

Why Olympic Bars Cost What They Cost



By Tom Lincir,
President and Founder,
Ivanko Barbell Company

The Olympic Bar may seem like an insignificant item in a club's vast array of equipment varieties and quality levels, but there are reasons why Club operators should nevertheless choose their Olympic bars very carefully. A bent or ugly Olympic bar can be like a dirty fork in a white tablecloth restaurant — a turn-off that nullifies the considerable investment made in quality equipment and furnishings everywhere else. More importantly, a structurally flawed Olympic bar can become a lethal weapon. If the bar snaps, the user can be injured, and the ensuing liability lawsuits could possibly bankrupt a commercial operation.

The purpose of this article, therefore, is to discuss the reasons why one Olympic bar can cost \$100 and another one \$300, and what the tradeoffs are as you move up the value scale. These quality/price considerations reside in four major areas

Steel Tensile Strength

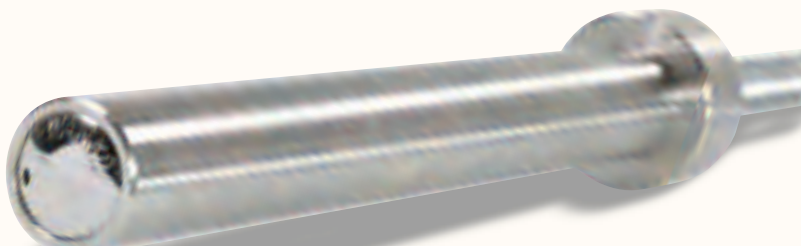
Quality Assurance Measures

Straightness

Final Assembly

Steel Tensile Strength

The proper measure of a bar's strength is its "tensile strength" rating, which is the pounds per square inch (PSI) of force required to pull the bar apart. "Pound



218,000 PSI tensile strength, ultrasonic tested for internal cracks, magnetic particle tested for external cracks, and never peels, chips, or rusts.

Stress Proof®, Fatigue Proof® and ETD 150® are registered trademarks of LaSalle Steel Company, Hammond, Indiana, U.S.A.

test" (expressed as "1000 pound test" or "2,000 pound test") is not a valid measure of bar strength, but is cited by some manufacturers either out of ignorance, or as an advertising gimmick to sell low quality materials.

Industry terms are often used to indicate different levels of tensile strength. A "Stress Proof"® bar has a tensile strength rating of about 115,000 PSI. "Fatigue Proof"® indicates a minimum tensile strength rating of 140,000 PSI. The prevailing wisdom among metallurgists and training experts is that a commercial grade Olympic bar requires a minimum of 150,000 PSI from a steel such as ETD 150®. Years of testing and field experience, however, have indicated to us that anything under 190,000 PSI

develops permanent bends over time. And as mentioned earlier, a bent bar becomes the "dirty fork" in your otherwise impeccable facility. To avoid this, you should look for bars rated 190,000 PSI, and ideally over 200,000 PSI.

As you would imagine, high tensile strength costs more money, and there

are two main reasons. First, higher quality steel is, naturally, more expensive. Second, 190,000+ PSI steel is more expensive to machine. The ultra hardened steel cuts tooling life to 10% of what it would be with softer steel. The alternative of machining the bar in the soft state and then hardening it results in a bent bar that must be painstakingly restraightened a second time at additional expense. And this restraightening process often mars the surface and flattens the knurling. These difficulties are the major reason most manufacturers do not make bars over 150,000 PSI. In fact, to our knowledge only four companies make ultra hardened super strong Olympic bars: Schnell of Germany, Eleiko of Sweden, Uesaka of Japan, and Ivanko in the U.S.

Quality Assurance Measures

Because bars are made of solid steel, and steel is generally regarded as "strong", few are aware that the bar can have defects on the surface or in the microstructure that may be a starting point for the bar to snap. To protect against this risk, bars should be

ultrasonic tested to eliminate internal defects, and eddy current or magnetic particle tested ("mag tested") to detect external cracks. Ivanko rejects about 6% of finished Olympic bars through these tests. This means that if bars are not tested, one out of sixteen may have a hairline crack or an inclusion. Over the last 30 years every broken bar we have examined had either an inclusion, a crack, or a problem with the internal microstructure. Testing to protect against such risks adds less than \$20 to the cost of the bar — an inexpensive insurance policy.

