SPLASHBACK WARNING! In the event of a Bullet-to-Baffle collision or "Baffle Strike" all muzzle brakes have the potential to eject high velocity splashback capable of causing serious bodily injury. Splashback consists of high velocity bullet and/or baffle fragmentation that is deflected from the baffle impingement surface. Similar to the well documented splatter zone associated with steel plate targets the Splashback Danger Zone extends to an angle 20-degrees greater than the baffle impingement angle (Fig. 1 a,b,c). In order to minimize this risk it is important to implement the preventative actions outlined below, however it is ultimately the responsibility of the shooter to anticipate the possibility of splashback and to MAKE SURE ALL BYSTANDERS ARE CLEAR OF THE SPLASHBACK DANGER ZONE BEFORE DISCHARGING THE FIREARM.

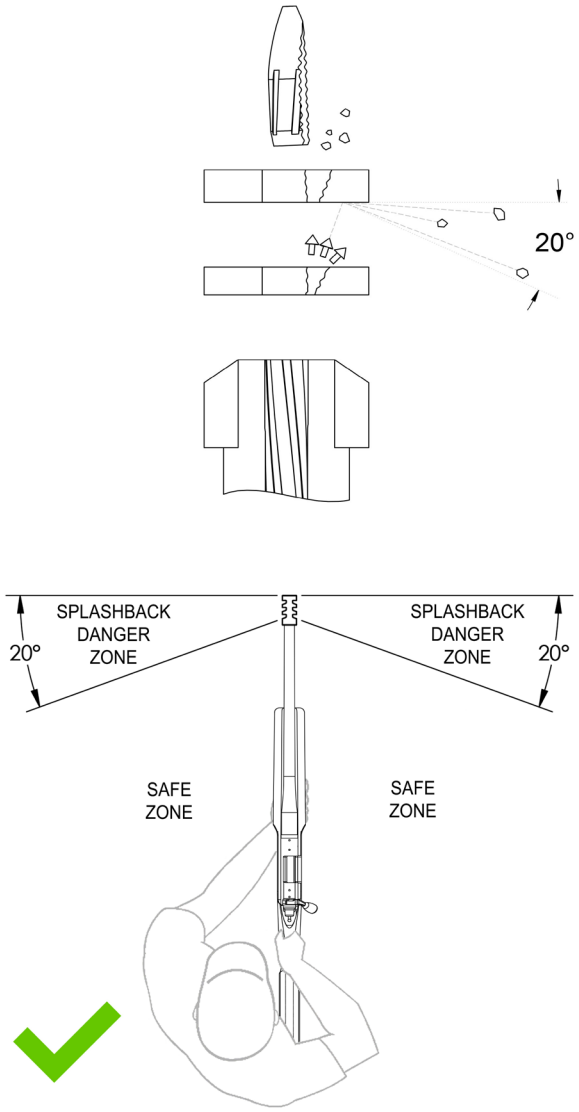

Figure 1a. Flat baffles feature a zero-degree impingement angle providing the largest safe zone.

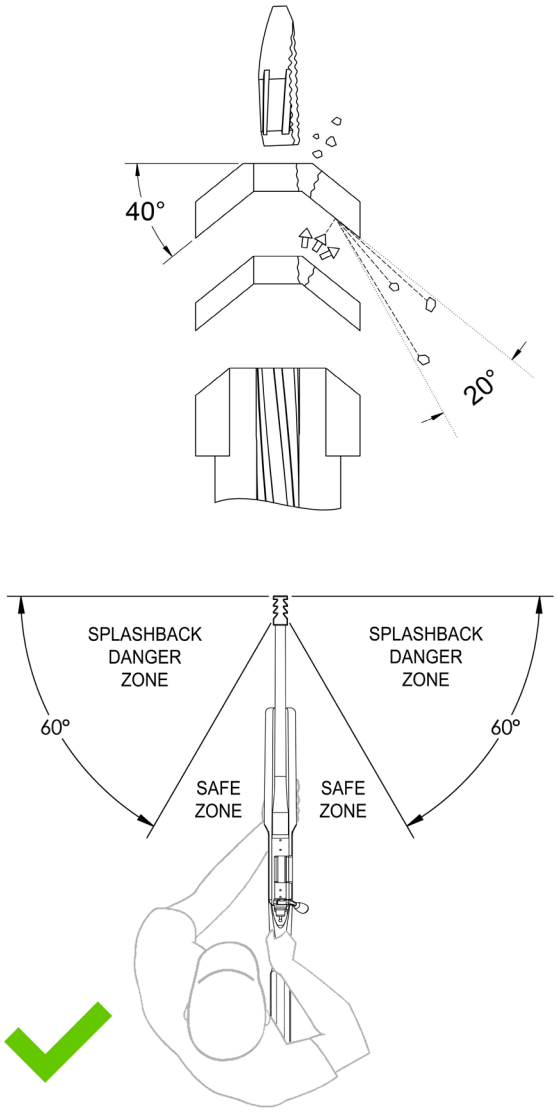

Figure 1b. 40 degrees is the maximum permissible safe baffle angle. It will create a 60-Deg safe zone around the shooter, a realistic minimum for adequate protection.

