



TUBUS Bumpers

***Elastomer Products for Energy Control
Outperform Rubber, Urethane and Coiled Steel***



ACE Controls Inc.

*World leader in deceleration technology
ISO 9001 Certified*

03/02

Absorbs More Energy

TUBUS Series high performance elastomer bumpers from ACE Controls are highly engineered products that **absorb more energy per unit of weight and volume than many known materials**. In various applications, these dependable bumpers **significantly outperform rubber, urethane and coiled steel**. TUBUS Series bumpers consistently solve energy absorption problems where other materials have failed or simply don't exist.

These durable bumpers solve difficult energy management problems in applications involving shock isolation, vibration isolation and return springs. TUBUS Series bumpers from ACE are reshaping performance standards in cost-effective energy absorption, durability, resilience and application flexibility.

TUBUS Series bumpers are **comprised of a thermal plastic co-polyester material that is excellent in resisting oil, grease, chemicals, salt water, ultra-violet light and microorganisms**. They do not absorb water and will not swell.

The secret is in both the shape and in the proprietary manufacturing process. **Each TUBUS Series bumper is specifically processed to a precise shape to meet the required load rates**.

The result is a highly tailored, highly engineered product that adds performance and value to each application.

Proven Endurance and Resilience

The success of the proven elastomer bumper is demonstrated by the following information:

- ◆ **Thousands of hours in mine trucks without failure**
- ◆ **Many years in rail car impact devices without failure**
- ◆ **Millions of cycles at maximum deflection without failure on step machines for the fitness industry**
- ◆ **More than 10 years in forklift truck masts without failure**
- ◆ **Millions of parts in automobiles without failure**

Proven TUBUS Series bumpers are ideally **suited for applications in the electric drive, heavy corrosive and crane bumper markets** as well as numerous others.

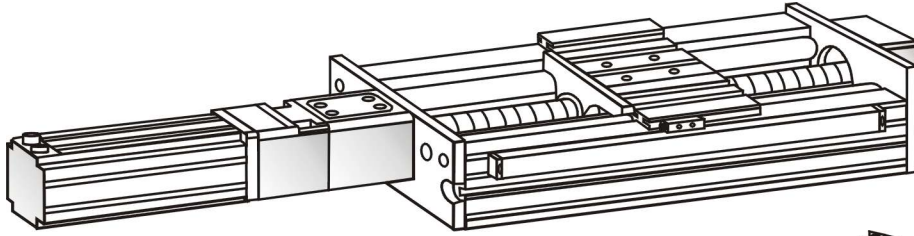
TUBUS Series bumpers from ACE Controls are the lightweight, ultra-strong, exceedingly durable and economical product solution for your bumper application needs.

Advantages

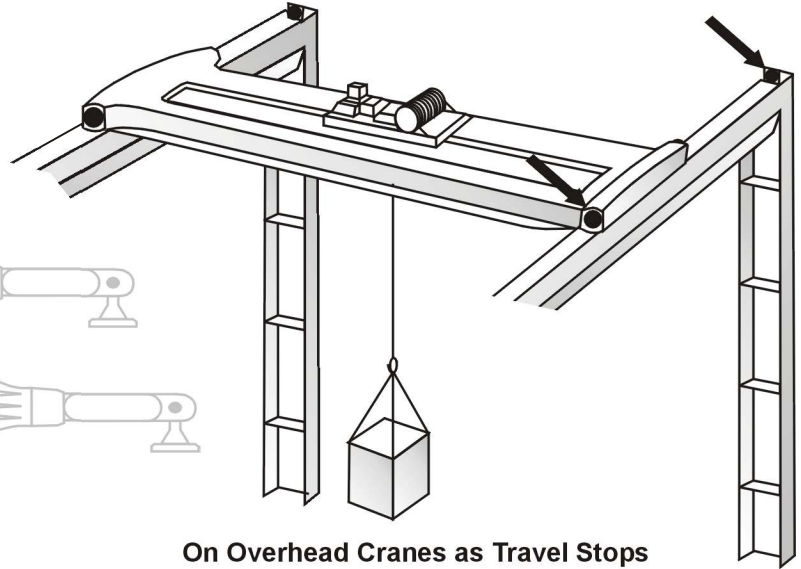
Cost-effective
Space saving design
Low weight
Long life expectancy
Easily adaptable to existing systems
Unaffected by oil, grease, chemicals, salt spray, ozone, sunlight, hydraulic fluids or fuels
Maintenance free
Wide service temperature range

TUBUS Bumpers Durability

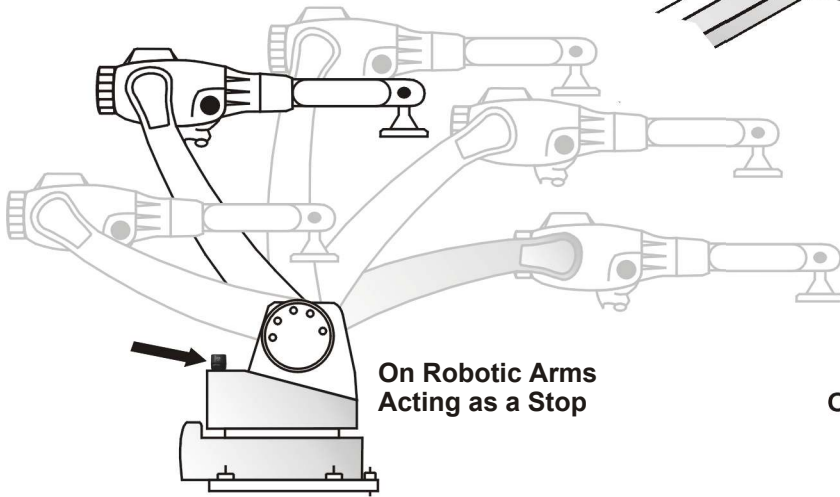
5 times longer life expectancy than coiled steel
10 times greater than rubber
20 times greater than urethane



