



# TESTEX RUNDTEST

## STOFFEIGENSCHAFTEN

## FABRIC PROPERTIES

### No. 8

## AUSWERTUNG / EVALUATION

## REVISED VERSION

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## ANMERKUNG

Verschiedentlich zeigen einzelne Resultate eines Labors eine unerwartet hohe Abweichung zu Resultaten anderer Labors. Solche Resultate beeinflussen die Mittelwert-Berechnung teilweise sehr stark. Um den Mittelwert nicht zu verfälschen, werden die Resultate auf ihre Abweichung zum Mittelwert überprüft.

Resultate von stetigen Merkmalen (Seite 3 bis 24), welche bei einer ersten Berechnung des Mittelwertes ausserhalb des Bereiches von  $\pm 2s$  liegen, sowie Werte mit einer Abweichung  $>1$  Note (Seite 25 bis 29) werden mit "x" gekennzeichnet. Diese markierten Resultate sind bei der Berechnung der statistischen Kenndaten nicht berücksichtigt, werden der Vollständigkeit halber aber trotzdem aufgeführt.

Resultate, die sich statistisch nicht sinnvoll auswerten lassen (z.B.  $>200$ ) werden in der Auswertung ebenfalls mit einem "x" gekennzeichnet und werden in der Grafik nicht mehr dargestellt.

Resultate von stetigen Merkmalen (Seite 3 bis 24), welche nach der Berechnung des in der Tabelle angegebenen Mittelwertes ausserhalb des Bereiches von  $\pm 1.5s$  liegen, werden mit "o" markiert.

Als Kontrollgrenze wurde der Bereich von  $\pm 1.5s$  gewählt, da die häufig verwendete Kontrollgrenze von  $\pm 1.0s$  nach unseren Erfahrungen normale Schwankungen in Flächengebilden nicht genügend berücksichtigt.

Auf der Seite 25 bis 28 sind nebst dem Mittelwert und der Standardabweichung auch der Median angegeben. Der Median ist die Zahl die in der Mitte einer nach Grösse sortierter Zahlenreihe liegt, d.h. die eine Hälfte der Zahlen hat Werte die kleiner oder gleich sind als der Median und die andere Hälfte hat Werte die grösser oder gleich sind als der Median.

In den vorliegenden Graphiken auf Seite 4 bis 24 resp. 31 ist die Kontrollgrenze  $1s$  mittels durchgehender Linie, der Bereich  $1.5s$  mit gestrichelter Linie und bei den Graphiken auf Seite 26 bis 29 der Mittelwert ( $\emptyset$ ) mittels durchgehender Linie gekennzeichnet.

### SPEZIELLE ANMERKUNG:

Bei der Zugfestigkeit des Gewirkes gemäss Grab-Methode haben einige Labors einen Klemmbruch festgestellt. Diese Teilnehmer sind mit einem (\*) markiert in der Tabelle auf S. 9.

Weiterhin wurde neu die Kraft zur Nahtöffnung bei 3mm geprüft, da die Öffnung bei 4mm nicht ermittelbar war. Die Auswertung zeigt, dass durch diese Anpassung deutlich mehr Teilnehmer sinnvolle Werte liefern können, die einen Vergleich zulassen.

### Warengewicht

Die eingegangenen Ergebnisse zum Warengewicht zeigen eine ungewöhnliche hohe Schwankung der Werte. Diese Unterschiede waren bei den durchgeführten Vorab-Tests zur Eignung des Materials nicht ersichtlich. Diese hohen Schwanken können zur Folge haben, dass diverse physikalische Eigenschaften wie Festigkeit & Weiterreisskraft ebenfalls mehr Aurreisser generieren als üblich, die auf die unterschiedlichen Gewichte zurückzuführen sind. Wir raten daher dringendst, die bei ISO 13934-1 & ISO 13937-1/-2/-3 markierten Werte ("o" & "x") mit Vorbehalt zu betrachten und nach interner Absicherung der Methode ggf. zu ignorieren.

## REMARKS

Sometimes single results of a lab show an unusual high standard deviation compared to the results of other labs. Such results may affect the calculation of the average value to a large extent. To avoid a falsification of the average value, the results are checked against their deviation to the average value.

Results of continuous criteria (page 3 to 24), from which the first calculated average value exceeds the range of  $\pm 2s$ , and values with a deviation  $>1$  grade (page 25-29) are being marked with an "x" in the evaluation. These marked results are not taken into consideration for the calculation of statistical values. They are only listed for the sake of completeness.

Results that cannot be used for statistical calculations (e.g.  $>200$ ) are also marked in the evaluation with an "x" and are excluded from the graph.

Results of continuous criteria (page 3 to 24), from which the calculated average value listed in the table exceeds the range of  $\pm 1.5s$ , are marked with "o".

The control limit value of  $\pm 1.5s$  was chosen, because the usual applied control limit of  $\pm 1.0s$ , according to our long time experience, was too small and did not entirely take the normal variations within fabrics into consideration.

On page 25 to 28 is, besides the mean value and standard deviation, also the median value indicated. The median is the figure in the middle of a range of figures which are sorted according to their size, i.e. half of the figures have values which are smaller or even to the median and the other half of the figures have values which are larger or even to the median.

In the existing graphics on page 4 to 24 & 31 respectively the control limit value  $1s$  is characterized with a continuous line, the range  $1.5s$  with a broken line and in the graphics on page 26 to 29 the average value ( $\emptyset$ ) with a continuous line.

### SPECIAL COMMENT:

For tensile properties 'grab method' of the knitted fabric, those labs who have registered a breaking of the fabric at the wedge are marked with an (\*) in the table on page 9.

Furthermore we'd like to point out that force measured at seam slippage was now registered at 3mm instead of 4mm. The evaluation shows that due to this change a more sensible and adequate comparison is possible.

### Fabric weight

The results of the fabric weight show an unexpectedly high variation of values. Such big variations were not identified when pre-testing was done on the fabric to check its suitability. These high variations might have an effect on the outcome of some other physical tests, like strength and tear force, and generate more discordant values than usual. This might be caused by the fabric weight variation. We strongly recommend therefore to consider the values marked as "o" & "x" under ISO 13934-1 & ISO 13937-1/-2/-3 with reservation, or even to ignore them once internal method is re-checked and confirmed.

**RUNDTTEST FABRIC PROPERTIES NO. 8**
**Weight of fabric**

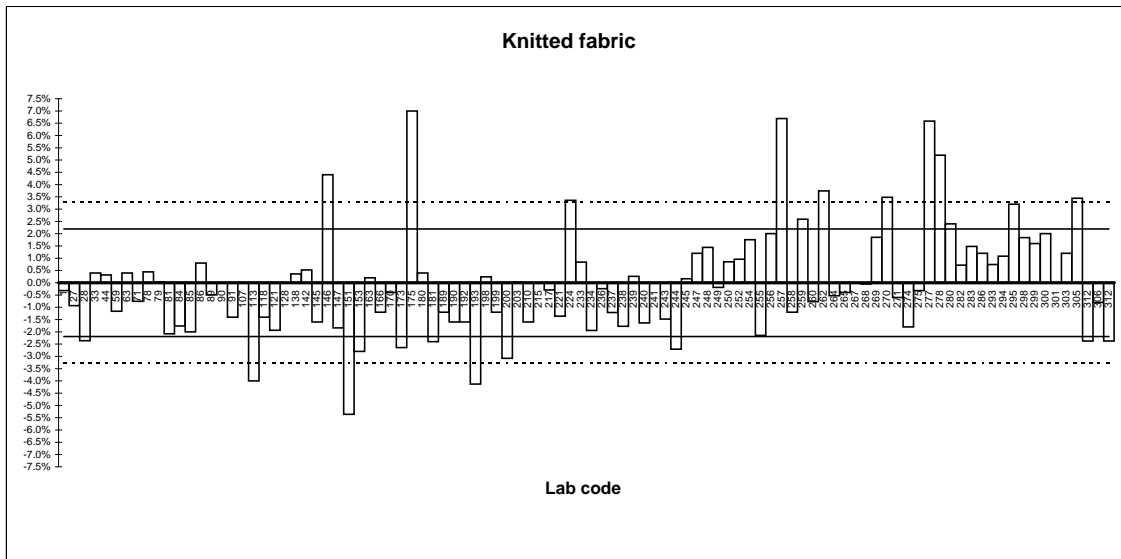
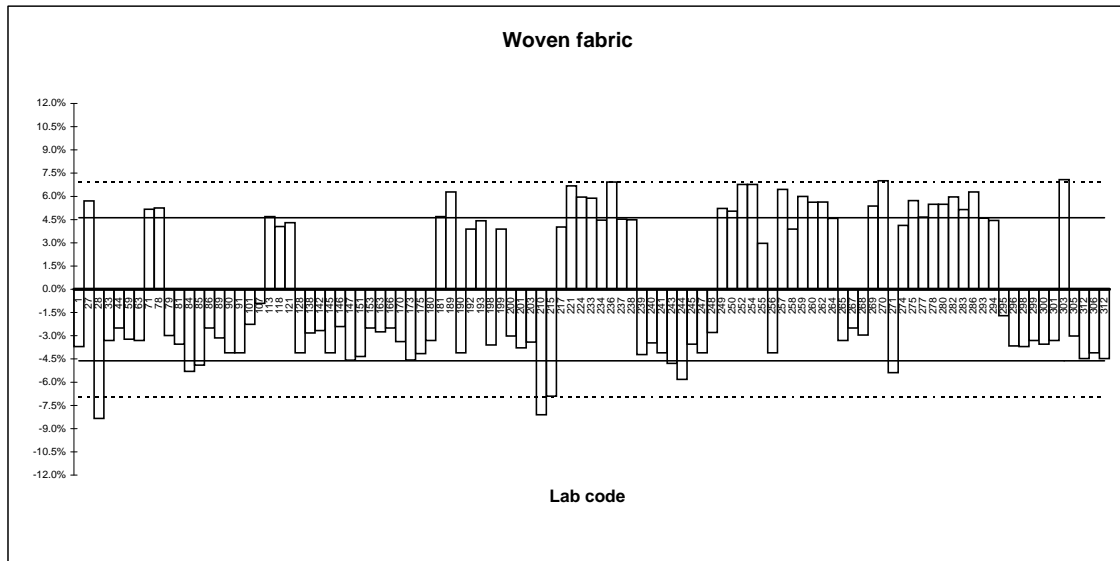
Lab Code	Testing equipment	Standard applied	No. of tests	Woven fabric		Knitted fabric	
				ø g/m <sup>2</sup>	CV (%)	ø g/m <sup>2</sup>	CV (%)
1	sample cutter& scale	EN 12127	5	120.50	0.52	249.20	1.56
27	Mettler Toledo AG 245	DIN EN 12127	5	132.28	0.40	247.66	1.26
28	Sartorius	EN 12127	5	o 114.70	0.40	244.10	0.57
33	sample cutter& scale	EN 12127	5	121.00	0.76	251.00	0.64
44	Cutter & Mettler Toledo Balance	EN 12127	10	122.00	0.40	250.80	0.70
59	Stanze & Waage	EN 12127	5	121.10	0.50	247.10	1.20
63	Sartorius	EN 12127	3	121.00		251.00	
71	Sartorius	EN 12127	5	131.60	0.19	248.10	0.72
78	sample cutter 100cm2	ISO 3801/5	3	131.70	0.40	251.10	0.20
79	sample cutter 100cm2	ISO 3801/5	5	121.40	0.36	250.10	0.57
81	AG Delta Range 204	DIN EN 12127	5	120.70	0.90	244.80	0.80
84	?	EN 12127	5	118.50	0.70	245.60	0.70
85	?	EN 12127	5	119.00		245.00	
86	Press cutter & balance	EN 12127	5	122.00	0.69	252.00	2.01
89	sample cutter 100cm2	DIN EN 12127	5	121.20		248.76	
90	Sample cutter & balance	EW 12127	3	120.00	0.83	250.00	3.30
91	Mettler	EW 12127	3	120.00	0.60	246.50	0.90
101	Balance Mettler	EN 5114	5	122.30	0.90		
107	Handstanze	EN 12127	5	124.00	0.30	250.00	2.30
113	Mettler	DIN EN 12127	3	131.00	0.40	o 240.00	0.60
118	PR-2ST	ISO 3801	5	130.20	0.45	246.50	1.45
121	Rundprobenschneider	DIN EN 12127	5	130.52	0.37	245.16	1.50
128	Balance Sartorius	EN 12127	5	120.00	0.53	250.00	1.94
138	Cutter & balance	ISO 3801/1977	3	121.60	0.50	250.90	0.70
142	SDL Sample cutter	EN 12127	5	121.80	0.45	251.30	0.85
145	Balance	DIN EN 12127	3	120.00		246.00	
146	Calibrated sample cutter	ISO 3801/5	5	122.12	0.83	o 261.00	0.96
147	metallic form cutter 101 cm <sup>2</sup>	EN 12127	5	119.40	0.20	245.40	0.30
151	Cutting machine	UNI 5114	3	119.70	0.90	o 236.60	0.30
153	Branca Ideal A. R.	ISO 3801	3	122.00	0.70	243.00	0.40
163	Balance	EN 12127	5	121.70	0.60	250.50	0.80
166	Sartorius BP1608	EN 12127	5	122.00		247.00	
170	Mettler AT 100	EN 12127	5	120.90	0.80	249.00	1.30
173	Cutter & balance	EN 12127	5	119.42	0.40	243.40	0.09
175	Sartorius	ASTM 3776	5	119.94	0.60	o 267.50	0.37
180	sample cutter 100cm2	EN 12127-1	3	121.00	0.75	251.00	0.70
181	Stanze & Waage	EN 12127	5	131.00	0.20	244.00	0.50
189	Cutter & balance	EN 12127	5	133.00	0.88	247.00	1.84
190	Cutter & balance	EN 12127	5	120.00	0.40	246.00	0.50
192	Balance		3	130.00		246.00	
193	Precisa 220 A	EN 12127	5	130.67	0.44	o 239.67	0.87
198	PB 153-L	DIN EN 12127	3	120.63	1.04	250.60	0.84
199	Sartorius	EN 12127	5	130.00	1.30	247.00	0.90
200	Cutter & balance	ISO 3801	5	121.36	0.01		
201	Mettler Toledo	EN 12127	3	120.40		242.30	
203	Sartorius Balance	DIN EN 12127	3	120.87	0.66	250.07	0.16
210	Balance	DIN EN 12127	5	o 115.00	0.68	246.00	0.96
215	Mettler AG 204 & cutter	ISO 3801	5	116.50	1.00	250.00	1.20
217	Punch & balance		3	130.16	0.25	249.26	1.38
221	balance	BR EN 12127	5	133.49	0.27	246.59	0.86
224	Sample cutter	ASTMD 3776-96	5	132.58	36.00	o 258.40	0.82
233	Ohaus	DIN EN 12127	5	132.50	0.59	252.10	0.40
234	Handcutter&Sortarius Balance	ISO 3801 / EN 12127	5	130.72	0.22	245.14	0.08
236	Sortarius Balance	DIN EN 12127	5	o 133.80	1.20	249.40	1.20
237	Cutter & balance	ISO 3801	5	130.80	0.71	246.96	0.68
238	sample cutter & scaler	ISO 3801	5	130.75	0.33	245.56	1.15
239	sample cutter 100cm2	EN 12127	5	119.86	0.76	250.65	1.40

