



TecPak®

Bumpers

The shape of shock absorption

**TecPak® Bumpers
outperform
conventional rubber,
polyurethane and
coiled steel by
providing**

**Greater energy
absorption per
weight**

**Greater energy
absorption per
volume**

**Superior endurance
and resilience**

**More cost effective
performance**



THE NEXT ADVANCE IN ENERGY ABSORPTION

TecsPak® bumpers represent the next step in energy absorption because they are engineered to meet demanding performance requirements in an array of applications. Superior durability cuts downtime maintenance for increased productivity. Design flexibility ranges from ultra light to massive end loads. Applications are found throughout the mining, automotive and general industrial markets where energy impact and vibration must be managed.

MICRO BUMPERS...p5

- Automation Equipment
- Robotics
- Lightweight Automated Machines
- General Industrial

GBA BUMPERS...p6

- Sawmill and Debarking Equipment
- Mining/Heavy Construction Machinery
- Gantry/Trolley, Shipping Bulkhead and Heavy Door Bumpers
- Agricultural Equipment

GBA-S BUMPERS...p7

- Hydraulic and Pneumatic Actuated Machinery
- Packaging, Bottling, Canning, Sealing Wrapping and Textile Machinery
- High Capacity Machine Tools/Robotics
- Carriage and Turret Stops

GBR BUMPERS...p8

- Pneumatically Powered Equipment
- Door/Shroud and Enclosures
- Seat Suspensions
- Fitness Equipment

GBR-55 BUMPERS...p9

- Pneumatically Powered Equipment
- Door/Shroud and Enclosures
- Seat Suspensions
- Fitness Equipment

TCB BUMPERS...p10

- Overhead Cranes
- Construction Equipment
- Material Handling Equipment
- Stamping and Foundry Equipment

RTB BUMPERS...p11

- Construction Equipment
- Agriculture Equipment
 - Mining
 - Material Handling

SUCKER ROD CUSHIONS...p12-13

- Sucker Rod Cushions

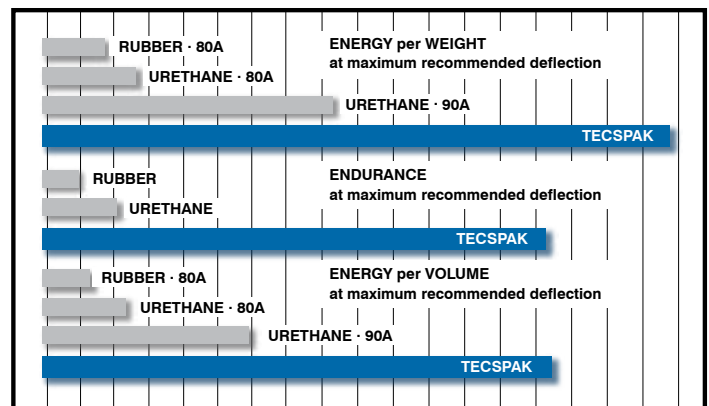
ENERGY TECHNOLOGY YOU CAN USE

TecsPak® bumpers are highly engineered elastomeric products designed to absorb more energy per unit of weight and volume than most known materials. TecsPak® bumpers are ideal for energy management problems involving shock isolation, vibration isolation shock absorbers and return springs. In addition, the performance characteristics of TecsPak® bumpers significantly outperform rubber, urethane and coiled steel. The unmatched durability, performance and design flexibility provide the cost-effective solution to your energy absorption requirements.

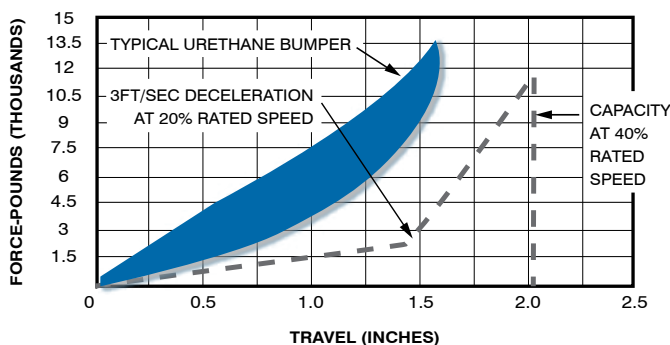
TecsPak® is a patented thermoplastic elastomer originally developed for high end load railroad applications. The unique shape, combined with the proprietary processing of a TPEE based material, results in a bumper that precisely meets your required load rates.

TecsPak® Bumpers vs. Rubber and Polyurethane

TecsPak® bumpers offer an operational life which far exceeds that of other tested energy absorbing devices, lasting 20 times longer than urethane and 10 times longer than rubber in comparative tests. TecsPak® is inert and resists exposure to dirt, oils, hydraulic fluid, gasoline and diesel fuels. Operating temperature range is typically -40°F to +120°F.

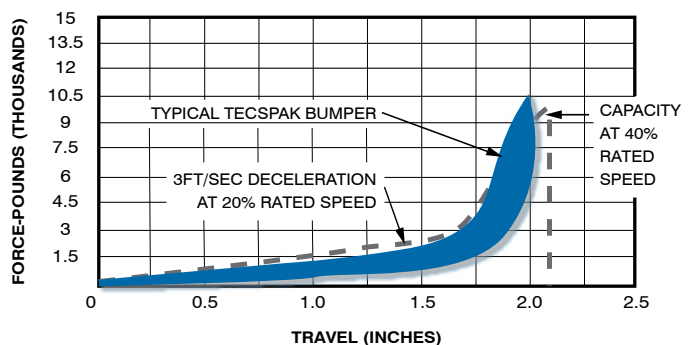


TYPICAL URETHANE BUMPER
FORCE VS TRAVEL CURVE
THEORETICAL DYNAMIC ENVELOPE



Envelope within dotted line represents the minimum requirements of existing OSHA and CMMA Standards

TYPICAL TECSPAK BUMPER
FORCE VS TRAVEL CURVE
THEORETICAL DYNAMIC ENVELOPE



Envelope within dotted line represents the minimum requirements of existing OSHA and CMMA Standards

