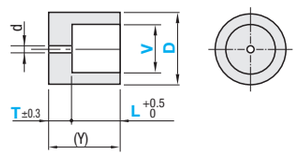
# Urethane, Rubbers
## Cap Type

■Caps useable for protection of various tips.

| Standard | Configurable Type | Material | Hardness | Color |
|---|---|---|---|---|
| UTCS | UTNS | Ether Polyurethane | Shore A95 | Natural Color |
| UTCH | UTNH | | Shore A90 | Natural Color |
| UTCM | UTNM | Ester Polyurethane | Shore A70 | Natural Color |
| UTCL | UTNL | | Shore A50 | Natural Color |
| RBCN | RBNN | Nitrile Rubber (NBR) | Shore A70 | Black |
| RBCC | RBNC | Chloroprene Rubber (CR) | Shore A65 | Black |
| RBCU | RBNU | Low Elasticity Rubber | Shore A32 | Black |
| RBCS | RBNS | Silicon Rubber (SI) | Shore A70 | Light Gray |
| RBCA | RBNA | | Shore A50 | Milky White |
| RBCF | RBNF | Fluororubber (FPM) | Shore A80 | Black |




The milky white color of silicone rubber shore A 50 is translucent.
For Urethane Type, I.D. tolerance has been changed.

**T Tolerance**

| T | Urethane | Rubber |
|---|---|---|
| 30 or Less | ±0.2 | ±0.3 |
| 31 ~ 50 | ±0.3 | - |

**D Tolerance**

| D | Urethane | Rubber |
|---|---|---|
| 40 or Less | ±0.2 | ±0.5 |
| 41~60 | ±0.3 | ±0.6 |
| 61~100 | ±0.4 | - |

**V Tolerance**

| V | Urethane | Rubber |
|---|---|---|
| 2~50 | -0.2 -0.4 | 0 -1.0 |
| 51~ | -0.2 -0.5 | 0 -1.2 |

### ■Standard

| Part Number Type | D | V Selection | T Selection | L Selection | d | Unit Price UTCS | UTCH | UTCM | UTCL | RBCN RBCC | RBCU | RBCS RBCA | RBCF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UTCS (Shore A95) | 6 | 2 | 2 3 4 5 | 4 5 6 8 | 1 | | | | | | | | |
| UTCH (Shore A90) | 8 | 3 4 | | | | | | | | | | | |
| UTCM (Shore A70) | 9 | 3 5 | 2 5 7 | 4 5 6 10 | 1.5 | | | | | | | | |
| UTCL (Shore A50) | 10 | 4 6 | 2 3 5 6 | 4 8 10 12 | | | | | | | | | |
| RBCN Nitrile Rubber (NBR) | 12 | 6 8 | | 7 8 9 10 | | | | | | | | | |
| RBCC Chloroprene Rubber (CR) | 15 | 8 10 | 2 4 7 8 | 4 6 8 10 | | | | | | | | | |
| RBCU Low Elasticity Rubber | 20 | 12 16 | 2 3 5 10 | 7 10 15 20 | 2 | | | | | | | | |
| RBCS (Shore A70) Silicon Rubber (SI) | 25 | 15 20 | 5 6 10 12 | 10 15 25 30 | | | | | | | | | |
| RBCA (Shore A50) Silicon Rubber (SI) | 30 | 20 25 | 2 3 5 10 | 15 20 30 | | | | | | | | | |
| RBCF Fluororubber (FPM) | | | | | | | | | | | | | |

Ordering Example: Part Number - V - T - L → UTCH8 - 3 - 2 - 4

### ■Urethane Configurable Type

| Part Number | 1mm Increment D | V | T | L | d | Unit Price UTNS | UTNH | UTNM | UTNL |
|---|---|---|---|---|---|---|---|---|---|
| UTNS (Shore A95) UTNH (Shore A90) | 6~15 | 2~11 | 2~30 | 4~10 | 1 | | | | |
| | | | | 11~25 | | | | | |
| | | | | 26~40 | 1.5 | | | | |
| | | | | 41~60 | | | | | |
| | 16~30 | 12~26 | | 7~10 | | | | | |
| | | | | 11~25 | | | | | |
| | | | | 26~40 | | | | | |
| | | | | 41~60 | | | | | |
| UTNM (Shore A70) UTNL (Shore A50) | 31~45 | 27~41 | 5~40 | 7~10 | | | | | |
| | | | | 11~25 | | | | | |
| | | | | 26~40 | | | | | |
| | | | | 41~65 | | | | | |
| | | | | 66~70 | | | | | |
| | 46~60 | 42~56 | 5~50 | 7~10 | 2 | | | | |
| | | | | 11~25 | | | | | |
| | | | | 26~40 | | | | | |
| | | | | 41~65 | | | | | |

(Y)=T+L (Y)V≤D-4
For Urethane Configurable Type, configurable dimension range has been shortened.

