THE
CHATFIELD APPLIED RESEARCH LABORATORIES LTD.
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SPECIALIST CONSULTANTS FOR SURFACE COATINGS (PAINTS, LACQUERS, SYNTHETIC RESINS, PRINTING INK, ADHESIVES, ETC.), SEALANTS, ROAD AND BUILDING MATERIALS, RUBBERS, PLASTICS, GEOCHEMISTRY
Quality Assurance Directorate (Materials), and British Standards Institution Approved Test House

RESEARCH LABORATORY REPORT

Date 15th February 1973 *Serial No.* RLR.1.

Subject ASSESSMENT OF COMPOSIL CARPET TREATMENT

Instigator R.T. Crosby Esq., Messrs Composil Ltd.

REPORT

DESCRIPTION OF SAMPLES

1 Tine marked COMPOSIL containing the treatment fluid.

3 pieces of green Wilton Carpet each approximately 3ft x 4ft 6 ins were used in the tests.
Each piece was of a similar type of carpet but with different ultimate treatment as follows:-

1). Carpet treated with COMPOSIL designated Type I (Specimens numbered 100 - 199).

2). Carpet untreated as received designated Type II (specimens numbered 200 - 299).

3). Carpet treated by washing in detergent designated Type III (specimens numbered 300 - 399).

The detergent used was TEEPOL "H" POWDER which was made into a 5% solution by dissolving in water. The pile surface of the carpet was scrubbed with the detergent suds using a stiff household brush. Rinsing was done by sponging the pile surface with a damp sponge frequently rinsed in clean water. The cleaning procedure above was repeated once more and the carpet was then dried, flat on the floor using a fan heater.

TESTS & RESULTS

1. Resistance to Soiling Agents.

Each of the 3 types of carpet was soiled by the application of 5 ml (one teaspoonful) of sixteen different soiling agents to the pile surface of 6 x 3 in rectangles of the carpets.

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There is some evidence that the Composil treatment reduces wear by comparing results with treated and untreated carpet.

The water repllency of the Composil treated carpet is maintained at a high level after subjected to wearing, and is also resistant to soiling.

Persistant wiping of the Composil treated carpet causes some slight loss in weight but water repellency is very well maintained as is resistance to soiling.

After the volatile carrier of Composil has disappeared the active residue shows a useful degree of permanency.

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Signed.

H.W. CHATFIELD (DR.)

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REPORT

GENERAL CONCLUSIONS

The Composil treatment of the Wilton carpet is effective in eliminating or reducing staining or soiling which might otherwise be caused by a range of possible soilants.

Its efficiency has been assessed by both cold and hot application of soilants, shortly after their application and twenty four hours later.

The Composil treatment gives very good water repellency both initially and after water has been in contact for at least an hour. It operates by preventing the water from wetting or spreading over and into the pile.

The Composil treatment has been shown to penetrate the pile. The presence of the Composil treatment throughout the depth of the pile has been shown quantitatively by extraction and weighing, by infra-red spectrophotometric analysis, and practically by water repellency on pile at different depths.

R.T. Crosby Esq
Messrs. Composil Ltd.

R.L.R.I.
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	CARPET TYPE		
	I (Composil Treated)	II (Untreated)	III (Untreated and Washed)
Bass Export Ale	172	272	372
After 20 secs	2 Gentle dabs- No stain	No stain	Trace of stain
After 24 hours	173	273	373
	2 Gentle dabs- no stain.	No stain	Slight stain
Whisky	158	258	358
After 20 secs	Soaked in quickly - removed by 2 firm dabs - no stain	No stain	No stain
Rum	164	264	364
After 20 secs	Soaked in quickly - 2 dabs required - no stain	No stain	Trace of stain
Blackcurrant Juice (Ribena)	154	254	354
After 20 secs	2 Gentle dabs - No stain.	Pronounced stain.	Pronounced stain.
After 24 hours	155	255	355
	2 gentle dabs, 1 wipe but no stain.	Pronounced	Stained
Orange Juice	152	252	352
After 20 secs	1 dab and 2 wipes - no stain	Trace of stain	Trace of stain
After 24 hours	153	253	353
	2 dabs & 2 wipes - required - no stain	Stained	Stained

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	CARPET TYPE		
	I (Composil treated)	II (Untreated)	III (Untreated & Washed
Tomato Soup	150	250	350
After 20 secs	2 dabs & 2 wipes. - No stain.	Soiled & Stained	Soiled & Stained
Fountain Pen Ink	168	268	368
After 20 secs.	One gentle dab only - No stain.	Stained.	Stained.
White Emulsion Paint	167	267	367
After 24 hours.	Paint dried & mostly removed from carpet followed by 12 firm wipes but white still persisted.	Worse than Type I	Worse than Type I
Port.	160	260	360
After 20 secs.	2 firm dabs - No stain.	Trace of stain.	Negligible stain.
Oxtail Soup	162	262	362
After 20 secs	6 Firm wipes - No stain.	Slight stain.	Slight stain.
Milk	156	256	356
After 20 secs..	2 Gentle dabs - no stain.	Stained.	Stained.
HOT APPLICATION RESULTS			
Tea (Just off the boil, from the pot)	105	205	305
After 20 secs	2 gentle dabs required to remove. No stain remained.	Trace of stain	Trace of stain
After 24 hours	106	206	306
	2 gentle dabs - No staining.	Slight stain.	Trace of stain.

