QA1® SPRING RATE INFORMATION

WHAT IS SPRING RATE?

Spring rate refers to the amount of weight that is needed to compress a spring one inch. If the rate of the spring is linear, its rate is not affected by the load that is put on the spring. For example, say you have a 200 lb. per inch spring - it will compress 1" when a 200 lb. load is placed onto the spring. If another 200 lbs. is put onto the spring, the spring will compress another inch. At this point the load on the spring is 400 lbs. The rate of the spring, however, remains constant at 200 lbs. per inch.

SPRING RATE CORRECTION FOR ANGLE MOUNTING

If your spring is mounted at an angle you will need to consider that in your spring calculations. Measure the angle of your spring from vertical (A) in degrees. Use the examples provided on this page or the formula below to determine your Angle Correction Factor (ACF).

ACF = COS ∠ A°

The greater the installed angle, the stiffer the spring rate must be to support the same weight. First, determine the spring needed for the application if the spring is installed straight up. Then, to compensate for installations at different angles, use the chart above.

EXAMPLE:
Straight Mounted Spring = 200 lbs.
Spring Mounted at 30° = 200/.87 = 230 lbs.

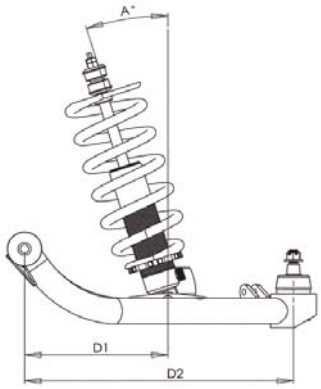
The 230 lbs. represents the spring rate needed when mounted at a 30° angle to equal the desired spring rate of 200 lbs. when standing straight up.

Shock Angle	Angle Correction Factor (ACF)
10°	.98
15°	.96
20°	.94
25°	.91
30°	.87
35°	.82
40°	.77
45°	.71

HOW TO SELECT THE SPRING RATE FOR INDEPENDENT SUSPENSIONS

Select your spring rate by using the following calculations:

D1 = The distance from the pivot point of the a-arm to the mounting point of the spring/shock.
D2 = The distance from the pivot point of the a-arm to the center of the ball joint.
Divide D1 by D2 to calculate the force ratio (Fr).
Force Ratio (Fr) = D1/D2
Weigh your car to determine the weight on the wheels (W).
Divide the weight on the wheel by Fr to determine the force required at the spring (Sf).
W/Fr=Sf



If your spring is mounted at an angle you will need to consider that in your spring calculations. Measure the angle (A) of your spring from vertical in degrees. Use the table above to determine your Angle Correction Factor (ACF). Now divide the Spring Force (Sf) from the earlier calculation by the Angle Correction Factor (ACF) to get the Adjusted Spring Force (ASf).
Sf/ACF=ASf

Note: This calculation determines spring FORCE not spring RATE.

The required Adjusted Spring Force (ASf) can now be used to select the proper spring rate for your application. The required spring rate can be obtained several different ways. A lighter rate spring with more preload or a stiffer rate spring with less preload will generate the same spring force. The softer rate will generate a smoother ride while the stiffer spring will result in a firmer ride. You need to consider these options when you are selecting the proper spring rate for your application.

Springs should typically be compressed 25-30% of the free length when supporting the weight of the vehicle. Drag race cars will normally use a lighter rate spring (about 30%) to promote weight transfer while a street car will use a firmer rate spring (about 25%).

ASf/(spring free length x 0.25) = Firmer Spring Rate
ASf/(spring free length x 0.30) = Softer Spring Rate

Spring rate calculations for solid axle suspension are the same as above except the Force Ratio (Fr) = 1.

AVERAGE STREET ROD WEIGHTS

These charts are general guidelines to determine the approximate weight of the most popular street rods. Each car is different so it is ideal to actually weigh the front and rear halves of your vehicle. Average car weights listed are with driver, automatic transmission, small block Chevrolet V-8, full upholstery and all normal street equipment (such as a spare tire and gas in the tank). Fiberglass cars weigh the same as steel. Stripped or lightened cars will weigh less. Extra passengers will add to the weight.

Average weight of your car type here:

YEAR	MODEL	FRONT	REAR
To 1927	Ford Coupe	1200	1300
1928-1931	Ford Coupe	1300	1400
1932-1934	Ford Coupe	1400	1600
1935-1938	Ford Coupe	1600	1700
1939-1940	Ford Coupe	1700	1800
1932-1938	Chev., Mopar Coupe	1500	1550
1939-1940	Chev., Mopar Coupe	1600	1600
1946-1948	Ford Coupe	1700	1750
1947-1954	Chev. Pickup	1950	1450

Adjust weight according to the following options:

OPTIONS	FRONT	REAR
Air Conditioning	+75 lbs.	+25 lbs.
Sedan (4-door)	+50 lbs.	+125 lbs.
Sedan delivery	+50 lbs.	+200 lbs.
Roadster	-50 lbs.	-50 lbs.
Less fenders	-100 lbs.	-75 lbs.
Big-block V-8	+175 lbs.	+25 lbs.
Other small block V-8's	+75 lbs.	+25 lbs.