GENERAL BUMPERS

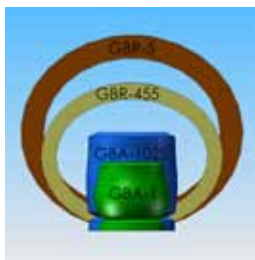
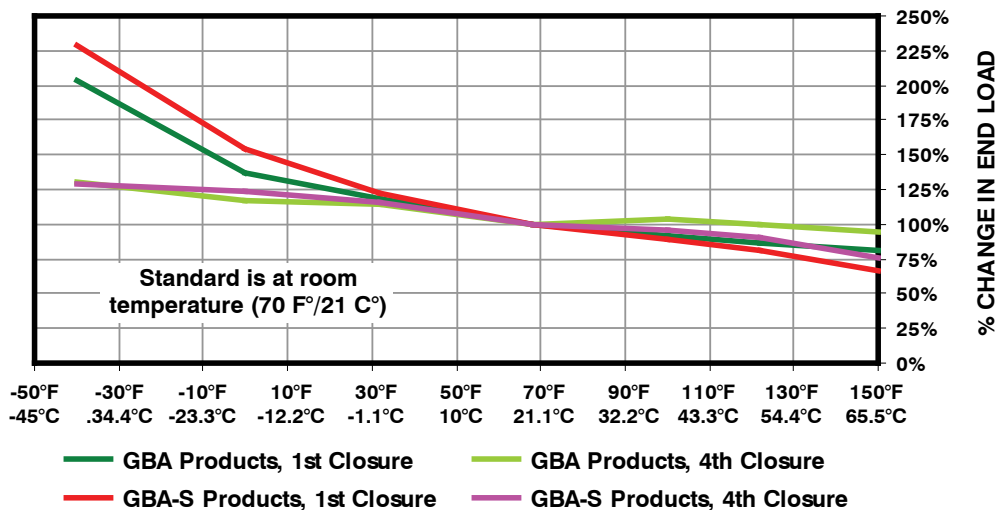
All TecsPak® data is based upon standard tests conducted at room temperature (70°F/21°C). However, there are many applications where the product will be used at other temperatures. The following information is to be used a guide in evaluating the effect of temperature in selecting a product.

TecsPak®, like all elastomers, has a variable stiffness based upon temperature. Also, because our material absorbs energy during deflection and converts this energy to heat (hysteresis), the temperature of the material will rise during use. For this reason, as well as others, each bumper was tested four times from the free height to the solid height.

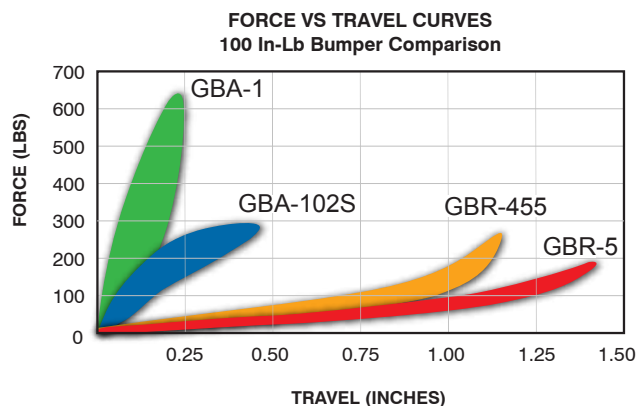
The chart below shows the effects of temperature on both the GBA and GBA-S product lines. The performance at room temperature is considered the standard (100%) and the peak end loads at various temperatures are then shown as a percentage of this standard.

EFFECT OF TEMPERATURE ON GENERAL PRODUCTS

4 closure static tests after the bumpers were saturated at temperature



This drawing shows size comparisons of identical capacity bumpers from each product group. The force vs. travel graph shows comparable performance characteristics.



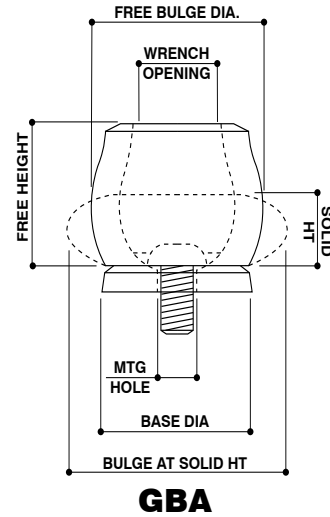
MICRO BUMPERS

TecsPak® Micro Bumpers are perfect for end of stroke cushioning and other energy absorbing applications, their performance make TecsPak® Micro Bumpers ideally suited for mechanisms requiring smaller size and weight. These bumpers are available in five sizes. The smallest model is approximately the size of a pencil eraser and has a rated energy capacity of 20 in-lbs (2.2 N-m). A versatile and proven technology, TecsPak® Micro Bumpers can be used in some of the most demanding applications imaginable. Any application involving shock absorption or collision protection is suitable for using TecsPak® Micro Bumpers. Far exceeding the life of rubber and urethane bumpers, Micro Bumpers are inert and performance is not affected by dirt, oils, and other chemicals. Operating temperature ranges from -40 F to +120 F.



| BUMPER | DIMENSIONAL DATA | | | | | | | PERFORMANCE DATA | | | |
|----------|------------------|-------------|----------------|---------------|-----------------|--------------|-------------------|------------------|----------------|-----------------|----------------|
| | FREE HEIGHT | FREE BULGE | WRENCH OPENING | BASE DIAMETER | MOUNTING HOLE** | SOLID HEIGHT | BULGE @ SOLID HT. | @ RATED ENERGY | | EMERGENCY STOP* | |
| | IN | IN | IN | IN | IN | IN | IN | ENERGY IN-LBS | PEAK FORCE LBS | ENERGY IN-LBS | PEAK FORCE LBS |
| GBA-A | .43+/-0.10 | .47+/-0.15 | .23+/-0.15 | .41+/-0.10 | 0.14 | 0.24 | 0.60 | 20 | 200 | 25 | 225 |
| GBA-C | .62+/-0.10 | .67+/-0.15 | .33+/-0.15 | .58+/-0.10 | 0.17 | 0.39 | 0.82 | 50 | 375 | 80 | 400 |
| GBA-E | .74+/-0.10 | .79+/-0.15 | .40+/-0.15 | .70+/-0.10 | 0.21 | 0.39 | 1.01 | 90 | 550 | 130 | 625 |
| GBA-098S | 0.58+/-0.10 | 0.54+/-0.15 | 0.34+/-0.15 | 0.51+/-0.10 | 0.18 | 0.29 | 0.76 | 18 | 120 | 25 | 140 |
| GBA-099S | 0.73+/-0.10 | 0.68+/-0.15 | 0.42+/-0.15 | 0.64+/-0.10 | 0.21 | 0.40 | 0.96 | 33 | 180 | 50 | 200 |