Ordering Example: Part Number - D - V - T - L → RBNN - D60 - V50 - T5 - L20

### ■Rubber Configurable Type

| Part Number | 1mm Increment D | V | T | L | d | Unit Price RBNN RBNC | RBNU | RBNS RBNA | RBNF |
|---|---|---|---|---|---|---|---|---|---|
| RBNN Nitrile Rubber (NBR) | 6~15 | 2~11 | 2~10 | 4~10 | 1 | | | | |
| RBNC Chloroprene Rubber (CR) | | | | 11~20 | | | | | |
| | | | | 21~28 | | | | | |
| | | | | 29~48 | | | - | | - |
| RBNU Low Elasticity Rubber | 16~30 | 12~26 | | 7~10 | 1.5 | | | | |
| | | | | 11~20 | | | | | |
| | | | | 21~28 | | | | | |
| | | | | 29~48 | | | - | | - |
| RBNS (Shore A70) Silicon Rubber (SI) | 31~45 | 27~41 | 5~15 | 7~10 | | | | | |
| | | | | 11~20 | | | | | |
| | | | | 21~28 | | | | | |
| RBNA (Shore A50) Silicon Rubber (SI) | | | | 29~45 | | | - | | - |
| | 46~60 | 42~56 | | 7~10 | 2 | | | | |
| | | | | 11~20 | | | | | |
| | | | | 21~28 | | | | | |
| RBNF Fluororubber (FPM) | | | | 29~45 | | | - | | - |

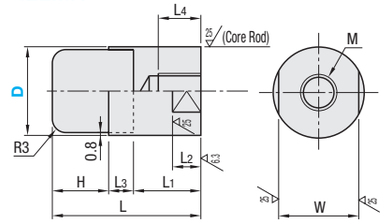
(Y)=T+L (Y)V≤D-4 (Y)≤50
(Y)≤30 for RBNU, RBNS and RBNF.



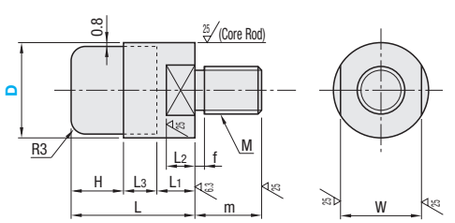
# Shock Absorbing Bumpers
## Tapped, Threaded

■New bumpers provided with shock and sound absorbing effect, made of soft shock-absorbing gel. For material properties, see P.389

Tapped **GELMR**




Threaded **GELMF**




Gel — M Material: Viscoelastic Elastomer (Gray); H Hardness: Asker F75 (Two-layered; F98 for Outer Layer)
Core Rod — M Material: SUS304

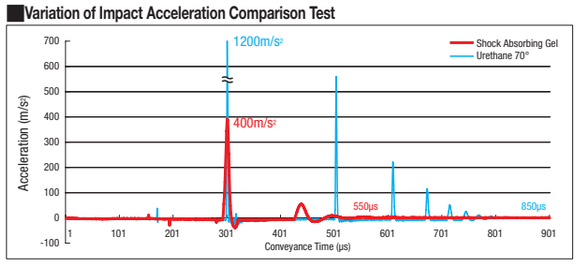
| Part Number Type | D | H | L | L1 | L2 | L3 | L4 | M | W | Unit Price |
|---|---|---|---|---|---|---|---|---|---|---|
| Tapped GELMR | 12 | 8 | 22 | 11 | 4 | 3 | 7 | M5x0.8 | 10 | |
| | 16 | 10 | 28 | 14 | 5 | 4 | 11 | M6x1.0 | 14 | |
| | 16A | | 31 | 17 | | | 14 | M8x1.25 | | |
| | 20 | 13 | 35 | 17 | 6 | 5 | 14 | M8x1.25 | 17 | |
| | 20A | | 39 | 21 | | | 16 | M10x1.25 (Fine) | | |
| | 30 | 15 | 44 | 24 | 8 | 5 | 20 | M12x1.75 | 27 | |
| | 30A | | 46 | 26 | | | 22 | M14x1.5 (Fine) | | |