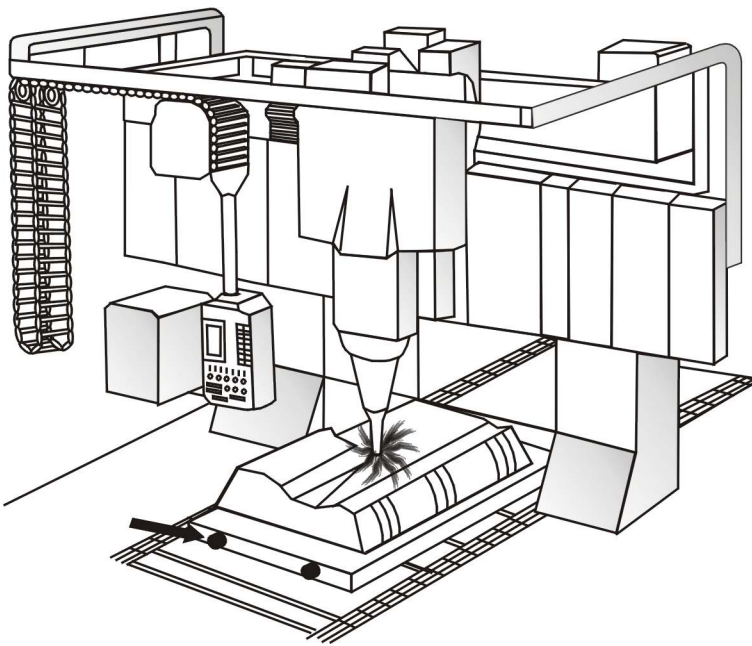
On Electric Drive Units



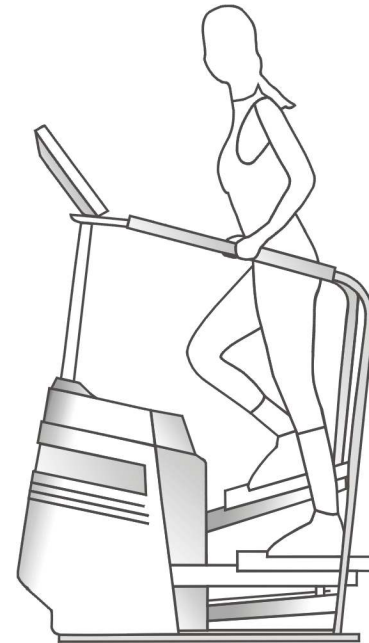
On Overhead Cranes as Travel Stops



On Robotic Arms Acting as a Stop



On Machining Centers as Dampening Elements



As System Cushion Units on Fitness Industry Equipment

Additional Selected Application Areas Include:

On equipment in heavy corrosive environments
Mining equipment

Jounce stops
Rebound bumpers and stops
Sawmill equipment

Steel mill equipment
Paper mill equipment
Oil well heads



TUBUS TA-Series elastomer bumpers are designed to provide the maximum amount of energy absorption in the minimum amount of space. These dependable units are available in numerous model sizes to handle your energy control needs. **TUBUS bumpers from ACE Controls, in various applications, outperform rubber, urethane and coiled steel.**

Technical Data

Service temperature: -30° to 150°F (-34° to 65°C)

Energy absorption: 40 to 66%

Energy capacity: 100 to 17,000 in-lbs (11 to 1,921 Nm)

Peak dynamic force: 700 to 18,000 lbs (3,114 to 82,288 N)

Elastomer material: excellent resistance to chemicals, salt water, ultra-violet light and microorganisms. Does not absorb water and will not swell.

