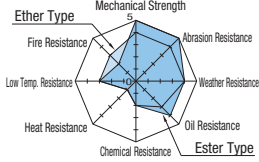


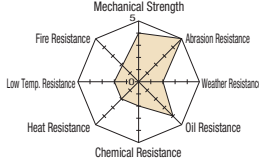
# Rubber Properties

## Rubber Properties

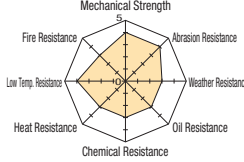
### Urethane Rubber



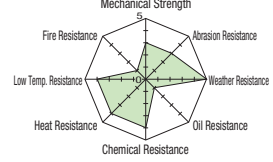
### Nitrile Rubber



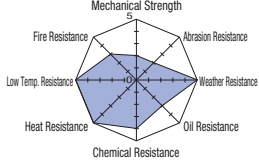
### Chloroprene Rubber



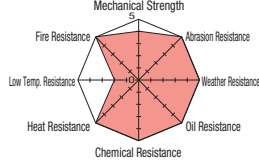
### Ethylene Rubber



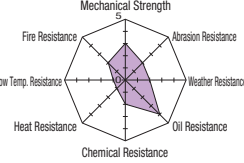
### Silicon Rubber



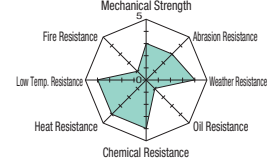
### Fluororubber



### Low Elasticity Rubber

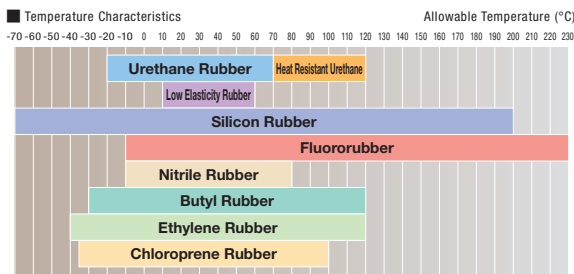


### Butyl Rubber



Material	Features
<b>Urethane Rubber</b>	Superior in mechanical strength and abrasion resistance to other rubbers. Especially excels in strength in repeat use and shock-absorbing properties. Can be used for applications such as Mechanical Stopper. Excellent in oil resistance but poor in chemical resistance. Ester Type is Hydrolytic. Do not use in humid and wet areas.
<b>Nitrile Rubber (NBR)</b>	Acrylic Nitrile Butadiene Rubber Economical general-purpose rubber excellent in oil resistance. Used for various applications such as O-rings and gaskets.
<b>Chloroprene Rubber (CR)</b>	Chloroprene Rubber Well-balanced synthetic rubber excellent in weather, heat, oil and chemical resistance. Non-staining chloroprene rubber which minimizes contamination from contacting materials is also available.
<b>Ethylene Rubber (EPDM)</b>	Excels in weather, low temperature and chemical resistance. Can be used for general-purpose applications such as gaskets and doorstops.
<b>Silicon Rubber (SI)</b>	Excels in heat resistance and electric property (insulation). Physiologically safe and can be used for medical, food-related and electronic devices which require heat resistance.
<b>Fluororubber (FPM)</b>	Expensive, but widely used with its excellent heat, oil, solvent and chemical resistance. Fluororubber is generally known as Teflon and Viton®. Has the highest resistance to ozone, heat, oil and chemicals in rubbers.
<b>Low Elasticity Rubber (Hanenaito®)</b>	Excels in shock and vibration resistance and absorbs energy without rebound. Physical property and durability are equal to general rubbers. Widely used as components for quiet and low-vibration products.
<b>Butyl Rubber (IIR)</b>	Isobutylene Isoprene Rubber Excellent in heat, cold and weather resistance, and good in water and chemical resistance.

## Comparison of Allowable Temperature



## Comparison of Chemical Resistance

	Urethane	Nitrile	Chloroprene	Ethylene	Butyl	Fluorine	Silicon	Low Elasticity
Gasoline Light Oil	⊙	⊙	○	×	×	⊙	△-○	△
Water	△	⊙	⊙	⊙	⊙	⊙	○	△
Strong Acid	×	○	○	○	⊙	⊙	△	△
Strong Alkali	×	○	⊙	⊙	⊙	×	⊙	○
Ether	×	×	×	○	△-○	×	×	△
Keton	×	×	×	⊙	⊙	×	○	×

⊙ = Excellent, ○ = Good, △ = Acceptable, × = Not Acceptable

## Indication of Hardness

Three hardness categories are used for MISUMI's Urethane, Rubbers and Sponges.

### ① Shore A

Used to describe the hardness of Urethane and Rubbers.  
"Shore A 70" means hardness measured by using type-A Durometer in accordance with New JIS Standard K6253.

### ② ASKER C

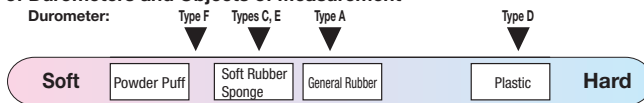
Used to describe the hardness of Sponges.  
"Asker C 25" means hardness measured by using a spring type hardness tester Asker C in accordance with SRIS 0101 (Standard by the Society of Rubber Industry, Japan).

For those two above, larger value indicates harder material.

### ③ Penetration

Used to describe the hardness of gel materials.  
JIS K 2207 Standardized testing method. It indicates hardness by the penetrated length that a pin of specified weight penetrates in a sample perpendicularly.  
The value is one penetration for 1/10mm length. (Larger value indicates softer material.)

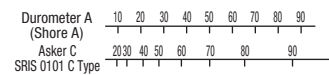
## •Types of Durometers and Objects of Measurement



## Hardness Images

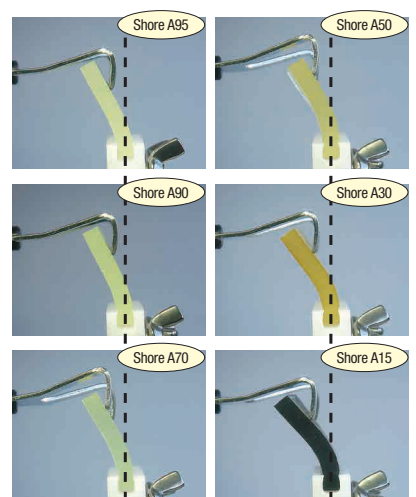
Shore A95	Golf Ball
Shore A90	Baseball
Shore A70	Softball
Shore A50	Ballistic Eraser
Shore A30	Bicycle Tube
Shore A15	Firm Gelatin

•Margin of Error: ±5



## Ref.: Bending Test by Hardness

Test Conditions: Standard Urethane, Thickness 5mm, Width 30mm, Length 40mm  
When pulled by push-pull gauge with the load 5N:



There are various types of durometer instrument as shown above to measure the hardness of a material, depending on the property of the measured material. For urethane and rubber, Type A (Asker Durometer Type A) compliant with JIS K 6253 is most commonly used. Hardness of materials softer than urethane and rubber is measured by Asker Type C or Type E. Shock absorbing gel is soft and super flexible material whose hardness is measured by Asker Type F.