| Part Number Type | D | H | L | L1 | L2 | L3 | M | W | m | f | Unit Price |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Threaded GELMF | 12 | 8 | 16 | 5 | 4 | 3 | M5x0.8 | 10 | 8 | 1.5 | |
| | 16 | 10 | 20 | 6 | 5 | 4 | M6x1.0 | 14 | 10 | 2 | |
| | 20 | 13 | 26 | 8 | 6 | 5 | M8x1.25 | 17 | 12 | 2 | |
| | 30 | 15 | 30 | 10 | 8 | 5 | M10x1.5 | 27 | 14 | 2.5 | |

Ordering Example: Part Number → GELMR16A

### ■Precaution for Use
- Do not stick or cut with sharpened objects.
- Do not tear or twist.
- Insert it only from the vertical direction.
- Keep away from fire.
- Do not use detergents for cleaning.
- Replace it when broken.

### ■Variation of Impact Acceleration Comparison Test




| | Max. Impact Acceleration (m/s²) | Conveyance Time (μs) |
|---|---|---|
| Shock Absorbing Gel | 400 | 550 |
| Urethane 70 deg. | 1200 | 850 |
| Urethane 50 deg. | 836 | 1273 |
| Extra Low Hardness Urethane 15 deg. | 450 | 1660 |
| Low Rebound Urethane | 1750 | 450 |
| Nitrile Rubber | 1050 | 670 |
| Low Rebound Rubber | 1580 | 400 |

* Convergence time is defined as the time until acceleration falls below 10m/s².

**• From Test Results**
Peak acceleration of the shock absorbing gel is lower at around 30% of other materials and deceleration dampening is higher.
(Extra low hardness urethane has a low peak value as well, but takes three times longer to converge.)
This is because the material transmits energy dispersing in multiple directions, while absorbing impact force.
From these characteristics, effects such as impact absorption and noise reduction can be expected.
(Effects vary depending on operation environment.)

**• Test Conditions**
Measuring Method: Measured with accelerometer secured on the hammer dropped on the test materials.
Size of Test Material: ø30, Height 20mm
Measuring Instruments:
Hammer: Weight 958g, Drop Height 255mm
Length from Fulcrum to Barycenter: 255mm

Equipments:
Acceleration Pickup (Brüel & Kjær Type 4507B001)
Data Logger (Keyence NR-500, NR-HA08)
PC, Sensor Amplifier (Ono Sokki SR-2200)
Measurement Condition: Temperature 18°C, Humidity 40%

### ■Elasticity of Shock Absorbing Gel

**• Shock Absorbing Gel** **• Urethane, Shore A50**

Normal State / When Applied Force / Normal State / When Applied Force

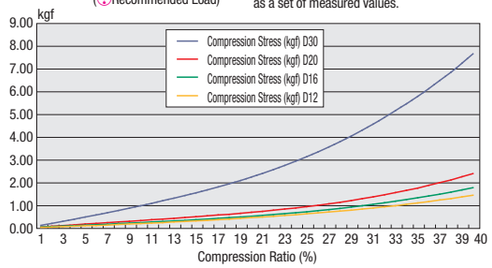
A major characteristic is the three-dimensional slow recovery, the function to recover after compression slowly and in multiple directions.
Pressed as thin as shown in the photo and recovers to the original shape gradually after being released from pressure.
* The double-layer structure of the gel part reduces stickiness.

### ■(40%) Compressive Load Test Results

| D | 12 | 16 | 20 | 30 |
|---|---|---|---|---|
| 40% Compression Load Average (kgf) | 1.4 | 1.8 | 2.4 | 7.7 |

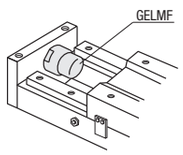
(Recommended Load)

**• Test Conditions**
A static compression load measurement test causing the 60% thickness is repeated 3 times. Below are the mean values of three measurement results.
These are not guaranteed values but an example as a set of measured values.




Example

**• Bumper**




**• Shaft Attachment**