AXIAL BUMPERS · HIGH LOAD · ENERGY ABSORPTION

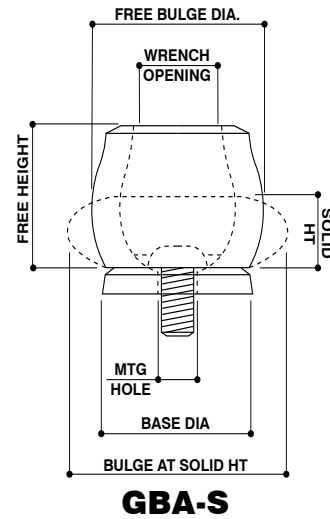


| BUMPER | DIMENSIONAL INFORMATION | | | | | | | PERFORMANCE DATA | | | |
|--------|-------------------------|--------------|----------------|---------------|-----------------|--------------|-------------------|------------------|----------------|-----------------|----------------|
| | FREE HEIGHT | FREE BULGE | WRENCH OPENING | BASE DIAMETER | MOUNTING HOLE** | SOLID HEIGHT | BULGE @ SOLID HT. | @ RATED ENERGY | | EMERGENCY STOP* | |
| | IN | IN | IN | IN | IN | IN | IN | ENERGY IN-LBS | PEAK FORCE LBS | ENERGY IN-LBS | PEAK FORCE LBS |
| GBA-1 | .76+/-0.025 | .84+/-0.025 | .42+/-0.020 | .74+/-0.020 | 0.31 | 0.42 | 1.07 | 100 | 650 | 180 | 800 |
| GBA-2 | 1.01+/-0.030 | 1.11+/-0.030 | .56+/-0.020 | .98+/-0.020 | 0.31 | 0.54 | 1.43 | 250 | 1,100 | 400 | 1,250 |
| GBA-3 | 1.18+/-0.035 | 1.31+/-0.045 | .66+/-0.020 | 1.16+/-0.020 | 0.31 | 0.67 | 1.70 | 400 | 1,600 | 750 | 1,900 |
| GBA-4 | 1.31+/-0.040 | 1.47+/-0.045 | .72+/-0.020 | 1.28+/-0.020 | 0.31 | 0.72 | 1.88 | 550 | 2,000 | 975 | 2,400 |
| GBA-5 | 1.37+/-0.045 | 1.55+/-0.050 | .80+/-0.020 | 1.35+/-0.020 | 0.42 | 0.73 | 1.97 | 700 | 2,000 | 1,100 | 2,300 |
| GBA-6 | 1.49+/-0.045 | 1.70+/-0.055 | .79+/-0.020 | 1.48+/-0.030 | 0.42 | 0.85 | 2.15 | 900 | 2,800 | 1,450 | 3,200 |
| GBA-7 | 1.62+/-0.050 | 1.80+/-0.055 | .93+/-0.020 | 1.58+/-0.030 | 0.54 | 0.88 | 2.33 | 1,100 | 3,000 | 1,500 | 3,200 |
| GBA-8 | 1.77+/-0.055 | 1.96+/-0.060 | 1.02+/-0.030 | 1.71+/-0.030 | 0.54 | 0.97 | 2.51 | 1,400 | 3,200 | 1,950 | 3,400 |
| GBA-9 | 1.86+/-0.060 | 2.08+/-0.065 | 1.02+/-0.030 | 1.84+/-0.030 | 0.54 | 0.99 | 2.69 | 1,700 | 4,200 | 2,950 | 5,000 |
| GBA-10 | 2.02+/-0.065 | 2.25+/-0.070 | 1.16+/-0.030 | 1.97+/-0.030 | 0.54 | 1.10 | 2.86 | 2,000 | 4,000 | 2,650 | 4,400 |
| GBA-11 | 2.14+/-0.065 | 2.38+/-0.075 | 1.23+/-0.030 | 2.10+/-0.030 | 0.54 | 1.19 | 3.05 | 2,500 | 5,000 | 3,150 | 5,200 |
| GBA-12 | 2.26+/-0.070 | 2.54+/-0.080 | 1.28+/-0.030 | 2.23+/-0.030 | 0.54 | 1.25 | 3.22 | 3,000 | 6,000 | 4,100 | 6,200 |
| GBA-13 | 2.38+/-0.075 | 2.70+/-0.085 | 1.35+/-0.030 | 2.35+/-0.030 | 0.54 | 1.32 | 3.40 | 3,500 | 6,400 | 4,600 | 6,700 |
| GBA-14 | 2.54+/-0.080 | 2.81+/-0.085 | 1.40+/-0.030 | 2.44+/-0.030 | 0.80 | 1.40 | 3.58 | 4,000 | 6,700 | 4,900 | 6,800 |
| GBA-15 | 2.72+/-0.085 | 3.10+/-0.095 | 1.56+/-0.030 | 2.71+/-0.030 | 0.80 | 1.55 | 3.94 | 5,000 | 8,000 | 7,300 | 9,000 |
| GBA-16 | 2.91+/-0.090 | 3.22+/-0.100 | 1.65+/-0.030 | 2.82+/-0.030 | 0.80 | 1.60 | 4.12 | 6,000 | 9,000 | 8,000 | 9,400 |
| GBA-17 | 3.00+/-0.090 | 3.35+/-0.105 | 1.70+/-0.030 | 2.96+/-0.030 | 0.80 | 1.69 | 4.30 | 7,000 | 10,000 | 9,000 | 11,000 |
| GBA-18 | 3.15+/-0.095 | 3.50+/-0.105 | 1.75+/-0.030 | 3.11+/-0.030 | 0.80 | 1.73 | 4.48 | 8,000 | 11,000 | 11,000 | 11,500 |
| GBA-19 | 3.37+/-0.100 | 3.83+/-0.120 | 1.90+/-0.030 | 3.34+/-0.050 | 0.80 | 1.91 | 4.83 | 10,000 | 12,500 | 13,500 | 13,500 |
| GBA-20 | 3.98+/-0.120 | 4.56+/-0.140 | 2.24+/-0.030 | 3.93+/-0.060 | 0.80 | 2.20 | 5.73 | 17,000 | 19,000 | 26,000 | 21,000 |

* Emergency Stop data is to be applied to applications where the bumper will be struck no more than 20 times with a minimum of 24 hours between uses.

