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**RESEARCH LABORATORY TEST REPORT**

*Report No*                      RLR.2

*Date*                                8 September 1998

*Instigator*                      P Lerche Esq  
   Tefcote Surface Systems

*Subject*                            **EFFECT OF FORMALDEHYDE CONTACT  
WITH TEFCOTE TOPCOAT 4000HRX**



TESTING NO. 0140

**A UKAS - Accredited Testing Laboratory No. 0140**

<i>Expert Witness</i>	<i>Failure Investigation</i>	<i>Raw Material &amp; Finished Product Evaluation</i>	<i>Specification Testing</i>	<i>Analysis</i>
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1. Introduction

1.1 Two 20cm x 24cm hardboard panels coated on 20 July 1998 with white Tefcote Topcoat 4000 (base batch 807030, hardener batch 807047) were received at our laboratories on 25 August 1998. An assessment of their resistances to contact by 37.5% and 20% formaldehyde was requested. The panels were assigned our references C.8651/1-2.

2. Test methods

2.1 The 60° gloss levels of the coatings were measured using an Erichsen Miniglossmeter, pre-calibrated against a standard 29.6° gloss surface.

2.2 Four circular areas of approximately 64mm diameter were delineated on each panel. Circular dykes of Vallance Shower, Bath & Kitchen Sealant (approximately 6mm diameter) were constructed on the circumferences, and when these were just touch dry the enclosed areas were filled with formaldehyde solution (GPR ex BDH) at either 40% or 20% w/w. 10mm deep cylindrical aluminium dishes were then rested on the sealant dykes to create sealed cells.

2.3 Owing to the hazard associated with the use of formaldehyde, the tests were conducted on the laboratory roof. The aluminium dishes were removed after 4½, 10½, 25 and 48 hours' formaldehyde solution contact time. The temperature ranges for each duration are given below:

4½ hours	12 - 16°C
10½ hours	10 - 16°C
25 hours	6 - 16°C
48 hours	6 - 16°C

The formaldehyde solution and the dykes were removed and the 60° gloss of the coating at the contact area was measured at once, at seven locations. Gloss changes were also assessed visually.

48 hours after the last test had ended, the panels were rinsed under cold mains water, dried, and the 60° gloss levels re-measured. A visual re-assessment was also made. The results are given in Section 3 below.

3. Results

3.1 60° gloss - Initial (as received)

	<u>Range</u>	<u>Mean</u>
Panel C.8651/1	36.3 - 51.7	42.7
Panel C.8651/2	42.3 - 54.2	49.9

3.2 60° gloss - Immediately after formaldehyde solution contact

<u>Formaldehyde solution contact time, hr</u>	<u>Formaldehyde solution strength</u>	
	<u>40% w/w (C.8651/1)</u>	<u>20% w/w (C.8651/2)</u>
0	42.7	49.9
4½	39.4	41.4
10½	27.1	38.8
25	23.6	37.6
48	27.3	39.5

3.3 60° gloss - After recovery

<u>Formaldehyde solution contact time, hr</u>	<u>Formaldehyde solution strength</u>	
	<u>40% w/w (C.8651/1)</u>	<u>20% w/w (C.8651/2)</u>
0	42.7	49.9
4½	41.0	47.2
10½	35.7	40.4
25	37.3	42.4
48	36.5	41.9

3.4 Visual gloss assessments

No changes in gloss level were detected when test areas were viewed in the horizontal plane at a glancing angle, from a distance of about 60cm, except for a very slight short-term loss of gloss at the area contacted by 40% w/w formaldehyde solution for 10½ hours.

4. Discussion

- 4.1 With one exception, formaldehyde solution at 20% w/w or 40% w/w produced no visual change in coating gloss at contact times up to 48 hours and temperatures up to 16°C. The single exception was a very slight but temporary loss of gloss at an area contacted by 40% formaldehyde solution for 10½ hours. In view of the absence of effect at longer contact times, this result may be related to the degree of coating cure at the test area.
- 4.2 The formaldehyde solutions generated a reduction in instrumentally measured 60° gloss levels, but these reduced gloss levels appeared to be stabilising as contact time increased, as the attached graphs show.
- 4.3 Gloss levels were found to recover somewhat once the test areas had been exposed to the air and water-washed; this trend is also shown on the attached graphs.
- 4.4 Formaldehyde solution would be regarded as a reasonably aggressive chemical at 40% w/w strength, and depending on the frequency and duration of expected coating contact by formaldehyde, longer term tests may be appropriate.
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