Information Report supplied by New Zealand Leather & Shoe Research Association.

Sample Information: 3 Leather Care Products – Leather Cleaner, Leather Conditioner Protector and Waxed Oiled Upholstery Leather Revitaliser

Assessment of colour change of leathers

We can rate colour or surface change by use of ISO 105 grey scales.
These are a worldwide standard measure of colour change or surface change.
A rating of 5 indicates no change, while a rating of 1 means total contrast (like black and white).

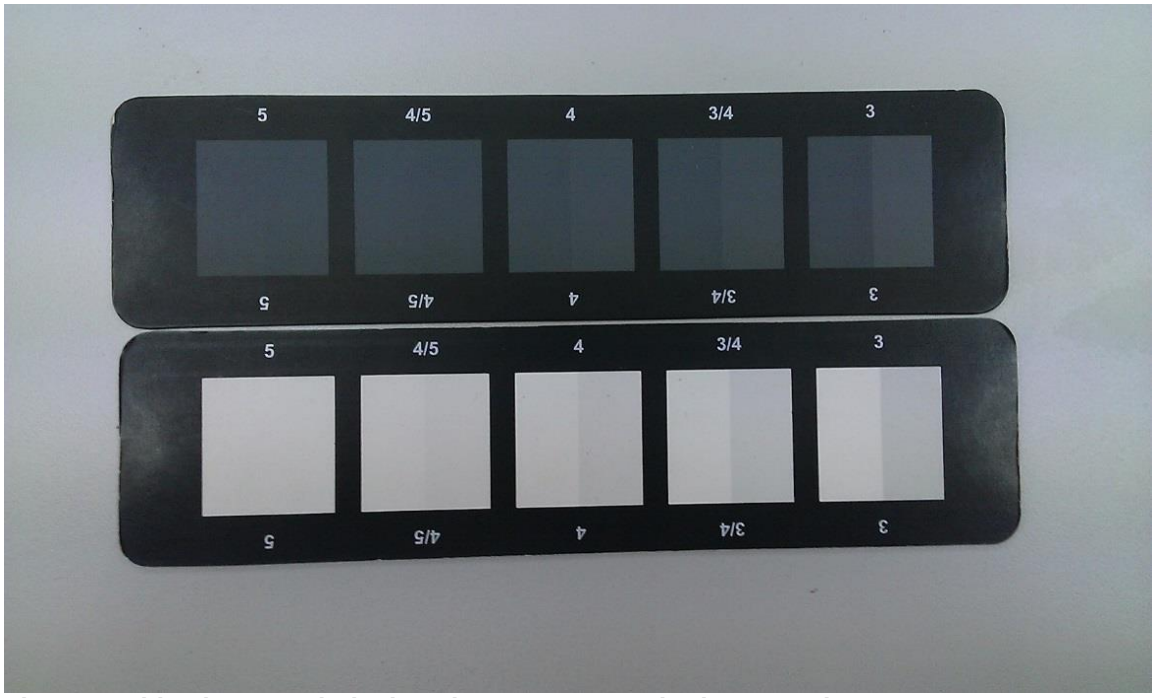

Figure 1: This photograph depicts the ISO 105 standard grey scales.

Surface damage to the leather is assessed using the top grey scale.
Transfer of colour or staining is assessed using the lower scale.

A grey scale grade/rating of 3 is considered to be the pass/fail mark in many colour based assessments. It is considered that this would be the degree of contrast which would prompt customers to complain about colour change.

Methods of product assessment

The cleaner and the protector/conditioner were each applied to a selection of leathers following the instructions on the product containers, and this applied coating was allowed to dry overnight in our controlled atmosphere laboratory which is maintained at 23^{o}C and 50% relative humidity, as required for all leather testing to ISO test methodology.

We use EN 13336, the internationally accepted standard specification for upholstery leathers as a minimum benchmark for leather performance.

In instances to assess the prolonged effects of wear and soiling we used the Martindale abrasion test as would be applied to upholstery fabric.

Leathers used to assess the products

- Pigmented corrected grain: A pigment finished corrected grain upholstery leather with a thicker and more durable finish built of layers of pigmented resin, and which is known for its hard wearing performance

- Vulnerable pigment finished leather: This is similar to the pigmented corrected grain above, but it is a leather we know is marginal in terms of its resistance to wet and sweat rubbing

- Semi Aniline: Leather with a light coating of finish, and with only enough pigment to emphasise the natural character of the grain surface rather than to hide faults, more suited to light formal use.

