

Cutlery and Allied Trades Research Association



Research and Development
Consultancy Services

Special Purpose Machines
Quality Testing

Laboratories and Registered Office:
Henry Street, Sheffield S3 7EQ
United Kingdom

Tel: 0114 276 9736
Fax: 0114 272 2151
E-mail: info@catra.org
Web: <http://www.catra.org>

Director of Research
R C Hamby C Eng M I Prod E

Secretary
Mrs T A Couldwell MIQPS

Our ref: GEG/974365

30 July 2012

Argentium International Ltd
Medway
Haslemere
Surrey
GU27 1NN

For the attention of: Charles Allenden



Sheet 1 of 3

Report Number 974365

Tarnish Testing of Silver Alloys

Introduction

Four different alloys of silver, listed below, were received for tarnish testing in accordance with:

- BS EN ISO 4538: 1995 Thioacetamide tarnish test.

Samples Received

- 1 Traditional Sterling Silver
- 2 Argentium 960 alloy
- 3 Argentium 935 alloy
- 4 Trusilver alloy

Test Method

The Thioacetamide corrosion test requires the samples to sit in a closed, gas-tight chamber that contains a saturated solution of sodium acetate tri-hydrate and thioacetamide distributed on a horizontal plate within the chamber (50mg per square decimetre of surface). This ensures a relative humidity of 75% at $20 \pm 5^{\circ}\text{C}$ within the sealed container. The samples sat 35mm above the plate at an ambient temperature of 24°C .

The test samples remained in the chamber for 24 hours.

Tarnish mechanisms

The term “tarnishing” generally refers to the films formed on silver by the action of sulphur under atmospheric conditions. The accelerated test is an accepted procedure for comparing tarnish prevention treatments applied to silver or by alloy additions at ambient temperature.

Silver and high silver content alloys are resistant to many corrosive agents however, they are attacked by sulphurous fumes that cause the surface to tarnish by the formation of a silver sulphide (Ag_2S) film.

The film varies in appearance passing through a range of interference colours from light brown, dark brown, blue black before becoming black, the true colour of Ag_2S .

This affect can be seen from the photographic record after 24 hours.

Results

Figure 1 shows the silver alloy samples before testing and Figure 2 after 24 hours in the test chamber.

Argentium 960 silver alloy has resisted tarnishing but discoloured slightly

Argentium 935 silver alloy has resisted tarnishing but discoloured slightly

Sterling Silver has corrosive attacked and tarnished to a light brown colour due to Ag_2S forming on the surface.

Trusilver has more severe corrosive attack attaining a blue black Ag_2S colour on the surface.

Conclusion

The Argentium silver alloys have resisted tarnishing in the accelerated BS EN ISO 4538: 1995 Thioacetamide tarnish tests better than the Sterling Silver and Trusilver alloys.



