

# How Strong is Strong Enough?

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The majority of rowers use some form of resistance training in their preparation for the rowing season. While strength is obviously very important for a competitive rower how strong does a rower have to be? Does it really make any difference in rowing performance if you increase the weight you can squat from 500 lbs. to 550 lbs.?

Every sport requires a certain level of strength to achieve optimal performance. Increasing strength beyond these levels does not necessarily improve performance and in some instances can be detrimental to performance. Once the ideal level of strength has been achieved the time needed to increase beyond this point could be better spent training something else i.e. rowing technique, aerobic fitness, flexibility, or anaerobic fitness.

## How Much Strength do Rowers Need?

There are several ways to determine the strength demands of a sport. A biomechanical analysis of the forces generated on the foot stretchers, oar lock, or at the blade can provide good information on how much force is developed with each stroke. Elite rowers generate their highest forces on the first stroke of a race. These forces have been found to reach 1352 N, which is roughly equal to 135 kg, for men and 1019 N or 102 kg for women. Back in 1975, research on the East German National team indicated that the minimum level of rowing strength required for international competition was 133 kg. With the increases in boat speed and changes in oar technology this is undoubtedly higher today.

A second method for determining strength goals is to base them on the strength levels of elite competitors. Presumably, if a competitor is medalling at the Olympics or World Championships they are strong enough to be successful. This doesn't hold true all the time because of differences in technical efficiency and aerobic fitness but it is a good starting point. In order to study maximal force generation at the catch Secher developed an isometric apparatus that was adjustable so as to suit individual rowing positions. Using Dutch Olympic, national, and club level rowers it was found that international rowers on average generated 204 kg of force. National level rowers generated 183 kg of force and club rowers generated 162 kg of force. Using other non-specific rowing tests – isometric arm pull, back extension, trunk flexion and leg extension – on the same groups of athletes, it was found that the higher the competition level of the rower the greater the strength in all tests.

The use of non rowing tests of strength has its pros and cons. Force application in a boat is technically different than it is in a leg press or squat. While these tests are very good for determining if the muscles are strong enough to do the job they don't necessarily reflect someone's boat moving ability. Weight lifting tests do have the advantage of being low tech, they don't require computer links to strain gauges or force plates, and easy to

administer. Concept II has developed a machine called the Dyno which works on the same air resistance principals as the erg but can be used for strength training and testing. This is a very well made machine and in time will probably become a standard tool for strength testing for rowers. Unfortunately, because it has only been on the market for a couple of years I can't provide any strength norms for it yet.

## **Strength and Body weight**

Strength can be classified as either absolute or relative. Absolute strength represents the maximum amount of weight that can be lifted one time. Larger people tend to have higher absolute strength than smaller people because they carry more muscle mass. Relative strength is the maximum amount of weight that can be lifted one time in relation to bodyweight. Relative strength is of more importance to a rower than absolute strength. The amount of weight in a boat affects the drag through the water. Increasing absolute strength is of no benefit if the weight gain offsets the strength gain by increase resistance through the water. Increasing relative strength makes it easier to accelerate the boat with each stroke because strength has increased without increasing the drag. It is because of the importance of relative strength that the strength goals presented here are expressed as percentages of bodyweight.

## **Strength Goals**

The table of goals below have been developed from the data I have collected during my consultation with rowers from novice high school rowers to Olympic Champions as well as from an examination of the force and strength research that has been done. Because the goals are expressed as multiples of body weight they are applicable to both heavyweight and lightweight rowers.

**Table 1. Strength to Weight Factors for Men**

|            | <b>High School</b> | <b>U 23</b> | <b>Club</b> | <b>National</b> | <b>Olympic</b> |
|------------|--------------------|-------------|-------------|-----------------|----------------|
| Squat      | 1.0                | 1.3         | 1.4         | 1.7             | 1.9            |
| Deadlift   | 1.0                | 1.3         | 1.4         | 1.7             | 1.9            |
| Bench Pull | 0.7                | 0.9         | 1.05        | 1.2             | 1.3            |

**Table 2. Strength to Weight Factors for Women**

|            | <b>High School</b> | <b>U 23</b> | <b>Club</b> | <b>National</b> | <b>Olympic</b> |
|------------|--------------------|-------------|-------------|-----------------|----------------|
| Squat      | 0.8                | 1.0         | 1.25        | 1.4             | 1.6            |
| Deadlift   | 0.8                | 1.0         | 1.25        | 1.4             | 1.6            |
| Bench Pull | 0.6                | 0.8         | 0.95        | 1.1             | 1.2            |

## **Using the Tables**

To use the table take your body weight and multiply it by the appropriate factor. For instance if you were a 200 lb. Male club rower you should be able to bench pull 210 lbs. one time ( $200 \text{ lb. Bodyweight} \times 1.05 = 210$ ). These tables are appropriate for rowers aged 15-35. Strength normally decreases after age 35 and those under 15 should be focusing on technique and body stability instead of maximum strength. In a future article I will provide tables for rowers over age 35.

If you currently are able to meet these goals you can focus your training on other areas. If you can't meet these goals strength may be one of the things holding back your performance. Here are some pointers to help you reach your goals:

### ***1. Take a Long Term Approach to Strength Development***

Don't try to achieve these goals overnight. It may take several years for you to reach the strength goal at each competitive level. Notice how the strength level of Olympic rowers is twice that of the high school rower. The average age of Olympic rowers is 26-28 years old. This gives the high school rower about 10 years to double their strength. Rapid increases in strength are possible but won't likely be maintained from year to year.

### ***2. Keep Everything in Perspective***

Just because you haven't achieved the strength goals that I have outlined there is no reason to panic and wildly change your program. Decreasing the amount of aerobic training or technical training so that you can spend more time in the weight room may help you reach your strength goal but it may not make you a better rower. Look at all aspects of your performance before changing your program. Aerobic and technical training are far more important than strength is to your performance. If you feel that you are technically proficient and aerobically very fit then maybe you can decrease the time you spend on these things until your strength level improves. Otherwise work on the other things first.

### ***3. Don't Over Do it***

Keep strength training sessions short. Sessions that last longer than 45-60 minutes often lead to overtraining. Shorter more frequent training sessions cause greater strength increases than long infrequent sessions. Try to fit in 3-5, 45 minute sessions each week.

### ***4. Focus on Strength not Strength Endurance***

Until you have adequate strength, strength endurance training should be eliminated from the program. Strength increases do not occur with the high repetition, low resistance training common in strength endurance programs. Strength endurance training without adequate strength only means you are getting better at being weak.