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	CARPET TYPE		
	I (Composil Treated)	II (Untreated)	III (Untreated & Washed)
Coffee - Black (from the pot, just off the boil)	107	207	307
After 20 secs	2 gentle dabs - No stain.	Trace of stain.	Trace of stain.
Chocolate (just off the boil)	109	209	309
After 20 secs	No stain.	Trace of stain.	Trace of stain.
After 24 hours	110	210	310
	2 dabs & 2 wipes - Negligible stain.	Slight stain.	Slight stain.
Blackcurrant Juice (70 °C)	115	215	315
After 20 secs	2 gentle dabs - No stain	Slight stain.	Slight stain.
After 24 hours	116	216	316
	2 gentle dabs - No stain.	Pronounced stain.	Pronounced stain.
Orange Juice (70 °C)	117	217	317
After 20 secs	2 dabs & 2 wipes. No stain.	Trace soiled.	Trace soiled.
After 24 hours	118	218	318
	2 dabs & 2 wipes - No stain.	Slightly soiled.	Slightly soiled.
Tomato Soup (just off the boil)	119	219	319
After 20 secs	2 dabs & 2 wipes. No stain.	Slightly soiled.	Slightly soiled.

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	CARPET TYPE		
	I (Composil treated)	II (Untreated)	III (Untreated & Washed
Port (70° C)	121	221	321
After 20 secs.	2 gentle dabs- No stain.	Trace of stain.	Trace of stain.
After 24 hours	122	222	322
	2 gentle dabs- No stain.	Slightly stained.	Trace of stain.
Oxtail Soup (just off the boil)	123	223	323
After 20 secs.	2 dabs & 4 wipes No trace of soiling.	Slightly soiled.	Slightly soiled.
Milk Just off the boil.	125	225	325
After 20 secs	2 gentle dabs- No stain.	Trace soiled.	Trace soiled.
After 24 hours.	126	226	326
	2 gentle dabs- No stain.	Trace soiled.	Trace soiled.

ASSESSMENT OF WATER REPELLENCE

SHORT TERM

Water applied and shaken off after 20 seconds.

Pieces of each type of carpet were treated by allowing 5 ml. of water to stand on the pile surface for 20 seconds. Any water not absorbed by the carpet and still on the pile surface was removed by light shaking. The increase in weight of the carpet enabled its water repellency to be calculated.

Carpet Type	I (Composil treated)	II (Untreated)	III (Untreated & washed)
Water Repellency			
After 20 secs.	99.2%	55.0%	0%

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LONG TERM

Water shaken off after 1 hour.

Method as for short test.

Carpet Type	I (Composil treated)	II (Untreated)	III (Untreated & washed
Water repellency			
After 1 hour	98%	4.4%	0%

ASSESSMENT OF PENETRATION OF COMPOSIL TREATMENT THROUGH CARPET PILE

Pile was cut from pieces of treated (Type I) carpet at three different levels, and the amount of COMPOSIL on the pile was determined by solvent extraction.
A similar extraction was made on the whole pile froma piece of untreated carpet (Type II).
Water repellency (as previous) was also measured at the different depths.

Pile Type	Top 40% depth.	Centre 20%	Bottom 40% depth
Benzene soluble matter.	5.95 %	2.66 %	1.95 %

The benzene soluble marter i.e. natural oils etc. in the untreated carpet was found to be 0.87 % of the pile. Subtracting this figure from the above 3 results gives the amount of COMPOSIL, excluding natural oils, at the different depths through the pile.

	5.08 %	1.79 %	1.08 %

Infra - red spectrophotometric examination of benzene soluble matter from Composil treated and untreated carpets.

The three spectra of the extracts from the top, middle and lowest parts of the pile from the Composil treated carpet all show definite evidence for the presence of active ingredients from the Composil, manifested by the infra-red absorptions at 8.0, 9.8 and 12.5 microns wavelength, previously noted as being characteristic of the active ingredients of the Composil. It is noteworthy that the spectra of extracts from the top surface and centre part of the pile are very similar tothe spectrum of the active ingredients from the Composil, while that from the lowest portion of the pile, although it exhibits the Composil active ingredient absorptions, resembles more closely the spectrum obtained from the greasy and oily matter extracted from an untreated carpet. This observation shows that Composil has penetrated throughout the carpet pile, but in lesser amount at lower levels of the pile than at upper levels as would be expected.

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Thus from the infra-red studies it may be concluded that:-

Comparison of the infra-red spectra for the top, middle and lowest parts of the pile with the spectrum of the active ingredients of Composil indicates that these active ingredients are present throughout the pile.

