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THE TEARING OF WEATHERED RUBBER-COATED FABRICS.(U)
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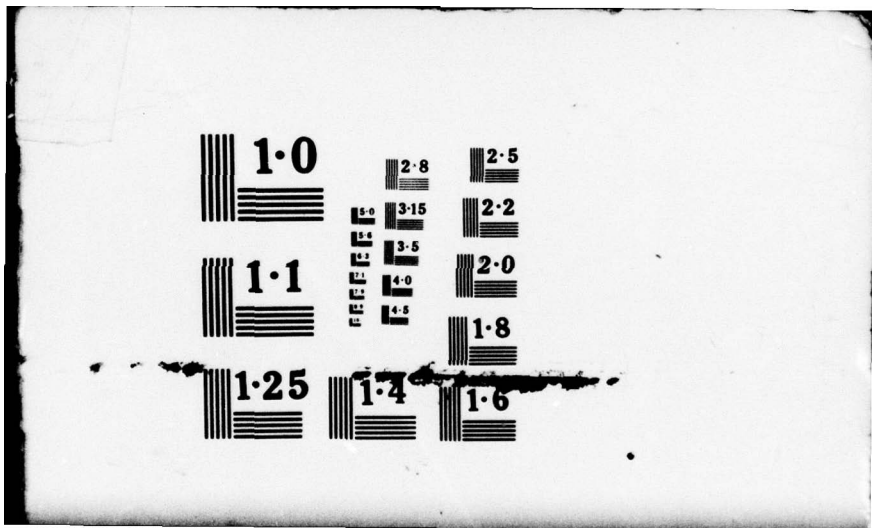
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THE TEARING OF WEATHERED RUBBER-COATED FABRICS

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SUMMARY

The wing-rip tear strengths of a nylon and of a cotton fabric, each coated with natural rubber, neoprene, polyurethane or chlorosulphonated polyethylene and exposed to various weathering conditions, were determined.

The coated nylon fabrics had higher tear strengths than the cotton ones, but were more variable. Polyurethane-coated nylon increased in tear strength on exposure at two Australian sites, but natural rubber coated cotton decreased on exposure in UK. Load during exposure reduced the tear strengths of the natural rubber coated fabrics.

Departmental Reference: Mat 339

* QAD Mats, Chorley

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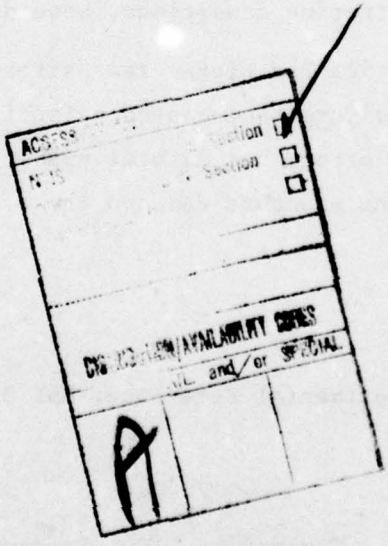

1 INTRODUCTION

The exposure of rubber-coated fabrics for up to one year of weathering and the effects of this on their flexibilities, strengths and breaking extensions have previously been reported[1,2].

In a collaborative trial involving several Establishments of MOD(PE) and the Joint Tropical Research Unit (JTRU), nylon and cotton base fabrics of similar mass per unit area were coated with natural, neoprene, polyurethane (PU) or chlorosulphonated polyethylene (CSPE) rubbers. These coated fabrics were exposed for three, six or twelve months, and a second period of six months (6S) commencing at the end of the first, under loads of 1% or 10% of the nominal breaking strengths. Pieces of fabric were positioned at 45° to the horizontal and facing the equator at a site in the UK (PERME, Waltham Abbey, referred to as ERDE in the earlier reports) and at two sites in Queensland (hot, dry at Cloncurry and hot, wet, cleared jungle at Innisfail).

The coated nylon fabrics were found to be thicker, heavier and less flexible than the coated cotton fabrics; PU rubber, particularly on nylon, stiffened more than the other rubbers during exposure. The coated nylon fabrics were stronger and more extensible than the cotton ones, but those coated with natural rubber lost strength and extension at a faster rate when exposed under load. Nylon coated with PU was initially stronger and more extensible than when coated with the other rubbers, but lost these properties faster at Innisfail. Extension was more severely affected than strength by load during exposure.

The present Report gives the results and their analyses for the wing-rip tear strengths of these coated fabrics on weathering.

2 DETERMINATION OF TEAR STRENGTHS

The wing-rip tear strengths, the preferred British Standard method at slow speeds, were determined in accordance with the standard[3], except that the rate of jaw separation was 5 cm/min instead of 10 cm/min and that only two test pieces were available per condition, both for tearing across warp threads, instead of five (except in the original controls, though to maintain uniformity in the subsequent processing of the results, the first two recorded were those used).

A 15cm cut was made across the warp in each test piece, of which the dimensions were 12.5 cm warpway × 20 cm weftway. Lines at angles of 55° to the

cut were marked on both tails, which were then inserted into the jaws of a recording tensile testing machine, with the marks along the edges of the jaws; the machine was situated in a room at 20°C and 65% relative humidity and test pieces were conditioned in this atmosphere for at least 24 h before testing. Ignoring the first peak in each tear trace, the median and maximum forces were recorded.

Most specimens gave satisfactory tears, except that in eight cases, where the tear strength was high, there was thread slippage or coating flaking. Nevertheless, tear values were obtained in all cases, and these were used in the subsequent analyses.

The uncoated cotton fabric had a median tear strength of 5.1 N, and a maximum of 7.1 N. The uncoated nylon fabric had a median tear strength of 100 N, and a maximum of 255 N.

3 ARRANGEMENT OF RESULTS

The median and maximum tear strengths for each condition are given in Tables 1 and 2 respectively, the duplicate results referring to replication. The determinations were inevitably separated in time of determination by well over a year, and some were not made until more than two years after the end of the exposures. The effect of this on the conclusions is not known.

As noted previously[1,2], the three month specimens from Australia were not differentiated as to their loading conditions; the columns containing the lower nylon/natural rubber tear strengths were therefore ascribed, as with breaking strength, to the 10% loading.

The tear strengths were divided into the same nine sets as for the breaking strengths[2], it not being possible to consider the results as a whole because of specimen losses. Since the median and maximum tear strengths were closely correlated (correlation coefficient = 0.996, slope = 1.18), only median strengths were analysed in detail. The 368 usable values were analysed by computer using the following columns from Table 1:

Set	No. of columns in set	Columns from Table 1 used	Brief description[1]
(a)	2	A, B	Controls
(b)	6	C, D, K, L, S, T	3 months
(c)	12	C, E, G, I, K, M O, Q, S, U, W, Y	1%
(d)	24	C-Z	Natural rubber
(e)	8	C-J	PERME
(f)	6	A, B, C, E, G, I	PERME, 1%, with controls
(g)	6	A, B, K, M, O, Q	Cloncurry, 1%, with controls
(h)	6	A, B, S, U, W, Y	Innisfail, 1%, with controls
(i)	24	C-Z	Nylon with 3 rubbers

However, because the variability of the nylon fabrics was significantly greater than that of the cotton (see section 4.1), the analysis of variance assumption that the error was randomly-distributed over all the results was strained. Thus significant cotton effects could be missed, and unjustifiably significant conclusions might be drawn for the nylon fabrics. The nylon and cotton results were therefore treated separately, though the combined analysis was also performed for additional effects not obtainable in the separate analyses, making 24 altogether (3 × 8 + set (i) which contained only nylon - nylon results from set (d) which were obtainable from set (i)).