**Mounting hole dimensions are nominal values and provide clearance for the recommended mounting hardware.

AXIAL BUMPERS - MEDIUM LOAD - ENERGY ABSORPTION

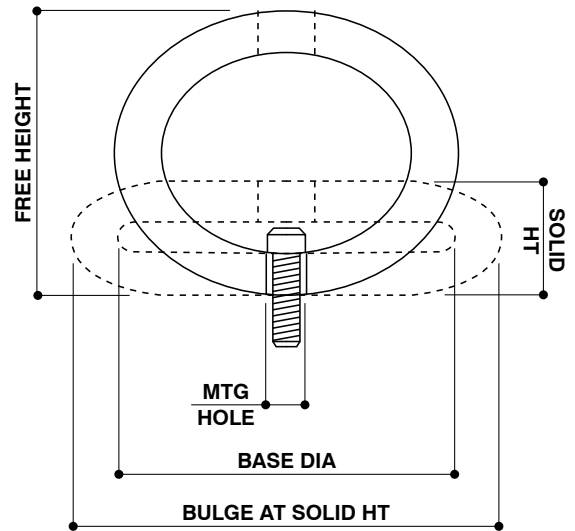


| BUMPER | DIMENSIONAL DATA | | | | | | | PERFORMANCE DATA | | | |
|----------|-------------------|------------------|----------------------|---------------------|-----------------------|--------------------|-------------------------|--------------------------|-------------------|-------------------------------------|-------------------|
| | FREE HEIGHT IN | FREE BULGE IN | WRENCH OPENING IN | BASE DIAMETER IN | MOUNTING HOLE** IN | SOLID HEIGHT IN | BULGE @ SOLID HT. IN | @ RATED ENERGY IN-LBS | PEAK FORCE LBS | EMERGENCY STOP* ENERGY IN-LBS | PEAK FORCE LBS |
| GBA-101S | .815+/- .025 | .79+/- .025 | .48+/- .015 | .73+/- .020 | 0.31 | 0.42 | 1.08 | 50 | 180 | 60 | 185 |
| GBA-102S | 1.09+/- .035 | 1.02+/- .035 | .63+/- .020 | .97+/- .020 | 0.31 | 0.57 | 1.45 | 100 | 300 | 125 | 325 |
| GBA-103S | 1.27+/- .040 | 1.24+/- .040 | .77+/- .020 | 1.16+/- .030 | 0.31 | 0.65 | 1.72 | 200 | 400 | 225 | 425 |
| GBA-104S | 1.42+/- .045 | 1.38+/- .045 | .84+/- .020 | 1.28+/- .030 | 0.31 | 0.72 | 1.90 | 250 | 600 | 320 | 600 |
| GBA-105S | 1.48+/- .045 | 1.44+/- .045 | .82+/- .020 | 1.35+/- .030 | 0.31 | 0.76 | 1.99 | 300 | 700 | 360 | 700 |
| GBA-106S | 1.63+/- .050 | 1.60+/- .050 | .93+/- .030 | 1.48+/- .030 | 0.54 | 0.85 | 2.17 | 400 | 900 | 550 | 1,000 |
| GBA-107S | 1.75+/- .050 | 1.66+/- .050 | .98+/- .030 | 1.58+/- .030 | 0.54 | 0.88 | 2.35 | 550 | 900 | 625 | 1,000 |
| GBA-108S | 1.91+/- .060 | 1.85+/- .060 | 1.08+/- .030 | 1.73+/- .030 | 0.54 | 0.97 | 2.53 | 700 | 1,100 | 800 | 1,200 |
| GBA-109S | 2.03+/- .060 | 1.90+/- .060 | 1.12+/- .030 | 1.83+/- .030 | 0.54 | 1.00 | 2.71 | 800 | 1,400 | 1,000 | 1,500 |
| GBA-110S | 2.18+/- .065 | 2.11+/- .065 | 1.24+/- .030 | 1.97+/- .030 | 0.54 | 1.06 | 2.89 | 1,000 | 1,600 | 1,375 | 1,700 |
| GBA-111S | 2.33+/- .070 | 2.20+/- .070 | 1.30+/- .030 | 2.09+/- .030 | 0.54 | 1.19 | 3.07 | 1,200 | 1,700 | 1,350 | 1,800 |
| GBA-112S | 2.45+/- .075 | 2.34+/- .075 | 1.39+/- .030 | 2.21+/- .030 | 0.54 | 1.25 | 3.25 | 1,400 | 1,800 | 1,475 | 1,800 |
| GBA-113S | 2.58+/- .080 | 2.53+/- .080 | 1.46+/- .030 | 2.33+/- .030 | 0.54 | 1.32 | 3.43 | 1,700 | 2,300 | 2,200 | 2,500 |
| GBA-114S | 2.71+/- .085 | 2.57+/- .085 | 1.51+/- .030 | 2.44+/- .030 | 0.80 | 1.40 | 3.61 | 2,000 | 2,300 | 2,400 | 2,400 |
| GBA-115S | 2.96+/- .090 | 2.90+/- .090 | 1.70+/- .030 | 2.71+/- .030 | 0.80 | 1.55 | 3.97 | 2,500 | 3,500 | 3,500 | 3,600 |
| GBA-116S | 3.11+/- .095 | 3.05+/- .095 | 1.82+/- .030 | 2.82+/- .030 | 0.80 | 1.63 | 4.15 | 3,000 | 3,700 | 4,000 | 3,900 |
| GBA-117S | 3.31+/- .100 | 3.20+/- .100 | 1.86+/- .030 | 2.95+/- .030 | 0.80 | 1.69 | 4.33 | 3,500 | 4,000 | 5,500 | 5,000 |
| GBA-118S | 3.36+/- .105 | 3.29+/- .100 | 1.97+/- .030 | 3.07+/- .040 | 0.80 | 1.80 | 4.52 | 4,000 | 4,200 | 5,800 | 5,000 |
| GBA-119S | 3.66+/- .110 | 3.55+/- .110 | 2.14+/- .030 | 3.32+/- .040 | 0.80 | 1.78 | 4.88 | 5,000 | 4,000 | 6,600 | 5,300 |
| GBA-120S | 4.31+/- .130 | 4.22+/- .130 | 2.56+/- .030 | 3.95+/- .040 | 0.80 | 2.10 | 5.78 | 8,000 | 5,000 | 8,500 | 5,500 |

* Emergency Stop data is to be applied to applications where the bumper will be struck no more than 20 times with a minimum of 24 hours between uses.