Water Repellency	40% Cut off	60% Cut off	All pile cut off
After 20 seconds	99.8 %	99.8 %	99.8 %
After 1 hour	97.6 %	94.6 %	3.96 %

Assessment of Wear Resitance of carpet treated with COMPOSIL.

Pieces of each type of carper were subjected to

Artificial wearing of the pile and to attempted wiping off of the Composil.
Following the wear test and separate wiping tests the loss in weight of each type of carpet was calculated (loss of pile):

The Retention of Water Repellency was assessed.

The Retention of Resistance to Soiling Agents was assessed.

The wearing test was made by subjecting the pile to a reciprocating block covered with coarse emery cloth and loaded with 650 g. 1000 complete cycles were given to each piece of carpet. A similar method was used for rubbing the carpets except that the emery was replaced by soft drill cloth.

Wear Resistance to Abrasive Rubbing.

Loss in Weight of pile.

Carpet Type	I (Composil treated)	II (Untreated)	III (Untreated & washed)
Weight loss after 1000 rub cycles	720 mg	840 mg	550 mg

These losses are for test areas $3\frac{1}{2}$" x $1\frac{1}{2}$".

Retention of Water Repellency

Water Repellency After 20 secs	99.2%	55.6%	7.4%
Water Repellency After 1 hour	96.0%	6.4%	1.6%

Retention of Resistance to Soiling Agents

Pieces of each type of carpet which had been abraded with emery cloth and others which had been rubbed with the drill cloth, as described above, were soiled with 5 different agents (cold) and cleaned after 20 seconds and 24 hours.

TESTS ON EMERY WORN CARPETS

	CARPET TYPE		
	I (Composil treated)	II (Untreated)	III (Untreated & washed)
SOILING AGENT			
Coffee Black from the pot	187	287	387
After 20 secs	Removed by 2 dabs of sponge - no stain.	Trace of stain.	Trace of stain.
Blackcurrant (Ribena)	183	283	383
After 20 secs	2 gentle dabs - No stain.	Trace of stain	Pronounced stain.
After 24 hours	1 gentle dab plus 1 firm dab- No stain.	Pronounced stain.	Pronounced stain.
Tomato Soup	182	282	382
After 24 hours	2 firm dabs plus 12 firm wipes- trace of soiling.	Pronounced soiling	Pronounced soiling
Fountain pen Ink	186	286	386
After 20 secs	2 dabs required No stain.	Pronounced stain	Pronounced stain
After 24 hours	3 dabs required Tracestain	Very pronounced stain	Very pronounced stain.
Milk	184	284	384
After 20 secs.	2 gentle dabs- No stain.	Trace stain	Trace stain.
After 24 hours	2 gentle dabs- No stain.	Trace soiling	Trace soiling.

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Wear Resistance to Drill Cloth Rubbing

Loss in weight of pile

Carpet Type	I (Composil treated)	II (Untreated)	III (Untreated & washed)
Weight loss after 1000 rub cycles.	122 mg	94 mg	65 mg

These losses are for test areas of 3½" x 1½"

Retention of Water Repellency

After 20 secs	99.6%	56.1%	9.1%
After 1 hour	98.2%	12.0%	2.8%

Retention of Resitance to Soiling Agents.

Methods as used for Emery cloth.

Soiling Agent			
Blackcurrant juice (Ribena)	189	289	389
After 20 secs	Removed by 1 gentle plus 1 firm dab- No stain.	Slight stain.	Pronounced stain.
After 24 hours	Removed by 1 gentle plus 1 firm dab - No stain.	Pronounced stain.	Pronounced stain.
Tomato Soup	188	288	388
After 20 secs	2 Firm dabs of sponge plus4 hard rubs - No trace of soiling.	Slight soiling.	Soiled.
After 24 hours	2 Firm dabs plus 4 hard rubs - Slight soiling.	Soiled.	Soiled.
Fountain Pen Ink	192	292	392
After 20 secs	2 dabs of sponge No stain.	Slight stain	Pronounced stain.
After 24 hours.	2 dabs of sponge Trace of stain.	Pronounced stain	Pronounced stain.

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	I (Composil treated)	II (Untreated)	III (Untreated & Washed)
Oxtail Soup	191	291	391
After 20 secs	2 gentle dabs plus 2 firm wipes. Trace of soiling.	Slight soiling.	Soiled.
Milk	190	290	390
After 20 secs	2 gentle dabs - No stain.	No stain	No stain
After 24 hours	2 gentle dabs. - No stain.	Trace of soiling.	Trace of soiling

Permanence of Non Volatile Residues

Small amounts of the Composil fluid was placed in weighed dishes and allowed to evaporate at different temperatures, namely 15° C, 25° C and 40° C. The dishes were reweighed daily to assess whether the non-volatile residues continued to lose weight or was permanent.

The results showed that permanence was in fact achieved after 6 days at 15° c and at 25° C, whereas at 40° C permanence was achieved after only 3 days and no further losses occurred.

These results are illustrated in the accompanying diagram. This shows initial loss of volatile matter but thereafter the amount of active residue remains virtually unchanged.

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