**RUNDTTEST FABRIC PROPERTIES NO. 8**
**Weight of fabric**

Lab Code	Testing equipment	Standard applied	No. of tests	Woven fabric		Knitted fabric	
				ø g/m <sup>2</sup>	CV (%)	ø g/m <sup>2</sup>	CV (%)
240	Mettler Toledo AG 204	DIN EN 12127	5	120.80	1.10	245.90	0.39
241	sample cutter & balance	EN 12127	5	120.00	1.38	250.00	0.48
243	Mettler Toledo	EN 12127	5	119.14	0.82	246.30	1.35
244	Mettler balance	ISO 3801	3	117.85	0.01	243.23	0.02
245	Bicancia sartorius CPA 324 S	EN 12127	5	120.70	0.81	250.40	1.23
247	sample cutting machine & analytical balance	EN 12127	5	120.00	0.30	253.00	0.40
248	Cutter & balance	EN 12127	5	121.64	0.20	253.61	0.18
249	Mettler Toledo	EN 12127	5	131.66	0.27	249.53	1.02
250	Hans Schmidt	ISO 3801	5	131.45	0.01	252.14	0.01
252	OHaus	ISO 3801	5	133.60	0.30	252.40	1.30
254	Thwing-Albert	EN 12127	5	133.61	0.70	254.39	0.84
255	SDL Atlas sample cutter	EN 12127	5	128.85	0.43	244.63	0.11
256	sample cutter machine & analytical balance	EN 12127	5	120.00	0.52	255.00	0.49
257	cutter & balance	ISO 3801-1977	5	133.21	0.31	o 266.73	0.24
258	Ohaus	EN 12127	5	130.00	0.82	247.00	0.43
259	Die. Cutter / Balance	ISO 3801	5	132.63	0.32	256.47	0.23
260	Circular cutter / balance	EN 12127	5	132.17	0.69	248.07	1.19
262	Circular cutter / balance	ISO 3801/ EN 12127	5	132.18	0.72	o 259.36	0.33
263	Balance	EN 12127	3			x 115.00	
264	Sample cutter / balance	EN 12127	5	130.87	0.59	248.67	0.57
265	Sample cutter / balance	EN 12127	5	121.00	0.80	249.00	1.90
267	Mesdan	ISO 3801	5	122.00	0.83	250.00	1.99
268	Sample cutter 100cm <sup>2</sup>	ISO 3801	3	121.43	0.96	249.87	0.19
269	Sample cutter 100cm <sup>2</sup> / balance	EN 12127	5	131.86	0.30	254.63	0.20
270	Digital Balance	ISO 3801	3	o 133.90	0.95	o 258.70	1.37
271	Circular cutter 100cm <sup>2</sup> / balance	ISO 3801-1977	3	118.40	0.30	248.50	0.50
274	Die. Cutter & balance	ISO 3801	3	130.30	0.49	245.50	0.10
275	Mod. Acquati	EN 12127	6	132.30	0.40	249.20	0.80
277	balance	EN 12127	5	130.97	0.58	o 266.47	0.54
278	Satorius balance	ISO 3801	3	132.00	0.20	o 263.00	0.50
280	cutter (circular sample)	ISO 3801	5	132.00	0.60	256.00	0.20
282	cutter & balance	EN 12127	5	132.60	0.30	251.80	0.70
283	cutter Mettler Toledo	ISO 3801	5	131.57	0.32	253.70	0.45
286	cutter & balance	ISO 3801	5	133.00	1.14	253.00	2.00
293	Satorius balance	EN 12127	5	130.88	0.57	251.86	1.38
294	Schroder GSM cutter method	ISO 3801-77	3	130.70	0.21	252.70	0.30
295	Mettler Balance	ISO 12127	5	123.00	0.50	258.00	0.80
296	?	EN 12127	3	120.56			
298	cutter & balance	ISO 3801	5	120.50	0.46	254.60	0.06
299	GSM cutter	ISO 3801	5	121.00	0.58	254.00	0.17
300	GSM cutter	ISO 3801	3	120.70	0.29	255.00	0.31
301	GSM cutter	ISO 3801	3	121.00	0.48	250.00	1.22
303	Scale KERN	EN 12127	5	o 134.00		253.00	
305	Mold 100cm <sup>2</sup> &Balance	DIN EN ISO 12127	5	121.36	0.30	o 258.60	0.88
312	Mettler Sample cutter 100 cm <sup>2</sup>	SRPS F.52.016	6	119.54	0.74	244.07	1.16
306	Scale	TS 251	5	120.00	0.37	248.00	0.66
312	Mettler Sample cutter 100 cm <sup>2</sup>	SRPS F.52.016	6	119.54	0.74	244.07	1.16
<b>n</b>				<b>103</b>		<b>100</b>	
<b>ø</b>				<b>125.13</b>		<b>250.00</b>	
<b>s</b>				<b>5.78</b>		<b>5.47</b>	
<b>CV %</b>				<b>4.62</b>		<b>2.19</b>	
<b>s<sub>p</sub><sup>2</sup></b>				<b>25.19</b>		<b>5.95</b>	
<b>s<sub>L</sub><sup>2</sup></b>				<b>28.19</b>		<b>27.99</b>	
<b>s<sub>R</sub><sup>2</sup></b>				<b>53.38</b>		<b>33.94</b>	
<b>r</b>				<b>14.05</b>		<b>6.83</b>	
<b>R</b>				<b>20.46</b>		<b>16.31</b>	

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Weight of fabric**





TESTEX®

**RUNDTTEST FABRIC PROPERTIES NO. 8**

**Construction of fabric**

Lab Code	Testing equipment	Standard applied for		No. of tests	Woven fabric		Knitted fabric	
		Woven fabric	Knitted fabric		Warp ø threads/cm	Weft ø threads/cm	ø wales/cm	ø courses/cm
1	Manually	SN 198452	SN 198452	3	49.6	30.2	16.0	26.0
27	Manually	DIN EN 1049-2	DIN EN 14971	5	48.9	30.3	15.7	24.4
28	Thread counter	EN 1049		5	50.0	30.0	15.0	25.2
33	Reglet-loupe	NF EN 1049-2	NF EN 14971	5	49.4	30.1	15.3	25.4
44	?	ISO 7211-2	EN 14971	20	49.0	30.0	16.0	25.0
59	?	EN 1049-2	DIN 53883	5	o 52.0	o 32.0	16.0	25.0
63	Lupe	?	?	3	49.0	30.0	16.0	25.0
71	Stereolupe Zeiss	EN 1049-2	EN 14971	5	48.9	30.3	15.5	25.0
78	?	DIN 53853	DIN 53883	3	48.9	30.3	15.5	25.0
79	Thread counter	DIN 53853	DIN 53853	5	49.6	30.5	15.4	25.1
81	Manually Lupe	DIN 1049-2	14971	6	48.8	30.0	15.5	25.5
84	?	EN 1049-2	EN 14971	5	49.3	29.9	15.4	25.2
86	Ruler	EN 1049-2	EN 14971	5	49.7	30.5	15.9	26.0
89	Manually Lupe	EN 1049-2	EN 14971	6	49.7	30.2	15.5	25.6
90	Manually (Counting glass)	ISO 7211-2	ISO 7211-2	3	50.0	30.5	16.0	o 23.0
91	Method C	ISO 7211-2	ISO 7211-2	5	o 51.5	31.0	15.0	25.0
101	Magnifying Lens / Stereo	EN 1049-2	EN 1049-2	5	50.0	30.0		
107	Manually (Lupe / Zähnadel)	EN 1049-2		5	50.0	30.0	15.0	26.0
113	Fadenzähler Leitz	EN 1049-2	DIN EN 14971	3	50.5	30.8	15.1	25.9
121	Thread counter	EN 1049-2	DIN EN 14971	5	48.8	29.8	15.2	25.3
128	Needle & pick glass	EN 1049-2	EN 14971	5	50.2	30.4	16.0	25.3
138	Manually	ISO 4602	ISO 4602	5	49.7	30.6	15.7	25.6
142	SDL Pickneedle & counter	EN 1049-2	EN 1049-2	5	o 51.0	30.0	16.0	26.0
145	Thread counter	ISO 7211-2		5	x 32.0	x 24.0	o 14.0	o 24.0
146	Manually	ISO 7211-2	ISO 7211-2	3	49.0	30.0	15.0	o 21.0
147	Cross-Meter	EN 1049-2	EN 1049-2	5	o 51.0	30.0	16.0	26.0
151	Thread counter	EN 1049-2	EN 14971	5	50.0	31.0	16.0	26.0
153	???	ISO 7211-2	EN 14971	5	49.0	30.0	15.5	25.0
163	Thread counter	EN 1049-2		5	49.4	30.2		
166	Pinzette / Lupe	EN 1049-2	EN 53883	3	49.0	30.5	15.5	24.5
170	Microscope Shirley	EN 1049-2	EN 1049-2	3	49.9	30.2	15.0	25.5
173	Manuell	EN 1049-2	BS 5441	5	49.0	30.0	15.0	25.0
175	Magnifying Lens	ASTM 3776	ASTM 3887		50.0	30.0	16.2	26.6
180	Stereolupe	EN 1049-2	EN 53883	3	50.0	30.0	15.0	25.0
181	Manually	EN 1049-2	EN 14971	5	49.3	31.0	15.3	25.7
189	Manually	EN 1049-2			49.0	30.0		
190	Manually	ISO 7211-2	EN 14971	5	49.0	30.0	15.0	25.0
192	Manually	?	?	10	o 45.0	o 29.0	16.0	25.0
198	Magnifying Lens	?	?	3	49.5	x 33.7	15.5	25.3
199	Thread counter	EN 1049-2	EN 14971	5	49.0	30.5	15.5	26.5
200	Manually	EN 1049-2	?	5	50.0	30.0		
201	Manually	?	?	3	49.9	29.6		
203	Thread counter	DIN EN 1049-2	DIN EN 14971	3	49.0	30.0	15.5	25.5
210	Thread counter	EN 1049-2	DIN 53883	5	47.8	29.8	15.0	26.0
215	Magnifying Lens / Stereo	ISO 7211-2	DIN 53883	5	50.0	30.0	16.0	26.0
217	Magnifying Lens	? In-house	? In-house	6	o 45.0	31.0	16.0	o 27.0
221	Manually	BR EN 1049-2	BR 5903	10	49.0	30.0	15.0	26.0
224	Pick needle & counter	ASTMD 3775	ASTMD 3887	3	50.0	31.0	16.0	o 27.0
233	Manually	DIN EN 1049-2	DIN EN 14971	5	48.0	30.0	15.0	25.0
234	?	EN 1049-2	BS 5441	5	49.0	30.0	15.0	25.0
236	LEICK-Microscope	EN 1049-2	?	5	49.4	29.6		
237	Magnifying Lens	ISO 1049-2	ISO 1049-2	5	o 47.3	o 32.3	o 16.4	26.6
238	?	ISO 7211-2	ISO 7211-2	5	49.0	30.0	16.0	o 23.0
239	Lupe	DIN EN 1049-2	DIN 14971	4	47.8	29.5	15.1	25.1
240	Manually	?	?	3	48.3	30.3		
241	Microscope	EN 1049-2	EN 14971	5	49.2	o 31.7	16.0	o 27.0
243	?	?	ISO 7211-1	5	48.5	30.1		
244	?	?	?	3	50.0	31.0	16.0	25.0
245	Steel Ruler & Glass	EN 1049-2	EN 14971	5	o 51.0	30.2	15.5	25.0
249	Thread counter	EN 1049-2	EN 1049-2	5	49.0	30.0	15.5	26.5
250	pick glass / manually	ISO 7211-2		5	x 59.0	x 37.0		