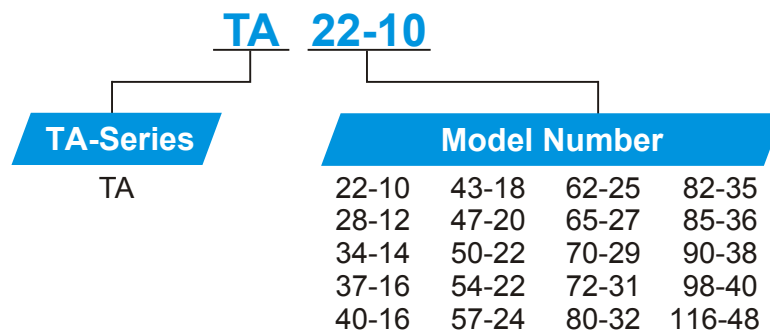
TUBUS TA-Series Bumpers



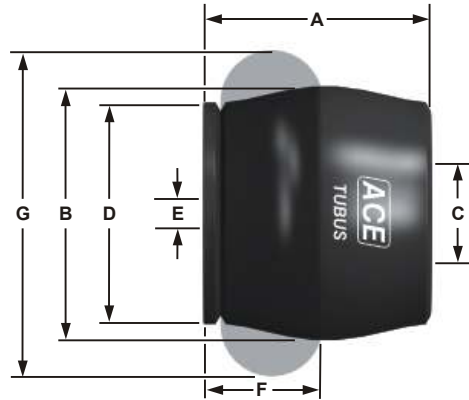
Socket Head Cap Screw

Model	Mounting Torque
TA 22-10	
TA 28-12	1/4-20 socket head cap screw
TA 34-14	Torque: 5 ft-lbs (7 Nm)
TA 37-16	
TA 40-16	3/8-16 socket head cap screw
TA 43-18	Torque: 12 ft-lbs (16 Nm)
TA 47-20	
TA 50-22	
TA 54-22	1/2-13 socket head cap screw
TA 57-24	Torque: 28 ft-lbs (38 Nm)
TA 62-25	
TA 65-27	
TA 70-29	
TA 72-31	
TA 80-32	
TA 82-35	3/4-10 socket head cap screw
TA 85-36	Torque: 75 ft-lbs (102 Nm)
TA 90-38	
TA 98-40	
TA 116-48	

Ordering Information



Specifications and Dimensions



Model	E3 Energy Capacity in-lbs (Nm)	Peak Dynamic Force lbs (N)	A Free Height in (mm)	B Free Bulge Diameter in (mm)	C Wrench Opening in (mm)	D Base Diameter in (mm)	E Mounting Hole in (mm)	F Solid Height in (mm)	G Bulge at Solid Height in (mm)	Shipping Weight oz (g)
TA 22-10	100 (11)	700 (3,114)	0.76 (19)	0.85 (22)	0.41 (10)	0.75 (19)	0.31 (8)	0.40 (10)	1.07 (27)	0.16 (5)
TA 28-12	250 (28)	1,200 (5,334)	1.01 (26)	1.11 (28)	0.56 (14)	0.98 (25)	0.31 (8)	0.53 (14)	1.43 (36)	0.37 (11)
TA 34-14	400 (45)	2,000 (8,896)	1.18 (30)	1.35 (34)	0.66 (17)	1.16 (30)	0.31 (8)	0.63 (16)	1.70 (43)	0.62 (18)
TA 37-16	550 (62)	2,400 (10,675)	1.31 (33)	1.47 (37)	0.72 (18)	1.28 (32)	0.31 (8)	0.69 (17)	1.88 (48)	0.86 (24)
TA 40-16	700 (79)	2,500 (11,120)	1.37 (35)	1.55 (39)	0.80 (20)	1.35 (34)	0.42 (11)	0.73 (18)	2.00 (50)	1.00 (28)
TA 43-18	900 (102)	3,600 (16,013)	1.49 (38)	1.70 (43)	0.79 (20)	1.48 (38)	0.42 (11)	0.79 (20)	2.15 (55)	1.40 (40)
TA 47-20	1,100 (124)	3,300 (14,678)	1.62 (41)	1.83 (47)	0.93 (24)	1.61 (41)	0.55 (14)	0.86 (22)	2.33 (59)	1.70 (48)
TA 50-22	1,400 (158)	3,800 (16,902)	1.77 (45)	1.96 (50)	1.02 (26)	1.71 (43)	0.55 (14)	0.92 (23)	2.51 (64)	2.00 (57)
TA 54-22	1,700 (192)	5,000 (22,240)	1.86 (47)	2.08 (54)	1.02 (26)	1.84 (47)	0.55 (14)	0.99 (25)	2.69 (68)	2.20 (62)
TA 57-24	2,000 (226)	5,000 (22,240)	2.02 (51)	2.25 (57)	1.16 (30)	1.97 (50)	0.55 (14)	1.06 (27)	2.86 (73)	3.10 (88)
TA 62-25	2,500 (283)	5,300 (23,574)	2.11 (54)	2.43 (62)	1.23 (31)	2.08 (53)	0.55 (14)	1.12 (28)	3.05 (78)	3.70 (105)
TA 65-27	3,000 (1,339)	6,100 (27,133)	2.26 (57)	2.54 (65)	1.30 (33)	2.23 (57)	0.55 (14)	1.19 (30)	3.22 (82)	4.60 (130)
TA 70-29	3,500 (396)	6,600 (29,357)	2.38 (61)	2.70 (69)	1.38 (35)	2.35 (60)	0.56 (14)	1.25 (32)	3.40 (86)	5.10 (145)
TA 72-31	4,000 (452)	7,500 (33,360)	2.54 (65)	2.81 (71)	1.41 (36)	2.46 (63)	0.80 (21)	1.32 (33)	3.58 (91)	6.10 (171)
TA 80-32	5,000 (565)	8,300 (36,918)	2.72 (69)	3.10 (79)	1.57 (40)	2.71 (69)	0.79 (20)	1.45 (37)	3.94 (100)	7.80 (221)
TA 80-35	6,000 (678)	8,700 (38,698)	2.91 (74)	3.22 (82)	1.69 (43)	2.82 (72)	0.81 (21)	1.52 (39)	4.12 (105)	9.10 (258)
TA 85-36	7,000 (791)	9,600 (42,701)	3.00 (76)	3.35 (85)	1.70 (43)	2.95 (75)	0.79 (20)	1.58 (40)	4.30 (109)	10.60 (301)
TA 90-38	8,000 (904)	10,800 (48,038)	3.13 (80)	3.50 (89)	1.75 (45)	3.07 (78)	0.81 (21)	1.65 (42)	4.48 (114)	11.80 (335)
TA 98-40	10,000 (1,130)	14,000 (62,272)	3.37 (86)	3.83 (97)	1.92 (49)	3.34 (85)	0.80 (21)	1.78 (45)	4.83 (123)	14.90 (422)
TA 116-48	17,000 (1,921)	18,000 (82,288)	3.98 (101)	4.56 (116)	2.26 (57)	3.93 (100)	0.80 (21)	2.11 (54)	5.73 (146)	26.10 (740)



TUBUS TS-Series elastomer bumpers are designed for applications where the energy absorption need not be maximized for the space available. This results in a significantly lower end load with only slightly longer stroke. These durable bumpers from ACE Controls can be easily mounted to horizontal or vertical surfaces with a single socket head cap screw.