**Mounting hole dimensions are nominal values and provide clearance for the recommended mounting hardware.

RADIAL BUMPERS - LOW LOAD - ENERGY ABSORPTION



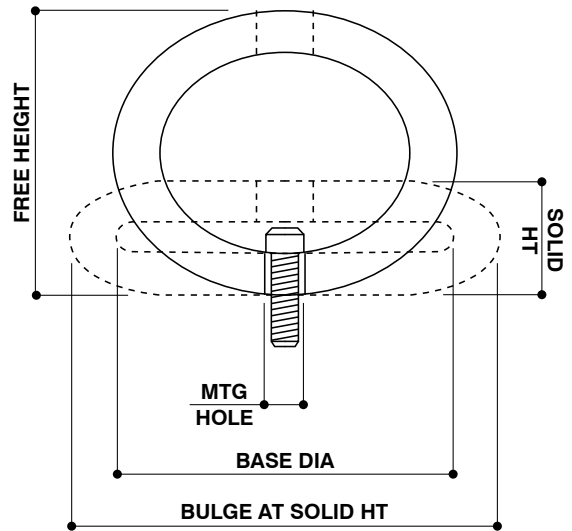
GBR

| BUMPER | DIMENSIONAL INFORMATION | | | | | | | PERFORMANCE DATA | | | |
|--------|-------------------------|--------------|--------------|----------------|-----------------|--------------|-------------------|------------------|----------------|-----------------|----------------|
| | FREE HEIGHT | FREE BULGE | WIDTH | WRENCH OPENING | MOUNTING HOLE** | SOLID HEIGHT | BULGE @ SOLID HT. | @ RATED ENERGY | | EMERGENCY STOP* | |
| | IN | IN | IN | IN | IN | IN | IN | ENERGY IN-LBS | PEAK FORCE LBS | ENERGY IN-LBS | PEAK FORCE LBS |
| GBR-1 | 0.97+/-0.030 | 1.12+/-0.035 | 0.52+/-0.015 | 0.38+/-0.015 | 0.22 | 0.32 | 1.51 | 10 | 50 | 15 | 70 |
| GBR-2 | 1.25+/-0.040 | 1.44+/-0.045 | 0.76+/-0.025 | 0.38+/-0.015 | 0.22 | 0.41 | 1.96 | 20 | 75 | 45 | 200 |
| GBR-3 | 1.47+/-0.045 | 1.68+/-0.050 | 0.78+/-0.030 | 0.37+/-0.020 | 0.22 | 0.48 | 2.27 | 30 | 100 | 70 | 250 |
| GBR-4 | 1.72+/-0.055 | 1.95+/-0.060 | 1.36+/-0.030 | 0.38+/-0.015 | 0.22 | 0.37 | 2.68 | 50 | 150 | 70 | 250 |
| GBR-5 | 2.17+/-0.065 | 2.48+/-0.075 | 1.70+/-0.030 | 0.38+/-0.015 | 0.22 | 0.47 | 3.43 | 100 | 200 | 150 | 400 |
| GBR-6 | 2.31+/-0.070 | 2.61+/-0.080 | 1.82+/-0.030 | 0.38+/-0.020 | 0.22 | 0.74 | 3.47 | 200 | 375 | 290 | 550 |
| GBR-7 | 2.65+/-0.080 | 3.00+/-0.090 | 1.80+/-0.030 | 0.48+/-0.020 | 0.28 | 0.85 | 4.03 | 300 | 475 | 375 | 600 |
| GBR-8 | 2.88+/-0.090 | 3.28+/-0.090 | 2.00+/-0.030 | 0.44+/-0.020 | 0.28 | 0.92 | 4.3 | 400 | 575 | 650 | 1,100 |
| GBR-9 | 2.88+/-0.090 | 3.23+/-0.090 | 2.65+/-0.030 | 0.61+/-0.020 | 0.40 | 0.92 | 4.3 | 600 | 850 | 800 | 1,400 |
| GBR-10 | 3.27+/-0.100 | 3.64+/-0.100 | 3.25+/-0.040 | 0.62+/-0.020 | 0.40 | 1.03 | 4.87 | 800 | 1,100 | 1,050 | 1,500 |
| GBR-11 | 3.47+/-0.090 | 3.94+/-0.090 | 3.20+/-0.040 | 0.62+/-0.020 | 0.40 | 1.11 | 5.22 | 1,000 | 1,275 | 1,275 | 1,700 |

* Emergency Stop data is to be applied to applications where the bumper will be struck no more than 20 times with a minimum of 24 hours between uses.

**Mounting hole dimensions are nominal values and provide clearance for the recommended mounting hardware.

RADIAL BUMPERS - HIGH LOAD - ENERGY ABSORPTION



GBR-55

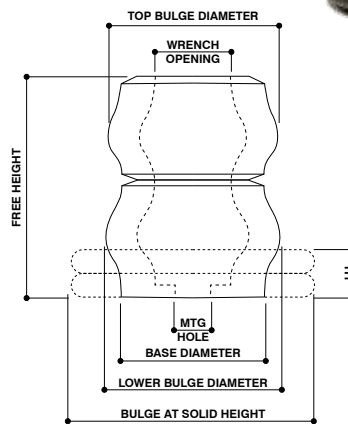
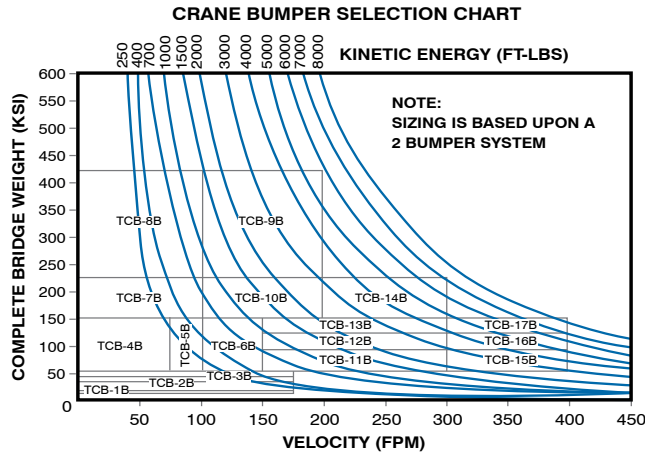
| BUMPER | DIMENSIONAL INFORMATION | | | | | | | PERFORMANCE DATA | | | |
|-----------|-------------------------|------------------|--------------|-------------------------|--------------------------|-----------------------|----------------------------|------------------|-------------------|------------------|-------------------|
| | FREE HEIGHT IN | FREE BULGE IN | WIDTH IN | WRENCH OPENING IN | MOUNTING HOLE** IN | SOLID HEIGHT IN | BULGE @ SOLID HT. IN | @RATED ENERGY | | EMERGENCY STOP* | |
| | | | | | | | | ENERGY IN-LBS | PEAK FORCE LBS | ENERGY IN-LBS | PEAK FORCE LBS |
| GBR-1-55 | 0.91+/-0.030 | 1.18+/-0.035 | 0.52+/-0.015 | 0.37+/-0.015 | 0.22 | 0.32 | 1.51 | 20 | 125 | 50 | 250 |
| GBR-2-55 | 1.17+/-0.040 | 1.52+/-0.045 | 0.75+/-0.025 | 0.37+/-0.015 | 0.22 | 0.41 | 1.96 | 50 | 225 | 160 | 700 |
| GBR-3-55 | 1.40+/-0.045 | 1.78+/-0.050 | 0.79+/-0.030 | 0.37+/-0.020 | 0.22 | 0.48 | 2.27 | 75 | 250 | 200 | 800 |
| GBR-4-55 | 1.64+/-0.055 | 2.03+/-0.060 | 1.34+/-0.030 | 0.37+/-0.020 | 0.22 | 0.37 | 2.68 | 100 | 275 | 175 | 525 |
| GBR-5-55 | 2.08+/-0.065 | 2.53+/-0.075 | 1.70+/-0.030 | 0.38+/-0.020 | 0.22 | 0.47 | 3.43 | 200 | 475 | 400 | 1,200 |
| GBR-6-55 | 2.20+/-0.070 | 2.67+/-0.080 | 1.80+/-0.030 | 0.38+/-0.020 | 0.22 | 0.74 | 3.47 | 550 | 1,050 | 850 | 1,500 |
| GBR-7-55 | 2.52+/-0.080 | 3.12+/-0.080 | 1.78+/-0.030 | 0.48+/-0.020 | 0.28 | 0.85 | 4.03 | 700 | 1,300 | 925 | 1,600 |
| GBR-8-55 | 2.70+/-0.090 | 3.39+/-0.090 | 2.00+/-0.030 | 0.43+/-0.020 | 0.28 | 0.92 | 4.3 | 1,100 | 1,675 | 1,800 | 3,000 |
| GBR-9-55 | 2.68+/-0.090 | 3.39+/-0.090 | 2.64+/-0.030 | 0.61+/-0.020 | 0.40 | 0.92 | 4.37 | 1,400 | 2,150 | 2,300 | 3,500 |
| GBR-10-55 | 3.01+/-0.100 | 3.72+/-0.100 | 3.21+/-0.040 | 0.60+/-0.020 | 0.40 | 1.03 | 4.87 | 2,000 | 2,800 | 3,000 | 4,100 |
| GBR-11-55 | 3.30+/-0.090 | 4.03+/-0.090 | 3.19+/-0.040 | 0.61+/-0.020 | 0.40 | 1.11 | 5.22 | 2,500 | 3,225 | 3,750 | 4,700 |