- Aniline deer: Leather dyed to shade with a very light and delicate lightly coloured finish suited to very light use.

Testing and findings

Resistance to rubbing of the finish

Our first test was on untreated pigment finished corrected grain upholstery leather designed to take heavy wear.

We normally assess your products effectiveness on such leathers using a rub fastness test.
EN 13336 is the internationally accepted standard specification for upholstery leather, and serves as a minimum benchmark for leather performance. This specification requires us to conduct rub fastness tests using ISO method 11640 and the following test conditions:

500 dry rubs
250 wet rubs
80 artificial sweat rubs (A solution of artificial sweat made using ISO method 11641)

On completion of these rubs, we use the grey scales to assess surface damage for dry, wet, and sweat rubs, as directed by the requirements of EN 13336. A minimum grey scale rating/grade of 3 indicating a pass.

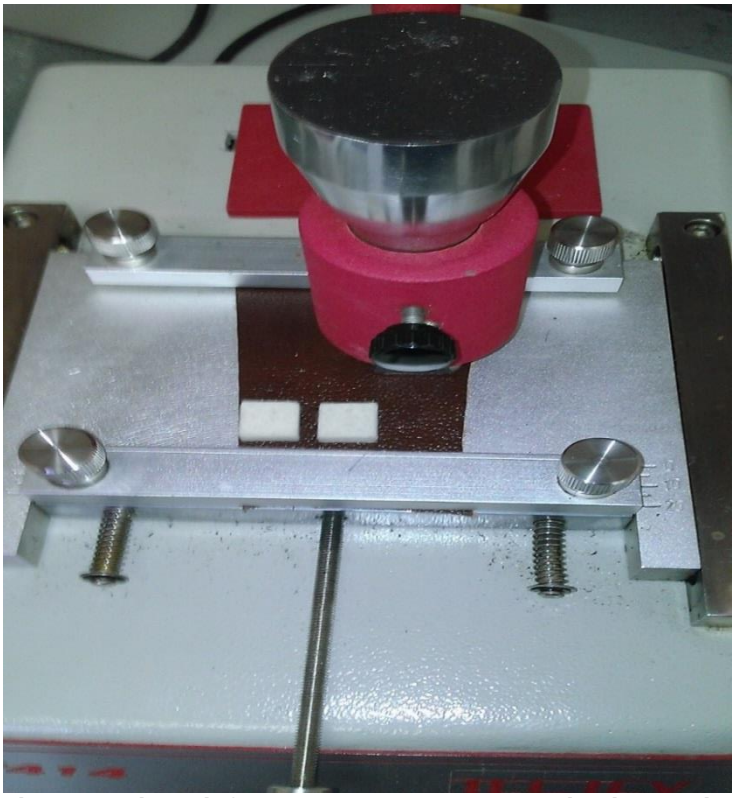

Figure 2: The rub fastness test arrangement is shown above.

This untreated pigment finished corrected grain leather passed the basic requirement for rub fastness contained in EN 13336 easily. Results across the test range were all grade 5, the highest possible rating as shown in table 1.

We then doubled the test durations to 1000 dry 500 wet and 160 sweat rubs on the untreated leather When we doubled the rubbing durations, the leather suffered grey scale grade 3 colour loss after 500 wet rubs in the untreated state. The dry test and the perspiration test were rated at grade 5.
See results in Table 1.

Table 1: Results for tests conducted on untreated pigment finished corrected grain leather

Rub fastness method ISO 11640					
Rubs	**Marring**	**Transfer**	**Rubs**	**Marring**	**Transfer**
500 dry	5	5	**1000 dry**	5	4-5
250 wet	5	5	**500 wet**	3	3-4
80 sweat	5	5	**160 sweat**	5	4

We then applied protector-conditioner or cleaner to the leather and dried it overnight at 23°C 50% RH before carrying out the doubled test durations. See results in Table 2.

Table 2: Results for tests conducted on treated pigment finished corrected grain leather

Rub fastness method ISO 11640					
Cleaner Rubs	**Marring**	**Transfer**	**Protector Rubs**	**Marring**	**Transfer**
1000 dry	5	5	**1000 dry**	5	5
500 wet	5	5	**500 wet**	5	5
160 sweat	5	5	**160 sweat**	5	5

Comments

These care products enabled this particular leather to pass DOUBLE the test requirement of the international standard specification for furniture leather in rub fastness testing.

