

Report date: 16 May 2019

Project Title: Design and Development of Leather Testing Methods for Comparative Study of PU Leather Durability

Report Summary

This is an interim report to update the company on the preliminary test results obtained from the comparative study of the two different PU supplied (Normal PU, Secretlab Prime 2.0 PU) using the testing method developed in SIMTech.

Preliminary evaluation of both PU (as obtained) showed that “Secretlab Prime 2.0 PU” is performing better than “Normal PU” at the abrasion test using the Martindale Method and the Taber Abraser; peeling of PU layer were observed for “Normal PU” after 200,000 cycles on the Martindale whereas no cracks or peeling were observed for “Secretlab Prime 2.0 PU”. In both cases, change in gloss were observed. Cracks/scratches were observed for the “Normal PU” after 1000 cycles of abrasion using the Taber Abraser, whereas there were few localized cracks/scratches observed for “Secretlab Prime 2.0 PU”. The tensile break strength for “Secretlab Prime 2.0 PU” is higher than the “Normal PU” for both transverse and longitudinal stretch.

Both PU samples were subjected to immersion in artificial sweat at an elevated temperature for accelerated aging. Preliminary evaluation showed that peeling was observed for “Normal PU” after 50,000 cycles on the Martindale, whereas no peeling or cracks were observed by visual examination for “Secretlab Prime 2.0 PU” after 200,000 cycles on the Martindale. The taber abrasion test and the tensile break strength evaluation is in progress.

1 OBJECTIVE

Comparative study of two different PU leather provided by Secretlab for their durability.

2 METHODOLOGY

2.1 Accelerated Testing

Immersion in Artificial Sweat at Elevated Temperature

This tests is conducted using acidic artificial sweat formulation.

PU leather samples were immersed in the in artificial sweat solution. Care was taken to ensure that the samples were fully immersed in the solution. The mixture of solution and samples were placed in the oven at elevated temperature, for a duration of 15 days. The samples were then cooled to room temperature and washed thoroughly with de-ionized water, and dried overnight. The dried samples were then evaluated using the test methods listed in section 2.2 below.

2.2 Evaluation Methods

The following tests was conducted in-house with some modifications, with each test conducted in triplicates:

(a) Breaking strength:

- Strip method, with reference to, and adapted with modifications from ASTM D751 and & D5035
- In the direction of longitudinal and transverse for breaking strength of the fabric
- Performed using Intron 5548

(b) Surface Abrasion:

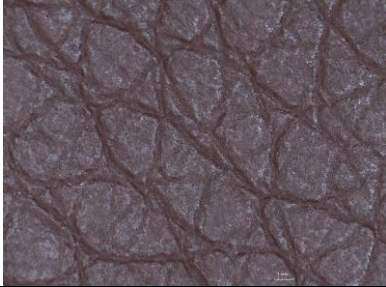
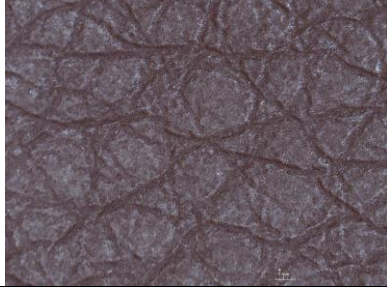


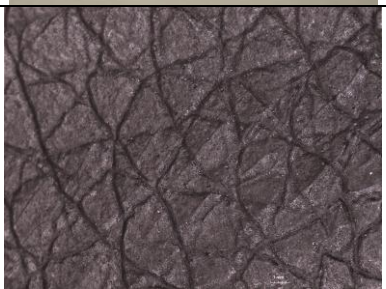
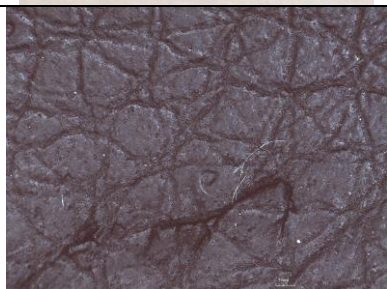
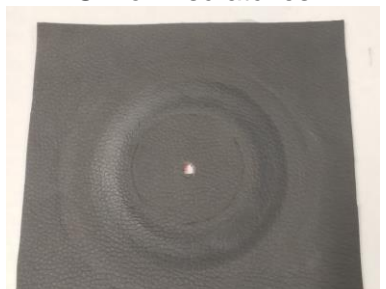
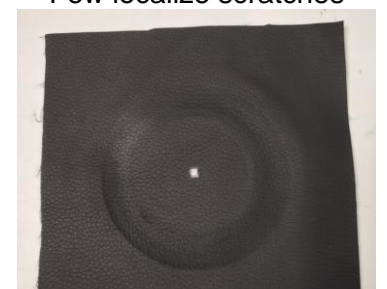
- Using Rotary Platform, Abraser Method with reference to, and adapted with modifications from ASTM D3884 and ASTM D7255
- At least 200 cycles, up to 1000 cycles
- Performed using Taber Abraser 5135

(c) Martindale Abrasion Test:





- Sample size: 38 – 40 mm diameter
- Rotating the platform and specimen
- Cycle: up to 200,000 cycles as requested

3 TEST RESULTS

3.1 Control Samples – PU samples as obtained

	Normal PU	Secretlab Prime 2.0 PU
Appearance Under Microscope, 6x		
Appearance after Martindale Abrasion Test for 200K cycles		
Appearance after Taber Abraser test 1000 cycles		
	Uniform scratches	Few localize scratches
		
Average Longitudinal Break strength / N	178.46 ± 6.58	260.49 ± 8.53
Average Transverse Break strength / N	306.48 ± 10.14	327.63 ± 22.26

3.2 Immersion in Artificial Sweat at elevated temperature

	Normal PU	Secretlab Prime 2.0 PU
Appearance of PU after Martindale abrasion	<p>Sample 1 (Peeling observed after 50,000 cycles)</p>  <p>Sample 2 (Peeling observed after 100,000 cycles)</p>  <p>*Stopped after 50,000 / 100,000 respectively cycles as peeling was observed for both 2 samples</p>	<p>Sample 1 (No peeling observed after 200,000 cycles)</p>  <p>Sample 2 (No peeling observed after 200,000 cycles)</p> 
Appearance after Taber Abraser test	In Progress	In Progress
Average Longitudinal Break strength / N	In Progress	In Progress
Average Transverse Break strength / N	In Progress	In Progress

4 PRELIMINARY FINDINGS

Preliminary evaluation of both PU (as obtained) showed that “Secretlab Prime 2.0 PU” is performing better than “Normal PU” at the abrasion test using the Martindale Method and the Taber Abraser; peeling of PU layer were observed for “Normal PU” after 200,000 cycles on the Martindale whereas no micro-cracks or peeling were observed for “Secretlab Prime 2.0 PU”. In both cases, change in gloss were observed. Uniform cracks/scratches were observed for the “Normal PU” after 1000 cycles of abrasion using the Taber Abraser, whereas there were little cracks/scratches observed for “Secretlab Prime 2.0 PU”. The tensile break strength for



“Secretlab Prime 2.0 PU” is higher than the “Normal PU” for both transverse and longitudinal stretch.

Both PU samples were subjected to immersion in acidic artificial sweat at an elevated temperature as a form of accelerated aging test. Preliminary evaluation showed that peeling was observed for “Normal PU” after 50,000 – 100,000 cycles of the Martindale abrasion test, whereas no visual peeling or cracks were observed for “Secretlab Prime 2.0 PU” after 200,000 cycles of the Martindale abrasion test. The taber abrasion test and the tensile break strength evaluation is in progress.

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