* Emergency Stop data is to be applied to applications where the bumper will be struck no more than 20 times with a minimum of 24 hours between uses.

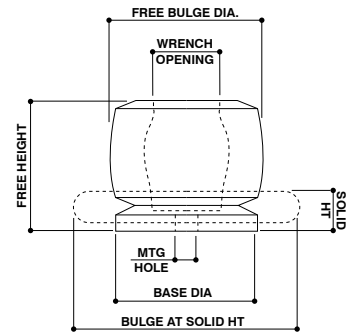
**Mounting hole dimensions are nominal values and provide clearance for the recommended mounting hardware.

DURABLE ELASTOMER BUMPERS FOR OVERHEAD CRANES

TecsPak® crane bumpers are a proven, cost-effective choice for energy management systems with excellent resistance to chemicals and humidity. These bumpers are designed to meet the minimum requirements of existing industry standards - OSHA and CMAA.



**TCB
DOUBLE**



**TCB
SINGLE**

| BUMPER | DIMENSIONAL INFORMATION | | | | | | | | PERFORMANCE DATA | |
|---------|-------------------------|------------------------------------------|-------------|--------------------------|-------------------------|--------------------------|------------------------|-----------------------------|------------------------------------|-------------------------------|
| | FREE HEIGHT IN. | FREE BULGE TOP IN. LOWER IN. | | WRENCH OPENING IN. | BASE DIAMETER IN. | MOUNTING HOLE* IN. | SOLID HEIGHT IN. | BULGE @ SOLID HT. IN. | RATED ENERGY CAPACITY FT-LBS | PEAK DYNAMIC FORCE LBS. |
| TCB-1B | 3.12+/-0.09 | 2.43+/-0.09 | 2.50+/-0.09 | 1.09+/-0.03 | 2.04+/-0.03 | 0.54 | 0.69 | 3.50 | 330 | 18,000 |
| TCB-2B | 3.76+/-0.12 | 2.86+/-0.09 | 2.92+/-0.09 | 1.29+/-0.03 | 2.37+/-0.06 | 0.54 | 0.80 | 4.50 | 720 | 37,000 |
| TCB-3B | 3.72+/-0.12 | 3.28+/-0.09 | 3.34+/-0.09 | 1.45+/-0.03 | 2.70+/-0.03 | 0.54 | 0.80 | 5.00 | 1,400 | 82,000 |
| TCB-4B | 2.09+/-0.06 | 4.25+/-0.12 | N/A | 1.11+/-0.03 | 3.00+/-0.03 | 0.54 | 0.90 | 5.25 | 1,400 | 102,000 |
| TCB-5B | 2.67+/-0.09 | 3.48+/-0.09 | N/A | 1.26+/-0.03 | 2.64+/-0.03 | 0.54 | 0.75 | 4.88 | 1,200 | 112,000 |
| TCB-6B | 3.32+/-0.09 | 3.94+/-0.12 | N/A | 1.72+/-0.03 | 3.62+/-0.05 | 0.54 | 1.00 | 5.88 | 1,300 | 57,000 |
| TCB-7B | 2.25+/-0.06 | 3.45+/-0.09 | N/A | 1.46+/-0.03 | 3.09+/-0.06 | 0.54 | 0.67 | 5.25 | 890 | 71,000 |
| TCB-8B | 3.85+/-0.12 | 4.17+/-0.12 | N/A | 1.60+/-0.03 | 3.24+/-0.05 | 0.80 | 1.38 | 5.50 | 1,450 | 50,000 |
| TCB-9B | 4.40+/-0.12 | 5.62+/-0.18 | 5.87+/-0.18 | 1.55+/-0.06 | 3.90+/-0.05 | 0.80 | 2.00 | 7.50 | 6,140 | 185,000 |
| TCB-10B | 4.18+/-0.12 | 5.35+/-0.18 | N/A | 1.69+/-0.03 | 4.16+/-0.05 | 0.80 | 1.63 | 7.00 | 3,130 | 112,000 |
| TCB-11B | 5.08+/-0.18 | 4.56+/-0.12 | N/A | 1.69+/-0.03 | 3.95+/-0.05 | 0.80 | 1.25 | 7.38 | 2,730 | 110,000 |
| TCB-12B | 7.31+/-0.18 | 5.50+/-0.18 | 5.50+/-0.18 | 2.52+/-0.03 | 4.62+/-0.06 | 0.80 | 1.63 | 8.44 | 5,375 | 160,000 |
| TCB-13B | 4.50+/-0.12 | 5.40+/-0.18 | N/A | 1.66+/-0.03 | 4.44+/-0.06 | 0.80 | 1.00 | 8.50 | 4,675 | 205,000 |
| TCB-14B | 6.54+/-0.18 | 6.60+/-0.18 | N/A | 2.78+/-0.03 | 5.77+/-0.06 | 0.80 | 1.65 | 10.25 | 7,440 | 220,000 |
| TCB-15B | 8.80+/-0.18 | 6.00+/-0.18 | 6.00+/-0.18 | 2.88+/-0.03 | 5.20+/-0.06 | 0.80 | 1.88 | 9.50 | 5,350 | 135,000 |
| TCB-16B | 9.50+/-0.18 | 5.84+/-0.18 | 5.88+/-0.18 | 2.90+/-0.03 | 5.19+/-0.09 | 0.80 | 2.50 | 8.81 | 6,530 | 126,000 |
| TCB-17B | 9.92+/-0.18 | 6.97+/-0.18 | 7.00+/-0.18 | 3.36+/-0.04 | 5.95+/-0.06 | 0.80 | 2.13 | 11.00 | 9,375 | 192,000 |

