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Report

Life Miracle Products, Inc.

Report No: 40123
Project No: 224401.13969
Date: 11/2/98

Re: Magnetic Units for Colorfastness and Tensile Evaluation

OBJECTIVE:

The project was divided into two distinct phases. Phase One was to determine whether Life Miracle magnetic units caused atypical dye migration when used in a normal washing manner. Phase Two of the project was to determine whether Life Miracle magnetic units caused any significant reduction in fabric strength when used in a normal washing manner.

SAMPLE IDENTIFICATION:

Lab Sample No. M5357 - Two (2) Life Miracle Magnetic Units delivered to Shuster Laboratories on July 9, 1998.

PROCEDURE:

As a background note, "Bundle" testing normally consists of preparing a laundry bundle composed of various blends of fabric and soils that is representative of a "typical household" bundle. For both Phases of this evaluation, bundles were prepared using six (6) pound loads made up of stripped ballast materials, consisting of ten (10) towels and six (6) bed sheets that were blends of cotton and polyester. The stripping procedure is a standard procedure that is used to ensure that there are no contaminants (ie., surfactants, finishes, etc.) from previous testing, since ballast materials are recycled.

Phase One of the study consisted of using a modified version of Standard Guide D-5548 from the American Society of Testing and Materials (ASTM). This standard is a method designed to evaluate color loss and color transfer of dyed and undyed fabrics in the presence of a chemical detergent system. The method is designed to utilize a terg-o-tometer for providing the mechanical washing energy. The modifications employed in the study were required to perform the testing in standard washing machines.

For Phase One of the study two identical bundles were prepared. Added to the ballast material of each bundle were eighteen (18) swatches measuring 4½" x 6". These swatches were attached to ballast through the use of plastic tag ties. The eighteen swatches comprised several dye categories. Six (6) of the test swatches were made of nylon and dyed with Acid Red #151. Six swatches were cotton and dyed with Direct Blue #1 and six swatches were cotton dyed with Direct Blue #90. In addition six (6) undyed swatches made of cotton were added to determine the amount of dye (color) transfer.

PROCEDURE: (cont.)

One of the bundles prepared was used as a water control to establish a baseline color loss/transfer. This provided information regarding how much dye loss/transfer was attributable solely to the effects of washing the dyed fabrics in water. The fabrics were initially measured for color (reflectance) with the use of a HunterLab Colorquest Spectrocolorimeter (Model CQS-1400) which provides color quantification using a color scale composed of L* a* b* values. These values are provided in Table 1.

Table I

Fabric Identification (Water Control)	L*	a*	b*	Fabric Identification (Magnetic Units)	L*	a*	b*
Red 151-01	40.27	61.94	35.42	Red 151-01	40.73	61.64	35.66
Red 151-02	40.52	61.93	35.61	Red 151-02	40.57	62.06	35.88
Red 151-03	40.54	61.82	35.57	Red 151-03	40.29	62.07	35.54
Red 151-04	41.03	61.37	35.00	Red 151-04	40.41	62.00	35.84
Red 151-05	40.42	61.93	35.63	Red 151-05	40.56	62.01	35.73
Red 151-06	40.47	61.88	35.65	Red 151-06	40.50	62.02	35.86
Blue 1-01	61.53	-12.69	-19.44	Blue 1-01	56.84	-12.52	-20.27
Blue 1-02	57.38	-12.66	-20.29	Blue 1-02	57.11	-12.56	-20.36
Blue 1-03	56.85	-12.63	-20.24	Blue 1-03	57.05	-12.55	-20.32
Blue 1-04	57.01	-12.49	-20.21	Blue 1-04	57.40	-12.60	-20.34
Blue 1-05	56.62	-12.55	-20.38	Blue 1-05	57.11	-12.57	-20.30
Blue 1-06	56.99	-12.59	-20.27	Blue 1-06	58.28	-12.54	-20.03
Blue 90-01	37.62	-7.12	-28.59	Blue 90-01	37.67	-7.15	-28.87
Blue 90-02	37.71	-7.22	-28.72	Blue 90-02	37.88	-7.23	-28.88
Blue 90-03	37.50	-7.16	-28.92	Blue 90-03	37.61	-7.14	-29.07
Blue 90-04	37.33	-7.10	-28.72	Blue 90-04	37.92	-7.25	-28.76
Blue 90-05	37.56	-7.11	-28.80	Blue 90-05	37.83	-7.05	-28.85
Blue 90-06	37.60	-7.21	-28.63	Blue 90-06	37.55	-7.07	-28.84
Undyed cotton-01	95.44	-0.84	2.75	Undyed cotton-01	95.35	-0.78	2.68
Undyed cotton-02	95.60	-0.81	2.48	Undyed cotton-02	95.61	-0.77	2.62
Undyed cotton-03	95.63	-0.79	2.49	Undyed cotton-03	95.65	-0.81	2.53
Undyed cotton-04	95.70	-0.79	2.40	Undyed cotton-04	95.67	-0.79	2.71
Undyed cotton-05	95.69	-0.79	2.26	Undyed cotton-05	95.60	-0.81	2.57
Undyed cotton-06	95.60	-0.75	2.25	Undyed cotton-06	95.59	-0.83	2.71