4 RESULTS AND DISCUSSION

4.1 Analysis of errors

The variances, standard deviations and degrees of freedom of the errors are given in Table 3. The nylon/cotton error variance ratios were significant in all the sets, necessitating separate analyses (see section 3). There was little evidence for differences in variability between the sets, however: for nylon, the highest variance ratio was 3.8 for (g)/(e); and for cotton, 4.4 for (a)/(b).

The means and coefficients of variation are also given in Table 3. Both measures were smaller for cotton than for nylon. Overall, the coefficients for tear strength were slightly higher than for breaking strength[2] but as there were no separate analyses for nylon and cotton breaking strengths, separate comparisons could not be made.

4.2 Analysis of median tear strengths

4.2.1 General

Variance ratios derived from analysis of variance within each set are given in Table 4. The effects are discussed below in their order of occurrence in the tables, it not being possible to base them on order of importance because this differed widely in the various sets. Only those effects which had better than 99.9% probability of being correct were considered.

The means of the median tear strengths for each effect are given in Table 5. These are given complete, since it was found that most were important in at least one set, and it was felt that there might be confusion if results were omitted in some cases.

The differences between pairs of means required for significance at 99.9% probability are given in Table 6.

The variance ratios in Table 4 for the interactions of fabric with the other factors were obtainable only from the overall analyses. The means in Table 5 for the fabric interactions were those from which the effects for the individual base fabrics were derived.

4.2.2 Effect of fabric (F)

This was obtainable only from the overall analysis. The variance ratios were upwards of 500, with the coated nylon fabrics always having higher tear strengths than the cotton: this tear strength ratio in set (a) was 5.4; in sets (c), (g) and (h), which included the longer exposures and the Australian sites, it rose to about 7 (*cf* FT and FS below).

4.2.3 Effect of rubber (R) and fabric × rubber interaction (FR)

These were important in all the sets except (a) and (i). The effect on the nylon-based fabrics was greater than for the cotton ones in sets (c), (g) and (h), and greater for cotton than for nylon in sets (b), (e) and (f). This was due mainly to an increased tear strength on weathering for the PU-coated nylon, particularly at the Australian sites, and a decreased tear strength on weathering for natural rubber coated cotton at PERME (*cf* RS and TS below). Because the coating tended to come off the weathered PU-coated nylon during the tear tests, its tear strength approached that of uncoated nylon (section 2).

4.2.4 Effect of time (T) and fabric × time interaction (FT)

These were important in all sets except (a) and (i). In sets (d), (e) and (f) there was a tendency for tear strength to decrease with time, because of the

effect on natural rubber coated cotton, particularly at PERME; in sets (c), (g) and (h), there was a tendency to increase, because of the effect on PU-coated nylon, particularly at the Australian sites (*cf* RS and TS).

4.2.5 Effect of load (L) and fabric × load interaction (FL)

In set (b), *ie* at short times, these were of no importance, but in (d), (e) and (i) the higher load caused some significant loss of tear strength in the nylon fabrics.

4.2.6 Effect of site (S) and fabric × site interaction (FS)

In set (b), the coated nylon fabrics at Cloncurry had lower tear strengths than at the other sites; with set (c), the coated nylon fabrics had higher tear strengths at Cloncurry and Innisfail than at PERME, this being due to the effects on PU-coated nylon at the longer times. For set (d), the natural rubber coated nylon fabrics were not significantly affected by the site, but the natural rubber coated cotton at PERME suffered losses in tear strength. In set (i), which did not include PU or cotton, there was no significant effect of site (*cf* RS).

4.2.7 Rubber × time interaction (RT) and fabric × rubber × time interaction (FRT)

In sets (a) and (i) these were of little importance. However, in (c), the PU-coated nylon fabric increased in tear strength with time of exposure, whilst the natural rubber coated cotton fabric decreased. In sets (e) and (f), the natural rubber coated cotton also decreased in tear strength with time. With sets (g) and (h), the PU-coated nylon increased in tear strength with time.

4.2.8 Rubber × load interaction (RL) and fabric × rubber × load interaction (FRL)

These were testable only in set (b), where they were not significant, and (e), where the natural rubber coated nylon and cotton fabrics under 10% load had lower tear strengths than when exposed under 1% load.

4.2.9 Rubber × site interaction (RS) and fabric × rubber × site interaction (FRS)

In set (b), the PU-coated nylon had higher tear strength at PERME and Innisfail. With (c), the PU-coated nylon had higher tear strength at Cloncurry and Innisfail, whilst the natural rubber coated cotton had lower tear strength at PERME.

4.2.10 Time × load interaction (TL) and fabric × time × load interaction (FTL)

In set (d), the natural rubber coated nylon fabric under 10% load lost tear strength with time. The effects were not significant in sets (e) and (i).

4.2.11 Time × site interaction (TS) and fabric × time × site interaction (FTS)

In set (c), the coated nylon fabrics increased in tear strength with time at the Australian sites. In set (d), the natural rubber coated cotton fabric lost strength with time. The effects were not significant in set (i), which did not include PU or cotton.

4.2.12 Load × site interaction (LS) and fabric × load × site interaction (FLS)

In set (b), *ie* at short times, these were not significant. With set (d), the natural rubber coated cotton fabric at PERME, and, in sets (d) and (i), the natural rubber coated nylon fabric at PERME and at Cloncurry, lost more tear strength after exposure under the higher load.

4.2.13 Rubber × time × site interaction (RTS) and fabric × rubber time × site interaction (FRTS)

In set (c), the PU-coated nylon increased in tear strength with time at the Australian sites, and the natural rubber coated cotton lost more strength with time at PERME than at the other sites. The effect was not significant with set (i), there being no PU and no cotton.

4.2.14 Other interactions

The other testable interactions were: RTL and FRTL in sets (e) and (i), TLS and FTLS in sets (d) and (i), LSR and FLSR in sets (b) and (i), and RTLS in set (i). Some of these just reached significance at 99.9% probability, but they did not add appreciably to the information gained from the experiment.

5 CONCLUSIONS

(1) The wing-rip tear strength of nylon and cotton fabrics of similar mass per unit area and coated with natural, neoprene, PU or CSPE rubbers have been determined after exposure to weathering in UK or Australia for up to one year under a load of 1% or 10% of the nominal breaking load.

(2) The ratio of tear strengths for the nylon to the cotton fabrics was more than 5, but the nylon had greater variability.

(3) The tear strength of the PU-coated nylon increased with time at the Australian sites, due to failure of the coating permitting yarn slip and bunching.

(4) The tear strength of the natural rubber coated cotton decreased with time in UK.

(5) The tear strengths of the natural rubber coated nylon and cotton were lower after exposure under the heavier load, especially after longer times of exposure.

(6) Fabrics coated with CSPE were least affected by weathering.

Acknowledgment

The authors thank Mr D.E. Lloyd of Mathematics and Computation Department, RAE, for discussions and the arranging of the computer programs.