SPRING RATE CHART

The charts below are a general guideline for selecting spring rates. Spring rates may vary depending on applications, usage and personal preference.

AXLE WEIGHT IN LBS.							
AXLE TYPE	SPRING LENGTH	900-1099	1100-1249	1250-1449	1450-1599	1600-1899	1900+
Solid Axle	8”	200	225	300	350	400	450
	9” or 10”	175	200	225	250	275	350
	12”	105	130	170	225	250	300
	14”	95	125	150	175	225	275
Independent Suspension	7”	350	450	550	600	650	Call
	8” (Chrome)	300	400	450	500	600	Call
	9”	220	300	350	450	550	650
	10”	200	250	300	400	450	550
	12”	150	200	250	300	400	450
Jaguar (IRS)	10”	115	140	200	250	250	275
Corvette (IRS) - Ahead of Axle	10”	200	225	275	350	400	500
Corvette (IRS) - Behind Axle	12”	95	125	150	225	275	300

QA1 GM PRO COIL SYSTEMS	Most Drag Race Vehicles			Most Small Block Vehicles			Most Big Block Vehicles		
	1500-1600	1601-1700	1701-1800	1801-1900	1901-2000	2001-2100	2101-2200	2201-2300	2301-2400
1st & 2nd Gen F-Body, A-Body, B-Body, G-Body, X-Body	250	300	350	400	450	500	550	600	650

QA1 GM PRO COIL SYSTEMS	Most Drag Race Vehicles		Nice Ride & Handling			Firm Ride with Great Cornering	
	Lighter Vehicle	Heavier Vehicle					
3rd Gen F-Body	170	200	220	250	275	300	325
4th Gen F-Body	275			300		325	
5th Gen F-Body					250		
C5 Corvette	450			550		650	

QA1 MUSTANG PRO COIL SYSTEMS	Extra Light Weight 1450-1600	Light Weight 1601-1750	Stock Weight 1751-1900	Heavy Weight 1901-2100	Extra Heavy Weight 2101-2300
79-Present Mustangs	150	175	200	225	250

QA1 MUSTANG PRO COIL SYSTEMS	<1350	1350-1525	1525-1700	1700+
Mustang II	375	500	600	700

QA1 REAR PRO COIL SYSTEMS	Soft	Medium	Firm
3rd & 4th Gen GM F-Body	110	130	150
64-72 GM A-Body	130	150	175
73-77 GM A-Body	170	200	220
78-88 G-Body	170	200	220
C5 Corvette	450	550	650
69-72 Grand Prix & 70-72 Monte Carlo	150	175	200
79-04 Mustang	95	110	130

AVERAGE GM MUSCLE CAR WEIGHTS

The following charts provide general guidelines to determine the approximate weight of the most popular GM muscle cars. Of course, each car is different so it is ideal to actually weigh the front and rear halves of your vehicle. Average car weights listed are with driver, automatic transmission, small block Chevrolet V-8, full upholstery and all normal street equipment (such as a spare tire and gas in the tank). V6 and LS engines weigh the same as a small block Chevrolet. Stripped or lightened cars will weigh less. Extra passengers will add to the weight.

Average GM Muscle Car Weights:

YEAR	MODEL	FRONT	REAR	TOTAL
1964-1972	A-Body	1850	1700	3550
1973-1977	A-Body	2175	1650	3825
1978-1988	A/G-Body	1900	1550	3450
1967-1969	F-Body	1750	1500	3250
1970-1981	F-Body	1800	1600	3400
1968-1974	X-Body	1750	1500	3250
1982-2004	S-Series Pickup	1850	1500	3350
1955-1957	Chevrolet Sedan	1900	1775	3675
1958-1970	GM B-Body	2025	1950	3975
1977-1990	GM B-Body	1925	1800	3725
1991-1996	GM B-Body	2175	1825	4000

Adjust weight according to the following options:

OPTIONS	FRONT	REAR
Air Conditioning	+75 lbs.	+25 lbs.
Big-block Chevrolet, Buick	+175 lbs.	+25 lbs.
Pontiac, Olds V-8's	+125 lbs.	+25 lbs.
Aluminum heads, small block	-50 lbs.	-
Aluminum heads, big block	-100 lbs.	-
without Power Steering	-25 lbs.	-
without Power Brakes	-25 lbs.	-
Wagon/Nomad	+50 lbs.	+200 lbs.