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SUB

Safety-related

Expert opinion

for use of the  
"Shootstop" plate

as a retention plate in  
granulate bullet trap systems.

Page 1 from 7

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screen text, Internet, etc., are n o t permitted without the prior written consent of SUB GmbH Kiel.

My expert opinion is based on the currently valid guidelines issued by the Federal Ministry of the Interior.  
published

"Guidelines for the Construction, Acceptance and Operation of Shooting Ranges",  
(Shooting Range Guidelines) as of 23 July 2012 / KM 5 - 681 2t0/1

were published in the Federal Gazette on 23 October 2012 / BAnz AT 23.10.2012 B2 and since the  
day of the announcement are to be applied.

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## Technical safety report

to

### for use of the "Shootstop" plate as a retention plate in granulate bullet trap systems.

The company

CONCEPT GmbH

Blackbird path 21  
65582 Auffl

commissioned me to assess whether the plastic plate sent to me with the trade name "Shootstop" bullet trap plate is suitable to fulfil the function of a retaining plate in a granulate bullet trap system.

For examination, I was given a milky / white plastic plate with the dimensions

Width: 50 cm; height: 20 cm and 5.5 cm thick with the inscription 02.11.15 on the upper left corner sent by the client, which was obviously shot at.

Information about the material or corresponding test certificates were not provided and are not known here.

## 1. The "granular fill" bullet trap system

The bullet trap system essentially consists of a granulate, e.g. a plastic or rubber granulate, which is located in a chamber. This chamber is provided on the side facing the direction of fire with a plate through which the projectiles can pass. This plate is made of a thermoplastic with a high resilience and can be made of the same material as the plastic granulate used. Depending on the design, several individual chambers can be constructed side by side or one above the other, forming a common effective surface as a surface system. The plastic sheet material is largely self-sealing after the bullet has passed through, depending on the bullets used, due to its high resilience.

Since the thermoplastic material used at the front is inevitably penetrated by the projectiles and the projectiles penetrate the granulate, the instructions for projectile arresting systems with penetrable materials given in the shooting range guidelines must be taken into account and evaluated. (Shooting Range Guidelines; 2.8.2 Definition of bullet trap systems No. 2.8.5.3.3 Bullet trap systems with penetrable materials).

### Operating principle:

The impacting projectile penetrates a thermoplastic retention layer and enters the granulate fill behind it in which the projectile energy is dissipated. The primary task of the retention layer is to retain the granulate. The inevitable energy reduction of the projectile during penetration is a positive side effect. The channel created in the retention layer during penetration of the projectile is largely closed due to the material properties.

In the case of a bullet trap system, the surface of the permissible retention layer consists of one or more plate-like elements, which can also be replaced individually. The resulting effective area is to be adapted to the target design to be used. The size of the effective surface shall be such that it projects beyond the target projection or the panes to be used by at least 50 mm on all sides.

Since, as already explained, this bullet trap system is a combined system consisting of penetrable material (retention layer) on the one hand and a granulate filling on the other, the overall depth of the system (granulate filling and retention layer at the front) must be adapted to the maximum bullet energy to be expected in order to prevent the residual energy of the bullet from being dissipated at the rear wall of the overall system.

The depth of the granules is therefore the determining factor for the **performance of the bullet trap system!**

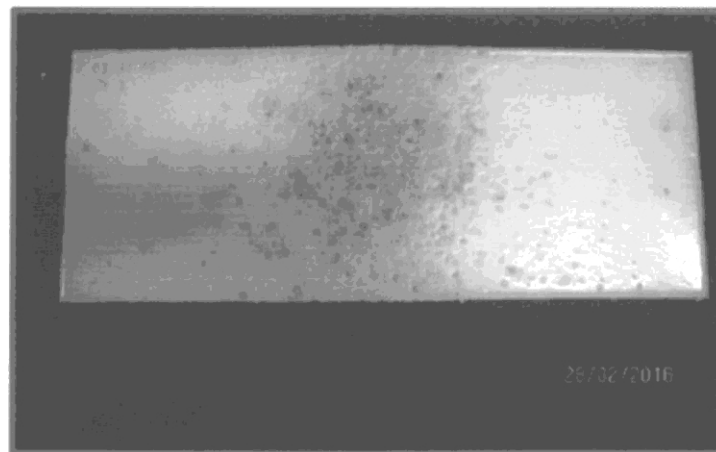
The "Shooting Range Guideline" stipulates that in the case of bullet trap systems with thermoplastic materials or plastic lamellae, the supplier must prove that the bullets cannot get stuck and thus lead to material contamination or nest formation.

The penetration depth/thickness of the plate must therefore be selected in such a way that the projectiles do not get stuck and thus the above-mentioned nesting can occur. This dimension is based on the different weapons and the different projectile energies to be expected from them. Not only the muzzle energy, but also the impact energy of the projectiles in the target medium must be taken into account, which also depends on the firing distance.