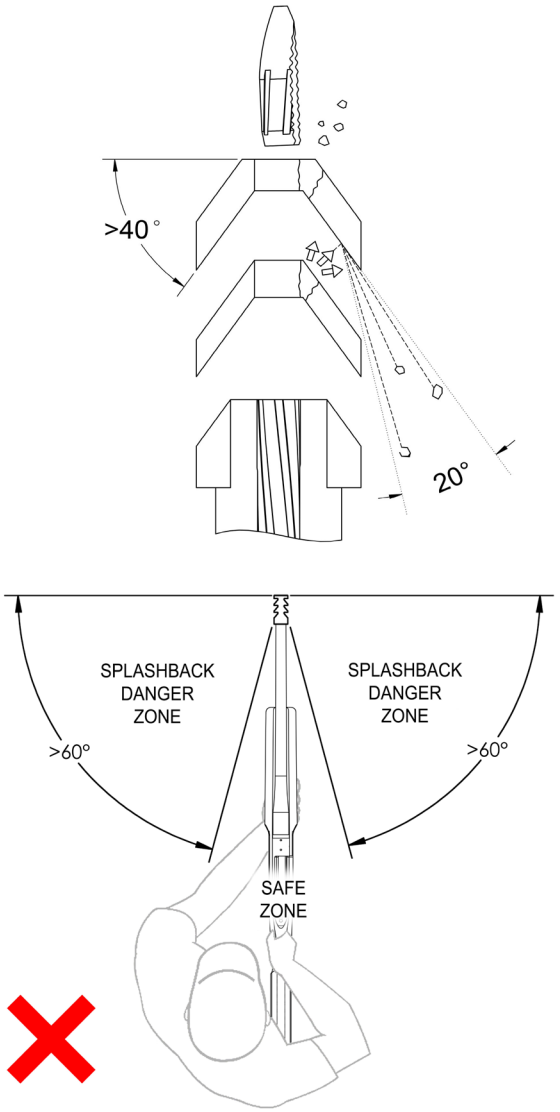

Figure 1c. Baffle angles greater than 40 degrees can cause splashback to directly strike the shooter causing serious injury. Muzzle brakes with baffle angles greater than 40-Deg should only be used if equipped with a rear mounted blast shield large enough to provide a minimum safe zone of 60-Deg.

COMMON CAUSES OF BAFFLE STRIKE AND THEIR PREVENTION

Cause #1: Improper installation

Preventative Action: Always Use a precision shim or precision jam nut for timing, never use a crush washer. Always apply the recommended installation torque and/or thread locker per factory instructions. After installation always have a qualified gunsmith verify bore alignment using a precision alignment rod.

Cause #2: Inadequate bore clearance

Preventative Action: Always physically measure and verify proper bore clearance, never rely on written specifications. Angled baffle brakes should have a minimum diametric bullet clearance of .060". Flat baffle brakes should have a minimum diametric bullet clearance of .030".

Cause #3: Bore obstruction caused by brake movement or damage

Preventative Action: Always apply the recommended torque and/or thread locker per factory instructions to prevent the brake from loosening during use. With the firearm unloaded, periodically inspect the brake to make sure it has not become loose or unthreaded. If the muzzle has been subjected to a sharp blow always have a qualified gunsmith recheck the bore alignment using a precision alignment rod before returning the firearm to service.

Cause #4: Bore obstruction caused by foreign object

Preventative Action: Before shooting, with the firearm unloaded, look through the side ports to make sure the brake is clear of any internal obstructions such as a cleaning patch, dirt, mud, Etc. Never shoot in close proximity to mud or loose debris that can be flung into the side ports potentially causing an obstruction.

Cause #5: Improper ammunition

Preventative Action: Never shoot saboted ammunition through a muzzle brake. Never shoot frangible or pre-fragmented ammunition through a muzzle brake. Never use ammunition that is too heavy to properly stabilize at the barrel's twist rate.

SPLASHBACK RICOCHET WARNING

Never shoot within close proximity to any hard object or barricade (ie. concrete wall, steel plate, etc.) located within the Splashback Danger Zone (Fig. 1), or with any type of weapon attachments (ie. tubular forearms, rails, flashlights, etc.) located within the Splashback Danger Zone (Fig. 1). In the event of a baffle strike any hard object located within the Splashback Danger Zone may further deflect splashback debris causing injury to the shooter and/or bystanders.

EXHAUST JET WARNING

All muzzle brakes produce high pressure, high temperature exhaust jets that occupy the same area as the Spashback Danger Zone (Fig. 1). All body parts must be kept within the Safe Zone and at a recommended minimum safe distance of 2 inches behind the back of the device. Any body parts located either within or in close proximity to the exhaust jets may suffer serious burn injuries and/or blast injuries.

HEARING SAFETY WARNING

When operating a firearm equipped with a muzzle brake hearing protection must be worn at all times by both the shooter and all bystanders. Using a muzzle brake significantly increases sound pressure level (SPL) at the shooters ear. Flat baffle brakes can increase SPL up to 10 dB and angle baffle brakes even higher. Recommended minimum Noise Reduction Rating (NRR) is 32 for flat baffle brakes, and 36 (earplugs + earmuffs) for angle baffle brakes.

EYE SAFETY WARNING

When operating a firearm equipped with a muzzle brake safety glasses must be worn at all times by both the shooter and all bystanders. Discharging a firearm equipped with a muzzle brake creates high velocity gas jets directed to the sides and rear of the shooter. These jets typically contain unburned powder particles as well as entrained dust and debris capable of causing serious eye injury.

SUPPORTING WEB REFERENCES

[1] Jauhari, M., Bullet Ricochet From Metal Plates, https://scholarlycommons.law.northwestern.edu/cgi/viewcontent.cgi?article=5613&context=jclc, 1970.

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[4] 1 Million FPS Slow Motion Video of Bullet Impacts, https://www.youtube.com/watch?v=QfDoQwIAaXg