The bundles were washed in paired Kenmore washing machines using 16 gallons of 105°F wash/70°F rinse temperatures at 150ppm water hardness (as $CaCo_3$). The Life Miracle magnetic units were placed on opposite sides of the agitator in the washing machine after the machine had filled and the bundle had been added. After the wash cycle was complete, the swatches were removed and dried using a rotary ironer for approximately twenty (20) minutes to allow the swatches to dry.

PROCEDURE: (cont.)

After drying the reflectance of the swatches was again measured using the spectrocolorimeter. These values were compared to the values obtained before washing and provided a Delta E value or color difference which can be correlated to the dye transfer/loss characteristics for a particular sample product (see Results). The L*a*b* values obtained after washing are shown in Table 2.

Table 2

Fabric Identification (Water Control)	L*	a*	b*	Fabric Identification (Magnetic Units)	L*	a*	b*
Red 151-01	40.29	60.95	35.35	Red 151-01	40.00	61.16	35.97
Red 151-02	40.57	60.90	35.55	Red 151-02	40.16	61.21	35.84
Red 151-03	40.35	61.13	35.81	Red 151-03	39.91	61.05	35.76
Red 151-04	40.95	60.99	35.82	Red 151-04	39.92	60.99	35.62
Red 151-05	40.00	61.08	35.93	Red 151-05	40.38	61.02	35.57
Red 151-06	40.28	61.06	35.75	Red 151-06	40.20	61.05	35.55
Blue 1-01	61.44	-11.70	-18.98	Blue 1-01	57.38	-11.73	-19.42
Blue 1-02	57.35	-11.74	-19.55	Blue 1-02	57.81	-11.96	-19.62
Blue 1-03	57.34	-11.79	-19.51	Blue 1-03	57.33	-11.92	-19.60
Blue 1-04	57.07	-11.67	-19.57	Blue 1-04	57.54	-11.71	-19.80
Blue 1-05	56.91	-11.64	-19.58	Blue 1-05	57.34	-11.75	-19.60
Blue 1-06	57.34	-11.68	-19.55	Blue 1-06	58.42	-11.65	-19.47
Blue 90-01	38.61	-5.17	-28.96	Blue 90-01	38.38	-5.89	-29.36
Blue 90-02	38.78	-5.84	-29.31	Blue 90-02	38.24	-5.74	-29.53
Blue 90-03	38.59	-6.31	-29.33	Blue 90-03	37.92	-6.54	-29.58
Blue 90-04	38.12	-5.71	-29.37	Blue 90-04	37.99	-5.52	-29.90
Blue 90-05	38.23	-5.90	-29.29	Blue 90-05	38.00	-5.36	-29.78
Blue 90-06	38.49	-6.13	-29.22	Blue 90-06	37.79	-5.29	-29.59
Undyed cotton-01	94.07	-0.74	1.89	Undyed cotton-01	94.12	-1.06	1.65
Undyed cotton-02	94.38	-0.95	1.83	Undyed cotton-02	94.33	-0.95	1.60
Undyed cotton-03	94.18	-1.12	1.59	Undyed cotton-03	94.24	-0.88	1.47
Undyed cotton-04	94.41	-1.01	1.73	Undyed cotton-04	94.10	-0.79	1.50
Undyed cotton-05	94.11	-0.93	1.33	Undyed cotton-05	94.24	-0.98	1.36
Undyed cotton-06	93.67	-0.93	3.20	Undyed cotton-06	93.74	-1.03	1.86

Phase Two of the project consisted of placing identical pieces of standardized cotton fabric measuring one yard square into two washing machines. One piece was washed in combination with the Life Miracle magnetic units, while the other was washed in water only. Once again, the purpose of washing in water only is to establish a baseline to determine how much if any reduction in fabric strength is attributable to the effects of water.

PROCEDURE: (cont.)

The fabric pieces were placed into the washing machines with identical six (6) pound bundles composed of ballast materials and washed in the exact same manner as described in Phase One. After washing the bundles were tumble dried and then the cotton test piece was removed. Each piece was then cut into twenty strips approximately 6" x 1" in size. Ten strips were cut in the machine (warp) direction and ten were cut in a cross (fill) direction to provide tensile information in both directions.

After conditioning the strips for forty-eight (48) hours at 70°F and 25-30% RH the strips were tested using a modified version of the "grab" test as outlined in ASTM Standard Test Method D-5034. All the pieces were tested on a Thwing-Albert Tensile Tester, Model QC II-XS. This model provides for a constant rate of elongation (CRE) with each strip being tested using a three (3) inch gap at a speed of ½" per minute.