*Mounting hole dimensions are nominal values and provide clearance for the recommended mounting hardware.

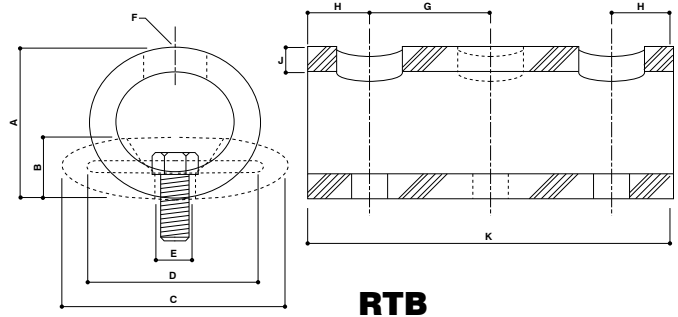
RADIAL TUBE BUMPERS FOR LOW END-LOAD APPLICATIONS

DESIGN AND CONSTRUCTION

Designed for low end-load applications (1,500 to 63,000 lbs. uniformly loaded) the radial tube bumpers are oval in shape and made from TecPak®, a Miner patented elastomer. The standard durometer for all stock bumpers is 40D, with other durometers available. Actual end-load capacities vary with the length and tube size.

TYPICAL APPLICATIONS

Any application involving shock or collision protection along a straight line is suitable for using TecPak® Radial Tube Bumpers. Possibilities include boom-dipper bumpers for construction and mining shovels, dump body/chassis pads for haulage trucks, dock and rack bumpers for warehouse, bumpers and rub strips for material handling equipment, and bumpers for push trucks.



| BUMPER | DIMENSIONAL INFORMATION | | | | | | | PERFORMANCE DATA | | | | |
|---------|-------------------------|------------|---------------|----------------|-------------------------|--------------|-------------------|------------------|-----------------------|-----------|-----------------------|--------------------|
| | FREE HEIGHT | FREE BULGE | MOUNTING HOLE | WRENCH OPENING | HOLE LOCATION FROM EDGE | SOLID HEIGHT | BULGE @ SOLID HT. | OVERALL LENGTH | NO. OF MOUNTING HOLES | END LOADS | RATED ENERGY CAPACITY | PEAK DYNAMIC FORCE |
| | IN. | IN. | IN. | IN. | IN. | IN. | IN. | IN. | | LBS. | IN-LBS | LBS. |
| RTB-140 | 2.32 | 2.58 | 13/32 | 15/16 | 1.0 | 0.78 | 3.44 | 6 | 2 | 1,500 | 900 | 1,700 |
| | | | | | | | | 12 | 2 | 3,000 | 1,800 | 3,400 |
| | | | | | | | | 18 | 2 | 4,500 | 2,700 | 5,100 |
| | | | | | | | | 24 | 2 | 6,000 | 3,600 | 6,800 |
| | | | | | | | | 30 | 3 | 7,500 | 4,500 | 8,500 |
| RTB-240 | 2.67 | 2.98 | 13/32 | 15/16 | 1.0 | 0.90 | 3.94 | 6 | 2 | 1,800 | 1,300 | 2,100 |
| | | | | | | | | 12 | 2 | 3,600 | 2,600 | 4,200 |
| | | | | | | | | 18 | 2 | 5,400 | 3,900 | 6,300 |
| | | | | | | | | 24 | 2 | 7,200 | 5,200 | 8,400 |
| | | | | | | | | 30 | 3 | 9,000 | 6,500 | 10,500 |
| RTB-340 | 2.89 | 3.26 | 13/32 | 15/16 | 1.0 | 1.02 | 4.19 | 6 | 2 | 2,100 | 1,600 | 2,400 |
| | | | | | | | | 12 | 2 | 4,200 | 3,200 | 4,800 |
| | | | | | | | | 18 | 2 | 6,300 | 4,800 | 7,200 |
| | | | | | | | | 24 | 2 | 8,400 | 6,400 | 9,600 |
| | | | | | | | | 30 | 3 | 10,500 | 8,000 | 12,000 |
| RTB-440 | 3.48 | 3.90 | 13/32 | 15/16 | 1.0 | 1.14 | 5.13 | 6 | 2 | 2,900 | 2,400 | 3,700 |
| | | | | | | | | 12 | 2 | 5,800 | 4,800 | 7,400 |
| | | | | | | | | 18 | 2 | 8,700 | 7,200 | 11,100 |
| | | | | | | | | 24 | 2 | 11,600 | 9,600 | 14,800 |
| | | | | | | | | 30 | 3 | 14,500 | 12,000 | 18,500 |
| | | | | | | | | 36 | 3 | 17,400 | 14,400 | 22,200 |
| | | | | | | | | 42 | 3 | 20,300 | 16,800 | 25,900 |
| RTB-540 | 5.01 | 5.62 | 25/32 | 1 5/8 | 1.5/2.0 | 1.78 | 7.50 | 6 | 2 | 4,400 | 5,300 | 5,000 |
| | | | | | | | | 12 | 2 | 8,800 | 10,600 | 10,000 |
| | | | | | | | | 18 | 2 | 13,200 | 15,900 | 15,000 |
| | | | | | | | | 24 | 2 | 17,600 | 21,200 | 20,000 |
| | | | | | | | | 30 | 3 | 22,000 | 26,500 | 25,000 |
| | | | | | | | | 36 | 3 | 26,400 | 31,800 | 30,000 |
| | | | | | | | | 42 | 3 | 30,800 | 37,100 | 35,000 |
| RTB-640 | 6.49 | 7.38 | 25/32 | 1 5/8 | 1.5/2.0 | 2.44 | 9.63 | 6 | 2 | 6,100 | 9,700 | 7,000 |
| | | | | | | | | 12 | 2 | 12,200 | 19,400 | 14,000 |
| | | | | | | | | 18 | 2 | 18,300 | 29,100 | 21,000 |
| | | | | | | | | 24 | 2 | 24,400 | 38,800 | 28,000 |
| | | | | | | | | 30 | 3 | 30,500 | 48,500 | 35,000 |
| | | | | | | | | 36 | 3 | 36,600 | 58,200 | 42,000 |
| | | | | | | | | 42 | 3 | 42,700 | 67,900 | 49,000 |

SUCKER ROD CUSHIONS



SRC-5-32

Peak Polished Rod
Load not to exceed 15,000 lbs.