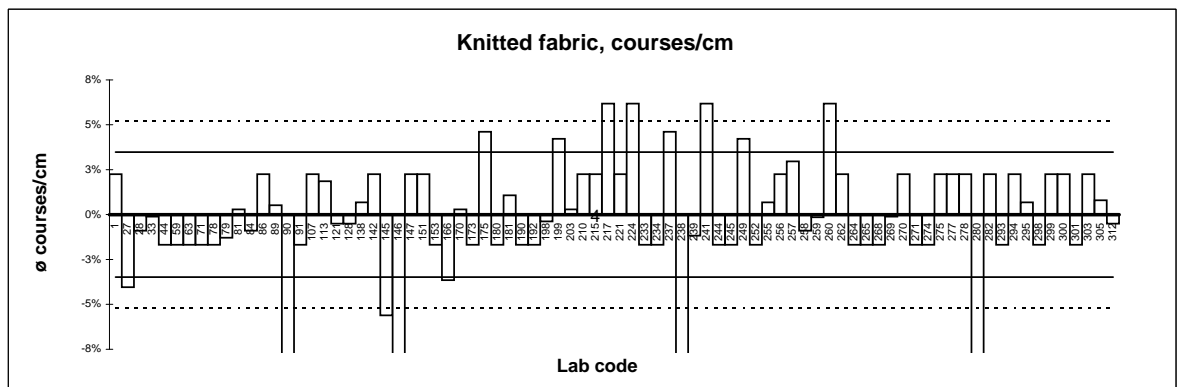
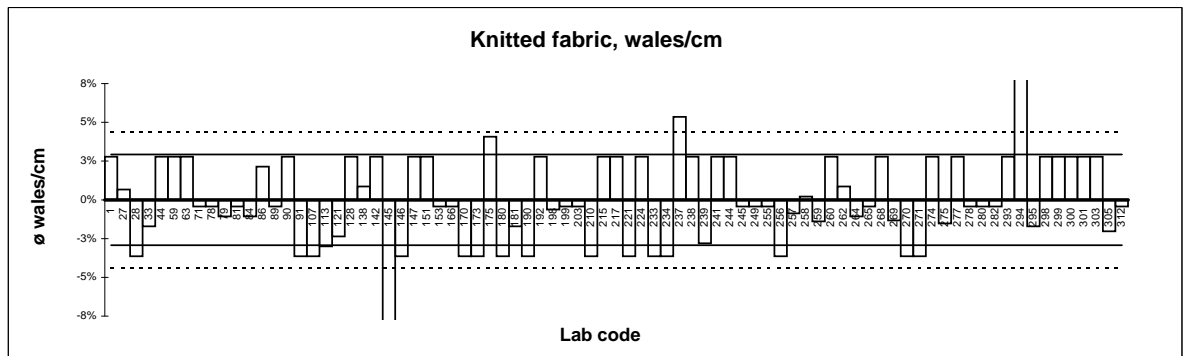
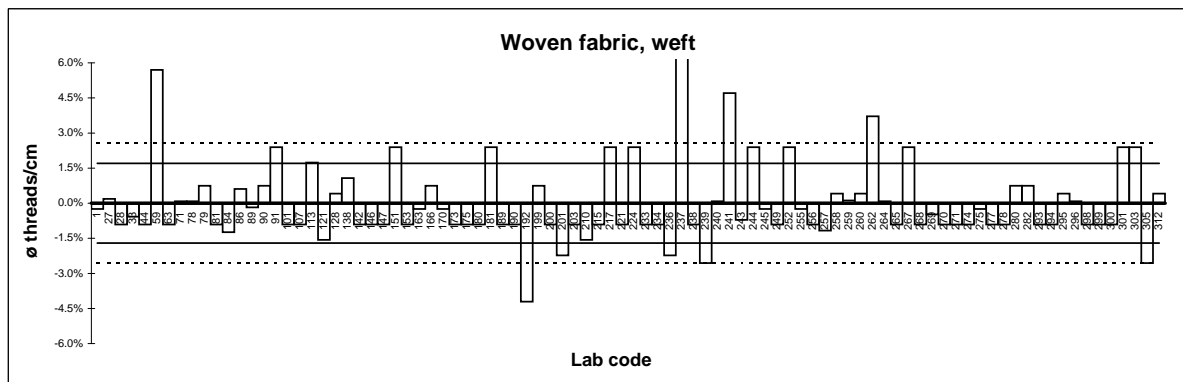
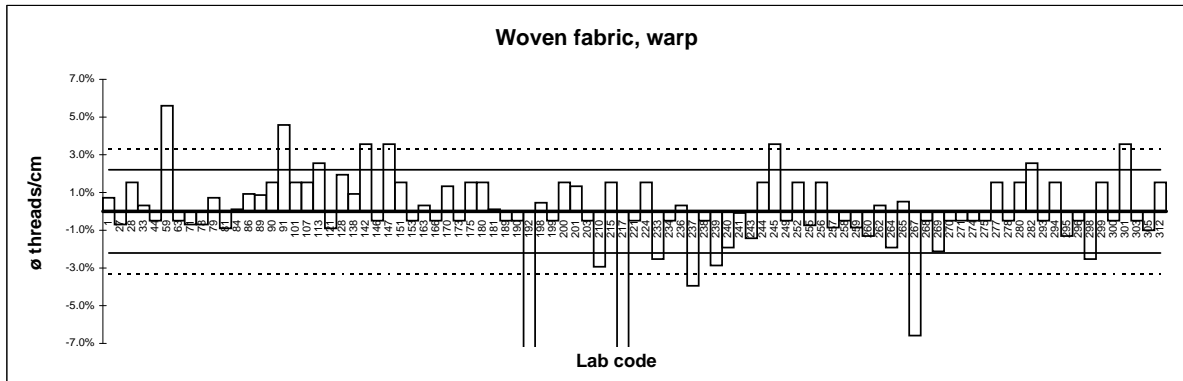
(x) unexpected value  
(o) beyond control limit

**RUNDTTEST FABRIC PROPERTIES NO. 8**

<b>Construction of fabric</b>									
Lab Code	Testing equipment	Standard applied for		No. of tests	Woven fabric		Knitted fabric		
		Woven fabric	Knitted fabric		Warp ø threads/cm	Weft ø threads/cm	ø wales/cm	ø courses/cm	
252	pick glass / manually	? In-house	? In-house	5	50.0	31.0	x	33.0	25.0
255	Magnifying Lens	EN 1049-2	ISO 7211		48.9	30.2		15.5	25.6
256	Thread counter	EN 1049-2	EN 1049-2	5	50.0	30.0		15.0	26.0
257	Manually ( Glass & Ruler )	ISO 7211-2	EN 14971	5	48.8	29.9		15.4	26.2
258	Thread counter	EN 1049-2	BS 5441	5	49.0	30.4		15.6	25.2
259	pick glass / manually	ASTM 3775	ASTM 3887	5	48.8	30.3		15.4	25.4
260	Manually	EN 1049-2	SR 5903	5	48.6	30.4		16.0	27.0
262	Steel Ruler & Glass	ISO 7211-2	BS 5441	5	49.4	31.4	o	15.7	26.0
264	pick glass / manually	ISO 7211-2	BS 5441	5	48.3	30.3		15.4	25.0
265	Thread counter	EN 1049-2	EN 14971	5	49.5	30.0		15.5	25.0
267	?	ISO 7211-2		5	46.0	31.0			
268	Counting Glass	ISO 7211-2	ASTM 3887	5	49.0	30.0		16.0	25.0
269	Traversing Thread counter	ISO 7211-2	BS 5441	5	48.2	30.1		15.4	25.4
270	pick glass / manually	ISO 7211-2	ISO 7211-2	3	49.0	30.0		15.0	26.0
271	pick glass / manually	ISO 7211-2	BS 5441	5	49.0	30.0		15.0	25.0
274	pick glass / manually	ASTM D 3776	ASTM D 3887	5	49.0	30.0		16.0	25.0
275	Method C & A	EN 1049-2	EN 14971	6	49.0	30.2		15.3	26.0
277	pick glass / manually	ISO 7211-2	EN 14971	5	50.0	30.0		16.0	26.0
278	pick glass / manually	ISO 7211-2	ISO 7211-2	3	49.0	30.0		15.5	26.0
280	pick glass / manually	ISO 7211-2	ISO 7211-2	5	50.0	30.5		15.5	
282	Magnifier	ISO 7211-2	BS 5441	5	50.5	30.5		15.5	26.0
293	?	?	?	3	49.0	30.0		16.0	25.0
294	Count Needle, magnifying glass	ISO 7211-2	ASTM D 3887	3	50.0	30.0	o	17.0	26.0
295	Magnifying Lens	ASTM D 3775	ASTM D 3775	5	48.6	30.4		15.3	25.6
296	?	?	?	3	49.0	30.3			
298	Thread counter	ISO 7211-2	ISO 7211-2	5	48.0	30.0		16.0	25.0
299	Counting Glass	ISO 7211-2		5	50.0	30.0		16.0	26.0
300	pick glass / manually	ISO 7211-2	ISO 14971	5	49.0	30.0		16.0	26.0
301	Counting Glass	ISO 7211-2	ISO 7211-2	3	51.0	31.0		16.0	25.0
303	Manually	ISO 7211-2		3	49.0	31.0		16.0	26.0
305	pick glass / manually	DIN EN ISO 1049-2	DIN EN ISO 14971	4	48.8	29.5		15.3	25.6
312	Thread counter	EN 1049-2	SRPS F.52.013	5	50.0	30.4		15.5	25.3
<b>n</b>					<b>91</b>	<b>90</b>		<b>81</b>	<b>81</b>
<b>ø</b>					<b>49.2</b>	<b>30.3</b>		<b>15.6</b>	<b>25.4</b>
<b>s</b>					<b>1.09</b>	<b>0.52</b>		<b>0.46</b>	<b>0.9</b>
<b>CV %</b>					<b>2.20</b>	<b>1.71</b>		<b>2.93</b>	<b>3.5</b>

RUNDTEST FABRIC PROPERTIES NO. 8

Construction of fabric







TESTEX®

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Tensile properties strip method  
ISO 13934-1**

