

Certificate of Test



Title :

**GRAFFITI RESISTANCE OF TRION
TENSID COATINGS**

**Masonry Substrates Protected With
AKS 3503**

Certificate of Test No: **4858**

Client's Name & Address:

**London Underground Limited
Building Control Group
30 The South Colonnade
Canary Wharf
London E14 5EU**

Our Ref: **1303S/SAH/JM/1852**
TEL Job No: **6584**
Your Ref: **117210/15071**
Date: **3 November, 1997**
Date Sample(s) Received: **See below**
Sample(s) Received From: **TAGS UK (123,205 and 123,207)
LUL approved supplier (123,206), Performance Chemicals
Ltd (123,208)**

Sample No(s): **123,205 (28 July 1997)
123,206 (3 October 1997), 123,207 (30 July 1997)
123,208 (27 August 1997)**

Tested By:.....*H.S. Johal*..... **H Johal**

Authorised By:.....*S. Hurley*..... **S A Hurley**

for

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1.0 SAMPLE DESCRIPTION

- (i) 5 litres of AKS 3503, a sacrificial anti-graffiti protective coating (supplied by Trion Tensid AB): TEL Sample Number 123,205.
- (ii) 4 x 0.5 litres of AKS 3505, a protective coating remover for AKS3503 (supplied by TAGS UK - British distributor of Trion Tensid AB products): TEL Sample Number 123,207/1-4.
- (iii) 0.25 litres of an LUL approved sacrificial anti-graffiti protective coating (supplied by an LUL approved supplier): TEL Sample Number 123,206.
- (iv) 5 litres of Multi-Purpose Graffiti Remover Gel, London Underground Part Nos. 17418-141/2 (supplied by Performance Chemicals Ltd): TEL Sample Number 123,208.
- (v) Substrates were procured directly by TEL as follows:
 - LBC sand-faced Fletton facing bricks (ex Hall & Co Ltd, Ruislip, Middlesex).
 - 450mm x 450mm precast concrete paving slabs (ex C & C Builders Merchants, Southall).
 - 300mm x 300mm terrazzo floor tiles (ex Field Terrazzo, West Hampstead).

Note: Certificates of sampling were not supplied for the materials listed above under (i) to (v).

2.0 TESTS REQUIRED

Assessment of the graffiti resistance of AKS 3503 on common masonry substrates following London Underground (LUL) Test Procedure 6220-03-052-TP-1 ('Assessment of the Graffiti Resistance of Materials').

The assessment of an LUL approved sacrificial coating was also required in order to provide a control for comparing the effectiveness of AKS 3503.

Both coatings were to be assessed on the three substrate types noted above using 6 no. coloured markings (4 felt tip pen inks and 2 aerosol paint sprays). Each coating/substrate/marker combination was to be assessed for the effectiveness of graffiti removal using the following treatments:

- Hot water.
- AKS 3505 Protective Coating Remover (Sample No. 123,207/1).
- Multi-Purpose Graffiti Remover Gel (Sample No. 123, 208).

Particular types of concrete and brick were not specified by the client. Consequently, it should be noted that this assessment relates to substrates with a smooth surface texture. Testing on rougher surfaces may lead to different conclusions regarding the effectiveness of the protective coatings.

The smoother 'off-the-mould' surface of the concrete slabs was used, thus providing an assessment which relates most closely to the protection of precast concrete.

In order to obtain a convenient test area, bricks with a plain (non-frogged; non-perforated) bed face were used. The light red bed face of the selected bricks is relatively hard with a smooth texture containing some fine crevices. It was considered that this texture adequately matches a finish which is frequently present on the header and stretcher faces of facing bricks.

3.0 **METHOD**

3.1 **Coating Application**

Loose material was removed from the substrate surface by light scrubbing and washing with clean water. The substrates were then allowed to air dry.

The coatings were brush applied following the suppliers' recommendations. In each case, two coats were applied at approximately 23°C and with an intermediate drying period of either 2 hours (AKS 3503) or 4 hours (LUL approved product). Care was taken to apply the coatings evenly using the minimum number of brush-strokes and without any 'working-in'. The coatings were then allowed to harden for 3 days at approximately 23°C prior to applying the graffiti marking.