Total Height **6.5"**
Width **6.75"**
Weight **25 lbs.**

SRC-5-30

Peak Polished Rod
Load not to exceed 44,000 lbs.

Total Height **13.625"**
Width **6.75"**
Weight **38 lbs.**

SRC-5-31

Peak Polished Rod
Load not to exceed 20,000 lbs.

Total Height **9.5"**
Width **6.75"**
Weight **29 lbs.**

SRC-5-33

Peak Polished Rod
Load not to exceed 9,000 lbs.

Total Height **6.5"**
Width **5.5"**
Weight **18 lbs.**

- Easy Installation and Maintenance Free
- Reduces Electrical Usage
- Increases Pump Output
- Reduces Pump Downtime by Reducing Rod String Breakage
- Reduces Stress on Bearing and Gears in the Pumping Unit
- Reduces Amperage Spikes when the Counter Balance Changes Velocity
- Increases Production

SPECIFICATIONS

USEFUL FORMULAS

Straight Rod String

$$PPRL = 1.2 \times W_F + 1.2 \times (F \times W_R)$$

Tapered Rod String

$$PPRL = 1.2 \times W_F + 1.2 \times (W_{R1} + W_{R2} + \text{etc.})$$

Minimum Polished Rod Load

$$MPRL = W_R (1.87 - F)$$

PPRL: Peak polished rod load in pound

MPRL: Minimum polished rod load in pounds

W_F : Weight of fluid in pounds (weight per foot on plunger x depth) see table 1

W_{R1} : Weight of rods in first rod section in pounds

W_{R2} : Weight of rods in second rod section in pounds

F: Impulse factor ($F = 1 + (S \times SPM^2 / 70,500)$) see table 3

S: Stroke length

| ROD SIZE | LBS/1000 FT |
|----------|-------------|
| 5/8" | 1150 |
| 3/4" | 1650 |
| 7/8" | 2200 |
| 1" | 2850 |
| 1-1/8" | 3650 |

| | | STROKES/MINUTE | | | | | | | | |
|------------------------|------|----------------|------|------|------|------|------|------|------|------|
| | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
| STROKE LENGTH (INCHES) | 24 | 1.01 | 1.02 | 1.03 | 1.05 | 1.07 | 1.09 | 1.11 | 1.14 | 1.16 |
| | 28 | 1.01 | 1.02 | 1.04 | 1.06 | 1.08 | 1.10 | 1.13 | 1.16 | 1.19 |
| | 32 | 1.02 | 1.02 | 1.05 | 1.07 | 1.09 | 1.12 | 1.15 | 1.18 | 1.22 |
| | 36 | 1.02 | 1.03 | 1.05 | 1.07 | 1.10 | 1.13 | 1.17 | 1.20 | 1.25 |
| | 40 | 1.02 | 1.04 | 1.06 | 1.08 | 1.11 | 1.15 | 1.17 | 1.23 | 1.27 |
| | 44 | 1.02 | 1.04 | 1.06 | 1.09 | 1.12 | 1.16 | 1.20 | 1.25 | 1.30 |
| | 48 | 1.02 | 1.04 | 1.07 | 1.10 | 1.13 | 1.17 | 1.22 | 1.27 | 1.33 |
| | 52 | 1.03 | 1.05 | 1.07 | 1.11 | 1.14 | 1.19 | 1.24 | 1.30 | 1.36 |
| | 56 | 1.03 | 1.05 | 1.08 | 1.11 | 1.16 | 1.20 | 1.26 | 1.32 | 1.38 |
| | 60 | 1.03 | 1.05 | 1.09 | 1.12 | 1.17 | 1.22 | 1.27 | 1.34 | 1.41 |
| | 64 | 1.03 | 1.06 | 1.09 | 1.13 | 1.18 | 1.23 | 1.29 | 1.36 | 1.44 |
| | 70 | 1.04 | 1.06 | 1.10 | 1.14 | 1.19 | 1.25 | 1.32 | 1.40 | -- |
| | 74 | 1.04 | 1.07 | 1.10 | 1.15 | 1.21 | 1.27 | 1.34 | 1.42 | -- |
| | 78 | 1.04 | 1.07 | 1.11 | 1.16 | 1.22 | 1.28 | 1.36 | -- | -- |
| | 86 | 1.04 | 1.08 | 1.12 | 1.18 | 1.24 | 1.31 | 1.40 | -- | -- |
| 100 | 1.05 | 1.09 | 1.14 | 1.20 | 1.27 | 1.36 | -- | -- | -- | |
| 106 | 1.05 | 1.10 | 1.15 | 1.22 | 1.30 | 1.38 | -- | -- | -- | |
| 120 | 1.06 | 1.11 | 1.17 | 1.25 | 1.33 | -- | -- | -- | -- | |
| 144 | 1.07 | 1.12 | 1.20 | 1.29 | 1.40 | -- | -- | -- | -- | |

| PLUNGER SIZE | WT. OF FLUID/FT ON PLUNGER |
|--------------|----------------------------|
| 3/4" | .191#/FT |
| 7/8" | .260#/FT |
| 1" | .340#/FT |
| 1-1/8" | .383#/FT |
| 1-1/4" | .531#/FT |
| 1-1/2" | .765#/FT |
| 1-5/8" | .900#/FT |
| 1-3/4" | 1.040#/FT |
| 2" | 1.360#/FT |
| 2-1/8" | 1.535#/FT |
| 2-1/4" | 1.720#/FT |
| 2-1/2" | 2.120#/FT |
| 2-3/4" | 2.570#/FT |
| 3-1/4" | 3.590#/FT |
| 3-3/4" | 4.780#/FT |
| 4-3/4" | 7.690#/FT |

CUSTOM DESIGN OPTIONS

Besides a standard line of Radial Tube Bumpers, Miner's engineering staff can develop special designs for any custom application. Variations can range from simple color changes to special durometer or sizes. Contact your Miner sales representative for more information.





1200 East State Street Geneva, IL 60134
p: 630-232-3000 f: 630-232-3172
www.minerelastomer.com