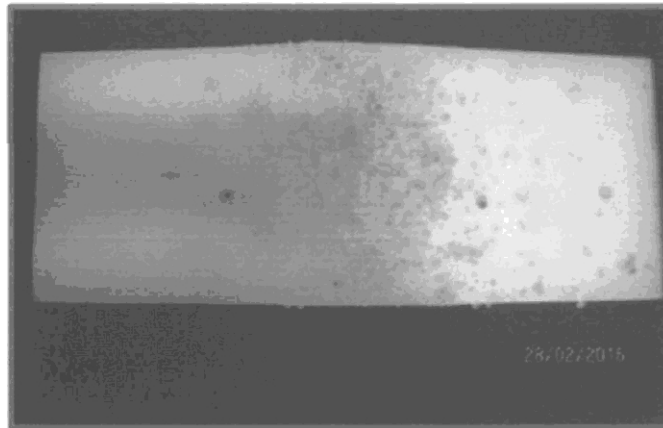
## 2. Evaluation of the material sample sent

Together with the material sample to be evaluated, a list was sent proving the firing of approx. 2,100 bullets in various calibres from .22 lfB to .357 Mag. / .45 ACP in the period from 06.11.2015 to 17.01.2016.

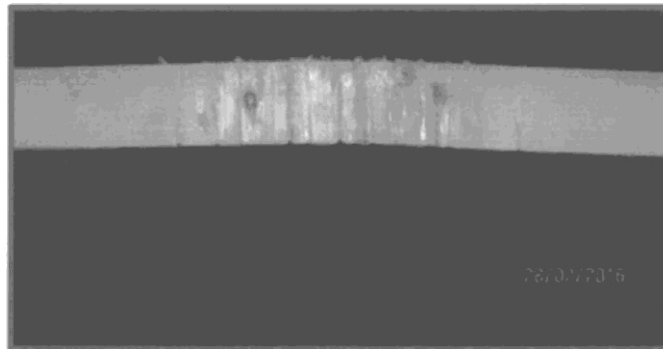
On the front side, the material sample shows bullet holes with slight funnel formation of different calibres, which do not correspond to the actual diameters as mentioned in the aforementioned list. Individual channels of different depths and diameters have formed, which have closed again during re-shooting, also due to the material displacement that has taken place. This circumstance indicates that the material used here has a high resilience. On the back side it shows corresponding rejects, which indicate a material discharge, which presumably formed due to the material entrainment of the warm bullet during the penetration of the plate. There are no break-outs to be found. The slab shows some dark spots in the material, which indicate bullets that got stuck in the slab. The plate itself is bent approx. 8.5 mm in the direction of firing.



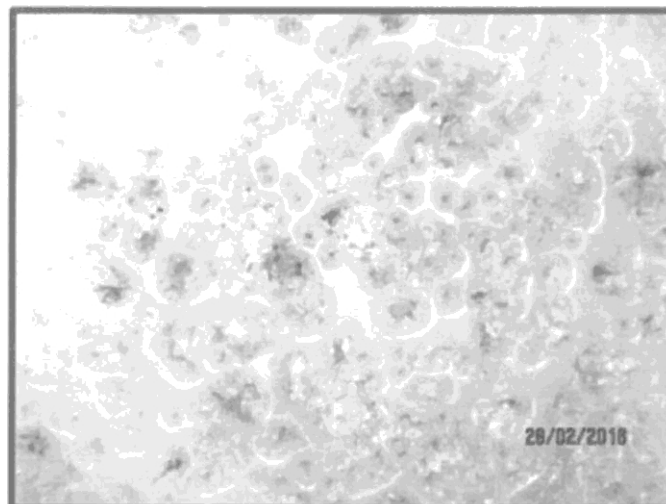
Front



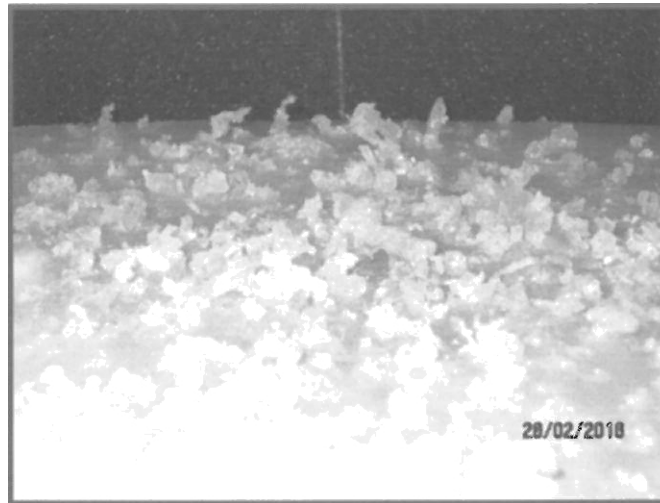
Back cover



Deflection in weft direction



Bullet holes on the front



Formation of the back

### 3. Summary assessment

The "Shootstop" bullet trap plate is suitable as a retaining plate for granulate bullet trap systems.

There are no safety concerns regarding the use of the "Shootstop" bullet trap plate as a retaining plate in a granulate bullet trap system if the material thickness is adapted to the calibres and bullet energies used and no nests are formed.

The granulate depth and not the thickness of the retaining plate is the decisive measure for the performance of the bullet trap system!

The granulate bullet trap system must therefore be adapted in the construction depth of the granulate fill to the maximum bullet energy to be expected in order to prevent residual energy of the bullet from being dissipated only at the rear wall.

Due to the previous weight load of the material sample, a  
The use of the funds cannot be assessed from an economic point of view.

For the expert opinion  
Kiel, 28 February 2016