Another quality precaution is to avoid bars that have grooves cut into the bar to define the hand spacing. People who understand stress analysis call these "suicide grooves", because, like the scribe lines cut into glass before snapping it, these grooves are the starting point for failures.

Protective coatings are also an important quality assurance factor. Although many manufacturers chrome plate their bars for aesthetic purposes, the chrome plating process can result in hydrogen embrittlement, which can cause the bar to snap at some unknown point in the future. Because of this, Ivanko uses only black oxide coating, or stainless steel which requires no coating. Black oxide is applied in heat conditions under 400° F (190° C), which will not alter the chemistry of the bar, or weaken its tensile strength. Stainless steel is the most expensive material, but it requires no coating process that can degrade the bar's microstructure. Although some manufacturers provide a "lifetime guarantee", this is more often than not simply a device to close the sale rather than to genuinely protect the club operator. In fact, the profit margin on some low end bars enables the manufacturer to replace the bar once or twice and still come out ahead. Such guarantees, however, do not indemnify the club against injuries caused by a bar snapping in two. The best guarantee against such risks is to self-insure by the features you demand in an Olympic bar: 190,000+ PSI steel, ultrasonic and mag tested, no suicide grooves or sharp edges, no welding on any part, and

either black oxide coated or stainless steel.

Straightness

When a bar is bent, it will try to rotate to reach stability with respect to gravity. This defect can be immediately felt by the user, especially with exercises such as power cleans that involve rotating the bar. Bar stock from the mills falls within a tolerance of 89 thousandths of an inch curvature over the 7 foot length of an Olympic bar. Conventional bars and some "competition" bars that we have checked are typically between 60 - 100 thousandths of an inch. At Ivanko, we straighten the bars to tolerances of less than 15 thousandths of an inch curvature over the length of the bar. It takes expensive machinery and a skilled operator to achieve this tolerance, but we feel the cost is well worth the quality difference that users will sense and appreciate.

Final Assembly

As the last step in the manufacture, it makes a big difference how the collars are affixed to the rotating sleeve. The collar should never be welded to the rotating sleeve because loading 45 pound plates acts like a sliding sledge hammer. This constant pounding can eventually break the weld, allowing the inside collar and plates to slide inward and possibly cause serious injury.

Ivanko uses a high tech locking system that requires no welding, and will never come loose. This requires machining parts to a tolerance of 5 ten-thousandths of an inch. The collar is then heated to expand it, and the sleeve is chilled to contract it, so that the collar just barely fits over a raised ledge on the chilled sleeve. When the temperature normalizes, the collar and sleeve lock together permanently. This procedure requires exact tolerances, tight temperature control, and precise timing. If any variable is incorrect, the parts have to be thrown away, because there is no way to separate the parts once the temperature normalizes.

After final assembly, the weight and dimension accuracy should be checked once again. In order to be approved for

international competition, an Olympic bar should weigh 20 kilograms or 44.08 pounds. The bar diameter should be 28 millimeters, and the length 2.2 meters. Sleeves should generally follow the spec of 49.5 to 50 millimeters diameter. Ivanko Olympic bars are thoroughly measured and tested by the International Powerlifting Technical Committee, and they have been approved for worldwide international competition.

A Difference Worth the Price

A cheap Olympic bar has no place in a facility that has invested in top quality equipment and furnishings everywhere else in order to be perceived as a first class operation. Investing in a higher quality bar yields differences your members can see and feel, and indemnifies you against risks that you can prevent only by choosing your Olympic bars wisely.



Ivanko offers professional and commercial quality products, manufactured to tight tolerances and calibrated to international powerlifting standards for weight accuracy.

Ivanko Barbell Company was founded by Tom Lincir in 1967, and it is the leading provider of professional and commercial grade barbell and dumbbell products worldwide. Your comments or questions are welcome. Write Tom Lincir at Ivanko Barbell Company, P.O. Box 1470, San Pedro, CA U.S.A. 90733.