Lab Code	Testing equipment	No. of tests	Pre-tension [N]	Testing length [mm]	Testing speed [mm/min]	Force warp ø N	CV%	Force weft ø N	CV%	Elongation warp %	CV%	Elongation weft %	CV%
1	Zwick Z010	5		200	100	641.00	2.48	o 210.80	2.31	7.22	1.22	26.14	0.46
27	Zwick ZMART PRO	5	2	200	100	670.99	1.13	o 283.09	3.64	8.24	0.66	26.44	1.81
28	Zwick 1445	5	2	200	20/100	572.80	1.59	o 226.60	3.14	7.73	2.87	28.30	1.65
33	Hounsfield K10KS	5	2	200	20/100	o 481.40	5.14	250.30	4.45	7.25	2.08	28.13	4.06
44	Hounsfield	5	2	200	20/100	520.00	3.90	260.00	0.50	6.80	2.00	28.00	4.10
59*	Autograph	5	2	200	20/100*	540.00	3.00	220.00	2.90	7.80	3.50	30.00	0.80
63	Instron	5		200	100	x 406.00		o 196.00		6.70		25.10	
63	Instron	3		200	200	520.00		253.00					
71	Zwick Z010	5	2	200	100	682.30	2.72	284.50	3.00	8.57	1.10	28.90	3.20
78	Instron	5	2	200	100	645.60	5.70	291.00	2.40	o 9.50	3.20	29.30	0.70
79	Instron	5	2	200	20/100	533.00	3.50	228.00	6.70	7.80	3.90	29.10	1.90
81*	Zwick Zmart PRO	6	2	200	20/100	528.00	7.80	257.00	5.20	6.70	5.20	27.90	2.00
84	Instron 3369	5	2	200	100	553.00	5.90	246.00	4.00	7.20	6.40	26.10	3.70
85	Instron 5966	5	2	200	100	570.00	2.96	252.00	1.28	7.00	2.19	27.00	2.40
86*	Hounsfield	5	2	200	20/100	530.00	2.64	270.00	3.36	7.20	2.38	28.00	1.37
89	Zwick / Roell Z010	5	2	200	20/100	539.00		252.00		7.00		26.80	
90	Titan	5	2	200	100	587.70	2.44	261.90	2.84	7.68	2.40	28.00	1.93
91	Instron	5	2	200	20	540.00	2.60	230.00	3.10	7.50	3.50	30.30	0.70
101	Titan JHH	5	2	200	100	505.30	1.60	o 206.60	6.70	7.50	0.30	26.50	2.10
107	Zwick	5	2	200	100	569.00	2.82	273.00	2.04	8.00	3.48	o 34.60	1.02
113	Zwicky 1120	5	2	200	100	666.00	2.60	o 307.00	1.30	9.10	1.45	27.70	1.50
118	Zwick	5		200	100	650.00	1.70	240.00	6.20	8.20	1.70	26.80	2.40
121	Zwick	5	2	100	100	656.60	6.15	o 303.80	5.04	8.92	3.49	30.48	3.49
128	Tinius Olsen HSKT	5	5	200	100	515.00	7.79	238.00	7.24	7.73	2.95	29.30	1.92
138	Instron 5569	5	2	200	100	535.30	2.20	252.40	2.60	o 6.20	0.60	o 22.40	2.80
142	SDL VTT	5	2	200	100	x 425.20	3.30	235.60	2.50	o 6.10	2.00	26.10	2.68
145	Instron 4466	5	2	200	100	556.13	4.41	267.01	3.52	o 9.61	4.12	o 33.07	1.60
146	Zwick 1455	5	2	200	100	568.00	3.97	261.00	4.47	6.40	2.80	o 23.50	1.70
147	MTSQ Test 50	10	2	200	100	620.00	6.70	o 300.00	1.00	o 6.20	4.00	28.00	2.20
151	Mesdan	5	2	200	100	595.70	4.50	244.40	4.50	7.30	2.00	28.00	1.90
153	Hounsfield H10KS	5	20	200	100	520.00	1.60	270.00	5.30	7.00	1.40	27.50	1.40
163	LLoyd EZ20	5	2	200	100	533.50	4.40	215.80	2.80	8.20	2.30	30.00	2.10
166	Statigraph 4 / Texttechno	5	2	200	100	x 423.70	3.70	x 180.60	8.87	o 6.10	3.30	o 20.90	3.12
170	Zwick Z005	5	2	200	100	600.00	3.10	250.00	7.10	7.20	1.60	o 23.50	2.10
173	Hounsfield	5	2	200	20/100	542.00	2.92	264.10	3.52	7.04	1.03	28.30	1.47
175	Tensolab-Mesdan	5	0	200	100	543.00	2.70	o 212.30	2.60	7.10	1.20	x 16.30	2.50
175	Titan 2	5	0	200	100	584.70	2.80	230.50	2.40	7.40	1.10	25.60	2.00
180*	Zwick	5	2	200	20/100	522.92	4.73	o 212.50	6.90	6.40	4.45	28.00	1.06
181	Zwick Z005	5	2	200	100	681.34	2.83	290.02	2.82	8.67	2.36	28.00	2.13
189	Titan Tester 710	5	2	200	100	o 697.49	2.27	o 305.42	1.29	9.16	1.37	28.49	2.09
190	SDL M-350	5	2	200	100	580.00	3.00	260.00	1.50	7.40	1.80	27.40	2.10
192	Zwick	5	5	200	100	o 713.00		287.00	0.59	6.60		o 22.00	0.11
193	Titan 510	5	2	200	100	636.00	14.11	x 340.63	3.06	8.11	7.11	28.24	1.11
198	Zwick Z010	5	2	200	100	587.00	4.45	263.00	2.55	7.00	2.56	26.80	2.23
199	Hounsfield	5	2	200	100	670.00	1.72	260.00	7.30	9.00	5.00	27.50	2.40
200	Tensile Machine Shimadzu	5	2	200	20/100	540.60	0.01	253.26	0.05	o 5.34	0.01	x 16.17	0.03
201	Zwick Z010	5	3	200	100	547.69		233.03		o 6.26		o 22.08	
203	Zwick 1455	5	2	200	20/100	538.08	4.83	271.92	1.34	7.08	2.02	30.17	1.03
210	Zwick Z010	5	2	200	100	596.60	3.30	242.00	3.96	6.49	2.72	26.65	3.65
215	Instron 4465	5	5	200	100	545.90	3.80	227.40	1.50	6.70	2.70	27.70	0.70
221	UPM	10	2	200	100	641.80	5.31	267.20	3.03	o 10.15	4.95	x 18.15	4.27
224	Tensile Tester	5	0	200	100	622.13	2.60	278.70	1.89	8.02	4.74	30.25	1.70
233	ZBM 50	5	2	200	100	662.40	1.86	268.50	5.43	7.73	4.21	25.70	3.08
234	Hounsfield	5	2	200	100	667.00	2.95	296.60	4.16	8.45	1.41	28.15	1.46
236	Zwick Z015	5	2	200	100	o 701.20	1.70	x 323.60	1.90	8.60	1.20	29.90	0.80
237	Titan	5	2	200	100	647.77	4.32	248.45	5.20	9.12	2.20	27.35	5.77
238	Zwick Z050	5	2	200	100	675.95	4.22	284.62	2.36	7.98	2.25	27.86	1.40
239	Tinius Olsen HSKT	5	2	200	100	632.80	1.49	o 211.20	3.38	7.62	1.21	27.06	2.20
240	Zwick Z020	5	2	200	20	542.89	6.67	x 185.62	5.81	7.09	1.85	27.95	1.38

(x) unexpected value  
(o) beyond control limit



## RUNDTEST FABRIC PROPERTIES NO. 8

### Tensile properties strip method ISO 13934-1

Lab Code	Testing equipment	No. of tests	Pre-tension [N]	Testing length [mm]	Testing speed [mm/min]	Force warp $\bar{\sigma}$ N	CV%	Force weft $\bar{\sigma}$ N	CV%	Elongation warp %	CV%	Elongation weft %	CV%
241	Instron	5	2	200	100	676.60	6.00	216.20	8.43	8.20	2.89	31.00	1.38
243	Lloyd LR5K	5	2	200	20/100	603.83	2.67	o 203.88	3.59	7.55	2.81	30.54	3.24
244	Instron	5	2	200	100	557.70	3.57	o 192.20	6.68	7.40	2.37	26.00	1.86
245	Titan Jeames Heal	5	2	200	100	o 495.00	1.88	x 160.00	1.51	8.00	1.50	28.80	2.80
248	R23/T846086	5	2	200	100	594.30	2.22	x 171.93	0.61	x 11.50	1.40	31.40	0.73
249	Titan	5	2	200	100	660.94	1.67	250.47	6.66	9.21	0.82	27.21	1.51
250	Lloyd LRX Plus	5	2	200	200	646.58	0.09	292.92	0.16	8.69	0.04	31.13	0.03
254	Instron	5	2	200	100	656.00	5.76	263.00	2.81	8.65	3.22	26.90	1.17
255	ZP 20	5	2	200	100	637.43	4.25	240.26	2.89	x 10.55	2.60	o 33.00	21.83
257	Hounsfield H10KS	5	2	200	100	650.00	1.80	280.00	1.90	o 9.50	2.70	o 32.00	1.00
258	Hounsfield H10KS	10	0	200	100	603.00	3.05	249.20	1.57	8.40	2.79	30.46	1.15
259	Tinius Olsen HSKT	5	2	200	100	660.00	1.01	287.20	1.40	9.30	0.81	30.82	1.00
260	Tinius Olsen HSKT	5	0	200	100	642.00	3.57	259.40	5.04	9.00	1.85	30.33	2.25
262	CRE type Tensile Tester	5	2	200	100	553.89	2.64	216.78	4.82	o 9.50	2.44	31.34	5.11
263	MESDAN	5	2	200	100	x 447.70	2.60	226.50	1.40	6.90	0.70	27.00	1.90
264	CRE	5	2	200	100	680.42	3.09	o 306.88	1.76	8.95	1.19	27.72	1.45
265	Instron 5566	5		200	100	o 490.00	6.20	250.00	4.30	8.20	4.90	o 32.00	3.90
267	Tinius Olsen	5	2	200	100	560.00	4.50	260.00	4.40	6.94	2.41	25.60	2.21
268*	Hounsfield CRE	5	2	200	20/100	510.00	2.57	260.00	2.92	7.38	1.88	30.51	0.79
269	* See bottom of page!	5	2	200	100	655.61	1.73	285.48	1.67	o 9.36	1.42	30.22	1.35
270	CRE	5	2	200	100	618.76	4.99	280.32	3.64	8.42	2.53	28.00	0.58
271*	Tinius Olsen H10KT	5	2	200	20/100	540.00	2.30	220.00	1.70	7.80	1.00	28.30	1.80
274	Instron CRE	5	0	200	100	571.91	4.00	288.60	3.00	9.10	2.00	26.64	2.00
275	ACQUATI AG8/E	5	2	200	100	677.60	3.60	281.00	3.00	8.20	1.60	o 24.00	0.90
277	CRE machine	5	2	200	100	682.20	1.60	295.68	0.79	8.85	1.20	28.83	0.84
278	SDL H10KL	5	2	200	100	640.00	3.00	290.00	3.10	8.50	3.10	28.30	1.30
280	Tensolab	5	2	200	100	660.00	2.90	240.00	13.60	o 9.50	2.10	o 33.00	13.60
282	Zwick	5	2	200	50	670.00	2.90	o 300.00	1.50	9.20	3.10	30.20	0.90
293	Zwick	5	2	200	100	623.96	4.04	246.10	5.20	8.45	2.44	27.08	1.01
294	Tinius Olsen CRE	5	2	200	100	681.00	4.41	295.50	2.84	8.30	2.53	28.32	1.20
295	Instron	5	0	200	100	557.00	3.70	221.00	7.30	7.50	0.90	28.80	2.10
296	Zwick	5	2	200	100	561.30		273.00		8.40		31.50	
298	Instron	5	2	200	100	540.00	1.42	261.00	1.84	6.70	0.82	27.00	3.10
299*	Hounsfield CRE	5	2	200	20/100	550.00	4.70	260.00	1.85	6.80	1.81	26.50	2.11
300	Tinius Olsen	5	2	200	100	529.00	3.23	259.80	4.24	6.90	12.30	28.00	1.83
301	Tinius Olsen	5	2	200	100	580.00	1.70	250.00	4.30	7.30	1.80	27.50	1.00
303	Titan	10	2	200	100	670.00	4.88	290.00	2.24	o 9.50	2.57	26.00	1.18
305	Tinius Olsen H10KL	5	2	200	20/100	545.00	4.45	262.70	3.47	7.30	2.45	28.20	3.06
306	Titan 3	5	2	200	20/100	522.22	2.74	283.96	1.66	7.60	1.60	30.26	0.63
312	RT-250 M Tekstilmat	10	2	200	100	589.09	3.85	278.11	4.32	6.50	0.00	25.00	3.40
<b>n</b>						<b>95</b>		<b>93</b>		<b>96</b>		<b>95</b>	
<b><math>\bar{\sigma}</math></b>						<b>595.87</b>		<b>257.22</b>		<b>7.81</b>		<b>28.09</b>	
<b>s</b>						<b>60.57</b>		<b>28.19</b>		<b>1.02</b>		<b>2.48</b>	
<b>CV %</b>						<b>10.17</b>		<b>10.96</b>		<b>13.02</b>		<b>8.83</b>	
<b><math>s_r^2</math></b>						<b>569.36</b>		<b>76.86</b>		<b>0.04</b>		<b>0.86</b>	
<b><math>s_L^2</math></b>						<b>3453.05</b>		<b>791.57</b>		<b>1.11</b>		<b>6.09</b>	
<b><math>s_R^2</math></b>						<b>4022.40</b>		<b>868.43</b>		<b>1.16</b>		<b>6.95</b>	
<b>r</b>						<b>66.81</b>		<b>24.55</b>		<b>0.58</b>		<b>2.59</b>	
<b>R</b>						<b>177.58</b>		<b>82.51</b>		<b>3.01</b>		<b>7.38</b>	

Labs with marking (\*) used teseting speed of 20 mm/min only for weft direction

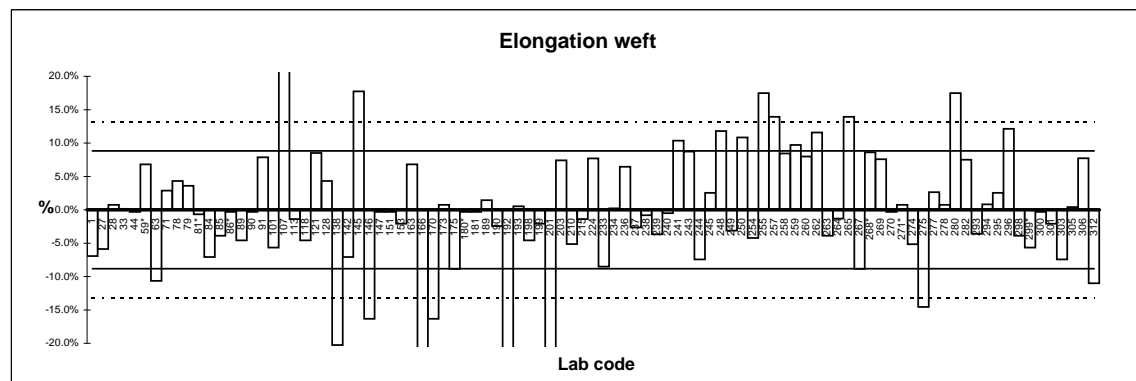
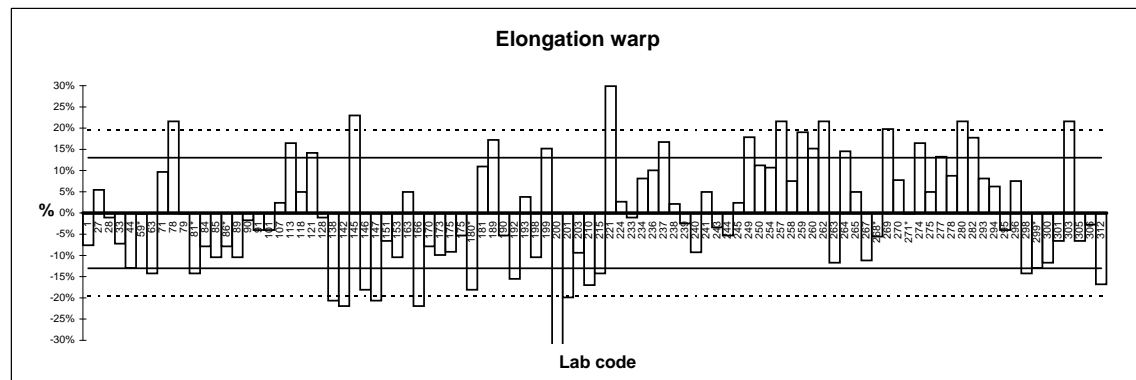
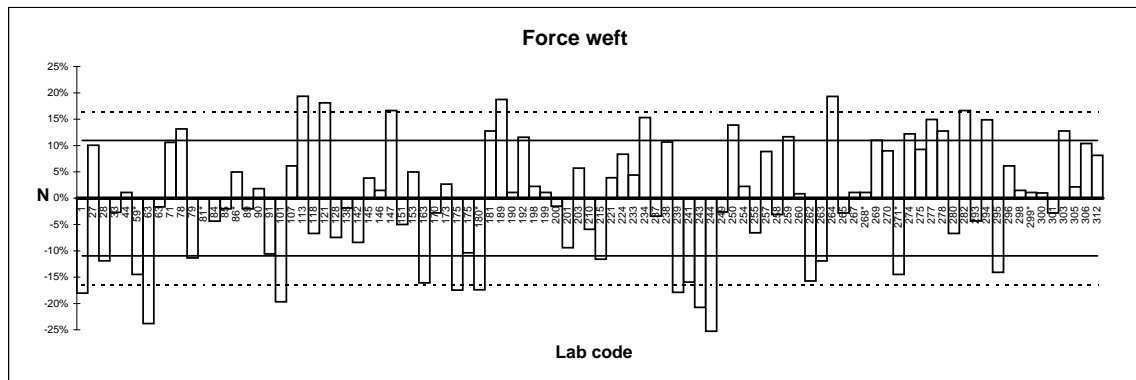
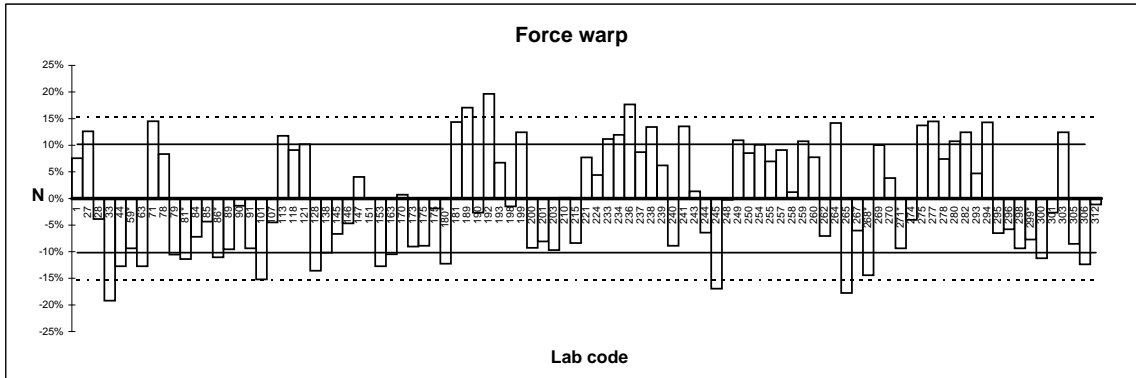
Lab 269: Instrument for testing indicated as "Instant rate of extension textile testing machine"