Table 1

MEDIAN TEAR STRENGTHS, N, OF WEATHERED COATED FABRICS

Site	Controls		PERME								Cloncurry								Innisfail							
Time, months	Original	Final	3		6		12		6S		3		6		12		6S		3		6		12		6S	
Load level, %			1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10
Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Fabric Rubber																										
Nylon Natural	24.5	21.8	23.5	22.8	25.9	18.8	27.1	14.1	22.0	21.2	18.4	17.7	22.9	19.0	32.2[a]	13.7	25.1[a]	19.1	22.8	22.8	16.1	18.4	19.6	18.1	26.3	23.9
	22.0	15.7	24.5	22.8	23.2	18.1	23.5	13.3	23.5	19.6	25.9	19.6	20.0	18.8	37.5[a]	15.5	30.2[a]	21.6	22.8	18.1	18.4	19.6	16.7	17.7	26.5	22.6
Nylon Neoprene	25.9	20.8	22.6	23.5	22.4	19.6	24.9	22.8	18.8	21.2	19.2	20.4	21.6	23.5	22.0	21.2	20.6	21.6	24.3	22.0	22.0	24.3	22.4	30.4	20.6	25.7
	25.1	22.6	22.4	21.2	22.6	22.8	21.4	22.0	21.6	20.4	21.6	22.4	21.6	23.5	20.2	25.5	25.0	21.8	24.7	21.2	24.3	25.9	23.3	24.5	22.6	25.1
Nylon PU	29.0	24.9	28.4	27.7	25.1	25.9	27.1	24.3	25.9	27.5	21.2	18.8	27.9	-	89.8[a]	-	52.5[a]	-	23.2	31.8	77.5[b]	83.4[b]	71.6[a]	-	58.9[a]	-
	29.4	22.8	28.8	29.0	26.3	27.9	24.7	25.1	25.9	25.5	20.8	18.4	22.8	-	91.7[a]	-	55.4[a]	-	23.2	33.0	80.4[b]	81.4[b]	75.0[a]	-	57.4[a]	-
Nylon CSPE	22.4	23.1	23.3	23.2	20.8	20.0	20.4	22.0	21.2	22.0	23.2	21.2	23.5	21.6	20.8	22.8	21.8	22.6	22.0	26.7	23.5	22.8	24.0	23.1	23.1	23.5
	24.3	23.5	23.2	22.0	23.9	21.2	18.8	21.2	21.6	24.3	23.5	23.5	25.5	20.8	20.6	23.0	23.7	21.6	22.0	23.9	23.9	22.8	21.6	23.5	23.3	23.1
Cotton Natural	4.5	4.6	4.3	4.2	3.1	3.1	1.8	0.5	3.9	3.7	4.5	4.5	3.9	4.3	3.8	3.2	4.3	3.9	4.3	4.5	3.7	3.9	3.9	3.5	4.4	4.9
	4.7	4.7	4.4	4.3	2.9	2.9	1.4	0.5	3.9	3.3	4.5	4.3	4.1	4.3	3.6	3.8	4.4	3.9	4.3	4.3	3.9	4.1	3.9	4.2	4.4	4.5
Cotton Neoprene	4.7	4.8	4.6	4.4	4.1	4.3	3.9	4.1	4.1	3.9	3.9	4.3	3.7	-	3.3	-	3.8	3.6	3.9	4.3	3.7	3.9	3.9	-	3.9	3.8
	4.6	4.7	4.8	4.6	4.1	4.1	3.9	4.3	4.3	4.3	4.1	4.3	3.7	-	3.4	-	3.7	3.4	3.9	4.3	3.7	3.7	3.5	-	4.1	3.8
Cotton PU	4.0	4.0	4.1	4.2	3.9	3.9	3.7	3.5	3.7	4.1	3.7	3.7	3.7	3.7	4.4	-	4.0	4.4	3.7	4.1	3.9	-	4.0	3.5	4.4	4.6
	4.3	4.7	4.0	4.0	3.9	4.1	3.5	3.3	3.5	3.5	3.7	3.5	3.9	3.9	4.4	-	3.8	4.4	3.9	3.9	3.9	-	3.6	3.7	4.1	4.5
Cotton CSPE	3.9	4.0	3.7	3.6	4.1	3.9	3.7	3.5	3.8	3.9	3.9	3.7	3.3	-	3.1	-	3.5	3.5	3.9	3.7	3.9	3.7	3.7	4.0	3.5	4.3
	3.9	4.0	3.7	3.7	3.9	4.3	3.7	3.9	3.5	3.7	3.9	3.7	3.7	-	3.1	-	3.7	3.7	4.1	3.7	3.9	4.1	3.4	4.0	3.4	4.1

- specimen lost or damaged

a thread slippage

b coating flaked

Table 2

MAXIMUM TEAR STRENGTHS, N, OF WEATHERED COATED FABRICS

Site	Controls		PERME								Cloncurry								Innisfail							
Time, months	Original	Final	3		6		12		6S		3		6		12		6S		3		6		12		6S	
Load level, %			1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10
Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Fabric Rubber																										
Nylon Natural	31.8	27.3	29.8	27.5	29.9	29.1	31.8	17.2	29.0	25.2	28.6	22.1	28.3	25.7	>39.2[a]	17.9	35.7[a]	23.1	30.0	30.1	19.9	22.1	25.3	20.3	31.2	27.9
	31.4	20.0	32.0	27.3	29.2	20.9	30.7	17.9	27.8	25.7	34.3	25.1	24.7	23.3	>39.2[a]	19.8	35.1[a]	26.0	27.9	25.1	23.9	23.5	18.6	22.0	31.8	29.6
Nylon Neoprene	32.8	27.5	31.4	32.4	26.3	25.2	28.9	29.0	26.3	27.0	26.0	31.7	26.9	27.2	27.1	24.9	25.3	26.7	31.5	26.4	27.0	31.0	28.3	33.7	26.0	29.6
	29.9	27.1	25.7	28.1	31.0	26.8	29.0	29.2	27.8	26.2	29.7	28.9	25.9	28.5	30.8	30.2	31.0	25.7	29.8	27.5	31.4	33.0	28.1	30.3	28.4	28.3
Nylon PU	29.0	29.4	>39.2	35.3	34.8	34.2	34.8	33.6	31.7	36.1	31.9	22.3	34.1	-	94.2[a]	-	61.3[a]	-	31.0	40.2	87.9[b]	104.0[b]	80.9[a]	-	68.2[a]	-
	37.9	26.1	36.9	>39.2	34.7	43.2	34.7	35.0	38.7	32.4	30.4	23.2	31.2	-	96.1[a]	-	67.7[a]	-	36.6	38.0	89.1[b]	95.7[b]	89.8[a]	-	64.3[a]	-
Nylon CSPE	26.9	28.7	28.6	26.9	26.9	23.7	25.8	24.9	25.7	28.1	30.2	27.5	27.4	26.3	26.5	27.9	28.3	27.5	29.4	28.3	28.4	28.6	29.9	28.0	30.4	28.0
	29.1	27.5	26.9	28.3	28.3	28.8	27.3	27.0	28.6	29.0	29.7	29.2	28.2	25.8	27.5	26.9	28.4	25.9	27.8	29.2	29.2	28.6	27.0	27.0	29.9	27.0
Cotton Natural	5.7	6.1	5.9	6.2	4.2	4.6	2.6	1.0	5.1	5.2	6.2	5.8	5.3	5.7	5.4	4.7	5.3	5.5	6.2	5.4	5.1	5.6	5.3	5.0	6.0	6.1
	5.9	5.9	5.7	6.2	3.6	4.1	2.4	1.0	5.3	4.7	6.1	5.6	6.1	6.4	4.9	5.0	5.9	5.4	6.2	5.8	5.6	5.7	5.1	5.4	5.8	6.2
Cotton Neoprene	6.1	6.0	5.9	6.3	6.0	6.2	5.1	6.5	6.2	5.5	5.4	6.2	5.8	-	4.9	-	4.9	5.0	5.7	6.7	5.7	6.1	5.2	-	5.4	5.5
	6.1	6.3	6.7	6.1	6.2	6.2	5.8	6.0	5.8	6.0	6.0	6.0	4.8	-	5.2	-	5.6	5.3	6.6	6.0	5.0	5.5	5.3	-	5.1	5.2
Cotton PU	5.9	5.8	5.6	6.0	5.3	5.4	4.6	4.6	4.9	5.5	5.3	5.2	4.8	5.4	6.1	-	5.1	6.4	5.4	5.4	6.3	-	5.6	5.3	6.0	5.6
	5.7	6.4	5.5	5.7	5.5	6.5	5.3	4.5	5.0	5.2	5.2	5.1	5.8	5.2	5.6	-	5.2	6.1	4.9	5.2	5.4	-	6.1	6.1	6.0	6.9
Cotton CSPE	5.1	4.9	5.5	4.6	5.8	3.4	5.2	5.0	5.0	5.2	5.5	5.0	4.6	-	3.9	-	4.8	5.2	5.6	5.0	4.8	6.3	5.5	5.1	4.3	6.2
	4.9	5.2	5.0	5.1	5.6	5.6	5.2	5.7	5.4	5.4	5.2	4.7	4.9	-	4.6	-	6.5	4.8	5.6	5.9	5.6	7.7	4.4	6.2	4.7	5.7

