



Guidance on Firearms, Ammunition and Smokeless Propellant Exposed to Fire (or Extreme Temperatures)

The Sporting Arms and Ammunition Manufacturers' Institute, Inc (SAAMI®) has prepared this informational document to provide guidance to the consumer on the effects of fire, or extreme high temperatures, on sporting firearms, ammunition, and reloading smokeless propellants. The intent is to help the consumer understand the steps that should be taken in the event of such exposure.

WARNING: Failure to follow these recommendations can result in property damage, personal injury and death.

FIREARMS

Firearms are designed, built, and tested to safely contain the high pressures created by modern ammunition, in many rifle cartridges reaching 65,000 psi or higher. This ability is dependent on the metallurgical and mechanical integrity of key pressure-containing parts, such as the barrel, and lock-up system components such as the bolt lugs. Many of these components undergo specific, controlled high-temperature heat treatment processes when they are manufactured to achieve the properties necessary to safely contain these high pressures. Exposure to the extreme high temperatures that occur in home fires, when considering the actual temperature and time of exposure, can detrimentally alter the properties of critical components, even when stored in a "fire-proof" safe, potentially rendering the firearm unsafe to use.

Excessive temperatures in home fires can also cause deformation, warpage, and even destruction of the firearm's components. Again, depending upon the actual temperature and time of exposure, the resultant damage to the components can adversely impact critical dimensional fits and alter safety characteristics of the firearm, such as headspace. Sometimes the deformation or warpage may be so subtle that it is undetectable by the human eye, but can adversely impact the performance of the firearm, potentially rendering it unsafe to use.

Finally, exposure of firearms to fire conditions, even indirectly, can allow the infiltration of grit, ash, and other debris from the fire into the action, potentially preventing the proper and safe operation of the firearm.

If your firearm has been exposed to fire or other extremely high temperatures, you should consult the firearm's manual or contact the manufacturer directly for guidance on best practices for cleaning, preserving, and inspecting your firearm. In the absence of manufacturer recommendations, the following practices can help ensure that your firearm does not suffer further damage or degradation before it can be inspected.

IF YOUR FIREARM HAS BEEN EXPOSED TO FIRE OR EXTREMELY HIGH TEMPERATURES, YOU SHOULD NOT USE THE FIREARM UNTIL IT HAS BEEN INSPECTED BY THE MANUFACTURER OR A QUALIFIED AND PROFESSIONAL GUNSMITH AND BEEN DEEMED SAFE FOR CONTINUED USE.

- The first order of business is safety: ensure the firearm is unloaded and always wear safety glasses when disassembling, assembling or otherwise working on the firearm.
- If possible, disassemble the firearm to the extent described in the user's manual. If unsure of this operation, enlist the services of knowledgeable persons or a qualified gunsmith.
- Wipe the metal, synthetic parts, and optics clean with available clean dry towels, cloths, or rags.
- Be particularly careful when wiping off optics, as grit or ash that has been deposited on the lens may scratch the lens. Any optics should then be removed from the firearm at this point and returned to the manufacturer to verify whether the hermetic sealing is intact and check for damage to the lens coating.
- **Very Important Note!** Some lubricants and cleaners can cause damage to plastic/synthetic parts, anodized aluminum parts, wood finishes, and painted surfaces. Read and follow the directions on the container and abide by all included warnings, including recommended personal protective equipment and ventilation requirements.
- Flood all the metal parts and inside of the barrel with a lubricant recommended by the firearm's manufacturer. Cleaners specifically intended to displace water are preferred if the firearm has been exposed to water during fire-fighting efforts.
- Work the lubricant into every nook and cranny possible, as well as down the barrel.
- Using clean dry cloths or rags wipe off the initial application of lubricant to remove as much contamination as possible. Apply a second coat of lubricant to act as a

surface protectant until the firearm can be inspected and serviced by the manufacturer, an authorized service center, or a qualified gunsmith.

- Special attention should be paid to wood stocks and grips. Exposure to high temperatures or contact with water or other firefighting chemicals may also result in damage to the wood finish. Wood stocks, and grips in particular, will hold moisture against metal parts for a long time and if not removed in a timely manner will greatly increase the probability of corrosion of metal parts they remain in contact with. Wood stocks and grips should be removed, then allowed to air-dry and not be forced-dried by exposure to heat. Allowing the wood to naturally air-dry will greatly aid in preventing the stock or grips from cracking or checking.

