

# THE TRUTH ABOUT STEEL AND STEEL TARGETS



With more and more companies and individuals manufacturing steel targets, the water has become increasingly muddy where accurate information is concerned. With technical data provided by the *American Iron and Steel Institute* in Washington D.C., this report is designed to cut through the recent hype and establish a basis of fact for accurate evaluation and comparison.

## WHAT IS STEEL?

Steel is a metal composed of iron plus varying amounts of carbon and/or other alloy elements such as chromium, nickel, tungsten, manganese, and so on. Different types of steel - that is, steel with different properties and characteristics - are produced by adjusting the chemical composition and adapting any of the different stages of the steel making process, such as rolling, finishing and heat treatment.

As each of these factors can be modified, there is potentially no limit to the number of different steel recipes that can be created. Currently there are over 3,000 catalogued grades or chemical compositions of steel available. Carbon steel (the most common) depends on carbon and manganese in conjunction with proper processing to improve mechanical properties. Steel can utilize a wide variety of alloying elements and heat treatments to develop the most desirable combination of properties.

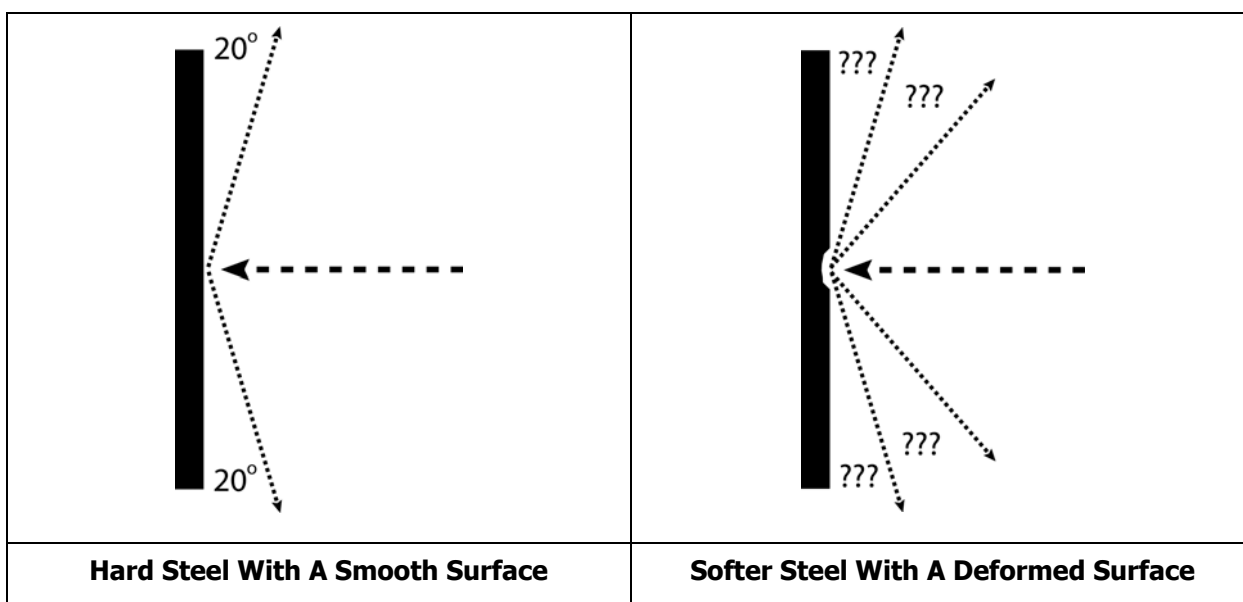
## STEEL HARDNESS

### Truth - *There are only 2 factors that affect the hardness of steel*

The first is the amount of carbon and other alloying elements in its chemical composition, and the second is the manner in which the heating and cooling of the steel is manipulated. These factors are determined at the most fundamental level, and affect the finished steel as a whole. There is no surface treatment or chemical application that can affect the steel's hardness.

### Truth – *Steel hardness is a critical safety issue*

The hardness of the steel is so critical because only a smooth surface will generate predictable splatter patterns. Steel that is not sufficiently hard will develop pits, craters, dimples, and other hazardous deformations. When a bullet hits one of these deformations, it is impossible to predict where the splatter will go, thereby creating an unacceptable training environment.



## BRINELL HARDNESS NUMBER (BHN)

The Brinell hardness test depends upon the resistance offered to the penetration of a carbide steel ball (1.6 mm diameter) when subjected to a weight of 12.6 kg. The resulting hardness value is computed as the ratio of the applied load to the area of the indentation produced. This test is accepted as a worldwide standard for measuring the hardness of steel.

