hardness range of 45 Shore 'A' to 60 Shore 'D'.

They are available in sizes up to 2700 x 1200mm x 12mm thick.



Polyurethane square bars are available in a shore hardness range of 45 Shore ‘A’ to 60 Shore ‘D’.
They are available in sizes up to 500mm x 500mm x 100mm high.

The standard colours available are; red, black, ochre, natural, green, blue, yellow and orange. Although some of these may be subject to additional charges dependent on the grading of the polyurethane.



Polyurethane slabs are available in a shore hardness range of 45 Shore ‘A’ to 60 Shore ‘D’.
They are available in sizes up to 1500mm x 1200mm x 60mm thick, with a maximum weight of 60kg.
The standard colours available are; red, black, ochre, natural, green, blue, yellow and orange. Although some of these may be subject to additional charges dependent on the grading of the polyurethane.

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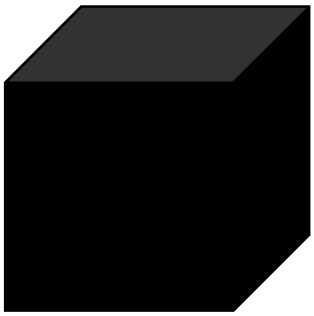

Polyurethane blocks are available in a shore hardness range of 45 Shore 'A' to 60 Shore 'D'.
They are available in sizes up to 1000mm x 1000mm x 100mm high, with a maximum weight of 60kg.
The standard colours available are; red, black, ochre, natural, green, blue, yellow and orange. Although some of these may be subject to additional charges dependent on the grading of the polyurethane.

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William Johnston and Company Limited manufacture industry standard and bespoke parts to customer's specification. These can range all the way through the supply chain, from parts used in a manufacturing process to specific components for customers own retail.
We can also work in collaboration with the customer to produce solutions from the ground up and are happy to assist with samples and manufacturing one off prototypes up to mass producing many thousands of parts. We pride ourselves on our innovative use of both technology and technique in providing solutions to customer's applications.

Polyurethane is used in many areas of industry.
Marine

- Dock bumpers
- Dry Dock ship supports
- Skids

Automotive

- Steps
- Seals
- Skids
- Rotor housings
- Snowplough blades – www.snowploughrubber.co.uk

Hardness
Polyurethane Elastomers offer a very wide hardness range in which items can be produced. They range from 10-15° Shore A which is softer than a gum eraser to over 90° Shore D which is much harder than a golf ball. For these unfamiliar methods of measuring hardness, the illustration (Chart B) below may be of help for all practical purposes, Shore A is interchangeable with IRHD (International Rubber Hardness Degrees).

Abrasion Resistance
In applications where severe wear is a problem, Polyurethane Elastomers offer outstanding durability when compared with Rubber, plastics or even metal. In many applications the unusual combination of properties has made it possible to design and fabricate products from Polyurethane Elastomers using less material than has been possible with other elastomers.
It should be emphasised, however that abrasion resistance is a complex property. Selection of the proper formulation of Polyurethane Elastomer should be based on actual experience or simulated service tests
Compression Properties

Polyurethane Elastomers have greater load-bearing capability than do conventional Elastomers of equal hardness. The capacity is a highly important advantage in some designs e.g. stripper springs, whilst in others it is the very factor that makes them possible. In addition to high load bearing properties in both tension and compression, Polyurethane's have a high load bearing capacity in shear.

Mechanical properties

At lower hardness levels, practically all elastomeric materials – including Polyurethane's- merely bend under impact. As conventional Elastomers are compounded up to higher hardness they tend to lose elasticity and crack under impact. On the other hand Polyurethane Elastomers even at their highest hardness levels, have significantly better impact resistance than almost all plastics.

Such great toughness combined with the many other outstanding properties associated with the high hardness Polyurethanes, leads to many applications in engineering.