TESTEX®

RUNDTTEST FABRIC PROPERTIES NO. 8

Tensile properties strip method  
ISO 13934-1





TESTEX®

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Tensile properties grab method  
ISO 13934-2**

Lab Code	Testing equipment	No. of tests	Pre-tension [N]	Testing length [mm]	Testing speed [mm/min]	Force warp/length ø N	CV%	Force weft/cross ø N	CV%
1*	Zwick Z010	5		100	50	154.30		146.50	
27	Zwick ZMART PRO	5	0	100	50	o 175.50	3.55	148.53	2.28
28	Zwick 1445	5	0	100	50	149.20	4.39	142.80	3.56
33	Hounsfield K10KS	5	0	100	50	147.50	8.68	142.70	2.34
44	Hounsfield	10	0	100	50	130.00	8.70	130.00	2.20
59	Autograph	5		100	50	x 81.00	12.50	o 100.00	3.70
63	Instron	5		75	300	142.00		131.00	
71	Zwick Z010	5	2	100	50	160.30	7.10	141.60	1.70
78	Instron	5	0	100	50	153.20	3.90	120.30	4.00
79*	Instron	5	0	100	50	170.00	5.50	151.00	0.70
81	Zwick Zmart PRO	5		100	50	141.00	6.70	130.00	4.90
84	Instron 3369	5		100	50	168.00	6.30	146.00	3.50
86*	Hounsfield	5		100	50	160.00	5.17	140.00	3.39
89	Zwick / Roell Z010	5		100	50	o 180.00		o 161.00	
90	Titan	5	0	100	50	149.48	8.59	139.40	3.23
91	Instron	5	no	100	50	162.00	3.40	125.00	0.80
101	Titan JHH	5	0	100	100	153.00	7.50	132.30	4.40
118	Zwick	5		100	50	o 120.00	2.80	150.00	3.20
128	Tinius Olsen HSKT	5	2	100	50	o 178.60	8.80	144.40	3.06
138	Instron 5569	5	2	75	50	o 121.90	0.40	o 115.00	2.80
142	SDL VTT	5		100	50	o 126.60	5.84	123.40	2.63
147*	MTSQ Test 50	10	no		50	156.00	3.50	138.00	3.20
151	MESDAN	5		100	50	o 189.00	5.50	o 162.00	1.60
153	Hounsfield H10KS	5		100	50	150.00	16.10	140.00	2.50
170	Zwick Z005	5	5	100	50	163.00	0.66	141.00	1.99
173	Hounsfield	5	0	100	50	172.10	6.13	141.80	3.13
175	Tensolab- Mesdan	5	0	100	50	143.50	2.80	135.00	2.90
175	Titan 2	5	0	100	50	169.90	2.50	o 157.80	2.70
180	Zwick	5	1	100	50	154.15	7.75	144.77	1.93
181	Zwick Z005	5	2	100	50	156.91	5.83	147.23	2.76
189	Titan 2	5	0	100	50	163.00	3.51	135.20	2.74
190	SDL M-350	5	0	100	50	170.00	2.60	150.00	1.50
198	Zwick Z0100	5	2	100	50	o 122.00	5.31	135.00	1.61
199	Hounsfield	5	0	100	50	140.00	6.40	130.00	1.10
203	Zwick 1455	5	0	100	50	138.92	6.11	127.76	1.80
210	Zwick Z010	5	0	100	50	139.30	6.61	146.80	1.97
215	Instron 4465	5		75	50	x 65.50	7.00	x 64.10	2.30
234*	Hounsfield	5	0	100	50	158.80	1.87	141.80	2.02
237	Titan	5	0	100	50	129.66	11.66	132.17	2.11
239	Tinius Olsen	5	2	100	50	147.70	1.33	129.90	2.72
240	Zwick Z020	5		75	50	o 181.35	4.98	153.73	1.55
244	Instron	5	0	100	50	x 85.00	6.50	o 95.00	3.50
245	Titan JHH	5	0	100	50	155.00	3.34	135.00	4.61
249	Titan	5	0	100	50	139.88	6.22	136.00	2.47
252	Testometric	5	0	75	300	150.40	10.50	150.80	1.90
254	Instron	5		100	50	130.00	5.84	124.00	0.78
257	Hounsfield H10KS	5		100	50	150.00	3.00	140.00	3.70
258	Hounsfield H10KS	10	0	100	50	154.30	4.69	140.30	2.73
259	Tinius Olsen HSKT	5	0	100	50	154.38	2.00	136.04	1.61
260	Tinius Olsen HSKT	5	0	100	50	152.90	7.01	139.20	1.66
262	CRE Type Tensile Tester	5		100	50	164.21	3.77	o 162.56	1.30
265*	Instron 5566	5		100	50	160.00	7.50	150.00	2.40
268	Hounsfield CRE	5	0	100	50	160.00	2.41	140.00	1.20
269	* See bottom of page!	5	0	100	50	152.17	2.03	135.47	1.83

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Tensile properties grab method  
ISO 13934-2**

Lab Code	Testing equipment	No. of tests	Pre-tension [N]	Testing length [mm]	Testing speed [mm/min]	Force warp/length ø N	CV%	Force weft/cross ø N	CV%
270	CRE	5		100	50	148.40	7.13	134.10	4.75
271	Tinius Olsen H10KT	5	0	100	50	160.00	6.30	150.00	4.00
274	Instron CRE	5	0	100	50	156.54	4.00	139.46	2.00
277	CRE	5		100	50	147.00	1.38	132.68	0.99
278	SDL H10KL	5		100	50	130.00	1.90	130.00	4.30
282	Zwick	5	0	100	50	149.30	8.10	144.10	3.70
286	Titan 3	5	0	100	50	133.48	7.97	119.87	3.02
293*	Zwick	5	0	100	50	154.38	4.47		
294	Tinius Olsen CRE	5	0	100	50	156.00	6.81	139.70	2.53
295	Instron CRE	5	0	100	50	o 118.00	4.50	124.00	2.10
296*	Zwick	5	0	100	50	142.50		o 162.60	
298	Instron	5		75	50	131.00	5.03	o 119.00	1.93
299	Hounsfield CRE	5		100	50	160.00	5.76	140.00	2.82
300	Tinius Olsen	5		100	50	162.80	6.89	141.70	3.16
301	Tinius Olsen	5		100	50	160.00	8.20	140.00	2.30
305	Tinius Olsen H10KL	5	0	100	50	148.80	7.58	132.60	1.80
306	Titan	5		100	50	158.03	4.30	147.91	2.27
312	FF-24 METEFEM	5		100	100	x 262.00	2.56	x 337.00	2.31
<b>n</b>						<b>68</b>		<b>69</b>	
<b>Ø</b>						<b>151.87</b>		<b>138.16</b>	
<b>s</b>						<b>15.28</b>		<b>12.66</b>	
<b>CV %</b>						<b>10.06</b>		<b>9.16</b>	
<b>s<sub>F</sub><sup>2</sup></b>						<b>79.04</b>		<b>10.59</b>	
<b>s<sub>L</sub><sup>2</sup></b>						<b>215.85</b>		<b>154.76</b>	
<b>s<sub>R</sub><sup>2</sup></b>						<b>294.89</b>		<b>165.35</b>	
<b>r</b>						<b>24.89</b>		<b>9.11</b>	
<b>R</b>						<b>48.08</b>		<b>36.00</b>	

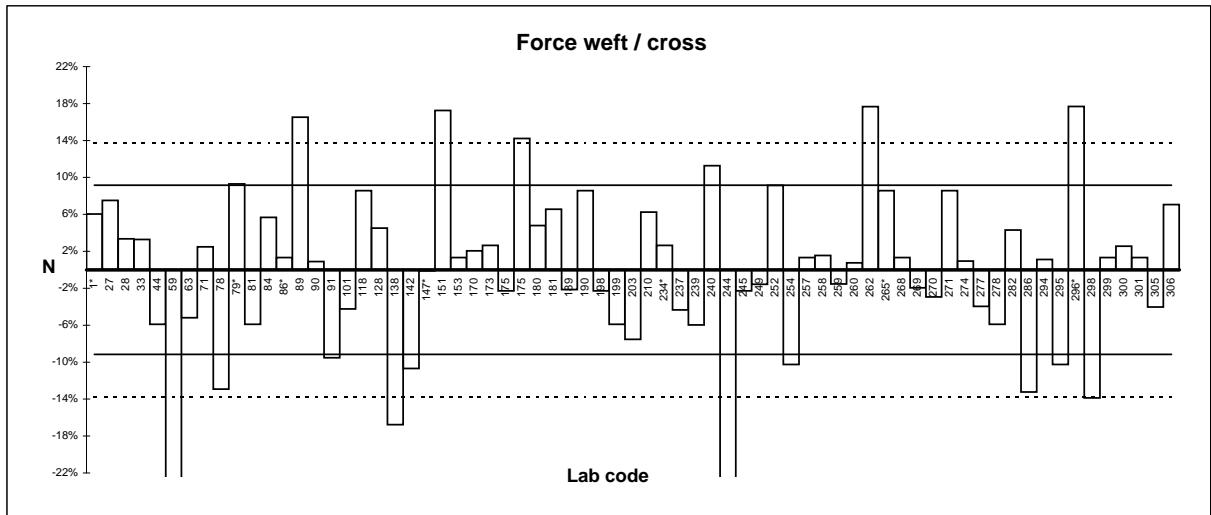
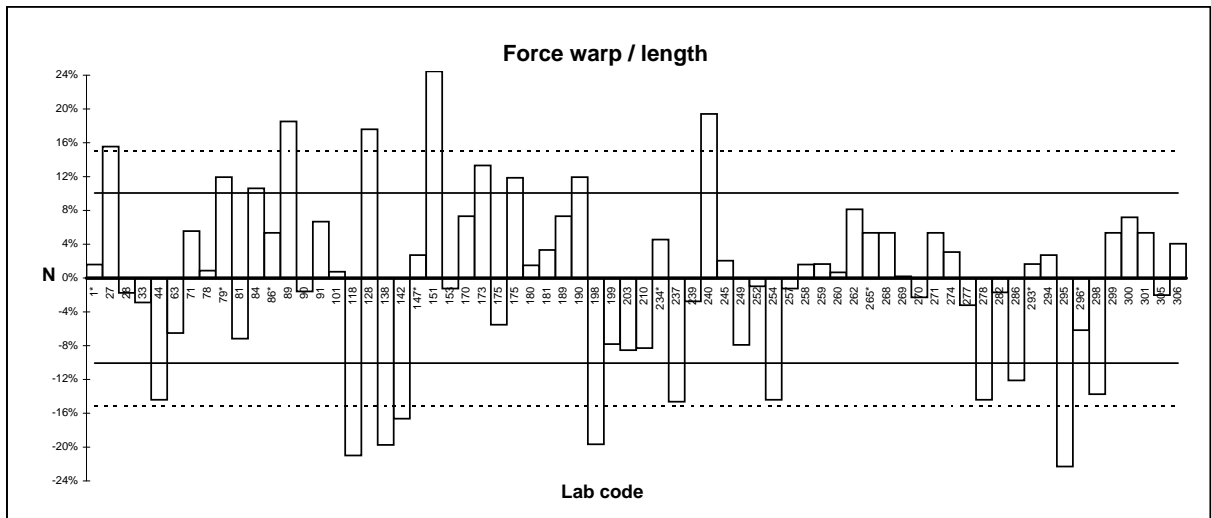
\*Marking: Labs registered a braking of fabric at the wedges / clamps

