LOAD CALCULATIONS

The following table may be used as a short cut to approximate the required CUSHIONEER in air cylinder propelled applications:

CHOOSE YOUR CUSHIONEER FROM THIS TABLE

Maximum weight of a load that can be stopped gently by a CUSHIONEER if the load is moved at full speed by an air cylinder at 100 psi.

CUSHIONEER Model No.	2003-31-1/2	2002-31-1/2	2003-31-1	2002-31-1	2003-31-2	2002-31-2
Stroke Length	1/2 inch	1/2 inch	1 inch	1 inch	2 inch	2 inch
Description	Light Duty	Standard Duty	Light Duty	Standard Duty	Light Duty	Standard Duty
1 1/8" Bore - 1/4" Ports	14 lbs.	32 lbs.	27 lbs.	64 lbs.	55 lbs.	128 lbs.
1 1/2" Bore - 1/4" Ports	32 lbs.	88 lbs.	64 lbs.	179 lbs.	128 lbs.	358 lbs.
2" Bore - 1/4" Ports	39 lbs.	103 lbs.	78 lbs.	206 lbs.	158 lbs.	420 lbs.
2 1/2" Bore - 3/8" Ports	—–	59 lbs.	—–	118 lbs.	—–	235 lbs.
3" Bore - 3/8" Ports	—–	40 lbs.	—–	80 lbs.	—–	160 lbs.

The port sizes given for each cylinder are the pipe thread sizes that are standard today on most brands of cylinders. Since 1 1/8", 1 1/2" and 2" bore cylinders all have the same port size, the smaller 1 1/8" and 1 1/2" cylinders can push a load at a ***higher velocity*** due to their more concentrated internal volume. Therefore, the load weights usable with the smaller cylinders are less than those usable with a 2" cylinder.

Load weights given are conservative and allow for the air cylinder to continue to push the load through the entire stroke of the CUSHIONEER. A CUSHIONEER can stop a heavier load than indicated if the load is coasting free of the air cylinder push, or if the cylinder is throttled to less than full speed by undersize piping or valves, partially closed valves, or reduced air pressure.

If the above values do not apply to your situation, please refer to the proper formulas shown below, to calculate your CUSHIONEER requirements. The use of a CUSHIONEER, with a longer stroke than required, will provide a more gentle deceleration.

PROPELLED LOAD CALCULATION:

Total Energy "**E**total" to be absorbed will be equal to the impact energy **"E**impact" + "**E**force" from any actuating force that pushes on the load during the CUSHIONEERS entire stroke.

"**E**total"**=**"**E**impact"**(.0013** x **w** x **v²) +** "**E**force"**(F** x **L)**

Where:

w = weight of the load (lbs.)
v = velocity of the load (inches/sec.)
L = desired stroke of the CUSHIONEER (1/2", 1" or 2")
F = driving force (lbs.) (See table 004)

LOAD CALCULATIONS (continued)

EXAMPLE: (For Propelled Loads)

The application incorporates a 2 in. Bore air cylinder operating at 100 psig and pushing a 100 lb. load at 30 inches/second. Assume that it is desired to use a 1 inch stroke model 2002-31-1 or 6000-31-1 CUSHIONEER to stop the load. Will it be adequate?

Air cylinder force "**F**" = Air Pressure (psig) multiplied by the Bore Area (inches)
= (100) x (.7854 x 2^2) = 100 x 3.142
= 314.2 lbs

w = 100 (lbs.)
v = 30 (inches/sec.)
L = 1 (in.)
F = 314.2 (lbs.)

Etotal = (.0013 x 100 x 30^2) + (314.2 x 1)
= 117 in. lbs. + 314.2 in. lbs. = 431.2 in. lbs.

This would fall within the 8 to 800 in. lb. Capacity of the Model 2002-31-1 Adjustable CUSHIONEER listed in table 1, page 2 of the CUSHIONEER bulletin S-64 or the 6000 –31-1 Self-Adjusting CUSHIONEER listed in table 2, page 3 of the same bulletin.

FREE FALLING LOAD CALCULATION:

Impact Energy = "**E**fall" (inch lbs.) = weight of the load in lbs. multiplied by the height or distance fallen in inches

Where:
w = weight of the load (lbs)
h = height or distance fallen (in.)

Efall = **(w** x **h)**