The following approximate wet application rates were used (monitored by use of a gravimetric procedure):

	<u>AKS 3503</u>		<u>LUL approved product</u>	
	g/m ²		g/m ²	
	1st Coat	2nd Coat	1st Coat	2nd Coat
	(Sample No.)		(Sample No.)	
Concrete	123	117	151	120
	(123,205/1)		(123,206/1)	
Terrazzo	106	114	118	121
	(123,205/5)		(123,206/5)	
Brick	105-112	134-141	125-148	112-146
	(123,205/2-4)		(123,206/2-4)	

Notes (i) Supplier's recommendation for AKS 3503: 100-150g/m²/coat.

(ii) Supplier's recommendation for LUL approved product: 200-400g/m²/2 coats.

3.2 **Graffiti Application and Removal**

Parallel strips of masking tape (25mm wide) were applied to the coated substrates in order to isolate lengths of test surface having a uniform width of approximately 20mm. Each exposed area was marked with one felt tip pen or aerosol paint. Solid pen-lines were obtained without excessive working into the surface. Adjacent areas were screened during application of the paints. The following markers were used:

- Pentel N60 Chisel Point Permanent Markers: red, blue, green and black.
- Buntlack Graphic-Spray: black and silver.

After keeping the test pieces under ambient conditions for 3 days, the masking tape was removed. Fresh tape was applied at 90° across the pen and paint stripes, again with a uniform spacing of approximately 20mm.

Depending upon the method of treatment, graffiti removal was effected using a paint brush, cotton swabs or a non-metallic scouring pad (see Section 4.0). After treatment with the AKS 3505 and the Multi-Purpose Gel, the surfaces were rinsed with clean water and allowed to dry.

4.0 RESULTS

The results of this assessment are given in Table 1 where the performance of the coatings is classified numerically according to the scheme given in the LUL procedure (as summarised in Table 2).

Specific observations regarding the ease of graffiti removal are summarised in Table 3. The following points apply generally:

- (i) No visible surface damage was caused by either the AKS 3505 or the Multi Purpose Gel.
- (ii) No significant differences were found between the ease of removing pen markings, or paints, of a different colour.
- (iii) Pen markings were removed more easily than the paints.
- (iv) The ease of graffiti removal was similar for the two sacrificial coatings (for any combination of substrate/marker/remover).
- (v) Irrespective of the substrate, pen and paint markings were removed most easily and rapidly with the Multi-Purpose Gel. However, removal was effected more easily with AKS 3505 than with hot water.
- (vi) In general, both types of marking were removed most easily and rapidly from the terrazzo tiles. Removal from the brick surfaces was much more difficult than removal from either the terrazzo or the concrete - small traces of the graffiti usually remained in the fine crevices on the brick surface.
- (vii) Treatment with hot water (80-90°C) was partially effective for removal of the pen marks when using a soft paint brush. Testing was generally completed by relatively light use of a non-metallic scouring pad.
- (viii) Treatment with AKS 3505 was carried out with a soft paint brush and cotton swabs. Fresh AKS 3505 was applied and 'worked in' as necessary during contact periods of up to about 30 minutes. Treatment of the bricks was then completed with a scouring pad.
- (ix) Treatment with the Multi-Purpose Gel required only the use of a soft paint brush and cotton swabs.