Technical Data

Service temperature: -30° to 150°F (-34° to 65°C)

Energy absorption: 26 to 56%

Energy capacity: 50 to 8,000 in-bs (6 to 904 Nm)

Peak dynamic force: 300 to 5,500 lbs (1,334 to 24,464 N)

Elastomer material: excellent resistance to chemicals, salt water, ultra-violet light and microorganisms. Does not absorb water and will not swell.

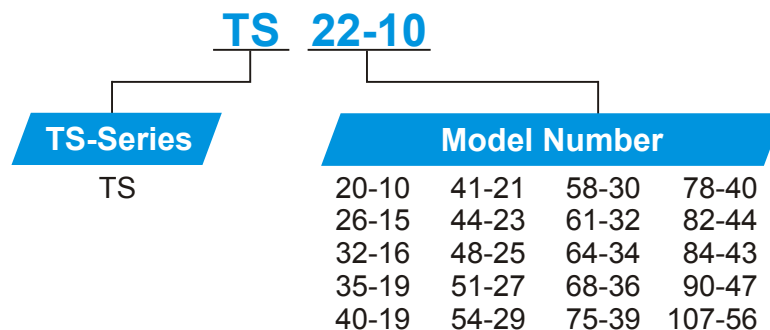
TUBUS TS-Series Bumpers



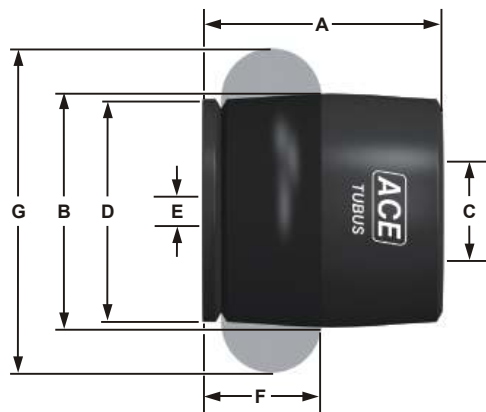
Socket Head Cap Screw

Model	Mounting Torque
TS 20-10	
TS 26-15	
TS 32-16	1/4-20 socket head cap screw
TS 35-19	Torque: 5 ft-lbs (7 Nm)
TS 40-19	
TS 41-21	
TS 44-23	
TS 48-25	1/2-13 socket head cap screw
TS 51-27	Torque: 28 ft-lbs (38 Nm)
TS 54-29	
TS 58-30	
TS 61-32	
TS 64-34	
TS 68-36	
TS 75-39	
TS 78-40	3/4-10 socket head cap screw
TS 82-44	Torque: 75 ft-lbs (102 Nm)
TS 84-43	
TS 90-47	
TS 107-56	