RESULTS:

Results for Phase One of the study are shown in Table 3. The Delta E values for each of the three types of dyed fabric are shown, along with the undyed cotton swatches. In this instance, the higher the Delta E value, the more significant the color change. Typically Delta E values of less than 5.0 are not visually perceptible.

Table 3

	Water Control	Life Miracle Sample		Water Control	Life Miracle Sample
Red 151-01	0.99	0.92	Blue 90-01	1.42	1.52
Red 151-02	1.04	0.94	Blue 90-02	1.84	1.67
Red 151-03	0.75	1.09	Blue 90-03	1.44	1.71
Red 151-04	0.90	1.15	Blue 90-04	1.73	2.06
Red 151-05	0.99	1.01	Blue 90-05	1.46	1.92
Red 151-06	0.83	0.99	Blue 90-06	1.51	1.95
AVG	**0.92**	**1.02**	**AVG**	**1.57**	**1.81**
Blue 1-01	1.09	1.28	Undyed cotton-01	1.62	1.65
Blue 1-02	1.18	1.07	Undyed cotton-02	1.38	1.65
Blue 1-03	1.18	1.00	Undyed cotton-03	1.75	1.79
Blue 1-04	1.04	1.05	Undyed cotton-04	1.47	1.98
Blue 1-05	1.25	1.11	Undyed cotton-05	1.84	1.98
Blue 1-06	1.21	1.05	Undyed cotton-06	2.07	2.05
AVG	1.16	1.09	AVG	1.69	1.85

RESULTS: (cont.)

The tensile strength and elongation values obtained in Phase Two of the study are shown in Table 4. In the table, tensile strength is reported as pounds per inch, while the elongation is a percent (%) value.

Table 4

	Unwashed Fabric		Water Control		Life Miracle Sample	
Machine Dir.	Tensile	Elongation	Tensile	Elongation	Tensile	Elongation
Repl. 1	22.8	6.4	19.0	9.6	21.4	8.6
Repl. 2	22.2	6.3	19.1	11.0	17.4	9.2
Repl. 3	23.3	6.5	18.0	9.6	20.5	10.4
Repl. 4	20.3	5.5	22.0	10.4	17.7	10.7
Repl. 5	23.5	6.5	16.7	10.5	21.1	10.0
Repl. 6	20.5	5.6	21.3	9.3	19.4	9.6
Repl. 7	22.8	5.9	21.5	10.2	22.9	10.7
Repl. 8	22.5	6.1	20.3	11.1	22.4	9.9
Repl. 9	23.6	5.9	22.2	10.7	21.3	9.4
Repl. 10	21.0	6.2	19.5	10.8	16.0	11.7
AVG	**22.3**	**6.1**	**20.0**	**10.3**	**20.0**	**10.0**
Cross Dir.						
Repl. 1	15.9	25.0	16.3	18.1	14.3	24.9
Repl. 2	16.4	26.6	15.9	23.4	12.2	25.7
Repl. 3	14.6	25.4	14.1	21.1	11.2	23.2
Repl. 4	14.9	26.5	11.1	27.7	11.5	22.3
Repl. 5	16.4	27.5	11.7	25.8	12.7	25.4
Repl. 6	14.9	23.8	15.0	24.9	15.0	24.7
Repl. 7	15.9	26.6	14.8	24.5	13.6	28.9
Repl. 8	16.0	23.9	11.6	23.3	15.1	25.6
Repl. 9	15.8	27.4	16.5	24.6	16.3	29.2
Repl. 10	16.1	26.6	12.3	25.5	13.3	23.8
AVG	**15.7**	**26.0**	**13.9**	**23.9**	**13.5**	**25.2**

CONCLUSIONS:

For this evaluation, the data obtained from Phase One of the study indicates that when washed in the presence of the Life Miracle magnetic units the dyed and undyed fabrics do not achieve any significant increase in dye loss or transfer, when compared to dyed fabrics washed in water only.

With regard to fabric strength (tensile) in the machine direction, the data obtained from Phase Two of the study indicates that those strips washed with the Life Miracle magnetic units and those washed in water alone are slightly reduced in tensile strength when compared to the unwashed strips,

RESULTS: (cont.)

and provide for a slightly higher elongation. However, based upon this examination the washed strips do not appear to be different from each other for either characteristic.

With respect to fabric strength (tensile) in the cross direction, the data obtained from Phase Two of the study indicates that those strips washed with the Life Miracle magnetic units and those washed in water alone are very slightly reduced in tensile strength when compared to the unwashed strips, and provide for a slightly lower elongation. Again, based upon this examination the washed strips do not appear to be different from each other with regard to either strength or elongation.

Respectfully submitted,

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