LAB 269: Instrument for testing indicated as "Instant rate of extension textile testing machine"



RUNDTTEST FABRIC PROPERTIES NO. 8

Tensile properties grab method  
ISO 13934-2





TESTEX®

**RUNDTTEST FABRIC PROPERTIES NO. 8**

**Tear force - Elmendorf method  
ISO 13937-1**

Lab Code	Testing equipment	No. of tests	Pendulum weight [cN]	Force of warp ø N	CV%	Force of weft ø N	CV%
1	Elmendorf	5	3200	17.62	2.45	7.64	5.20
33	L'homargy	5	6400	16.00	2.83	9.70	2.94
44	Textest FX 3750	10	6620	14.00	3.20	8.30	2.40
63	Textest FX 3750	5	3200	15.50		8.70	
71	Textest FX 3700	5	4200	17.58	3.70	9.57	3.80
78	Elmendorf	5	3200	18.70	2.15	9.80	1.03
79	Twing Albert	5	WE: 6400 / WA: 1600	14.90	2.10	9.80	4.00
81	Elmatear	10	WE: 1600 / WA: 3200	14.92	3.80	9.58	3.70
84	Shirley 008	5	6400	23.20	9.70	8.30	3.90
89	Textest FX 3750	5	3200	14.96		9.24	
90	Textest FX 3750	5	3200	14.78	4.98	9.88	3.66
91	Elmendorf	5	3200	14.20	2.10	9.40	3.20
101	Elmendorf	5	1600	14.60	3.70	9.70	2.90
113	096D Lorenzen&Wetpre	5	6280	20.29	6.20	12.90	2.80
118	Textest FX 3750	5	3200	16.90	9.07	9.70	6.33
128	Elmatear	5	3260	15.62	3.71	9.23	5.65
138	Thwing-Albert 9153	6	3136	9.70	4.40	17.80	0.90
142	SDL Elmendorf	5		16.80	4.18	10.10	2.83
145	Textest FX 3750	5	3200	14.18		8.77	
147	Textest FX 3750	10	3200	15.98	2.10	10.26	5.60
151	Elmendorf	5		17.40	1.70	8.80	5.50
153	Textest FX 3700	5	WE: 1600 / WA: 3200	15.20	3.90	10.10	2.60
166	Elmendorf	5	3200	14.50	6.10	8.30	1.50
170	Elmendorf Hans Baer	5	3140	15.40	4.40	8.20	5.10
173	Textest FX 3750	5	3200	14.30	3.83	8.72	1.26
175	Elmendorf Testex	5	3200	14.10	2.20	8.10	1.90
180	Elmendorf	5	3200	15.20	3.40	9.43	4.63
181	Textest FX 3750	5	WE: 1800 / WA:4200	16.56	2.70	8.69	3.20
189	Elmendorf Testex	5	WE: 1800 / WA:4200	16.70	2.80	9.62	7.20
190	Elmendorf	5	6400	15.60	1.70	9.10	3.20
193	Elmatear	5	? "B"	15.96	2.46	8.72	2.85
199	Frank	5	3200	18.69	2.00	9.84	5.80
201	Textest FX 3750	5	3200	14.05		8.13	
203	Textest FX 3750	5	3200	13.74	5.46	9.30	7.86
215	Textest FX 3700	5	3200	15.10	3.80	9.00	4.00
234	Textest FX 3750	5	3200	15.90	1.89	8.65	2.35
237	Elmatear	5	3262	15.69	4.48	8.76	5.71
245	Elmendorf Pendulum	5	WE: 1600 / WA: 3200		4.85	6.00	2.71
249	Textest FX 3700	5	4200	18.38	2.70	10.46	5.80
252	Textest FX 3750	6	3200	18.42	4.50	10.76	3.80
254	Messmer	5	WE: 1600 / WA: 6400	17.09	5.86	10.45	4.71
257	Elmendorf	5	3138	18.00	1.30	11.00	1.60
258	Elmatear 2	10	640	16.70	3.59	9.50	10.25
259	Elmendorf	5	3139	18.33	1.01	10.61	1.02
262	Elmendorf	5	3139	20.09	1.09	11.11	1.53
263	Elmatear	5		17.30	3.90	8.90	2.90
265	Elmatear 455	5		40.00	1.10	44.00	1.00
267	Elmendorf	5		15.62	3.02	10.02	6.87
268	Elmendorf	5	3139	17.22	2.57	10.16	3.23
269	Elmendorf	5	WE: 1600 / WA: 3200	18.09	2.30	10.36	2.59
270	Elmendorf	5	3139	18.21	1.22	10.17	1.67
271	Elmatear	5	WE: 3200 / WA: 6400	17.00	5.30	7.40	3.70
274	Twing Albert Pro Tear	5	3200	15.32	4.00	9.52	9.00
275	FX 3750	6	3200	16.00	2.20	9.30	4.30
277	Elmatear	5	1600	16.97	1.82	9.93	1.22
278	Elmendorf	5	3200	19.00	1.80	10.00	3.80
280	Elmendorf	5	6400	17.90	2.20	10.43	4.20
282	SDL Atlas	5	3200	16.00	2.00	9.80	2.50

(x) unexpected value  
(o) beyond control limit



TESTEX®

**RUNDTTEST FABRIC PROPERTIES NO. 8**

**Tear force - Elmendorf method  
ISO 13937-1**

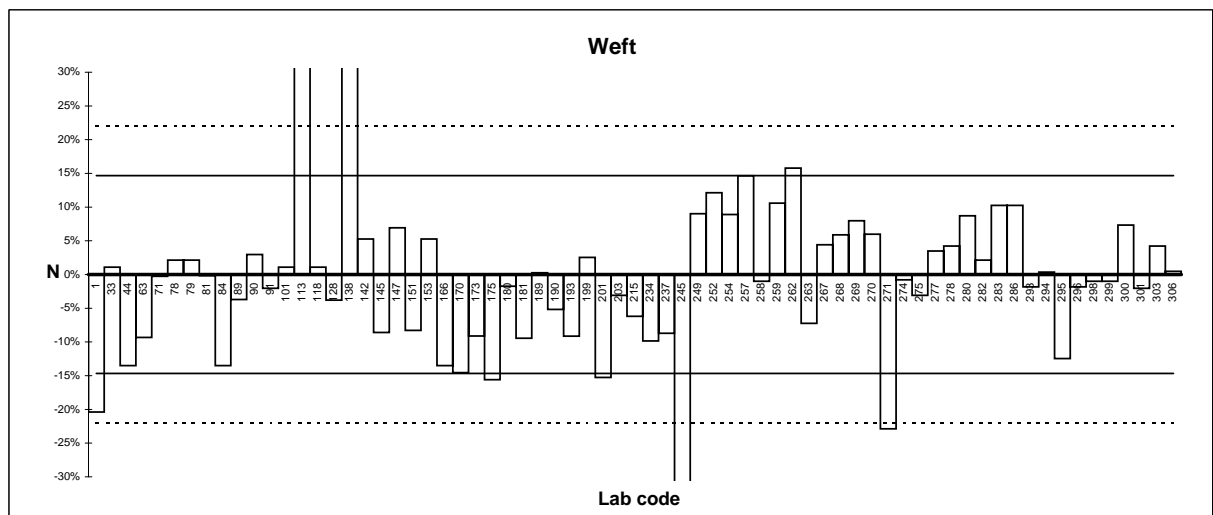
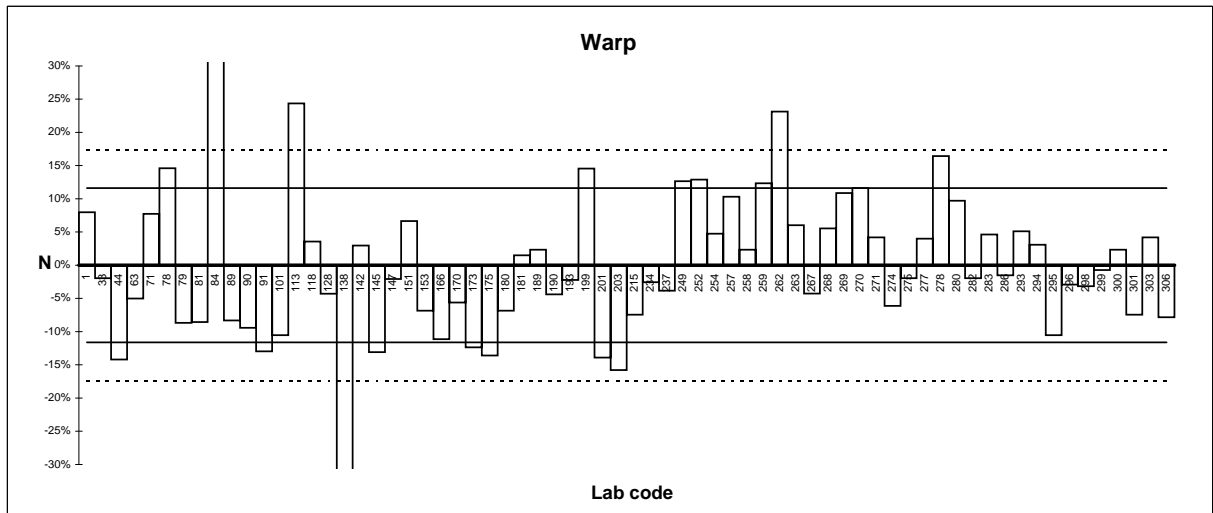
Lab Code	Testing equipment	No. of tests	Pendulum weight [cN]	Force of warp ø N	CV%	Force of weft ø N	CV%
283	Elmatear	5	3329	17.07	1.29	10.58	3.22
286	Elmatear	5	320	16.07	5.05	10.58	8.73
293	Elmatear	5	1600	17.15	2.82	9.42	2.87
294	Elmatear	5	320	16.82	2.70	9.63	5.42
295	Elmendorf	5	4300	14.60	6.10	8.40	6.50
296	Pendel Frank	5	320	15.84		9.42	
298	Elmendorf	5	3200	15.80	4.01	9.50	5.06
299	Elmendorf	5	3200	16.20	3.15	9.50	3.47
300	Twing Albert	5	3139	16.70	2.73	10.30	3.52
301	Elmatear	5	3316	15.10	4.30	9.40	3.20
303	James Heal	5		17.00	1.74	10.00	1.94
306	Elmatear 2	5	320	15.04	2.28	9.64	1.49
<b>n</b>				<b>68</b>		<b>69</b>	
<b>Ø</b>				<b>16.32</b>		<b>9.60</b>	
<b>s</b>				<b>1.89</b>		<b>1.41</b>	
<b>CV %</b>				<b>11.61</b>		<b>14.67</b>	
<b>s<sub>r</sub><sup>2</sup></b>				<b>0.37</b>		<b>0.14</b>	
<b>s<sub>L</sub><sup>2</sup></b>				<b>3.53</b>		<b>2.08</b>	
<b>s<sub>R</sub><sup>2</sup></b>				<b>3.91</b>		<b>2.22</b>	
<b>r</b>				<b>1.71</b>		<b>1.06</b>	
<b>R</b>				<b>5.53</b>		<b>4.17</b>	

\* tear out at sides / along diagonal direction or force > 32N



RUNDTTEST FABRIC PROPERTIES NO. 8

Tear force - Elmendorf method  
ISO 13937-1





TESTEX®

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Tear force - trouser-shape method  
ISO 13937-2**