Ordering Information



Specifications and Dimensions



Model	E3 Energy Capacity in-lbs (Nm)	Peak Dynamic Force lbs (N)	A Free Height in (mm)	B Free Bulge Diameter in (mm)	C Wrench Opening in (mm)	D Base Diameter in (mm)	E Mounting Hole in (mm)	F Solid Height in (mm)	G Bulge at Solid Height in (mm)	Shipping Weight oz (g)
TS 20-10	50 (6)	300 (1,334)	0.81 (21)	0.79 (20)	0.48 (12)	0.73 (18)	0.31 (8)	0.40 (10)	1.08 (27)	0.14 (4)
TS 26-15	100 (11)	400 (1,779)	1.09 (28)	1.02 (26)	0.63 (16)	0.98 (25)	0.31 (8)	0.53 (13)	1.45 (37)	0.32 (9)
TS 32-16	200 (23)	600 (2,669)	1.27 (32)	1.24 (31)	0.77 (20)	1.18 (30)	0.31 (8)	0.63 (16)	1.72 (44)	0.56 (16)
TS 35-19	250 (28)	700 (3,114)	1.42 (36)	1.38 (35)	0.84 (21)	1.28 (32)	0.31 (8)	0.69 (17)	1.90 (48)	0.77 (22)
TS 40-19	300 (34)	900 (4,003)	1.48 (38)	1.46 (37)	0.82 (21)	1.35 (34)	0.31 (8)	0.73 (18)	1.99 (50)	1.00 (28)
TS 41-21	400 (45)	1,100 (4,893)	1.63 (41)	1.60 (41)	0.93 (24)	1.48 (38)	0.56 (14)	0.79 (20)	2.17 (55)	1.30 (37)
TS 44-23	550 (62)	1,300 (5,782)	1.75 (45)	1.68 (44)	0.98 (25)	1.58 (40)	0.56 (14)	0.86 (22)	2.35 (60)	1.50 (42)
TS 48-25	700 (79)	1,600 (7,119)	1.91 (48)	1.88 (48)	1.09 (28)	1.73 (44)	0.56 (14)	0.92 (23)	2.53 (64)	2.10 (59)
TS 51-27	800 (90)	1,900 (8,451)	2.03 (52)	1.99 (50)	1.12 (28)	1.85 (47)	0.56 (14)	0.99 (25)	2.71 (69)	2.50 (71)
TS 54-29	1,000 (113)	2,000 (8,896)	2.18 (55)	2.11 (54)	1.21 (31)	1.97 (50)	0.55 (14)	1.06 (27)	2.89 (73)	2.80 (79)
TS 58-30	1,200 (136)	2,200 (9,786)	2.33 (59)	2.28 (58)	1.30 (33)	2.09 (53)	0.55 (14)	1.12 (28)	3.07 (78)	3.50 (99)
TS 61-32	1,400 (158)	2,600 (11,565)	2.45 (62)	2.40 (61)	1.39 (35)	2.21 (56)	0.81 (21)	1.19 (30)	3.25 (83)	4.20 (119)
TS 64-34	1,700 (192)	3,000 (13,344)	2.58 (65)	2.53 (64)	1.46 (37)	2.33 (59)	0.81 (21)	1.25 (32)	3.43 (87)	5.00 (142)
TS 68-36	2,000 (226)	3,500 (15,568)	2.71 (69)	2.67 (68)	1.51 (38)	2.47 (63)	0.77 (21)	1.32 (33)	3.61 (92)	5.70 (162)
TS 75-39	2,500 (282)	3,500 (15,568)	2.96 (75)	2.94 (75)	1.70 (43)	2.71 (69)	0.80 (20)	1.45 (37)	3.97 (101)	7.40 (210)
TS 78-40	3,000 (339)	3,700 (16,458)	3.11 (79)	3.05 (77)	1.82 (46)	2.82 (72)	0.81 (21)	1.52 (39)	4.15 (105)	8.50 (241)
TS 82-44	3,500 (395)	4,300 (19,126)	3.31 (84)	3.24 (82)	1.88 (48)	2.95 (75)	0.80 (21)	1.58 (40)	4.33 (110)	9.60 (272)
TS 84-43	4,000 (452)	4,400 (19,571)	3.36 (85)	3.29 (84)	1.97 (50)	3.07 (78)	0.80 (21)	1.65 (42)	4.52 (115)	10.60 (300)
TS 90-47	5,000 (565)	5,300 (23,574)	3.62 (92)	3.55 (90)	2.14 (54)	3.32 (84)	0.80 (21)	1.78 (45)	4.88 (124)	13.80 (391)
TS 107-56	8,000 (904)	5,500 (24,464)	4.31 (109)	4.22 (107)	2.56 (65)	3.95 (100)	0.80 (21)	2.11 (54)	5.78 (147)	21.60 (612)



TUBUS TR-Series elastomer bumpers are designed for applications where a long, soft energy absorption is required. This equates to the minimum end load with the maximum stroke. These proven TUBUS bumpers from ACE Controls can be easily mounted to horizontal or vertical surfaces with a single socket head cap screw.

Technical Data

Service temperature: -30° to 150°F (-34° to 65°C)

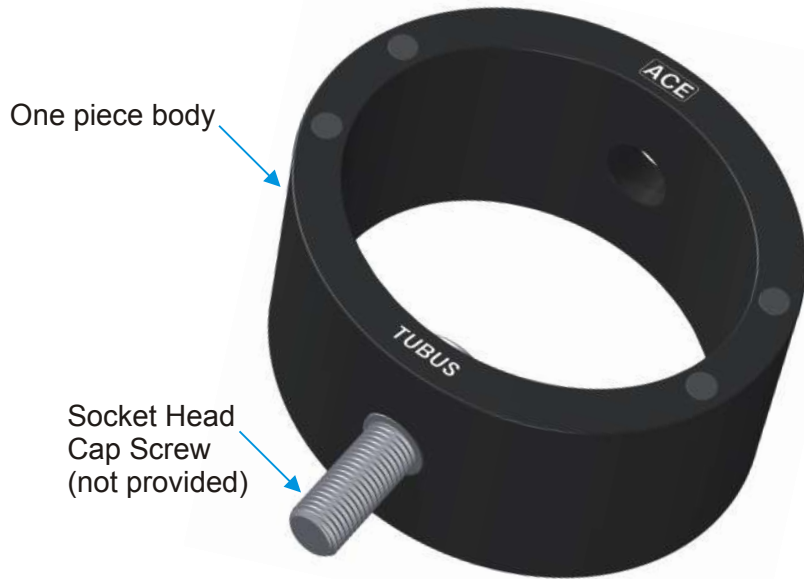
Energy absorption: 17 to 35%

Energy capacity: 10 to 1,000 in-lbs (1 to 113 Nm)

Peak dynamic force: 75 to 1,400 lbs (334 to 6,227 N)

Elastomer material: excellent resistance to chemicals, salt water, ultra-violet light and microorganisms. Does not absorb water and will not swell.