- specimen lost or damaged

a thread slippage

b coating flaked

Table 3

ANALYSIS OF ERRORS

Property	Source	Set								
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Error variance	Nylon	3.509	2.432	3.216	-	1.611	2.483	5.182	2.282	2.672
	Cotton	0.0391	0.0088	0.0161	0.0350	0.0278	0.0233	0.0216	0.0255	-
	Nylon/cotton error variance ratio	90	275	197	-	57	117	239	90	-
	Overall	1.774	1.220	1.616	2.082	0.819	1.253	2.602	1.157	-
Set mean, N	Nylon	23.6	33.2	28.2	-	22.9	23.6	27.6	28.7	22.2
	Cotton	4.4	4.1	3.8	3.8	3.7	3.9	4.6	4.1	-
	Overall	14.0	13.6	16.0	12.6	13.2	13.7	15.8	16.4	-
Standard deviation, N	Nylon	1.874	1.560	1.793	-	1.269	1.576	2.276	1.513	1.635
	Cotton	0.198	0.090	0.127	0.187	0.167	0.152	0.147	0.160	-
	Overall	1.332	1.105	1.271	1.443	0.905	1.119	1.613	1.075	-
Coefficient of variation, %	Nylon	7.9	6.8	6.4	-	6.4	6.7	8.2	5.2	7.4
	Cotton	4.5	2.4	3.3	4.9	4.5	3.8	3.6	3.9	-
	Overall	9.5	8.1	7.9	11.5	6.9	8.2	10.2	6.5	-
Degrees of freedom in error	Nylon } Cotton }	8	24	48	24	32	24	24	24	72
	Overall	16	48	96	48	64	48	48	48	-

Table 4

TABLE OF VARIANCE RATIOS

Effect	Source	Degrees of freedom	No.of levels	No.of results per level	Set								
					(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
F	Overall	1	2	16	1668								
F	Overall	1	2	48		7106		3625.6		840	517	1267	
F	Overall	1	2	96			18569						
F	Overall	1	2	64					16958				
R	Nylon	3	4	4	5.9								
R	Cotton	3	4	4	12.1								
R	Overall	3	4	8	5.3								
R	Nylon	3	4	12		12.8				18.9	177.7	845.9	
R	Cotton	3	4	12		112.8				47.3	37.1	17.1	
R	Overall	3	4	24		9.8				20.5	181.7	833.6	
R	Nylon	3	4	24			855.5						
R	Cotton	3	4	24			17.6						
R	Overall	3	4	48			912.0						
R	Nylon	3	4	16					58.2				
R	Cotton	3	4	16					150.4				
R	Overall	3	4	32					73.8				
R	Nylon	2	3	48									7.1
FR	Overall	3	8	4	6.6								
FR	Overall	3	8	12		16.5				22.8	177.7	839.2	
FR	Overall	3	8	24			897.0						
FR	Overall	3	8	16					65.3				
T	Nylon	1	2	8	13.5								
T	Cotton	1	2	8	1.3								
T	Overall	1	2	16	12.6								
T	Nylon	3	4	24			128.0						
T	Cotton	3	4	24			80.7						
T	Overall	3	4	48			114.4						
T	Cotton	3	4	12				154.3					
T	Overall	3	4	24				11.3					
T	Nylon	3	4	16					9.2				
T	Cotton	3	4	16					121.4				
T	Overall	3	4	32					28.6				
T	Nylon	5	6	8						5.1	68.5	128.4	
T	Cotton	5	6	8						72.9	36.4	23.2	
T	Overall	5	6	16						8.9	93.3	118.1	
T	Nylon	3	4	36									2.4
FT	Overall	1	4	8	14.3								
FT	Overall	3	8	24			141.3						
FT	Overall	3	8	12				4.7					
FT	Overall	3	8	16					6.0				
FT	Overall	5	12	8						6.1	102.8	136.3	
L	Nylon	1	2	24		0.0							
L	Cotton	1	2	24		0.0		5.4					
L	Overall	1	2	48		0.0		72.9					
L	Nylon	1	2	32					17.5				
L	Cotton	1	2	32					2.9				
L	Overall	1	2	64					15.7				
L	Nylon	1	2	72									23.4

Table 4 (continued)