The above steps will go a long way toward stabilizing the condition of the firearm and limiting the damage caused by exposure to fire and firefighting agents. Once the firearm has been thoroughly cleaned, consideration must be given to having the firearm inspected and serviced by the manufacturer, an authorized service center, or a qualified gunsmith at the earliest opportunity and prior to being put back into service. This is critical for the following reasons:

- A detailed disassembly, inspection, cleaning, and proper lubrication by qualified persons is the only practical means of preventing further deterioration of the mechanics and cosmetics of the firearm. It is also the best means of confirming that the firearm is mechanically safe to be put back into service.
- Exposure to fire can result in the deposition of grit, ash, and other debris in the action and safety mechanisms, which can impede or even disable their proper function, or which may lead to an obstruction of the barrel which could result in a catastrophic failure and severe injury or death to the user or bystanders.
- Exposure to fire may cause components to deform or warp which could, in some cases impede or even disable the mechanical function of the action and/or safety mechanisms.
- Exposure to fire can alter the material properties of critical components, rendering them unable to support the forces and pressures potentially leading to catastrophic failure causing property damage, personal injury or even death.
- Some moisture displacing lubricants may not be ideally suited for use in conjunction with a firearm under normal circumstances. Individual products may have unique characteristics that result in gelling, coagulation, or become so viscous as to prevent or impede the proper function of any mechanical system within the firearm. If such products have been used to clean or preserve a firearm following a fire, it is imperative that any residue from these products be professionally removed

from the firearm and the firearm be serviced by qualified persons prior to being put back into service.

- The amount and type of damage that occurs to a firearm when exposed to high temperatures and firefighting agents varies with the length of time and the temperature levels. Therefore, it is impossible to know with certainty the extent of the deteriorating effect, if any, the fire and water may have had on individual component parts without a complete and thorough inspection and assessment of each individual firearm by qualified persons.

AMMUNITION / SMOKELESS PROPELLANT / PRIMERS

When exposed to excessive heat, the energetic components of ammunition (smokeless powder and primer ingredients) can be permanently degraded without necessarily igniting. The fact a round did not initiate during a fire should not be taken as a sign that the product is not deteriorated.

Primers that have been degraded by heat exposure can exhibit an increased misfire rate, a safety issue if that ammunition is being relied upon in a self-defense or law enforcement scenario.

Smokeless powder degraded by exposure to heat presents different hazards, whether the propellant is contained in ammunition or is stored in containers for reloading purposes. As the energetic components of smokeless powder (nitrocellulose and nitroglycerin) degrade, they release acidic compounds which will further attack the propellant, creating a repeating cycle of deterioration. While modern smokeless powders are formulated to include stabilizers that will neutralize such acids and interrupt the decomposition cycle, if the rate of acid formation or the total amount of the acids becomes high enough due to excessive temperature, those stabilizers can be completely consumed and no longer provide protection against those acids.

Once the stabilizer is consumed, further decomposition of the smokeless powder may continue until it reaches the condition that a loaded round can self-initiate.

Even before a round reaches the point of self-initiation, the burning rate of the degraded propellant could change and, if fired, can produce significantly increased or decreased pressure. Higher than expected pressures may exceed the levels a firearm can safely contain, creating an unsafe situation that could lead to catastrophic failure and severe injury or death to the user or bystanders.

Lower than expected pressures can, in some cases, cause the bullet or wad/shot to become lodged in the bore of the firearm, causing a safety issue if another round is fired

into the obstructed bore. Again, this could lead to catastrophic failure and severe injury or death to the user or bystanders.

There is no easy way for a consumer to determine the level of the degradation of propellant in a cartridge exposed to excessive temperatures. Furthermore, the degree of damage may vary within a stock of ammunition as the time of exposure and the maximum temperatures may vary. If you believe your ammunition, propellant or primers may have been exposed to excessive temperatures (above about 200°F), it should be safely disposed of in accordance with all applicable local, state and federal regulations.

For more information, contact the manufacturer of your firearms, ammunition, and reloading components.