## STEEL PROPERTIES AND USES

Grade	Brinell Hardness BHN	Maximum Thickness	Applications and Type of Service
T-1 Type A	321min. 340min. 360min.	1¼" (32) 1 (25) ¾" (19)	Combination of high-resistance to sliding and impact abrasion and good weldability. For applications where formability and weldability are more critical than with the above steels.
T-1	321min. 340min. 360min.	2½" (63) 2 (50) 1½" (38)	Same as "T-1" type A but with better resistance to impact abrasion and available in greater thickness.
AR 350	321min.	1 (25)	Good sliding abrasion and light impact abrasion, buckets, chutes, hoppers, conveyors.
AR 400	360/444min.	< ¼" - ¾" ¼" - 1 5/8" > 1 5/8" - 2½"	Mining and material handling buckets, chutes, hoppers. Additional applications where improved formability, weldability and toughness are required.
AR 450	400/480min.	2	
AR 500	477min.	1 (25)	Suggested for severe abrasion applications requiring very high hardness.

## WHO USES THE BEST STEEL?

When it comes to steel targets, important and ironic truths exist on both sides of this common question. It is important to understand these truths in order to make an educated decision when purchasing steel targets.

### **Truth - There is a significant difference in the quality of steel being used**

Unfortunately, there are steel targets out there that are poorly designed and are made of inferior steel. Homemade targets from local welding shops are usually the culprits, but some commercial target manufacturers use inferior steel as well. Because these targets are vulnerable to cratering, pocking, and general deformation, they are very dangerous and should be avoided. Any steel with a "Brinell" hardness rating much under 400 falls into this category, including standard "T-1" steel with an hardness rating near the 300 range.

### **Truth - There is NOT a significant difference in the quality of steel being used**

This is not as big a contradiction as it may seem. After many years of experimenting to find the best solution, most major manufacturers of dependable, high quality steel targets now use what is known as "AR" steel with a Brinell hardness rating of at least 400. A few higher quality manufacturers use only AR500 steel, which is the same "AR" steel with a higher Brinell hardness rating of 500. There are only a few plants that make this kind of heavy-duty steel, and all the target manufacturers must get their supply from one of these plants. Steel of this quality and reputation is always certified by the plant that created it, regardless of which target manufacturer the steel is shipped to. Other certifications like "Magnum Steel" or "Extreme Steel" are added by the manufacturer and are merely cosmetic.

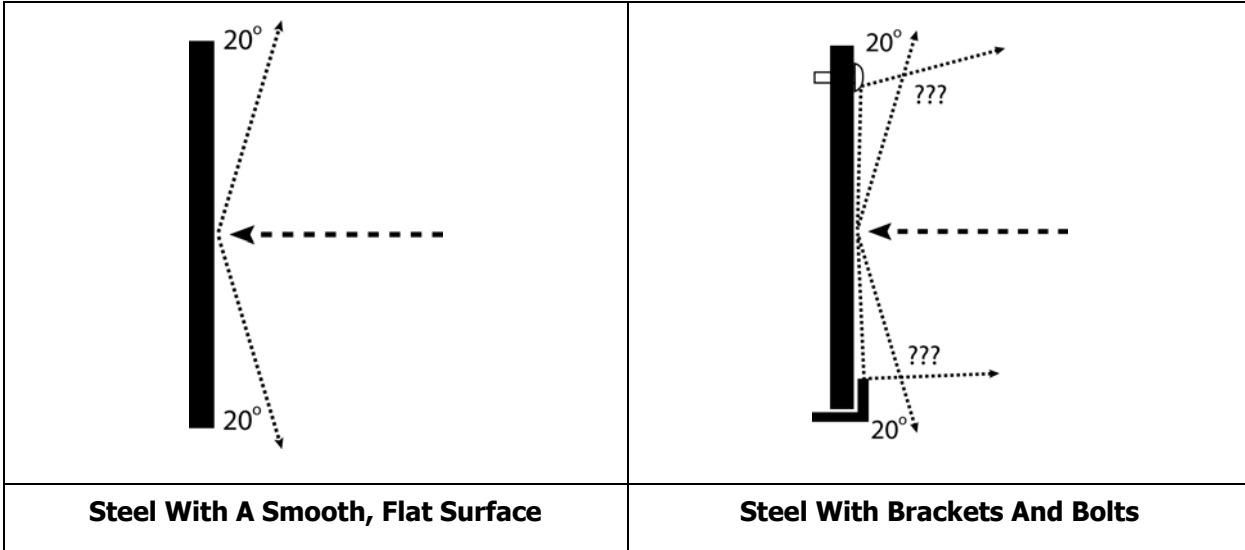
When all the rhetoric is boiled away, there are manufacturers who use steel that is not appropriate for targets, and there are those who use steel that is. Among the major manufacturers producing dependable and high quality steel targets, the quality of the steel itself is practically the same.

## PROPER DESIGN IS CRITICAL

Even the best steel can't compensate for poorly designed targets. There are several unavoidable truths that must be followed to create targets that are as safe and durable as possible.

