

MISTRAL'S GUNSHOT POWDER RESIDUE TECHNOLOGY Technical Overview

Mistral's Gunshot Powder Residue (GSPR) kit detects modern smokeless gunpowder and black powder that contain nitrate compounds. Single based powders contain nitrocellulose and double based gunpowder contains nitrocellulose and nitroglycerin both, of which, are detected by Mistral's GSPR.

GSPR was designed to be used when quickness and ease of use is paramount (safety may be an issue) including many subjects that may need to be tested, and field conditions may not permit the use of other types of gunshot detection products.

GSPR can detect limited types of primer residues, but GSPR was not designed specifically for this purpose. Primer components such as lead styphnate (used less and less) and barium nitrate can be detected by the product. Antimony sulfide cannot be detected, and GSPR cannot detect stabilizer components like diphenylamine.

Like Mistral's explosive detection aerosols, GSPR has no known false negatives. Because the product targets 'nitrate' compounds, it is possible that extraneous material on a person that contains nitrate elements, such as fertilizer or nitrocellulose particulates, may cause a false-positive. However, GSPR is designed as a presumptive field test and, as is true for any presumptive test, positive results should be confirmed by forensic lab personnel.

Gunshot residue that is detectable is emitted out of the weapon when the cartridge is discharged causing a gas cloud containing the burned gunpowder and unburned gunpowder particles. The cloud develops from at the point where the cartridge is ejected or between the barrel and cylinder in some handguns. Unburned gunpowder is what can be detected.

'Blow-back' from the cloud of shot residue adheres to clothing and skin of the person firing the weapon, which are the targets for detecting gunshot residue. The quantity of blow-back residue depends on the weapon's design, type of ammunition, and distance of the weapon when it is fired from the individual firing the weapon. Handguns tend to be



held closer or the distance between the escaping gases and the individual is usually smaller which tends to leave a greater quantity of residue on the individual that greatly increases the probability of detecting gunshot residue. For higher velocity automatic, semi-automatic, or single shot rifles, the probability of detection is also strong, except for a few gas-tight chamber designs, but the amount of detected residue may be somewhat less because of distance-to-individual factors and the manner by which the weapon is held. Consequently, it is advisable to test GSPR using the type of weapon that may be tested so as to determine (1) whether GSPR is effective for a particular type of weapon, and (2) to ascertain the type of blow-back that might be expected and where to best look for residue.

Some weapons are designed with gas-tight chambers that constrain the escape of gases (sometimes recycled as part of the firing mechanism) so that there is very little or no blow-back that will adhere to the shooter. The M-16 and AR15 (designed by Eugene Stoner) are examples of gas-tight firing systems.

The detection process should include the top and bottom of the hands; sleeves; face (cheeks), and waistband and inside of pockets (which may have been touched after shooting). Normal hand activity will make detection very difficult after 3 hours from the shooting, and washing will clean residues off of surfaces.

It should be noted that “skin” varies as to oils on the skin. Very dry skin will not show blow-back reactions as readily because the residue is less likely to stick to the skin in the quantity or sufficiently to test. Oily skin is a better prospect because residue will stick to such skin much better. Other factors that may affect a test are wind conditions, weather and humidity.

It is also important to note that many tests will result in only “spots” showing the reaction. In tests with GSPR, the more shots fired provides a greater probability of detection.

Using GSPR mittens: remove one package from under lid cover. Open top of package and, without removing mitten from plastic cover, place hand into mitten. Remove mitten from plastic cover and use as directed. When finished, and without touching outside of mitten, replace mitten into plastic cover (evidence) and seal.



Specifications:

Manufactured under ISO 9112-2000 standards

Primary detection: nitrate compounds (nitrate esters and nitro amines)

Sensitivity: as little as 20 nanograms

25 tests per kit.

Kit contains 3 aerosols for residue testing; collection mitts in individual plastic bags that serve as evidence bags afterwards; color chart; instructions



Detection within 1 minute of applying the test

Weight: 2 lbs

Two-year warranty

Temperature range: 0° to 130° F (store at room temperature).