Flex testing

We also carried out flex tests to see if the product dried out and embrittled the finish. We normally carry out 50,000 flexes on leathers for furniture. The leather when untreated, and when treated with cleaner, and with conditioner-protector withstood 70,000 flexes. No difference was detectable.

Vulnerable pigment finished leather

We know this particular leather cannot meet the EN 13336 rub fastness testing requirements in its untreated state, when we applied your products there was some improvement and we got a performance best described as a marginal pass after 500 dry rubs, 250 wet rubs and 80 sweat rubs.
See results in Table 3.

Table 3: Results for tests conducted on treated vulnerable pigment finished leather

Rub fastness method ISO 11640					
Cleaner Rubs	**Marring**	**Transfer**	**Protector Rubs**	**Marring**	**Transfer**
500 dry	4-5	4-5	**500 dry**	4-5	4-5
250 wet	2	1-2	**250 wet**	3	3-4
80 sweat	2	1-2	**80 sweat**	3	3

This leather would be at best described as marginal, however the results support improvement in leather finish performance for this vulnerable pigment finished leathers.

Martindale abrasion testing for soiling resistance and abrasion resistance assessments:

Soiling resistance of conditioner protector

We used the Martindale abrasion test with its sample holder fitted with a standard soiling cloth we import from a supplier in Europe, and the leather placed on the test bed where a standard abrasive fabric would normally be, to a establish time value on performance in respect to soiling prevention.
We used the ISO standard grey scales to quantify the change in appearance of the test leathers.

Pigment finished corrected grain

When untreated, the pigmented corrected grain leather (as used above) withstood 6,000 cycles to give a soiling result best described as light at a grey scale rating of 4.

The protector was found to be effective in reducing soiling after 6,000 cycles on treated leather.

We found the cleaner restored the untreated leather to grey scale grade 4 to 5. A very good performance for both the conditioner protector and the cleaner. See results in Table 4.

Table 4: Results for tests conducted on vulnerable pigment finished leather

Pigmented corrected grain leather Martindale abrasion with soiling cloth		
	Test duration	**Colour change (grey scale grade)**
Untreated soiling	6,000 cycles	4
Cleaner treated	6,000 cycles	4-5
Protector treated	6,000 cycles	5

However this was a darker brown leather so soiling assessment was somewhat masked in this test by the leather colour. Pinning accurate numbers to the result was difficult, and this high performance finish and dark colour were thought capable of masking other physical and appearance traits. A series of lighter colour shades and more delicate (less wear resistant) finish types were used as a more stringent test of these products.

Cleaner effectiveness – Test 1

Light tan coloured Semi-aniline finish

We decided to use this less robust leather finish to assess cleaner and/or protector effectiveness. See results in Table 5.

Table 5: Results for tests conducted on light tan coloured semi-aniline finish

Light tan coloured semi-aniline finish Martindale abrasion with soiling cloth		
	Test duration	**Colour change (grey scale grade)**
Untreated soiling	6,000 cycles	3
Cleaner treated	6,000 cycles	4-5
Protector treated	6,000 cycles	4

The application of protector before soiling led to reduced soiling and easier cleaning.

Figure 3: The photographs above show the semi aniline leather after 6,000 soiling cycles. The untreated leather is on the left, and the protector treated leather is on the right.

Cleaner restoration was near complete, and to original colour.

When protector was applied to this leather, after the same number of test cycles (6,000), soiling was considerably less evident, and cleaning was made easier, however colour change was still masked by the light tan colour.

Cleaner effectiveness – Test 2

A white aniline deer leather was used as the donor leather for cleaner and protector efficiency testing.

To further assess the cleaner we used a white aniline deer leather (this material is a near white colour) to emphasise the staining caused by the soiling treatment.

The Martindale machine was fitted with a standard soiling cloth from Europe, and colour change was assessed after 1,000 rubs on untreated leather versus protector treated leather.

Figure 4: On the left, untreated aniline deer leather after 1000 cycles and on the right, protector treated leather after 1000 cycles.

Table 6: Results for the white aniline deer leather (Colour: near white)

Martindale abrasion with soiling cloth		
	Test duration	**Colour change (grey scale grade)**
Untreated soiling	1,000 cycles	3-4
Cleaner applied		4-5
Protector treated	1,000 cycles	4
Protector treated (after cleaner)		4-5

Note that only half of each test piece appears stained in the photograph. This is because we elected to clean half of the leather to assess how well the original colour was restored by the cleaner. Cleaner appears to restore the leathers to original colour very well on this near white leather.