Effect	Source	Degrees of freedom	No.of levels	No.of results per level	Set								
					(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
FL	Overall	1	4	24		0.0		65.8					
FL	Overall	1	4	32					12.1				
S	Nylon	2	3	16		22.1							
S	Cotton	2	3	16		10.6		189.5					
S	Overall	2	3	32		23.4		4.0					
S	Nylon	2	3	32			165.4						
S	Cotton	2	3	32			11.7						
S	Overall	2	3	64			192.1						
S	Nylon	2	3	48									3.7
FS	Overall	2	6	16		20.7		4.6					
FS	Overall	2	6	32			178.9						
RT	Nylon	3	8	2	1.6								
RT	Cotton	3	8	2	0.1								
RT	Overall	3	8	4	1.5								
RT	Nylon	9	16	6			120.5						
RT	Cotton	9	16	6			29.7						
RT	Overall	9	16	12			132.4						
RT	Nylon	9	16	4					2.2				
RT	Cotton	9	16	4					64.9				
RT	Overall	9	16	8					4.1				
RT	Nylon	15	24	2						2.2	69.2	151.6	
RT	Cotton	15	24	2						24.2	7.6	4.0	
RT	Overall	15	24	4						1.7	71.4	152.1	
RT	Nylon	6	12	12									5.6
FRT	Overall	3	16	2	1.6								
FRT	Overall	9	32	6			122.1						
FRT	Overall	9	32	4					1.6				
FRT	Overall	15	48	2						4.2	66.6	147.8	
RL	Nylon	3	8	6		4.6							
RL	Cotton	3	8	6		7.1							
RL	Overall	3	8	12		4.6							
RL	Nylon	3	8	8					17.8				
RL	Cotton	3	8	8					6.6				
RL	Overall	3	8	16					26.8				
RL	Nylon	2	6	24									43.8
FRL	Overall	3	16	6		4.7							
FRL	Overall	3	16	8					19.8				
RS	Nylon	6	12	4		7.4							
RS	Cotton	6	12	4		16.2							
RS	Overall	6	12	8		7.9							
RS	Nylon	6	12	8			170.2						
RS	Cotton	6	12	8			58.0						
RS	Overall	6	12	16			181.1						
RS	Nylon	4	9	16									6.0
FRS	Overall	6	24	4		6.9							
FRS	Overall	6	24	8			181.6						

Table 4 (concluded)

Effect	Source	Degrees of freedom	No.of levels	No.of results per level	Set								
					(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
TL	Cotton	3	8	6				5.8					
TL	Overall	3	8	12				12.9					
TL	Nylon	3	8	8					4.7				
TL	Cotton	3	8	8					2.5				
TL	Overall	3	8	16					12.8				
TL	Nylon	3	8	18									1.7
FTL	Overall	3	16	6				10.0					
FTL	Overall	3	16	8					3.2				
TS	Nylon	6	12	8			83.7						
TS	Cotton	6	12	8			14.1						
TS	Overall	6	12	16			98.8						
TS	Cotton	6	12	4				50.3					
TS	Overall	6	12	8				6.9					
TS	Nylon	6	12	12									3.7
FTS	Overall	6	24	8			91.7						
FTS	Overall	6	24	4				5.2					
LS	Nylon	2	6	8		4.8							
LS	Cotton	2	6	8		3.5		8.3					
LS	Overall	2	6	16		5.2		14.4					
LS	Nylon	2	6	24									12.5
FLS	Overall	2	12	8		4.3		12.3					
RTL	Nylon	9	32	2					4.0				
RTL	Cotton	9	32	2					3.0				
RTL	Overall	9	32	4					6.5				
RTL	Nylon	6	24	6									10.0
FRTL	Overall	9	64	2					4.7				
RTS	Nylon	18	48	2			70.0						
RTS	Cotton	18	48	2			14.8						
RTS	Overall	18	48	4			75.0						
RTS	Nylon	12	36	4									3.2
FRTS	Overall	18	96	2			73.7						
TLS	Cotton	6	24	2				2.3					
TLS	Overall	6	24	4				5.5					
TLS	Nylon	6	24	6									3.4
FTLS	Overall	6	48	2				5.6					
LSR	Nylon	6	24	2		5.2							
LSR	Cotton	6	24	2		4.5							
LSR	Overall	6	24	4		5.1							
LSR	Nylon	4	18	8									5.5
FLSR	Overall	6	48	2		5.2							
RTLS	Nylon	12	72	2									4.1

Table 5

TABLE OF MEAN MEDIAN TEAR STRENGTHS, N

Factor	Level	Set								
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
F	Nylon	23.6	23.2	28.1	21.6	21.5	23.4	27.6	28.7	
	Cotton	4.5	4.1	3.8	3.7	3.7	4.0	4.0	4.1	
R	Natural	12.9	13.0	13.8		12.3	13.4	14.4	12.7	21.6
	Neoprene	14.1	13.2	12.9		12.9	13.2	13.1	13.6	22.5
	PU	15.4	14.6	24.0		15.1	15.1	22.4	25.9	-
	CSPE	13.6	13.4	13.0		12.9	13.0	13.3	13.4	22.6
FR		Nylon Cotton	Nylon Cotton	Nylon Cotton		Nylon Cotton	Nylon Cotton	Nylon Cotton	Nylon Cotton	
	Natural	21.0 4.6	21.8 4.4	23.8 3.8		21.5 3.0	23.2 3.7	24.7 4.3	21.1 4.3	
	Neoprene	23.5 4.7	22.2 4.3	22.2 3.9		21.6 4.2	22.6 4.4	22.2 4.0	23.2 4.1	
	PU	26.5 4.3	25.4 3.9	44.1 3.9		26.4 3.8	26.5 3.9	40.7 4.1	47.8 4.0	
	CSPE	23.3 3.9	23.2 3.8	22.5 3.7		21.8 3.8	22.2 3.8	23.0 3.7	23.1 3.8	
T	Original	14.8					14.8	14.8	14.8	
	Final	13.1					13.1	13.1	13.1	
	3 months			13.6	13.0	14.0	14.4	12.9	13.5	22.4
	6 months			15.6	12.0	13.3	13.7	13.3	19.8	21.8
	12 months			18.2	11.8	12.4	12.9	22.8	19.0	21.9
	6S months			16.4	13.8	13.2	13.2	17.9	18.1	22.8
FT		Nylon Cotton		Nylon Cotton	Nylon Cotton	Nylon Cotton	Nylon Cotton	Nylon Cotton	Nylon Cotton	
	Original	25.3 4.3					25.3 4.3	25.3 4.3	25.3 4.3	
	Final	21.9 4.4					21.9 4.4	21.9 4.4	21.9 4.4	
	3 months			23.2 4.1	21.8 4.4	24.3 4.2	24.6 4.2	21.8 4.0	23.2 4.0	
	6 months			27.5 3.8	19.9 3.7	22.8 3.8	23.7 3.7	23.2 3.7	35.8 3.8	
	12 months			33.2 3.5	20.8 2.8	21.8 3.1	23.5 3.2	41.8 3.6	34.3 3.7	
	6S months			28.9 3.9	23.4 4.1	22.7 3.8	22.6 3.8	31.8 3.9	32.4 4.0	
L	1%		13.6		13.8	13.5				22.8
	10%		13.5		11.4	12.9				21.6
FL			Nylon Cotton		Nylon Cotton	Nylon Cotton				
	1%		23.2 4.1		23.8 3.8	23.9 3.7				
	10%		23.1 4.1		19.0 3.7	19.0 3.7				
S	PERME		14.2	13.5	12.3					21.6
	Cloncurry		12.6	16.7	13.2					22.3
	Innisfail		14.0	17.7	12.4					22.6
FS			Nylon Cotton	Nylon Cotton	Nylon Cotton					
	PERME		24.3 4.2	23.8 3.7	21.5 3.0					
	Cloncurry		21.0 4.0	29.5 3.8	22.3 4.1					
	Innisfail		24.0 4.1	31.4 3.9	20.6 4.2					
RL			1% 10%			1% 10%				1% 10%
	Natural		13.7 12.5			13.7 10.8				23.8 19.0
	Neoprene		13.3 13.0			12.9 12.9				22.2 22.9
	PU		14.0 15.2			15.0 15.2				- -
	CSPE		13.3 13.5			12.8 12.9				22.5 22.6
FRL			1% 10%			1% 10%				
	Nylon									
	Natural		23.0 20.6			24.1 18.8				
	Neoprene		22.5 21.8			21.5 21.7				
	PU		24.2 26.5			26.2 26.6				
	CSPE		22.9 23.4			21.7 22.0				
	Cotton									
	Natural		4.4 4.4			3.2 2.8				
	Neoprene		4.2 4.4			4.2 4.3				
	PU		3.9 3.9			3.8 3.8				
	CSPE		3.9 3.7			3.8 3.8				