**GRAFFITI RESISTANCE OF AKS 3503 AND AN LUL APPROVED PRODUCT ON
MASONRY SUBSTRATES**

TABLE 1

GRAFFITI TYPE	COATING TYPE	GRAFFITI REMOVER	SUBSTRATE TYPE AND SCORE FOR REMOVAL		
			TERRAZZO	CONCRETE	BRICK
Red Pen	AKS 3503	Hot water	4	4	4
	AKS 3503	AKS 3505	4	4	4
	AKS 3503	MPG	4	4	4
	LUL approved product	Hot Water	4	4	4
	LUL approved product	AKS 3505	4	4	4
	LUL approved product	MPG	4	4	4
Blue Pen	AKS 3503	Hot Water	4	4	4
	AKS 3503	AKS 3505	4	4	4
	AKS 3503	MPG	4	4	4
	LUL approved product	Hot Water	4	4	4
	LUL approved product	AKS 3505	4	4	4
	LUL approved product	MPG	4	4	4
Green Pen	AKS 3503	Hot Water	4	4	4
	AKS 3503	AKS 3505	4	4	4
	AKS 3503	MPG	4	4	4
	LUL approved product	Hot Water	4	4	4
	LUL approved product	AKS 3505	4	4	4
	LUL approved product	MPG	4	4	4
Black Pen	AKS 3503	Hot Water	4	4	4
	AKS 3503	AKS 3505	4	4	4
	AKS 3503	MPG	4	4	4
	LUL approved product	Hot Water	4	4	4
	LUL approved product	AKS 3505	4	4	4
	LUL approved product	MPG	4	4	4
Silver Paint	AKS 3503	Hot Water	4	4	4
	AKS 3503	AKS 3505	4	4	4
	AKS 3503	MPG	4	4	4
	LUL approved product	Hot Water	4	4	4
	LUL approved product	AKS 3505	4	4	4
	LUL approved product	MPG	4	4	4
Black Paint	AKS 3503	Hot Water	4	4	4
	AKS 3503	AKS 3505	4	4	4
	AKS 3503	MPG	4	4	4
	LUL approved product	Hot Water	4	4	4
	LUL approved product	AKS 3505	4	4	4
	LUL approved product	MPG	4	4	4

Notes

- (i) MPG = Multi-Purpose Graffiti Remover Gel (Sample No. 123,208)
- (ii) Coating application date: 24/10/97 (LUL approved product/terrazzo and brick: 28/10/97)
 Graffiti application date: 27/10/97 (LUL approved product/terrazzo and brick: 31/10/97)
 Graffiti removal date: 30/10/97 (LUL approved product/terrazzo and brick: 03/11/97)

NUMERICAL CLASSIFICATION SCHEME FOR GRAFFITI REMOVAL

TABLE 2

SCORE FOR REMOVAL	GRAFFITI REMOVAL
4	Completely removed
3	Effectively removed, faint shadow visible
2	Mostly removed, definite shadow visible
1	Partially removed, coloured outline visible
0	No removal or clearly visible, although lighter in intensity

**GRAFFITI RESISTANCE OF AKS 3503 AND AN LUL APPROVED PRODUCT ON
MASONRY SUBSTRATES**

TABLE 3

MARKER AND REMOVAL METHOD	EASE OF REMOVAL (AKS 3503 AND LUL APPROVED PRODUCT)		
	TERRAZZO	CONCRETE	BRICK
<u>Pens</u>			
<ul style="list-style-type: none"> Hot Water 	Partially removed with paint brush - treatment completed with scouring pad. Slow removal.		
	Relatively easy removal		More difficult removal
	-	-	Some retention in crevices
<ul style="list-style-type: none"> AKS 3505 	Relatively easy removal using paint brush and cotton swabs. Contact time ~10 minutes.		
	-	-	Some retention in crevices
<ul style="list-style-type: none"> Multi-Purpose Gel 	Immediately effective following application by paint brush. Removal then completed with cotton swabs.		
	-	-	Some retention in crevices
<u>Paints</u>			
<ul style="list-style-type: none"> Hot Water 	Little removal using paint brush. Removal with scouring pad. Slow removal compared to pen markings.		
	Relatively easy removal.		More difficult removal
	-	-	Some retention in crevices
<ul style="list-style-type: none"> AKS 3505 	Relatively easy removal using paint brush and cotton swabs.		
	Contact time ~10 minutes	Contact time ~10-20 minutes	Contact time ~20-30 minutes
	-	-	Removal completed with scouring pad. Some retention in crevices.
<ul style="list-style-type: none"> Multi-Purpose Gel 	Immediately effective following application by paint brush. Removal then completed with cotton swabs.		
	-	-	Some retention in crevices.