Cleaner effectiveness – Test 3

Further samples were subjected to soiling using the soiling cloth for 6,000 cycles to allow soiling to penetrate deeply into the grain of the leather.

One leather sample was treated with the protector, the other left untreated. The soiled leathers were then cleaned under standard conditions.

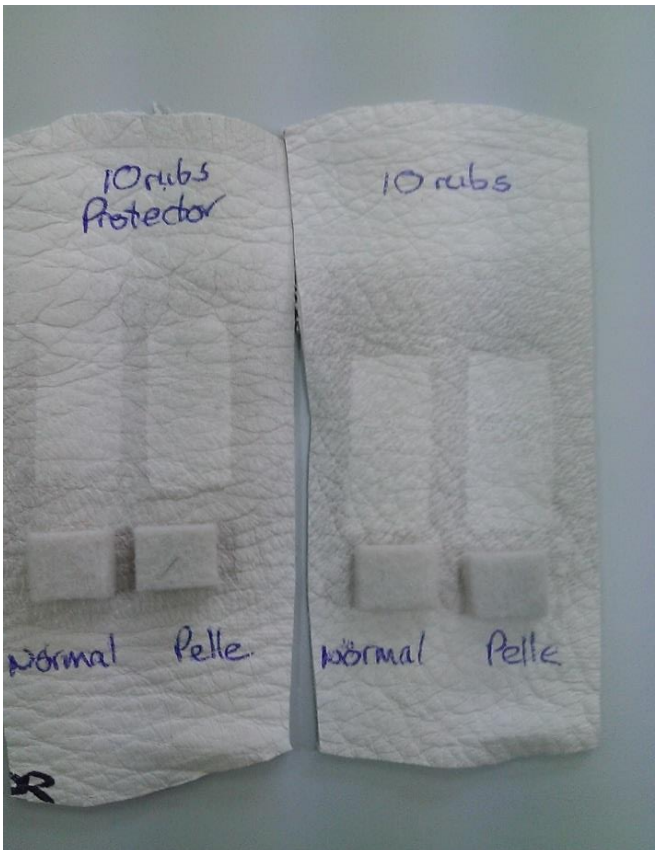

Figure 5: The leather sample on the left was treated with protector, the sample on the right was untreated

The standard wool felt pads required for ISO method 11640, shown in the photograph, were soaked in a standard commercial detergent, and others soaked in Pelle leather cleaner. These were then fitted to the test machine and used to clean the soiled leathers following the method described in ISO 11640 with a to and fro rubbing action under a 1kg load.

Soiling can be seen embedded in the pores of the skin in the untreated leather on the right, whilst this had been prevented by the conditioner treated sample on the left.

Assessment of the cleaned section, comparing them to the soiled sections gave the results seen in Table 7.

Table 7: Comparative results for protected and unprotected deerskin leather

Treatment		Detergent	Cleaner
Unprotected	Grey scale grade	3-4 *	4
Protected		4	4-5

** note soiling material ground into the pores of the skin material*

Finish wear/abrasion protection

For this assessment we used a light tan semi-aniline leather using a modified version of the Martindale abrasion test.

We found that by fitting leather to the test bed, and wetting the abrasion fabric in the traditional sample holder we could simulate wear/use conditions. The results can be seen in Figure 6.

The abrasion resistance was 5 times higher for this particular leather finish after treatment with conditioner/protector.

Figure 6: The left sample is treated with conditioner/protector and withstood 2,500 cycles on the Martindale abrasion tester, whilst the sample to the right is untreated and shows finish damage after just 500 Martindale abrasion cycles

In the following photograph the conditioner/protector treated leather on the left shows much less finish abrasion than the untreated leather on the left. Both had completed 6,000 cycles of Martindale abrasion. We consider this 6,000 cycle test duration to be a good reflection of the long term wear characteristic of a suite.

Figure 7: Sample on left - Conditioner/Protector treated leather. Sample on right: Untreated leather

Staining/soiling prevention

The Martindale abrasion machine test head can be fitted with a standard soiling cloth (known as EMPA cloth) made by a research organisation in Europe. This can then be used to apply a standard soiling mixture under standard condition, for any number of cycles.

A graduated approach to soiling build up revealed the results for soiling over time.

Table 8: Results for soiling build up over time

Soiling abrasion cycles	Protector treated (grey scale grade)	Unprotected (grey scale grade)
200	4-5	4
400	4	3-4
600	4	3-4
800	4	3
1000	3-4	3
1200	3-4	2-3
6000	3	2

This testing showed that untreated leather became soiled faster, and more severely than the protector treated leather.