Table 5 (continued)

Factor	Level	Set																							
		(a)				(c)				(e)				(f)				(g)				(h)				(i)		
		Natural	Neoprene	PU	CSPE	Natural	Neoprene	PU	CSPE	Natural	Neoprene	PU	CSPE	Natural	Neoprene	PU	CSPE	Natural	Neoprene	PU	CSPE	Natural	Neoprene	PU	CSPE	Natural	Neoprene	CSPE
RT	Original	13.9	15.1	16.7	13.6									13.9	15.1	16.7	13.6	13.9	15.1	16.7	13.6	13.9	15.1	16.7	13.6			
	Final	11.7	13.2	14.1	13.6									11.7	13.2	14.1	13.6	11.7	13.2	14.1	13.6	11.7	13.2	14.1	13.6			
	3					13.7	13.3	14.0	13.3	13.8	13.5	16.3	13.3	14.2	13.5	16.4	13.5	13.3	12.2	12.4	13.6	13.5	14.2	13.5	12.9	21.8	22.2	23.2
	6					12.1	13.1	23.6	13.7	12.3	13.0	15.1	12.8	13.7	13.3	14.8	13.1	12.0	12.7	14.5	14.0	10.6	13.4	41.4	13.8	19.9	22.9	22.6
	12					14.6	12.6	33.5	12.3	10.3	12.8	14.1	12.2	13.4	12.3	14.1	11.7	19.2	12.3	47.6	12.0	11.0	13.3	38.6	13.1	20.8	23.4	21.8
	6S					14.9	12.8	25.0	13.0	12.7	12.4	15.0	13.0	13.3	12.2	14.7	12.6	16.0	13.3	28.9	13.1	15.4	12.8	31.2	13.3	23.4	22.1	22.7
FRT	Nylon																											
	Original	23.2	25.5	29.2	23.3									23.2	25.5	29.2	23.3	23.2	25.5	29.2	23.3	23.2	25.5	29.2	23.3			
	Final	18.7	21.7	23.8	23.3									18.7	21.7	23.8	23.3	18.7	21.7	23.8	23.3	18.7	21.7	23.8	23.3			
	3					23.0	22.5	24.2	22.9	23.4	22.5	28.5	23.0	24.0	22.5	28.6	23.2	22.1	20.4	21.0	23.3	22.8	24.5	23.2	22.0			
	6					21.1	22.5	43.4	23.5	21.5	21.9	26.3	21.5	24.5	22.6	25.7	22.4	21.4	21.6	25.3	24.5	17.3	23.2	79.0	23.7			
	12					26.1	22.4	62.3	21.1	19.5	21.5	24.6	20.6	25.3	23.2	25.9	19.6	34.8	21.1	90.7	20.7	18.1	22.9	73.4	22.8			
	6S					25.6	21.6	46.0	22.5	21.6	20.5	26.2	22.3	22.8	20.2	25.9	21.4	27.7	22.8	54.0	22.8	26.4	21.6	58.1	23.2			
	Cotton																											
	Original	4.6	4.7	4.1	3.9									4.6	4.7	4.1	3.9	4.6	4.7	4.1	3.9	4.6	4.7	4.1	3.9			
	Final	4.7	4.7	4.3	4.0									4.7	4.7	4.3	4.0	4.7	4.7	4.3	4.0	4.7	4.7	4.3	4.0			
	3					4.4	4.2	3.9	3.9	4.3	4.6	4.1	3.7	4.3	4.7	4.1	3.7	4.5	4.0	3.7	3.9	4.3	3.9	3.8	4.0			
	6					3.6	3.8	3.9	3.8	3.0	4.2	4.0	4.1	3.0	4.1	3.9	4.0	4.0	3.7	3.8	3.5	3.8	3.7	3.9	3.9			
	12					3.0	3.7	3.9	3.5	1.1	4.1	3.5	3.7	1.6	3.9	3.6	3.7	3.7	3.3	4.4	3.1	3.9	3.7	3.8	3.5			
	6S					4.2	4.0	3.9	3.6	3.7	4.2	3.7	3.7	3.9	4.2	3.6	3.7	4.3	3.7	3.9	3.6	4.4	4.0	4.3	3.5			

Table 5 (continued)

Factor	Level	Set																	
		(b)				(c)				(d)				(e)				(f)			
		Natural	Neoprene	PU	CSPE	Natural	Neoprene	PU	CSPE									Natural	Neoprene		CSPE
RS	PERME	13.8	13.5	16.3	13.3	13.7	12.9	15.0	12.8									21.5	21.9		21.8
	Cloncurry	12.5	12.6	11.8	13.3	15.2	12.6	25.8	13.2									22.1	22.0		22.5
	Innisfail	12.9	13.6	15.9	13.7	12.7	13.4	31.2	13.3									20.6	23.9		23.3
FRS	Nylon	Natural	Neoprene	PU	CSPE	Natural	Neoprene	PU	CSPE												
	PERME	23.4	22.5	28.5	23.0	24.1	22.1	26.5	21.7												
	Cloncurry	20.4	20.9	19.8	22.9	26.5	21.5	47.8	22.9												
	Innisfail	21.6	23.1	27.8	23.6	21.2	23.1	58.4	23.0												
	Cotton																				
	PERME	4.3	4.6	4.1	3.7	3.2	4.2	3.8	3.8												
	Cloncurry	4.5	4.2	3.7	3.8	4.1	3.7	4.0	3.5												
	Innisfail	4.4	4.1	3.9	3.9	4.1	3.8	3.9	3.7												
TL										3	6	12	6S	3	6	12	6S	3	6	12	6S
	1%									13.7	12.2	14.6	14.9	14.4	13.8	12.9	13.2	22.8	22.4	23.2	23.2
	10%									12.5	11.3	9.0	12.7	14.1	12.9	11.8	13.2	21.9	21.2	20.8	22.3
FTL	Nylon									3	6	12	6S	3	6	12	6S				
	1%									23.0	21.1	26.1	25.6	24.6	23.8	22.6	22.6				
	10%									20.6	18.7	15.4	21.4	24.0	21.8	20.6	22.8				
	Cotton																				
	1%									4.4	3.6	3.0	4.2	4.2	3.8	3.2	3.8				
	10%									4.4	3.8	2.6	4.0	4.1	3.8	2.9	3.8				
TS						3	6	12	6S	3	6	12	6S					3	6	12	6S
	PERME					14.4	13.8	12.9	13.2	13.8	12.3	10.3	12.7					23.0	21.6	21.0	21.5
	Cloncurry					12.9	13.3	22.8	17.9	12.5	12.2	14.2	14.1					21.4	21.0	23.0	22.9
	Innisfail					13.5	19.8	19.0	18.1	12.9	11.0	11.0	14.7					22.8	21.8	22.1	23.8
FTS	Nylon					3	6	12	6S	3	6	12	6S								
	PERME					24.6	23.8	23.5	22.6	23.4	21.5	19.5	21.6								
	Cloncurry					21.8	23.2	41.9	31.8	20.4	20.2	24.7	24.0								
	Innisfail					23.2	35.8	34.3	32.4	21.6	18.1	18.1	24.8								
	Cotton																				
	PERME					4.2	3.8	3.2	3.8	4.3	3.0	1.1	3.7								
	Cloncurry					4.0	3.8	3.6	3.9	4.5	4.2	3.6	4.1								
	Innisfail					4.0	3.8	3.7	4.0	4.4	3.9	3.9	4.6								
LS		1%		10%						1%		10%						1%		10%	
	PERME	14.4		14.1						13.7		10.8						22.5		20.8	
	Cloncurry	12.9		12.2						15.2		11.0						23.6		20.9	
	Innisfail	13.5		14.5						12.7		12.7						22.4		22.9	
FLS	Nylon	1%		10%						1%		10%									
	PERME	24.6		24.0						24.1		18.8									
	Cloncurry	21.8		20.3						26.5		18.0									
	Innisfail	23.2		24.8						21.2		20.2									
	Cotton																				
	PERME	4.2		4.1						3.2		2.8									
	Cloncurry	4.0		4.0						4.1		4.0									
	Innisfail	4.0		4.1						4.1		4.2									