Lab Code	Testing equipment	No. of tests	Force of warp ø N	CV%	Force of weft ø N	CV%
1	Zwick Z010	5			7.55	3.39
27	Zwick ZMART PRO	5	14.61	1.88	9.39	2.11
28	Zwick Z010	5	13.03	4.36	8.43	6.93
33	Hounsfield	5	13.59	3.47	9.22	2.74
44	Hounsfield	10	14.00	4.80	9.70	5.00
59	Autograph	5	14.63	1.70	9.41	6.20
63	Instron	4	12.50		8.50	
71	Zwick Z010	5	14.32	4.40	9.44	2.90
78	Instron	5	14.90	2.10	9.50	3.60
79	Instron	5	13.80	4.10	8.90	4.40
81	Zwick Zmart PRO	5	12.20	4.60	8.70	3.10
84	Instron 3369	5	13.30	4.40	8.00	5.60
85	Instron 5966	5	14.00	3.33	9.00	2.23
86	Hounsfield	5	14.00	5.78	8.70	5.78
89	Zwick / Roell Z010	5	12.90		9.26	
90	Titan	5	o 10.70	4.25	o 7.04	3.49
91	Instron	5	13.80	2.50	8.80	2.20
101	Titan JHH	5	o 11.00	2.70	o 7.00	2.00
113	Zwicky 1120	5	o 10.63	1.72	o 6.83	3.39
121	Zwick 1425	5	12.22	3.14	o 6.80	4.59
128	Tiniuns Olsen HSKT	5	11.58	4.85	7.56	6.44
138	Instron 5569	5	13.70	1.80	9.00	1.40
142	SDL VTT	5	13.30	4.02	8.50	2.69
145*	Instron 4466	5	12.19		8.61	
151	Mesdan	5	11.20	3.20	7.40	2.10
153	Hounsfield H10KS	5	12.00	3.60	8.10	2.00
170	Zwick Z005	5	13.70	8.60	8.80	2.80
173	Hounsfield	5	12.72	1.02	8.62	4.13
175	Tensolab- Mesdan	5	o 10.50	2.60	7.80	2.10
175	Titan 2	5	11.80	2.50	7.70	2.00
180	Zwick	5	13.77	4.53	8.67	0.91
181	Zwick Z005	5	13.85	3.66	9.30	4.14
189	Titan 2	5	14.66	1.11	9.58	1.13
190	SDL M-350	5	12.80	3.80	8.50	5.30
192	Zwick	5	11.60	22.00	8.60	1.95
193	Titan 510	5	13.16	2.30	7.33	9.00
198	Zwick Z010	5	13.30	3.97	8.37	3.34
199	Hounsfield	5			9.45	9.70
201	Zwick Z010	5	o 10.84		o 6.20	
203	Statigraph 4	5	13.25	4.91	8.74	4.73
210	Zwick Z010	5	11.95	4.62	7.41	2.77
215	Instron 4465	5	13.20	3.70	8.10	0.80
221	Instron 1026	10	13.47	4.35	8.55	2.60
233	Z1120	5	13.48	3.00	9.39	2.48
234	Hounsfield	5	14.27	1.86	8.31	2.06
239	Tinius Olsen	5			o 6.08	3.77
240	Zwick Z020	5	12.40	6.63	o 6.52	2.43
241	Instron	8	13.10	5.72	o 6.90	3.45
243	Llyod LR5K	5			7.24	1.89
244	Instron	5	13.50	9.50	o 6.90	5.90
245	Titan JHH	5		12.94	x 5.00	4.83
248	R23/T846086	5	o 8.90	2.75	x 5.40	1.75
249	Titan	5	13.41	3.42	9.02	0.53
250	Lloyd LRX Plus	5	12.50	0.17	7.90	0.16
252	Testometric	5	o 18.00	4.80	x 12.10	2.90
255	ZP 20	5	o 9.49	18.22		

(x) unexpected value  
(o) beyond control limit



TESTEX®

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Tear force - trouser-shape method  
ISO 13937-2**

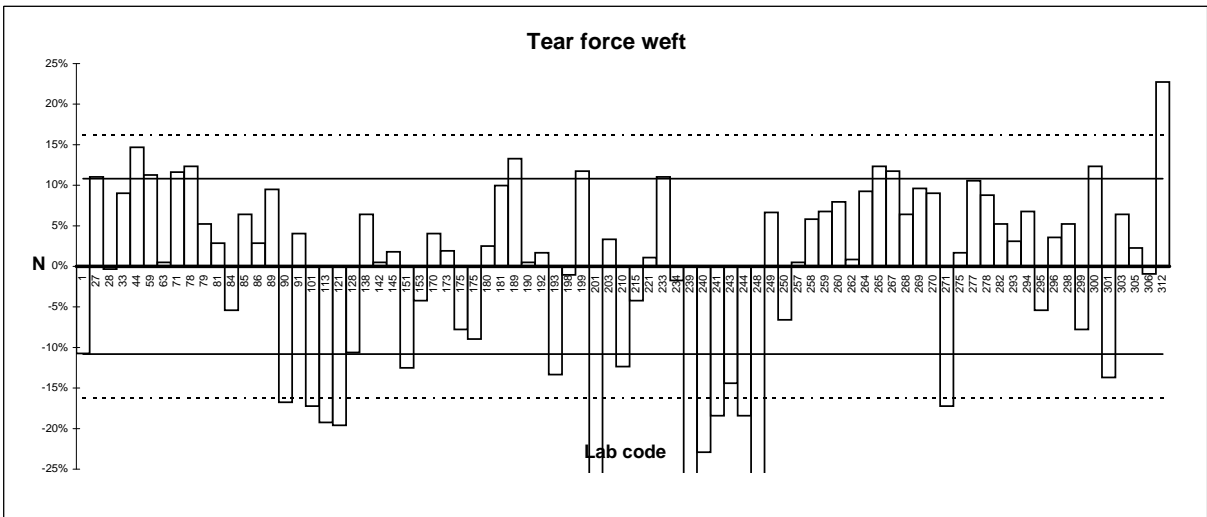
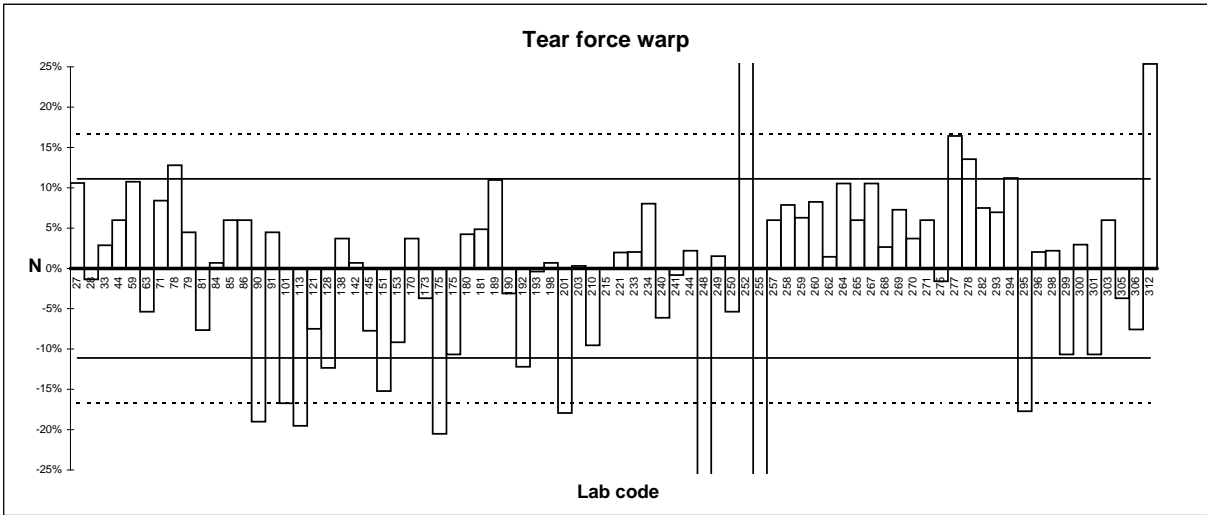
Lab Code	Testing equipment	No. of tests	Force of warp ø N	CV%	Force of weft ø N	CV%
257	Hounsfield H10KS	5	14.00	1.90	8.50	1.50
258	Hounsfield H10KS	10	14.25	3.22	8.95	5.33
259	Tinius Olsen	5	14.04	1.11	9.03	1.12
260	Tinius Olsen	5	14.30	3.92	9.13	5.49
262	CRE Type Tensile Tester	5	13.40	4.17	8.53	2.29
264	CRE machine	5	14.60	1.78	9.24	2.67
265	Instron 5566	5	14.00	6.90	9.50	3.00
267	Tinius Olsen	5	14.60	1.48	9.45	3.25
268	Hounsfield	5	13.56	2.48	9.00	2.57
269	* See bottom of page!	5	14.17	1.76	9.27	1.69
270	CRE	5	13.70	2.92	9.22	2.15
271	Tinius Olsen H10KT	5	14.00	1.50	7.00	1.50
275	ACQUATI AG8E	5	13.00	5.40	8.60	7.20
277	CRE	5	15.38	1.43	9.35	2.40
278	SDL H10KL	5	15.00	1.80	9.20	1.80
282	Zwick	5	14.20	1.40	8.90	4.20
293	Zwick	5	14.13	2.62	8.72	2.05
294	Tinius Olsen CRE	5	14.69	3.01	9.03	1.40
295	Instron CRE	5	10.87	11.90	8.00	16.10
296	Zwick	5	13.48		8.76	
298	Instron	5	13.50	1.95	8.90	1.52
299	Hounsfield CRE	5	11.80	3.61	7.80	3.48
300	Tinius Olsen	5	13.60	2.14	9.50	4.68
301	Tinius Olsen	5	11.80	2.30	7.30	2.50
303	Titan	10	14.00	3.04	9.00	3.18
305	Tinius Olsen H10KL	5	12.72	4.00	8.65	4.50
306	Titan 3	5	12.21	2.77	8.38	2.89
312	DL.OB 1070 TEX CONTROL	12	16.56	5.33	10.38	5.33
<b>n</b>			<b>78</b>		<b>80</b>	
<b>Ø</b>			<b>13.21</b>		<b>8.46</b>	
<b>s</b>			<b>1.47</b>		<b>0.91</b>	
<b>CV %</b>			<b>11.11</b>		<b>10.81</b>	
<b>s<sub>w</sub><sup>2</sup></b>			<b>0.39</b>		<b>0.10</b>	
<b>s<sub>L</sub><sup>2</sup></b>			<b>2.15</b>		<b>0.88</b>	
<b>s<sub>R</sub><sup>2</sup></b>			<b>2.53</b>		<b>0.98</b>	
<b>r</b>			<b>1.74</b>		<b>0.89</b>	
<b>R</b>			<b>4.45</b>		<b>2.77</b>	

LAB 269: Instrument for testing indicated as "Instant rate of extension textile testing machine"



**RUNDTTEST FABRIC PROPERTIES NO. 8**

**Tear force - trouser-shape method  
ISO 13937-2**





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**RUNDTEST FABRIC PROPERTIES NO. 8**

**Tear force - wing-shape method  
ISO 13937-3**

Lab Code	Testing equipment	No. of tests	Force of warp ø N	CV%	Force of weft ø N	CV%
1	Zwick Z010	5	13.86	4.66	o 6.65	5.72
33	Hounsfield	5	12.84	4.78	8.55	2.91
44	Hounsfield	10	12.00	3.30	9.30	5.60
59	Autograph	5	11.41	1.70	8.06	2.40
71	Zwick Z010	5	13.81	0.90	9.39	2.40
79	Instron 4301	5	12.50	3.20	8.90	5.10
84	Instron 3369	5	12.10	2.70	7.90	5.30
86	Hounsfield	5	13.00	5.74	8.60	5.28
89	Zwick / Roell Z010	5	12.40		8.88	
90	Titan	5	o 10.56	3.19	7.38	4.53
101	Titan JHH	5	x 9.80	1.70	7.20	4.90
113	Zwicky 1120	5	x 10.02	7.60	x 6.24	4.00
128	Tinius Olsen HSKT	5	13.92	2.48	7.91	5.42
138	Instron 5569	5	11.40	2.00	8.20	3.30
151	Mesdan	5	11.60	4.50	7.20	3.60
153	Hounsfield H10KS	5	12.00	3.20	8.70	1.70
163	LLoyd EZ20	5	13.10	4.30	9.30	3.90
170	Zwick Z005	5	11.70	1.30	8.50	5.30
173	Hounsfield	5	12.00	2.63	8.57	1.61
175	Tensolab Mesdan	5	13.60	2.10	o 7.00	2.90
175	Titan 2	5	o 11.20	2.00	7.60	2.50
181	Zwick Z005	5	13.37	0.95	9.00	2.74
189	Titan 2	5	12.79	1.41	8.81	3.66
190	SDL M-350	5	11.80	4.20	8.50	2.70
203	Statigraph 4	5	12.36	2.92	8.34	3.98
215	Instron 4465	5	11.50	1.90	7.90	0.80
221	Instron 1026	5	13.11	3.70	7.71	3.00
234	Hounsfield	5	13.57	1.61	8.11	4.62
240	Zwick Z020	5	13.50	1.40	o 6.32	6.56
241	Instron	8	14.20	4.12	o 6.90	6.55
245	Titan JHH	5	x 9.65	1.54	x 4.60	1.14
249	Titan	5	12.76	1.49	8.93	5.16
250	Lloyd LRX Plus	5	x 15.20	0.14	7.20	0.18
252	Testometric	5	13.50	0.80	8.60	2.70
255	ZP 20	5	o 14.89	2.36	o 10.10	5.76
257	Hounsfield H10KS	5	14.00	0.90	8.80	1.60
258	Hounsfield H10KS	10	13.46	2.57	8.21	4.29
259	Tinius Olsen HSKT	5	13.72	0.96	9.04	1.37
260	Tinius Olsen HSKT	5	13.36	0.71	8.96	4.58
262	CRE Type Tensile Tester	5	12.28	3.00	7.60	0.92
265	Instron 5566	5	13.00	2.40	9.40	5.10
268	Hounsfield (CRE)	5	12.65	1.78	8.74	4.22
269	* See bottom of page!	5	13.91	1.74	8.93	1.73
270	CRE MIC	5	13.66	0.89	8.65	5.95
271	Tinius Olsen H10KS	5	14.00	2.60	o 6.80	2.90
275	ACQUATI AG8E	5	12.90	0.80	9.40	9.60
277	CRE	5	13.86	1.68	9.34	2.21
278	SDL H10KL	5	14.00	3.10	8.70	3.60
294	Tinius Olsen CRE	5	14.11	0.90	9.44	5.31
295	Instron CRE	5	11.37	10.00	8.76	10.70
296	Zwick	5	11.33		7.85	



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**RUNDTEST FABRIC PROPERTIES NO. 8**