Comments and Conclusions on Conditioner-Protector

- The conditioner protector was found to improve rub fastness and abrasion resistance on all of our test leathers
- In one case we found a 5x improvement of wear life on leathers treated with conditioner-protector
- The results show that conditioner-protector slows the rate of soiling
- The results show that cleaning of leathers treated with conditioner-protector is more effective and quicker than cleaning leathers not pre-treated with conditioner-protector.

Comments and Conclusions on Cleaner

- Our tests found the cleaner removed more soiling than a commercial detergent.
- We noted the cleaner had deep cleaning ability, in that soiling was removed from the pores of the skin.
- The results also show that the cleaner works even faster on leathers treated with conditioner – protector.

Revitaliser

Using a waxed and oiled pull-up type finished leather, after 1,500 Martindale abrasion cycles the leather finish was damaged to grey scale grade 2. When revitaliser was applied to the damaged area, the leather was restored to within grey scale grade 4 to 5 of its original colour. Near complete restoration occurred as shown in Figure 9 below.

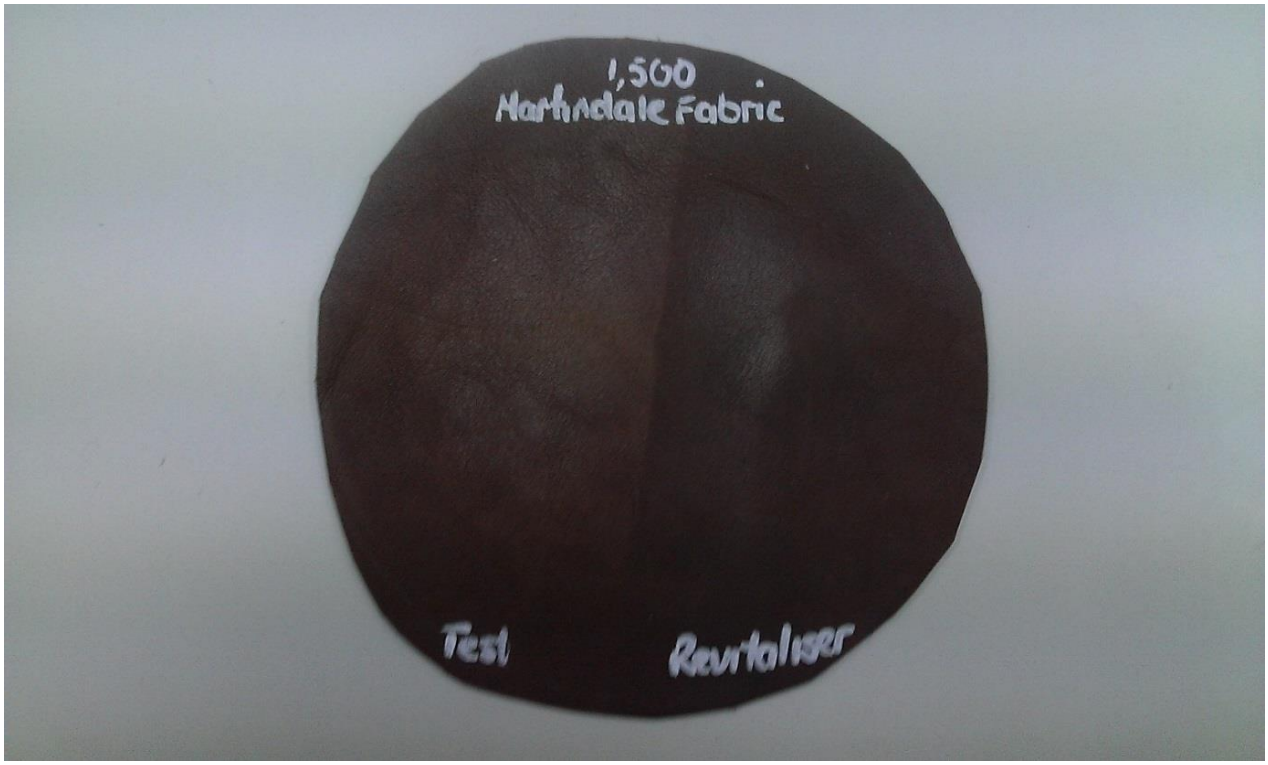

Figure 9: Damaged leather sample showing damage on left side and near complete restoration on right side after revitaliser is applied.