



**CSIRO**

# TEST REPORT

XC3171R1

**Anti Graffiti Testing of Greenlam  
Chemical Resistant Compact  
Laminate**

**CSIRO Materials Science and Engineering**

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# CMSE Report XC3173R1

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Report XC3173R1 replaces XC3173 following request by client to change description of the product

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## 1.0 INTRODUCTION

Six panels of “Greenlam Lab Guardian’ chemical resistant compact laminate were supplied to CSIRO on the 19 March 2013 by Greenlam Asia Pacific for testing their Graffiti Resistance in accordance with ASTM D6578-08.

## 2.0 TEST METHOD

### 2.1 Sample Details

The client submitted 6 panels of 300 mm x 150 mm of Lab Guardian 13 mm compact laminate – grey colour’. The face of the Lab Guardian Compact Laminate comprises of an acrylate layer hardened using electron beam curing process. Panels were more than one month from date of manufacture

### 2.2 Determination of Graffiti Resistance

The graffiti resistance was determined in accordance with ASTM D6578-08. The following marking materials were used:

- Solvent-based Permanent Ink Marker - blue
- Solvent-based Acrylic Spray Paint - red
- Solvent-based Alkyd Spray Paint - red
- Wax Crayon black
- Ballpoint Ink – black
- Water-based Ink Marker – black

The cleaning agents used were:

- Mild Detergent
- Isopropyl Alcohol (IPA)
- Mineral Spirits (mineral turpentine)
- Xylene
- Methyl Ethyl Ketone (MEK)

The marking materials were tested 24 hours after application to the surface. The brand names of the marking materials are given in Appendix A.

## 3.0 EVALUATION OF CLEANABILITY

### 3.1 Visual Assessment

The surface was observed visually to determine which of the cleaning agents was effective in removing the marking material.

### 3.2 Gloss Change

The change in gloss was determined in accordance with AS 1580 Method 602.2 using a Sheen Tri-Gloss meter. The ratio of the average gloss measured after the marking has been removed to the average gloss measured on the panel prior to marking was determined. The ratio should be at least 0.90.

### 3.3 Colour Change $\Delta E$

Colour Measurement of the panels before and after exposure was carried out in accordance with AS 1580 Method 601.1.

All colour measurements were made with a Minolta Chroma Meter CR-200 tristimulus analyser using diffuse illumination and  $0^\circ$  viewing angle. Measurements are expressed in terms of CIE 1976 tristimulus reflectance coordinates  $L^*$  (-black, +white),  $a^*$  (-green, +red) and  $b^*$  (-blue, +yellow). Colour difference measurements  $\Delta E^*_{ab}$  was calculated from these values.

$$\Delta E^*_{ab} = \sqrt{(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2}$$

The  $L^*$  value records any brightening or lightening in the colour of the panels, whilst the  $a^*$  &  $b^*$  measures any shift in the colour. For a graffiti marking to be considered as completely removed, the  $\Delta E^*_{ab}$  shall be less than 2.

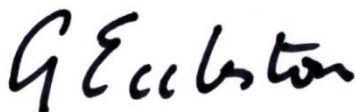
### 3.4 Cleanability

The following rating scale for cleanability (quantitative rating) was used:

- Cleanable with a dry rag = 10
- Cleanable with detergent = 9
- Cleanable with IPA = 8
- Cleanable with mineral spirits = 7
- Cleanable with Xylene = 6
- Cleanable with MEK = 5
- Not cleanable, gloss loss = 4
- Not cleanable, slight shadow = 3
- Not cleanable, heavy shadow = 2
- Not cleanable, shadow and gloss loss = 1

## 3.0 RESULTS

Marking Material	Results		
	Visual/ Quantitative	Gloss Retention	Colour Shift $\Delta E^* ab$
Solvent-based Permanent Ink Marker - blue	Cleanable (with IPA) Rating = 8	0.93 complies	0.3 complies
Solvent-based Acrylic Spray Paint - red	Cleanable (with IPA) Rating = 8	1.00 complies	0.2 complies
Solvent-based Alkyd Spray Paint - red	Cleanable (Mineral Spirits) Rating = 7	0.93 complies	0.3 complies
Wax Crayon black	Cleanable (with 1% Detergent) Rating = 9	1.03 complies	0.2 complies
Ballpoint Ink – black	Cleanable (with IPA) Rating = 8	1.02 complies	0.1 complies
Water-based Ink Marker – black	Cleanable (with 1% Detergent) Rating = 9	1.02 complies	0.1 complies



Senior Materials Scientist  
24 April 2013

## Appendix A Brand Names of Marking Material

Pentel Pen Permanent Marker – blue  
AVT Paints Ironlak Interior. Exterior Gloss Acrylic Paint - red  
PPG Fiddly Bits High Gloss Enamel – red  
Crayola Jumbo Crayons – black  
Bic Soft Feel Medium Ballpoint Pen  
Texta Bullet Tip Colouring Pens