Table 5 (continued)

Factor	Level	Set (e) 3	(e) 6	(e) 12	(e) 6S	Set (i) 3	(i) 6	(i) 12	(i) 6S
RTL	1%								
	Natural	14.2	13.8	13.4	13.3	23.0	21.1	26.1	25.6
	Neoprene	13.6	13.3	12.3	12.3	22.5	22.5	22.4	21.6
	PU	16.4	14.8	14.1	14.8				
	CSPE	13.5	13.2	11.7	12.6	22.9	23.5	21.1	22.5
	10%								
	Natural	13.5	10.8	7.2	12.0	20.6	18.8	15.4	21.4
	Neoprene	13.4	12.8	13.3	12.5	21.8	23.3	24.4	22.7
	PU	16.3	15.5	14.1	15.2				
	CSPE	13.1	12.4	12.7	13.5	23.4	21.5	22.6	22.9
FRTL	Nylon 1%								
	Natural	24.0	24.5	25.3	22.8				
	Neoprene	22.5	22.6	23.2	20.2				
	PU	28.6	25.7	25.9	25.9				
	CSPE	23.2	22.4	19.6	21.4				
	Nylon 10%								
	Natural	22.8	18.4	13.7	20.4				
	Neoprene	22.4	21.2	22.4	20.8				
	PU	28.4	26.9	24.7	26.5				
	CSPE	22.6	20.6	21.6	23.2				
	Cotton 1%								
	Natural	4.4	3.0	1.6	3.9				
	Neoprene	4.7	4.1	3.9	4.2				
	PU	4.1	3.9	3.6	3.6				
	CSPE	3.7	4.0	3.7	3.7				
	Cotton 10%								
	Natural	4.3	3.0	0.5	3.5				
	Neoprene	4.5	4.2	4.2	4.1				
	PU	4.1	4.0	3.4	3.8				
	CSPE	3.7	4.1	3.7	3.8				

Table 5 (continued)

Factor	Level	Set (c) 3	(c) 6	(c) 12	(c) 6S	Set (1) 3	(1) 6	(1) 12	(1) 6S
RTS	PERME								
	Natural	14.2	13.8	13.4	13.3	23.4	21.5	19.5	21.6
	Neoprene	13.6	13.3	12.3	12.3	22.5	21.9	22.8	20.5
	PU	16.3	14.8	14.1	14.8				
	CSPE	13.5	13.2	11.7	12.6	23.0	21.5	20.6	22.3
	Cloncurry								
	Natural	13.3	12.1	19.3	16.0	20.4	20.2	24.7	24.0
	Neoprene	12.3	12.7	12.3	13.3	20.9	22.6	22.2	22.3
	PU	12.4	14.6	47.6	28.9				
	CSPE	13.6	14.0	12.0	13.2	22.9	22.9	21.8	22.5
	Innisfail								
	Natural	13.5	10.6	11.1	15.4	21.6	18.1	18.1	24.8
	Neoprene	14.2	13.4	13.3	12.9	23.1	24.1	25.2	23.4
	PU	13.5	41.5	38.6	31.2				
	CSPE	13.0	13.8	13.2	13.3	23.6	23.2	23.1	23.2
FRTS	Nylon								
	PERME								
	Natural	24.0	24.5	25.3	22.8				
	Neoprene	22.5	22.6	23.2	20.2				
	PU	28.6	25.7	25.9	25.9				
	CSPE	23.2	22.4	19.6	21.4				
	Cloncurry								
	Natural	22.2	21.4	34.8	27.7				
	Neoprene	20.4	21.6	21.1	22.9				
	PU	21.0	25.3	90.7	54.0				
	CSPE	23.3	24.5	20.7	22.8				
	Innisfail								
	Natural	22.8	17.3	18.1	26.4				
	Neoprene	24.5	23.2	22.9	21.6				
	PU	23.2	79.0	73.4	58.2				
	CSPE	22.0	23.7	22.9	23.2				
	Cotton								
	PERME								
	Natural	4.4	3.0	1.6	3.9				
	Neoprene	4.7	4.1	3.9	4.2				
	PU	4.1	3.9	3.6	3.6				
	CSPE	3.7	4.0	3.7	3.7				
	Cloncurry								
	Natural	4.5	4.0	3.7	4.4				
	Neoprene	4.0	3.7	3.4	3.8				
	PU	3.7	3.8	4.4	3.9				
	CSPE	3.9	3.5	3.1	3.6				
	Innisfail								
	Natural	4.3	3.8	3.9	4.4				
	Neoprene	3.9	3.7	3.7	4.0				
	PU	3.8	3.9	3.8	4.3				
	CSPE	4.0	3.9	3.6	3.5				

Table 5 (continued)