Resilience

Resilience in conventional rubbers is generally a function of hardness. This often- undesirable relationship does not hold true with Polyurethanes. Formulations are available in a very wide range of resilience.

For very shock absorbing uses, low rebound compounds are usually used i.e. rebound value of 10-40%. For high frequency vibrations or where quick recovery is required, compounds in the 40-65% rebound value are used.

Flex properties

Polyurethane Elastomers resist cracking under repeated flexing. As with any elastomer, the rate of cut growth under decreasing the thickness of the part may reduce flexing. Unlike other Elastomers however, Polyurethane Elastomers can be utilised practically in very thin sections because of their strength and toughness.

Low Temperature Properties

Many Polyurethane Elastomers remain flexible at very low temperatures and possess outstanding resistance to thermal shock. The low temperature resistance of Polyurethanes has led to many applications in Arctic conditions.

Dry Heat Resistance

Whilst many Polyurethane Elastomers are only suitable for continuous operation up to 90°C, intermittent use up to 120°C or even higher can be achieved. Advice on the most suitable material for any particular application should be sought from your processor or raw material supplier.

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Water Resistance

Depending on type, Polyurethane Elastomers are very resistant to the swelling and deteriorating effects of water immersion and have excellent long-term stability in water up to 50°C. Continuous use in hot water over 80°C is not recommended.
Water absorption is very low (in the range of 0.3 to 1% by weight) and volume swell is negligible. This means for example, that Polyurethane Elastomers can operate at close tolerance in water lubricated bearings without fear of seizure.
The moisture vapor transmission rate of Polyurethane Elastomers is relatively high and advantage is taken of this fact in some applications e.g. poromeric shoe upper materials. However where this property might be disadvantageous, the advice of the processor or raw material supplier should be sought on the suitability of Polyurethane Elastomers for any particular application.

Electrical Properties

Some Polyurethanes have very good insulating properties and are used in many potting and encapsulating applications.
Oxygen and Ozone Resistance
Products made from Polyurethanes are highly resistant to degradation by atmospheric oxygen and ozone. Tests on samples, aged over 500 hours in an atmosphere containing 3 ppm ozone, show no attach even while under 20% strain. Past experience for several hundred hours are virtually immune to attack by normal atmospheric concentrations. This makes Polyurethanes highly successful when employed around electrical equipment, without hardening and cracking often experienced with conventional Elastomers and indeed many plastics.

Oil Grease and Chemical Resistance

Whilst many rubbers and plastics have excellent resistance to one or more specific solvents, oils or chemicals, the wide resistance of Polyurethanes to chemical attack means that they can be used in a multitude of environments with the exception of strong solvents.
As with all materials being examined for oil and chemical resistance, it is best to place a sample of the material in actual service. If this is not practical, tests should be devised which simulate actual service conditions as closely as possible.

Radiation Resistance

Polyurethane Elastomers are considered to have the best resistance to gamma ray radiation of all Elastomers. They retain a high proportion of their original flexibility and toughness whilst exposed to gamma radiation.

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Flame Resistance

Special compounds containing flame-retardants can be formulated to meet several self-extinguishing or non-burning specifications.

Mould, Mildew, Fungus Resistance

Suitably compounded Polyurethane Elastomers, usually Polyether based, do not support fungus growth and are generally resistant to such attack.
There are available many different types of polyol and several types of isocyanate. By selection of the right combination materials can be produced which are soft or hard, flexible or rigid but still retain the toughness and durability associated with Polyurethanes.

In addition to this wide choice of chemical combinations the large number of possible additives is considered, then the range of end products becomes very extensive. For example, catalysts can be chosen to give rapid or extended cure rates. Blowing agents can be used to produce foams, various additives can be employed to impart specific properties, e.g. flame retardant, antistatic, colour etc.
There are several methods of processing Polyurethane Elastomers and selection of the most suitable one enables either long or short production runs to be accomplished efficiently and economically. Please speak to a member of the William Johnston & Company Limited technical team for further assistance