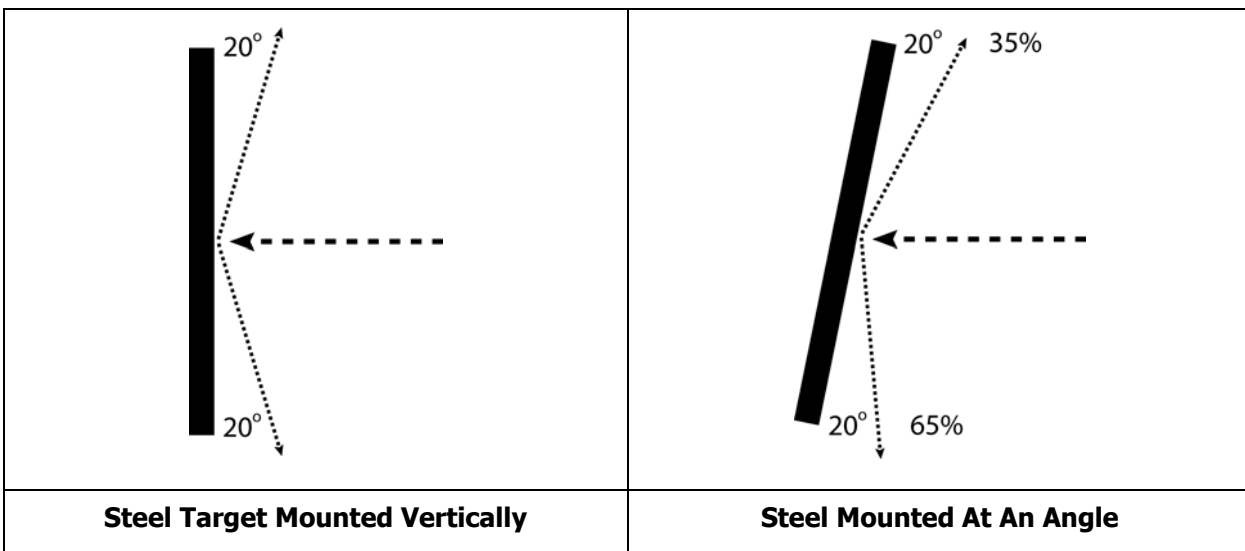
### Truth - *Smooth and totally flat shooting surfaces are essential for consistent splatter patterns*

There are 2 things manufacturers can do to ruin the smoothness and flatness of a steel target. First, they can use inferior steel that will crater, pock, and deform. Second, they can put brackets, clamps, or bolts in the way. Remember, anything that can be shot, will be shot. Why is this an issue? Because you can do a reasonable job of predicting and protecting against a bullet's splatter pattern when it hits a flat, uniform surface. If the steel is damaged or if anything else is in the way, all bets are off. Bullet fragmentation and ricochet are inherent and acknowledged issues when shooting on steel targets. Proper target design helps you address those issues with the highest degree of safety possible.



### Truth - *Dissipating a bullet's energy is safer and will help your targets last longer*

When a bullet strikes a steel target that is completely stationary at a 90-degree angle, all the bullet's energy goes directly to weakening that point on the steel. If the target is completely stationary but is positioned at less than a 90-degree angle, a portion of the bullet's energy at impact is deflected rather than absorbed. If the target is positioned at slightly less than a 90-degree angle AND the target is able to move on impact, a much larger portion of the bullet's energy is deflected rather than absorbed.



## **NO STEEL TARGET IS INDESTRUCTIBLE**

Without exception, every steel target out there today can be damaged. Steel hardness and proper design can both be defeated by misuse and/or abuse of the target.

### **Truth – *The basic destructive force generated by bullets striking steel targets is heat***

Excessive concentrated heat alters the steel's hardness properties and results in damage to the target's face. The amount of heat generated is proportional to the speed of the bullet, which is why rifles cause more damage to steel targets than handguns.

### **Truth – *Rifle distance on steel targets means 100 yards minimum***

No matter what anyone tells you, shooting on bare steel with a rifle at less than 100 yards can damage your target. Even at 100 yards, the target absolutely *must* be mounted at a significant angle, and the steel *must* be extremely hard (AR500).

### **Truth – *Shotgun slug distance on steel targets also means 100 yards minimum***

Shotgun slugs have the greatest potential for bodily harm to the shooter due to the sheer volume of lead that can be returned from damaged or poorly designed steel targets. Stay back!

### **Truth – *Frangible ammunition requires the same quality steel as regular ammunition***

Many types of frangible ammunition, particularly for rifles, are lighter than regular lead ammunition. Remember that lighter bullets can mean greater speed, which means more heat, which can mean damage to your steel target. Frangible ammunition can work very well with steel targets. Just make sure it designed specifically for that purpose.

## **TRUTH – All Action Target steel targets....**

- are made exclusively of the finest high carbon AR500 steel with proper alloy elements to produce the required depth of hardening. They last.
- are designed with totally smooth and flat shooting surfaces for consistent and predictable bullet splatter patterns. No dangerous brackets, clamps, or bolts to get in the way.
- are designed to rest at a downward sloping angle to allow for dissipation of bullet impact energy. No cratering.
- are designed to move when struck to allow for even greater dissipation of bullet impact energy. No pock marks.
- are easy to assemble and easy to use. More training, less hassle.
- provide challenging, realistic training on a tight budget.
- are extremely affordable. There is no better value in steel targets.
- come with a 100% satisfaction guarantee.