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**Report Number 972737**

**Tarnish Resistance of Different Cloths**

**Introduction**

A sheet of black coloured "Kenized" flannel was received for comparison testing with a black coloured "Pacific Silvercloth" - to the BS EN ISO 4538: 1995 - Thioacetamide corrosion test to ascertain if the flannel would protect Sterling silver from tarnishing in humid sulphurous conditions.

Sterling silver was also wrapped in both the cloths and left in the general atmosphere to see if there was any effect on the silver.

**BS EN ISO 4538: 1995 - Thioacetamide Tarnish Test**

The accelerated corrosion test requires the products to sit in a closed, gas-tight chamber that contains a saturated solution of sodium acetate tri-hydrate and thioacetamide that is distributed on a horizontal plate within the chamber (50mg per square decimetre of surface).

This ensures a relative humidity of 75% at 20  $\pm$ 5°C within the sealed chamber whilst the test pieces sat 35mm above the plate for 24 hours at an ambient temperature of 22°C.

**Testing of Kenized Flannel & Pacific Silvercloth**

Standard pieces of Sterling silver were used to establish if they tarnished when in the test chamber wrapped by both cloths.

One piece of Sterling silver was wrapped in the Kenized cloth with 1x sheet thickness and the edges sewn closed. Another piece of Sterling silver was wrapped in the same cloth that was 2x sheets thick and sewn closed

The same process was repeated with the Pacific Silvercloth.

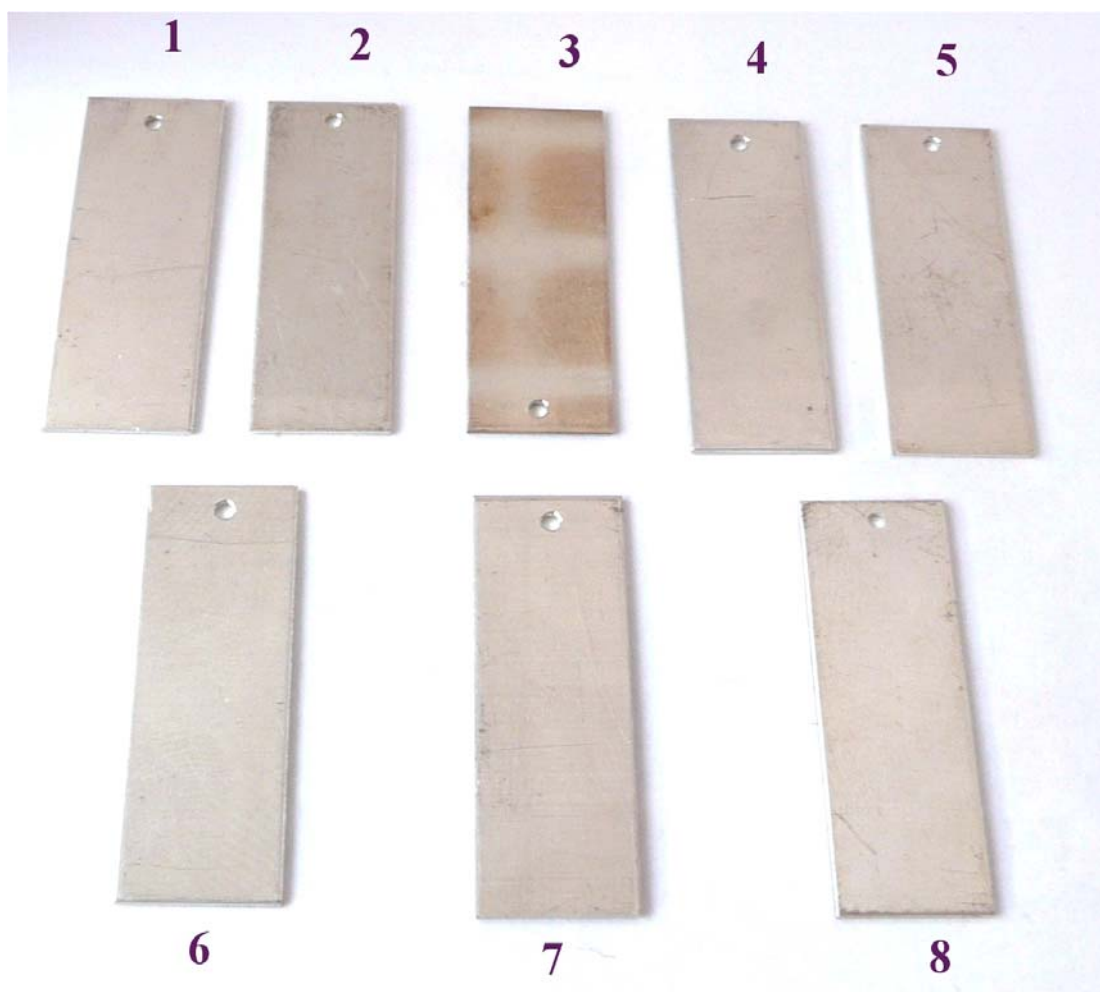
The samples sat in the chamber for 24 hours alongside a Sterling silver control sample.

To ascertain if the cloths had an effect on the Sterling silver in a normal everyday atmosphere pieces was wrapped with 1 fold from each cloth and left adjacent to a control sample for 24 hours.

### Results

Figure 1 is a photograph of the Sterling silver samples after testing:

- 1 Wrapped with 1 fold of Kenized flannel and left in thioacetamide chamber for 24 hours.
- 2 Wrapped with 2 fold of Kenized flannel and left in thioacetamide chamber for 24 hours.
- 3 Sterling silver control sample left in thioacetamide chamber for 24 hours.
- 4 Wrapped with 1 fold Pacific Silvercloth and left in the everyday atmosphere for 24 hours.
- 5 Wrapped with 2 fold Pacific Silvercloth and left in the everyday atmosphere for 24 hours.
- 6 Wrapped with 1 fold Kenized flannel and left in the everyday atmosphere for 24 hours.
- 7 Sterling silver control sample left in the everyday atmosphere for 24 hours.
- 8 Wrapped with 1 fold Pacific Silvercloth and left in the everyday atmosphere for 24 hours.



**Figure 1**

The Kenized and Pacific cloths have not caused the Sterling silver to deteriorate or tarnish when wrapped in 1x sheet thickness in an everyday atmosphere.

The Sterling silver was protected from tarnishing when covered with Kenized flannel and Pacific Silvercloth after being left for 24 hours in a humid sulphurous atmosphere in the test chamber.

The Sterling silver control sample in the test chamber tarnished brown/black due to a deposit of  $\text{Ag}_2\text{S}$  on the surface. The tarnishing mechanism is described below.

***The tarnish mechanism of Silver – nature of the film***

Although silver and high silver content alloys are resistant to many corrosive agents, they are attacked by sulphurous fumes that cause the surface to tarnish going through several interference colours from light brown dark brown, blue black and grey black the true colour of silver sulphide  $\text{Ag}_2\text{S}$ .

In the case of Standard Sterling (92.5% Ag; 7.5%Cu) the tarnish film consists mainly of silver sulphide  $\text{Ag}_2\text{S}$  or a mixture of  $\text{Ag}_2\text{S}$  and copper sulphide  $\text{Cu}_2\text{S}$ .

**Conclusion**

The Kenized flannel and Pacific Silvercloth did not cause any deterioration when in contact with Sterling Silver and further more protected the surfaces from tarnishing in a moist sulphurous atmosphere.

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