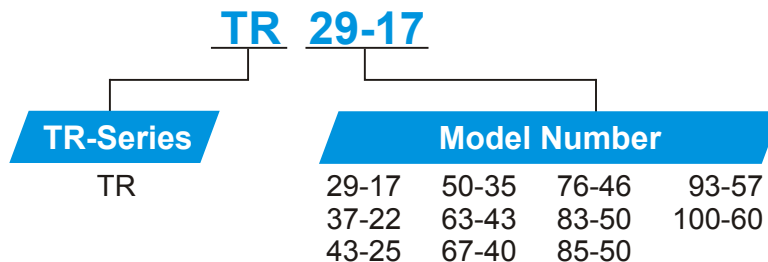
TUBUS TR-Series Bumpers



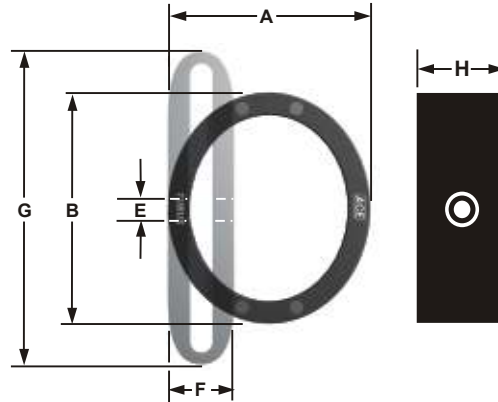
Socket Head Cap Screw

Model	Mounting Torque
TR 29-17	
TR 37-22	
TR 43-25	#10-24 socket head cap screw
TR 50-35	Torque: 1.6 ft-lbs (2 Nm)
TR 63-43	
TR 67-40	
TR 76-46	1/4-20 socket head cap screw
TR 83-50	Torque: 5 ft-lbs (7 Nm)
TR 85-50	3/8-16 socket head cap screw
TR 93-57	Torque: 12 ft-lbs (16 Nm)
TR 100-60	

Ordering Information



Specifications and Dimensions



Model	E3 Energy Capacity in-lbs (Nm)	Peak Dynamic Force lbs (N)	A Free Height in (mm)	B Free Bulge Diameter in (mm)	E Mounting Hole in (mm)	F Solid Height in (mm)	G Bulge at solid Height in (mm)	H Width	Shipping Weight oz (g)
TR 29-17	10 (1)	75 (334)	0.97 (25)	1.12 (28)	0.22 (6)	0.32 (8)	1.51 (38)	0.52 (13)	0.24 (7)
TR 37-22	20 (2)	100 (445)	1.25 (32)	1.44 (37)	0.22 (6)	0.41 (10)	1.96 (50)	0.76 (19)	0.48 (14)
TR 43-25	30 (3)	150 (667)	1.47 (37)	1.67 (43)	0.21 (6)	0.48 (12)	2.27 (58)	0.79 (20)	0.60 (17)
TR 50-35	50 (6)	200 (890)	1.72 (44)	1.95 (49)	0.22 (6)	0.37 (9)	2.68 (68)	1.36 (34)	0.90 (25)
TR 63-43	100 (11)	300 (1,334)	2.17 (55)	2.48 (63)	0.22 (6)	0.47 (12)	3.43 (87)	1.70 (43)	1.80 (51)
TR 67-40	200 (23)	475 (2,113)	2.31 (59)	2.61 (66)	0.22 (6)	0.74 (19)	3.47 (88)	1.82 (46)	2.80 (79)
TR 76-46	300 (34)	600 (2,669)	2.65 (67)	3.00 (76)	0.28 (7)	0.85 (22)	4.03 (102)	1.80 (46)	3.60 (102)
TR 83-50	400 (45)	725 (3,225)	2.88 (73)	3.28 (83)	0.28 (7)	0.92 (23)	4.30 (109)	2.00 (51)	5.30 (150)
TR 85-50	600 (68)	1,000 (4,448)	2.88 (73)	3.33 (85)	0.37 (10)	0.92 (23)	4.37 (111)	2.65 (67)	6.90 (196)
TR 93-57	800 (90)	1,250 (5,560)	3.27 (83)	3.67 (93)	0.40 (10)	1.03 (26)	4.87 (124)	3.25 (83)	10.30 (292)
TR 100-60	1,000 (113)	1,400 (6,227)	3.47 (88)	3.94 (100)	0.40 (10)	1.11 (28)	5.22 (133)	3.20 (81)	11.40 (323)



TUBUS TC-Series bumpers are designed for handling crane bumper type applications. These rugged bumpers meet the minimum requirements for existing industry standards for OSHA and CMAA through the use of a unique “dual-concept” for the device’s spring rate. **They are the proven, cost-effective choice for high-load energy management systems**, and can be mounted with a single socket head cap screw.

Technical Data

Service temperature: -30° to 150°F (-34° to 65°C)

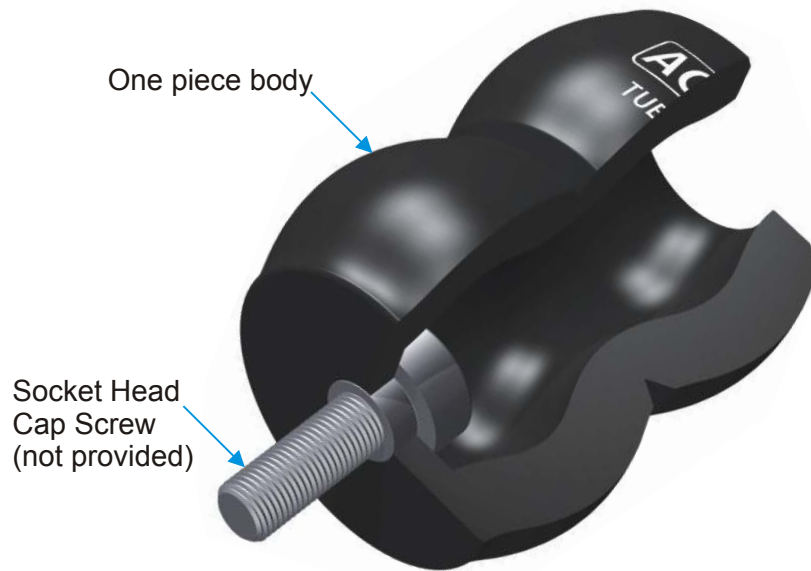
Energy absorption: 31 to 63%

Energy capacity: 330 to 9,375 ft-lbs (447 to 12,712 Nm)

Peak dynamic force: 18,000 to 220,000 lbs (80,064 to 978,560 N)

Elastomer material: excellent resistance to chemicals, salt water, ultra-violet light and microorganisms. Does not absorb water and will not swell.