Factor	Level	Set							
		(d)				(1)			
		3	6	12	6S	3	6	12	6S
TLS	1%								
	PERME	14.2	13.8	13.4	13.3	23.2	23.2	22.7	21.5
	Cloncurry	13.3	12.7	19.3	16.0	22.0	22.5	25.5	24.4
	Innisfail	13.5	10.6	11.1	15.4	23.1	21.4	21.3	23.7
	10%								
	PERME	13.5	10.8	7.2	12.0	22.6	20.1	19.2	21.5
	Cloncurry	11.6	11.4	9.1	12.2	20.8	21.2	20.3	21.4
	Innisfail	12.5	11.5	10.9	14.0	22.5	22.3	22.9	24.0
FTLS	Nylon								
	1%								
	PERME	24.0	24.5	25.3	22.8				
	Cloncurry	22.2	21.4	34.8	27.7				
	Innisfail	22.8	17.3	18.1	26.4				
	10%								
	PERME	22.8	18.4	13.7	20.4				
	Cloncurry	18.6	18.9	14.6	20.4				
	Innisfail	20.4	19.0	17.9	23.2				
	Cotton								
	1%								
	PERME	4.4	3.0	1.6	3.9				
	Cloncurry	4.5	4.0	3.7	4.4				
	Innisfail	4.3	4.4	3.8	4.0				
	10%								
	PERME	4.3	3.0	0.5	3.5				
	Cloncurry	4.4	4.3	3.5	3.9				
	Innisfail	3.9	3.9	4.4	4.7				
		(b)				(1)			
LSR	1%	Natural	Neoprene	PU	CSPE	Natural	Neoprene	CSPE	
	PERME	14.2	13.6	16.4	13.5	24.1	22.1	21.7	
	Cloncurry	13.3	12.3	12.4	13.6	26.2	21.5	22.9	
	Innisfail	13.5	14.2	13.5	13.0	21.2	23.1	23.0	
	10%								
	PERME	13.5	13.4	16.3	13.1	18.8	21.7	22.0	
	Cloncurry	11.6	12.9	11.1	13.0	18.0	22.5	22.2	
	Innisfail	12.5	12.9	18.1	14.5	21.1	24.9	23.6	

Table 5 (concluded)

Factor	Level	Set (b)			
FLSR	Nylon	Natural	Neoprene	PU	CSPE
	1%				
	PERME	24.0	22.5	28.6	23.2
	Cloncurry	22.2	20.4	21.0	23.3
	Innisfail	22.8	24.5	23.2	22.0
	10%				
	PERME	22.8	21.4	28.4	22.6
	Cloncurry	18.6	21.4	18.6	22.4
	Innisfail	20.4	21.6	32.4	25.3
	Cotton				
	1%				
	PERME	4.4	4.7	4.1	3.7
	Cloncurry	4.5	4.0	3.7	3.9
	Innisfail	4.3	3.9	3.8	4.0
	10%				
	PERME	4.3	4.5	4.1	3.7
	Cloncurry	4.4	4.3	3.6	3.7
	Innisfail	4.4	4.3	4.0	3.7
		Set (i)			
RTLS	3 months 1%	Natural	Neoprene		CSPE
	PERME	24.0	22.5		23.2
	Cloncurry	22.2	20.4		23.3
	Innisfail	22.8	24.5		22.0
	10%				
	PERME	22.8	22.4		22.6
	Cloncurry	18.6	21.4		22.4
	Innisfail	20.4	21.6		25.3
	6 months 1%				
	PERME	24.5	22.6		22.4
	Cloncurry	21.4	21.6		24.5
	Innisfail	17.3	23.2		23.7
	10%				
	PERME	18.4	21.2		20.6
	Cloncurry	18 3	23.5		21.2
	Innisfail	19.0	25.1		22.8
	12 months 1%				
	PERME	25.3	23.2		19.6
	Cloncurry	34.8	21.1		20.7
	Innisfail	18.1	22.9		22.9
	10%				
	PERME	13.7	22.4		21.6
	Cloncurry	14.6	23.3		22.9
	Innisfail	17.9	27.5		23.3
	6S months 1%				
	PERME	22.8	20.2		21.4
	Cloncurry	27.7	22.9		22.8
	Innisfail	26.4	21.6		23.2
	10%				
	PERME	20.4	20.8		23.2
	Cloncurry	20.4	21.7		22.1
	Innisfail	23.2	25.4		23.3

Table 6

DIFFERENCES BETWEEN MEANS, N, REQUIRED AT 99.9% PROBABILITY

Effect	Source	Set								
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
F	Overall	1.9	0.8	0.6	1.0	0.5	0.8	1.2	0.8	
R	Nylon	6.7	2.4	1.8		1.6	2.4	3.5	2.4	1.1
R	Cotton	0.7	0.2	0.1		0.2	0.2	0.2	0.2	
R	Overall	2.6	1.1	0.9		0.7	1.1	1.7	1.1	
FR	Overall	5.4	2.3	1.7		1.5	2.2	3.2	2.2	
T	Nylon	4.7		1.8		1.6	3.0	4.3	2.8	1.3
T	Cotton	0.5		0.1	0.3	0.2	0.3	0.3	0.3	
T	Overall	1.9		0.9	1.5	0.7	1.3	2.0	1.4	
FT	Overall	3.8		1.7	2.9	1.5	2.6	4.0	2.6	
L	Nylon		1.7			1.2				0.9
L	Cotton		0.1		0.2	0.2				
L	Overall		0.8		1.0	0.5				
FL	Overall		1.6		2.1	1.0				
S	Nylon		2.1	1.6						1.1
S	Cotton		0.1	0.1	0.2					
S	Overall		1.0	0.8	1.3					
FS	Overall		2.0	1.5	2.5					
RT	Nylon	13.3		5.2		4.6	8.4	17.1	8.0	3.2
RT	Cotton	1.4		0.4		0.6	0.8	0.8	0.9	
RT	Overall	5.4		2.5		2.1	3.6	5.6	3.7	
FRT	Overall	10.7		4.8		4.0	7.3	11.3	7.6	
RL	Nylon		4.8			3.3				2.3
RL	Cotton		0.3			0.4				
RL	Overall		2.3			1.5				
FRL	Overall		4.5			2.8				
RS	Nylon		5.9	4.5						2.8
RS	Cotton		0.4	0.3						
RS	Overall		2.7	2.1						
FRS	Overall		5.5	4.2						
TL	Nylon					3.3				2.7
TL	Cotton				0.6	0.4				
TL	Overall				2.9	1.5				
FTL	Overall				5.9	2.8				
TS	Nylon			4.5						3.2
TS	Cotton			0.3	0.7					
TS	Overall			2.1	3.1					
FTS	Overall			4.2	7.2					
LS	Nylon		4.1							2.3
LS	Cotton		0.3		0.5					

Table 6 (concluded)

Effect	Source	Set								
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
LS	Overall		2.0		2.5					
FLS	Overall		3.9		5.1					
RTL	Nylon					9.2				6.5
RTL	Cotton					1.2				
RTL	Overall					4.0				
FRTL	Overall					8.1				
RTS	Nylon			12.7						8.0
RTS	Cotton			0.9						
RTS	Overall			6.0						
FRTS	Overall			11.9						
TLS	Nylon									6.5
TLS	Cotton				1.4					
TLS	Overall				7.2					
FTLS	Overall				14.4					
LSR	Nylon		11.7							5.6
LSR	Cotton		0.7							
LSR	Overall		5.5							
FLSR	Overall		11.0							
RTLS	Nylon									15.9

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No.	Author	Title, etc
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REPORT DOCUMENTATION PAGE

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17. Abstract

The wing-rip tear strengths of a nylon and of a cotton fabric, each coated with natural rubber, neoprene, polyurethane or chlorosulphonated polyethylene and exposed to various weathering conditions, were determined.

The coated nylon fabrics had higher tear strengths than the cotton ones, but were more variable. Polyurethane-coated nylon increased in tear strength on exposure at two Australian sites, but natural rubber coated cotton decreased on exposure in UK. Load during exposure reduced the tear strengths of the natural rubber coated fabrics.