MGM Targets - Frequently Asked Questions

What are your targets made of?

All our targets are made of 500 Brinell steel, which is the same hardness as Armor Plate. AR 500 is comparable to roughly a 52 on the Rockwell C scale, which is also about the same hardness as a good knife blade. In addition to the chemical composition of the steel, a “quench and temper” process at the steel mill further enhances the steel hardness and toughness. In comparison, your car is made of mild steel, about 135 Brinell, and T-1, (the old steel for targets) is about 235 hardness. AR500 can withstand literally thousands of rounds from reasonable distances without significant damage.

How close can I shoot steel?

MGM strongly discourages shooting ANY steel closer than 15 yards. Period. Shooters AND spectators (especially children) should always wear ear AND eye protection, regardless of target composition (steel or paper). Any closer than 15 yards presents a significant risk of the shooter or spectators being hit by bullet fragments. Generally speaking, MGM targets will easily handle hits from any traditional defense caliber handgun without significant marking.

Regarding bullet fragments hitting shooters and/or onlookers, ANYTIME you are shooting steel, this is a possibility. I don't know anybody who has shot steel, that hasn't been hit by a fragment hard enough for it to draw blood. It is usually so insignificant that it doesn't even require a BAND-AID®, but I suppose that it could be much worse.

The MAIN reason bullet fragments hit people is because the surface of the target is damaged. Damage is usually the result of 1) the target was shot with a rifle (or shotgun slug, or .44 Mag -or larger-), or 2) the steel was too soft to be a satisfactory target, in which case, traditional pistol rounds could have damaged it, or 3) any combination of the above. If the target face is smooth, bullets hit it and splatter like an egg thrown against a wall. If it is dimpled or cratered, bullets hit it and ricochet out of the craters in any direction. I personally know of bullet fragments from a high powered rifle that flew back over 200 yards, to then hit the wall behind the shooter. (That was NOT an MGM target!!) ***Damaged steel should not be used, even with extreme caution, regardless of the distance the shooter is from the target.***

Can I shoot my rifle at your targets?

Of course, that is what many of them are designed for! MGM targets can withstand an incredible amount of wear, but even Armor plate can be abused. Every shot from a centerfire rifle at 100 yards is going to put a visible mark on the target. We recommend shooting the target at this distance a couple of times so you can determine if the mark is acceptable to you before moving it closer. These small marks are what cause the bullet frags to come back...

Shotgun slugs will also significantly mark the steel, and are not recommended at distances less than 50 yards. ***Steel shot should NEVER be used with steel targets.*** Buck shot of any size will not damage the steel, any more than twelve .38 caliber pistol bullets fired individually will. 00Buck is fine.

Why steel targets live or die…

We don't have the time or space to address every conceivable factor impacting the life (and death) of steel targets. Nor will we deal with the highly technical side of bullets impacting steel, such as how deep did each bullet penetrate a specific type of steel. I don't care how deep one

bullet penetrated a piece of steel. I want to know what thousands of rounds will do to it! Hopefully the following information will simplify this target business, and eliminate some of the "mystery metal" characteristics that tend to surround targets today.

Hardness is of course the single most critical element affecting target life. The hardness of steel is most typically measured on one of two scales: Brinell or Rockwell. Rockwell is used primarily in machine shops. Brinell would most commonly be used in a welding or heavy equipment repair shop. There are conversion tables available, but we have not included them here.

To put hardness into perspective, please consider the following:

- Mild Steel (like I-beams, angle iron, channel, pipe is 112-163 Brinell.
- T-1 (ASTM A514) which has been the target steel of choice for years has a Brinell hardness of 235-293. All our standard targets are targets are 500 Brinell (460-540). This converts to roughly a 52 on the Rockwell scale.
- ARMOR PLATE is 500 Brinell, and has been Ballistically tested and certified.

You will notice that each material has a range of hardness that is acceptable to the manufacturer and the ASTM (American Society for Testing Materials). I suspect that, with the exception of the Armor plate, this is because each material is designed for a particular application or purpose. The hardness will affect that application, but hardness is not the primary design criteria. It is easy to see that the harder material is, the better it will stand up in a target application, as long it is not brittle. Some steel (like tungsten carbide) is harder, but you can break it with a hammer. Target steel has to have the right amount of hardness, coupled with the necessary chemical properties to make it tough, and able to stand up to the impact and vibration a target is subjected to.