G E Gregory
BEng (Hons) CEng MIMMM
Metallurgist

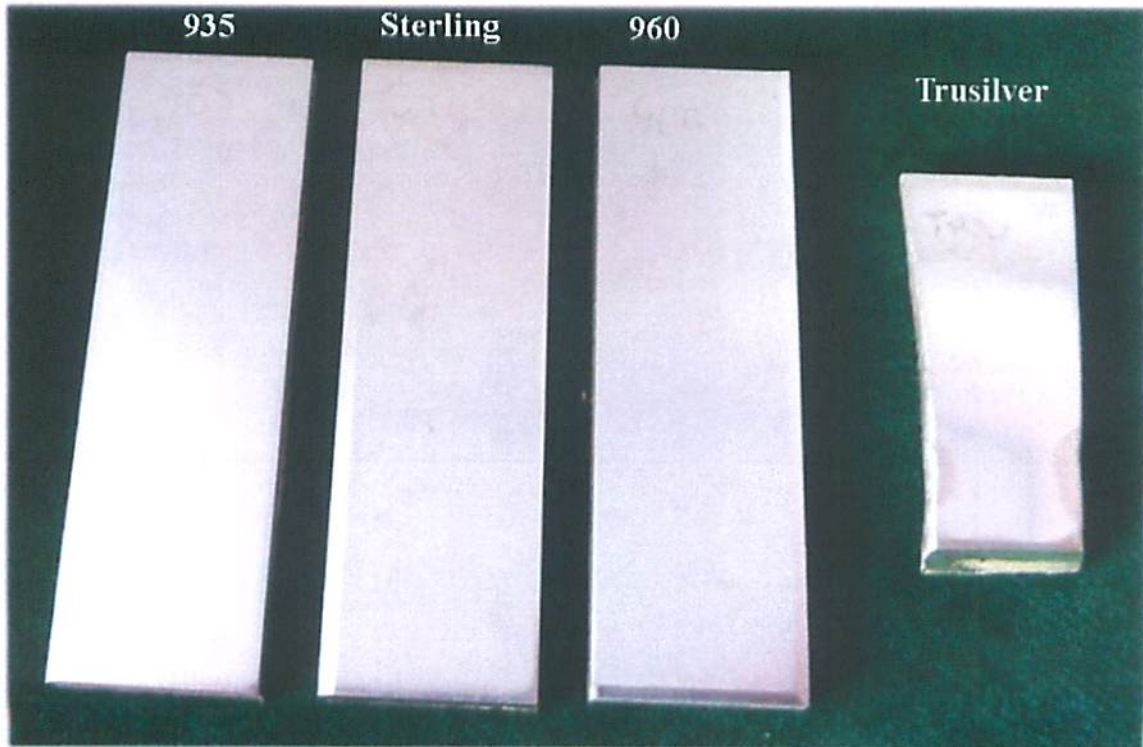


Figure 1

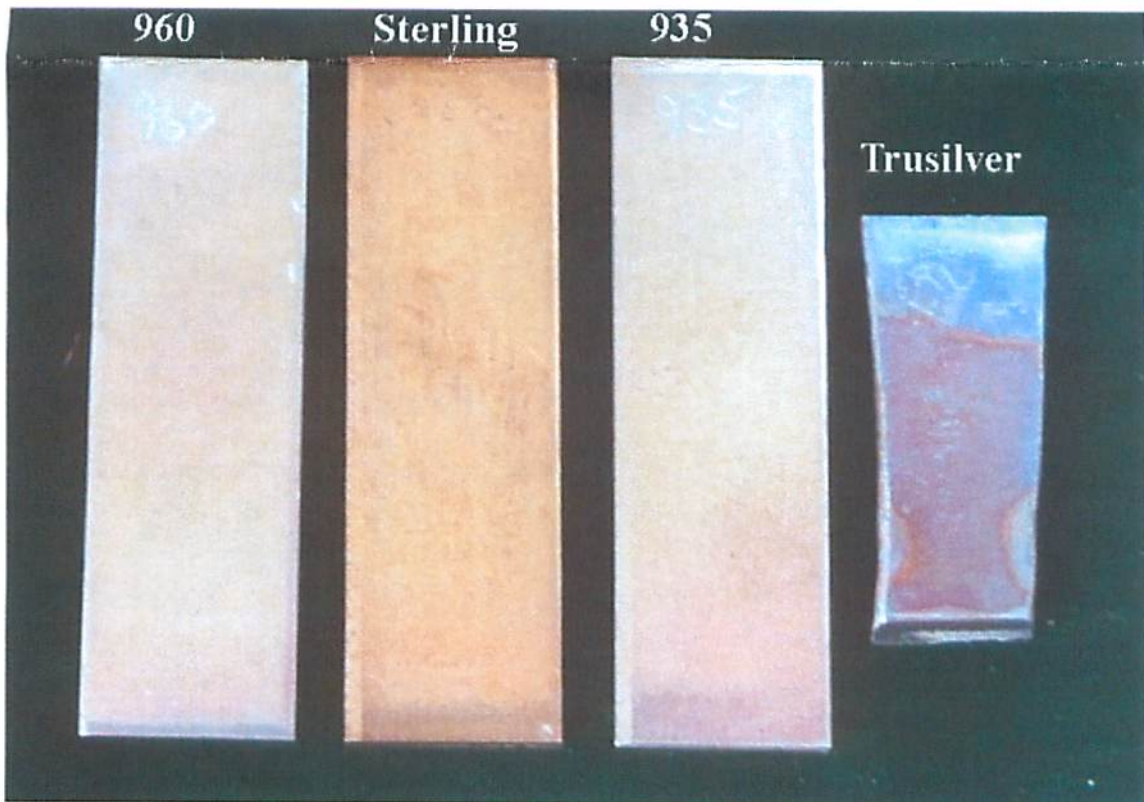


Figure 2