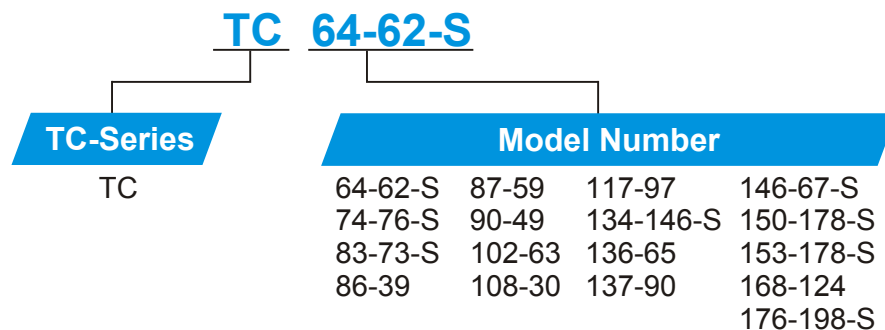
TUBUS TC-Series Bumpers



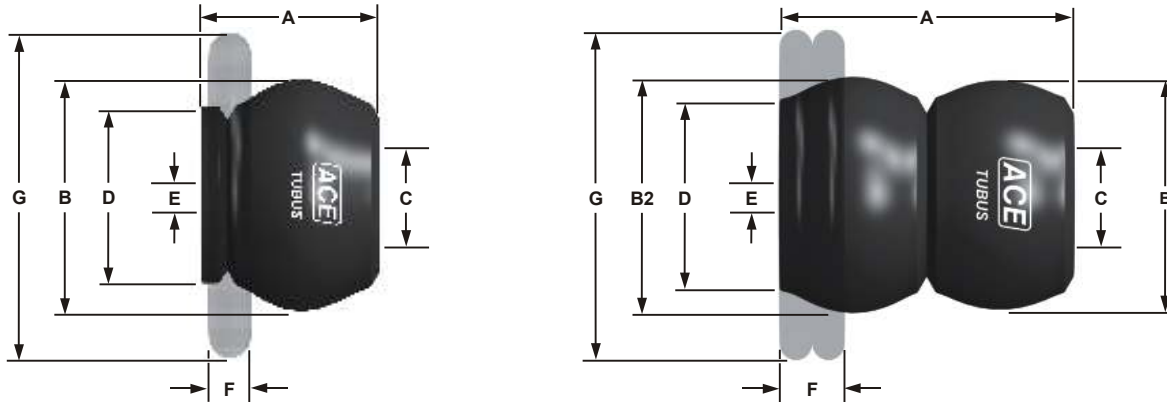
Socket Head Cap Screw

Model	Mounting Torque
TC 64-62-S	1/2-13 socket head cap screw Torque: 60 ft-lbs (81 Nm)
TC 74-76-S	
TC 83-73-S	
TC 86-39	
TC 87-59	
TC 90-49	
TC 108-30	3/4-10 socket head cap screw Torque: 200 ft-lbs (271 Nm)
TC 102-63	
TC 117-97	
TC 134-146-S	
TC 136-65	
TC 137-90	
TC 146-67-S	
TC 150-178-S	
TC 153-178-S	
TC 168-124	
TC 176-198-S	