Two other major factors to consider in target design are weight and movement. Physics: An object at rest tends to stay at rest. If your target is too heavy for the bullet to move, or is designed to not move, the target face has to absorb 100% of the bullet energy, and is consequently going to sustain more damage than a target that can fall down, or is spring loaded. The same is true for a stationary target. We have seen penetration much deeper on a 3/4" 500 Brinell immobile target, than on a 3/8" target of the same hardness that could move. There are some applications where you have to go thicker, simply because the bullet carries enough energy to penetrate the target plate.

Check out our section on target repairs, and how heat affects the hardness of target steel

Target Maintenance and Repair

Someplace back in time, maybe 50 years ago, U.S. Steel developed a product affectionately known as T-1, designated by the ASTM (American Society for Testing Materials) as A-514. Some time after that, shooters decided it was a great steel to use for targets. It did a great job then, but there are better products out there now. The catch is, virtually all of them are heat hardened steels, so there are some complications related to repairing them.

The easiest and best way to repair damage to steel targets is to purchase steel that isn't easily damaged. Pretty basic, but frequently overlooked while trying to save a relatively inconsequential amount of money. That's why we use the 500 Brinell hardness materials on everything we sell.

If your organization has old steel, like most do, I hope the information that follows will help you make better repairs until you can replace the old stuff. If you have any questions, please feel free to call me - I'll be glad to help however I can.

One of the most misunderstood, or overlooked factors impacting target life is heat. Virtually all target steels in use today are "quenched and tempered", meaning that at the time they are rolled (at the mill) they are heat treated. The chemical content of the steel certainly plays a big roll in target life, but any heat applied after the mill heat treatment will adversely affect the life of your targets. This stuff isn't mild steel, so you can't treat it as such.

There are some manufacturing processes that affect hardened steel during fabrication. The first thing that comes to mind is the cutting process. The hardened steels cut nicely with an oxy-acetylene torch, but the heat that is put into them when the torch travels at 30-40 inches per minute is great. We cut all of our steel with a high definition plasma, laser, or water-jet. The heat affected zone is minimal, basically only at the extreme edge of the target. You'll never notice it under pistol fire, but it can be seen to an extent when you begin to hit the edges with high power rifle rounds.

If you have to repair cracks, our recommendation is to use the edge of a grinder to grind the crack out, all the way to the bottom. You may need to grind some from both sides, rather than all from one side. If you don't remove the cracked material, and just weld over a crack, the life you'll get out of the repair will probably be half (or less) than if you do it right. It is unreasonable to think that your repair will never crack again. You have a heat treated, hardened area, coupled to a chemically hard but soft area (softened by the heat you introduced into it), coupled to a soft weld area. "Ductility" is the technical word describing the rates with which metals flex or bend. The ductility of the three areas of your repair are all different. You WILL get another crack there. The only question is, when? If you are the person who did the welding, don't take it personally. Without the technology, welding facilities, (and expense) of NASA, everyone should expect a new crack at some point in the future. Like death and taxes, it's inevitable.

When you weld on any heat treated material, use multiple small, hot beads, rather than a large one. The object is to limit the amount of heat you put into the steel as much as possible. Let the first weld get cold enough to touch before you make the second pass, or before you make a pass on the other side. This will minimize what is technically called the "heat affected zone", and consequently minimize the amount of temper that is removed from the parent material. Heat on mild steel has very little effect on it, but it is critical when you are working with heat hardened steel.

If some a) clown, b) moron, c) yahoo, d) expletive deleted shoots a hole in one of your targets, or if they shoot it with a shotgun slug, castration is always in order. After that, you've got two real problems. First, all of the area surrounding the weld repair (or plug) will be softened because of the welding heat. Second, your welding filler material will be the same hardness as mild steel. The trouble with this is, you have a spot of 135 Brinell hardness on your target. This is going to significantly crater the first time it sustains a direct hit from a .38 Super, or something similar. Your welding supply store may be able to suggest a much harder filler metal than the traditional E-7018, or E70S-6 wire, but in any case, it's never going to be as hard as it was before the repair.

In general, re-heat treating damaged/welded steel isn't cost effective. If you happen to have a high tech heat treater in your vicinity, you'll find it terribly expensive. It will probably cost you half the replacement cost of the targets, or more, especially if you have to pay freight there and back. Additionally, they usually need to know specifically what type of steel you have, and what you want done to it. They might be able to recommend a generic treatment, but it is a safe bet they aren't going to guarantee anything without knowing the specific chemical composition of the material. If you are the original purchaser of the material, you can probably find that out from your supplier. If the purchaser has moved on and you can't locate the source of the steel, you may be out of luck.