Ordering Information



Specifications and Dimensions



Model	E3 Energy Capacity ft-lbs (Nm)	Peak Dynamic Force lbs (N)	A Free Height in (mm)	B Top/Free Bulge Diameter in (mm)	B2 Lower Bulge Diameter in (mm)	C Wrench Opening in (mm)	D Base Diameter in (mm)	E Mounting Hole in (mm)	F Solid Height in (mm)	G Bulge at Solid Height in (mm)
TC 64-62-S	330 (447)	18,000 (80,064)	3.12 (79)	2.43 (62)	2.50 (63)	1.09 (28)	2.04 (52)	0.54 (14)	0.69 (17)	3.50 (89)
TC 74-76-S	720 (976)	37,000 (164,576)	3.76 (96)	2.86 (73)	2.92 (74)	1.29 (33)	2.37 (61)	0.54 (14)	0.80 (20)	4.50 (114)
TC 83-73-S	1,400 (1,898)	82,000 (364,736)	3.72 (93)	3.28 (83)	3.34 (83)	1.45 (37)	2.70 (69)	0.54 (14)	0.80 (20)	5.00 (127)
TC 86-39	890 (1,207)	71,000 (315,808)	2.25 (56)	3.45 (86)	N/A	1.46 (37)	3.09 (78)	0.54 (14)	0.67 (17)	5.25 (133)
TC 87-59	1,300 (147)	57,000 (253,536)	3.32 (84)	3.94 (100)	N/A	1.72 (44)	3.62 (91)	0.54 (14)	1.00 (25)	5.88 (149)
TC 90-49	1,200 (1,627)	112,000 (498,176)	2.67 (68)	3.48 (88)	N/A	1.26 (32)	2.64 (67)	0.54 (14)	0.75 (19)	4.88 (124)
TC 102-63	1,450 (1,966)	50,000 (222,400)	3.85 (98)	4.00 (102)	N/A	1.60 (41)	3.24 (82)	0.80 (20)	1.38 (35)	5.50 (140)
TC 108-30	1,400 (1,898)	102,000 (453,696)	2.09 (53)	4.25 (108)	N/A	1.11 (28)	3.00 (77)	0.55 (14)	0.90 (23)	5.25 (133)
TC 117-97	2,730 (3,702)	110,000 (489,280)	5.08 (129)	4.56 (117)	N/A	1.69 (44)	3.96 (100)	0.80 (20)	1.25 (32)	7.38 (187)
TC 134-146-S	5,375 (7,288)	160,000 (711,680)	7.31 (187)	5.50 (134)	5.50 (134)	2.52 (64)	4.62 (117)	0.80 (20)	1.63 (41)	8.44 (214)
TC 136-65	3,130 (4,244)	112,000 (498,176)	4.18 (106)	5.35 (136)	N/A	1.69 (44)	4.16 (106)	0.80 (20)	1.63 (41)	7.00 (178)
TC 137-90	4,675 (6,339)	205,000 (911,840)	4.50 (115)	5.40 (137)	N/A	1.66 (43)	4.44 (113)	0.80 (20)	1.00 (25)	8.50 (216)
TC 146-67-S	6,140 (8,326)	185,000 (822,880)	4.63 (118)	5.50 (140)	5.75 (146)	1.55 (44)	3.90 (99)	0.79 (20)	2.00 (51)	7.50 (190)
TC 150-178-S	6,530 (8,855)	126,000 (560,448)	9.50 (241)	5.84 (148)	5.88 (149)	2.90 (74)	5.19 (132)	0.80 (20)	2.50 (63)	8.81 (224)
TC 153-178-S	5,350 (7,255)	135,000 (600,480)	8.80 (226)	6.00 (152)	6.00 (152)	2.88 (74)	5.20 (131)	0.80 (20)	1.88 (48)	9.50 (241)
TC 168-124	7,440 (10,089)	220,000 (978,560)	6.54 (166)	6.60 (168)	N/A	2.78 (72)	5.77 (147)	0.80 (20)	1.65 (42)	10.25 (260)
TC 176-198-S	9,375 (12,712)	192,000 (854,016)	9.92 (252)	6.97 (175)	7.00 (176)	3.36 (86)	5.95 (150)	0.80 (20)	2.13 (54)	11.00 (279)

Model	Shipping Weight lbs (g)	Model	Shipping Weight lbs (g)	Model	Shipping Weight lbs (g)
TC 64-62-S	0.35 (159)	TC 102-63	1.13 (512)	TC 146-67-S	3.28 (1,488)
TC 74-76-S	0.52 (236)	TC 108-30	0.78 (354)	TC 150-178-S	5.69 (2,581)
TC 83-73-S	0.62 (281)	TC 117-97	2.21 (1,002)	TC 153-178-S	5.13 (2,327)
TC 86-39	0.56 (254)	TC 134-146-S	3.44 (1,560)	TC 168-124	5.13 (2,327)
TC 87-59	1.13 (512)	TC 136-65	2.38 (1,080)	TC 176-198-S	7.94 (3,602)
TC 90-49	0.56 (254)	TC 137-90	2.38 (1,080)		

ACE TUBUS Bumpers Sizing Software

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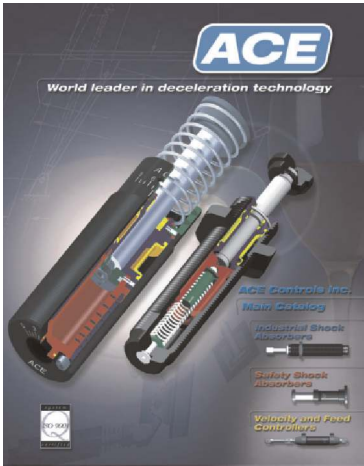


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TUBUS Bumpers sizing software from ACE Controls is available to help you select the proper bumper for your application. Contact your nearest ACE distributor or ACE Controls directly to obtain the TUBUS Bumpers CD-ROM. Distributors can be easily located on the ACE Controls web site at . . . www.acecontrols.com

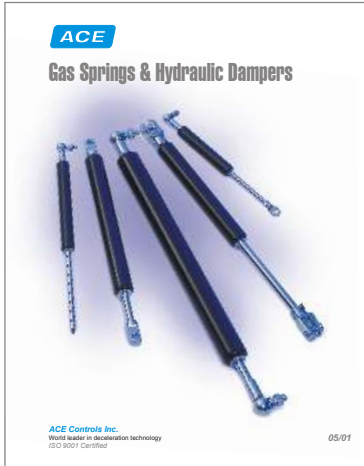
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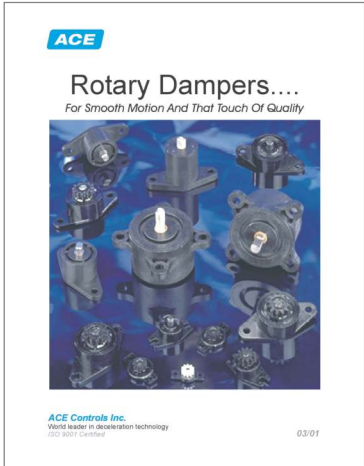
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