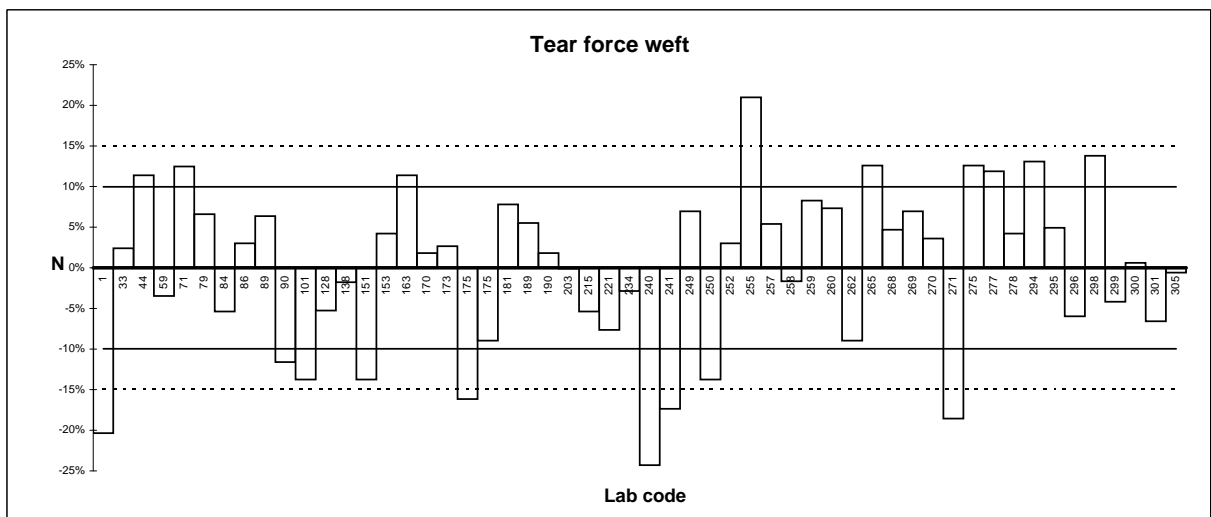
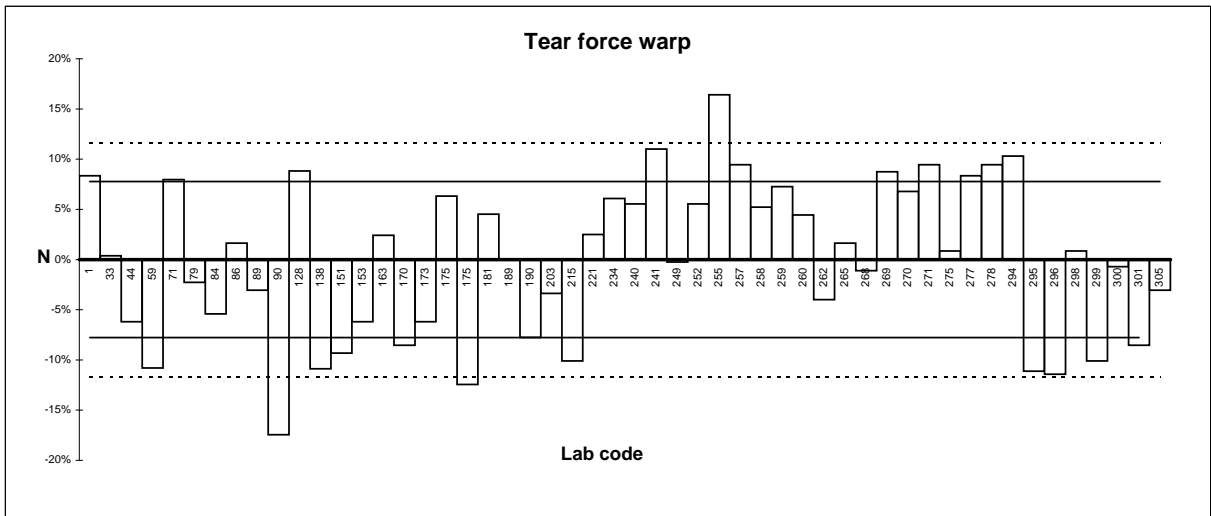
**Tear force - wing-shape method  
ISO 13937-3**

Lab Code	Testing equipment	No. of tests	Force of warp ø N	CV%	Force of weft ø N	CV%
298	Instron	5	12.90	0.88	9.50	1.14
299	Hounsfield CRE	5	11.50	1.48	8.00	4.12
300	Tinius Olsen	5	12.70	2.69	8.40	2.79
301	Tinius Olsen	5	11.70	2.20	7.80	1.30
305	Tinius Olsen H10KL	5	12.40	6.35	8.30	3.21
<b>n</b>			<b>52</b>		<b>54</b>	
<b>ø</b>			<b>12.79</b>		<b>8.35</b>	
<b>s</b>			<b>1.00</b>		<b>0.83</b>	
<b>CV %</b>			<b>7.78</b>		<b>9.97</b>	
<b>s<sub>w</sub><sup>2</sup></b>			<b>0.15</b>		<b>0.11</b>	
<b>s<sub>L</sub><sup>2</sup></b>			<b>0.96</b>		<b>0.70</b>	
<b>s<sub>R</sub><sup>2</sup></b>			<b>1.10</b>		<b>0.81</b>	
<b>r</b>			<b>1.07</b>		<b>0.92</b>	
<b>R</b>			<b>2.94</b>		<b>2.52</b>	

LAB 269: Instrument for testing indicated as  
"Instant rate of extension textile testing machine"

RUNDTTEST FABRIC PROPERTIES NO. 8

Tear force - wing-shape method  
ISO 13937-3





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**RUNDTEST FABRIC PROPERTIES NO. 8**

**Bursting strength  
ISO 13938-2**

Lab Code	Testing equipment	No. of tests	test size [cm <sup>2</sup> ]	Bursting strength ø kPa	CV%	Bursting height ø mm	CV%
1	Tru Burst	5	50	125.50	0.80	57.10	1.00
27	Burst Tester J. Heal 810	5	50	114.10	3.92	58.90	2.80
28	Frank	5	50	111.80	2.80	45.54	2.94
71	Tru Burst	5	50	127.20	4.10	48.70	1.40
81	Louis Schopper	8	50	178.50	2.40		
85	SDL Atlas	5	50	142.10	2.50	51.50	0.40
89	Schröder BP 30-E	5	50	140.40		45.78	
90	Tru Burst	5	50	121.00	2.70	49.90	1.25
101	Tru Burst	5	50	167.40	2.40	45.50	1.80
113	Tru Burst James Heal	10	50	119.90	2.27	63.70	2.74
146	Tru Burst	5	50	115.50	4.52	48.20	0.88
151	Scoppiometro	5	50	490.00	x		
163	Tru Burst	5	50	120.00	8.70	49.50	2.90
173	Tru Burst James Heal	5	50	130.80	2.26	54.92	11.07
175	SDATLAS-M229	10	50	141.60	3.20	53.40	1.30
180	Tru Burst	5	50	173.00	0.66	52.00	1.34
181	Tru Burst	5	50	128.60	5.72	58.00	2.91
190	Tru Burst	5	50	126.00	3.20	52.00	1.00
192	Tru Burst	3	50	111.00	1.53	58.90	2.45
198	Tru Burst	5	50	129.04	3.78	50.22	1.15
203	Tru Burst	5	50	118.80	4.87	56.00	3.15
233	Tru Burst	5	50	114.60	3.89	53.60	2.57
234	Tru Burst	5	50	133.40	3.16	51.50	2.39
237	Tru Burst	5	50	123.80	4.87	58.20	3.34
239	?		50	229.00		53.00	
241	Bursting Tester	5	50	117.00	6.50	55.00	4.04
245	Tru Burst	5	50	120.60	2.37	54.30	2.81
247	Tru Burst	5	50	114.00	3.10	48.00	1.50
249	James Heal	5	50	129.10	8.05	50.60	5.02
250	DL-Autobursting	5	50	121.20	7.50	55.40	2.10
252	Frank	5	50	225.00	6.30	45.50	3.30
257	Tru Burst James Heal	5	50	102.00	2.90	73.00	0.30
258	Tru Burst 810	5	50	119.90	4.14	59.60	1.89
259	J.Heal Tru Burst	5	50	124.08	0.92	48.28	0.16
268	Tru Burst 2	5	50	106.22	2.35	50.30	1.97
269	Tru Burst	5	50	126.32	2.31	48.52	1.47
270	Tru Burst	5	50	122.50	3.57	52.90	10.24
271	Tru Burst	5	50	120.00	5.20	58.90	1.30
274	Tru Burst 2	5	50	123.00	1.87	56.90	2.02
277	Pneumatic Bursting Tester	5	50	121.10	2.49	65.42	2.39
278	Tru Burst 2	5	50	115.00	1.50	60.00	1.20
282	Mullen	5	50	310.00	2.20	19.00	7.10
283	Tru Burst 2	5	50	116.70	1.38	59.30	0.43
286	Tru Burst 2	5	50	113.60	4.35	63.80	0.95

(x) unexpected value  
(o) beyond control limit





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**RUNDTEST FABRIC PROPERTIES NO. 8**

**Bursting strength  
ISO 13938-2**

Lab Code	Testing equipment	No. of tests	test size [cm <sup>2</sup> ]	Bursting strength ø kPa	CV%	Bursting height ø mm	CV%
294	Tru Burst 2	5	50	123.12	2.60	54.10	1.51
295	Mullen	5	50	x 472.00	1.50	x 15.00	9.80
296	?	5	50	152.00		47.20	
298	Tru Burst	5	50	150.00	2.60	57.00	0.92
299	Tru Burst	5	50	109.30	1.04	46.70	1.01
<b>n</b>				<b>46</b>		<b>45</b>	
<b>Ø</b>				<b>130.76</b>		<b>53.93</b>	
<b>s</b>				<b>26.29</b>		<b>5.96</b>	
<b>CV %</b>				<b>20.10</b>		<b>11.04</b>	
<b>s<sub>r</sub><sup>2</sup></b>				<b>25</b>		<b>2.20</b>	
<b>s<sub>L</sub><sup>2</sup></b>				<b>490</b>		<b>36.95</b>	
<b>s<sub>R</sub><sup>2</sup></b>				<b>515</b>		<b>39.15</b>	
<b>r</b>				<b>14.02</b>		<b>4.15</b>	
<b>R</b>				<b>63.54</b>		<b>17.52</b>	

LAB 153: registered "no bursting"

LAB 215: No results available=> bursting height is not evaluable with this apparatus



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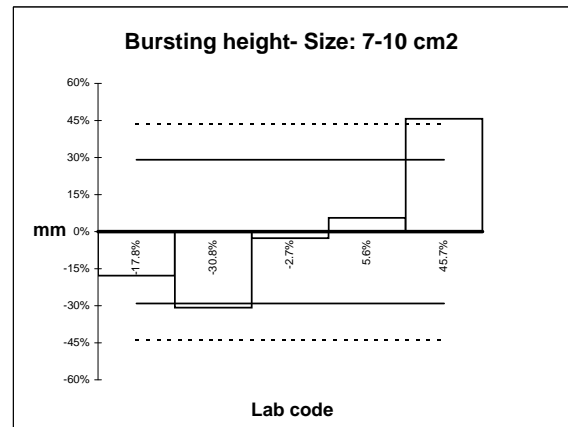
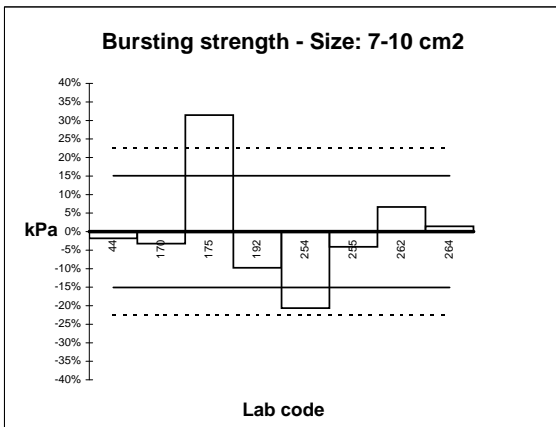
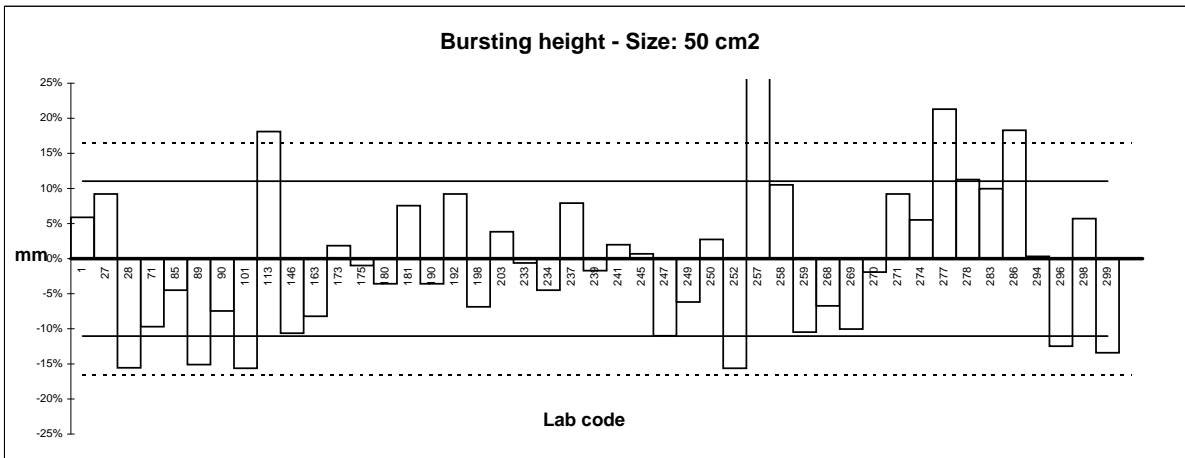
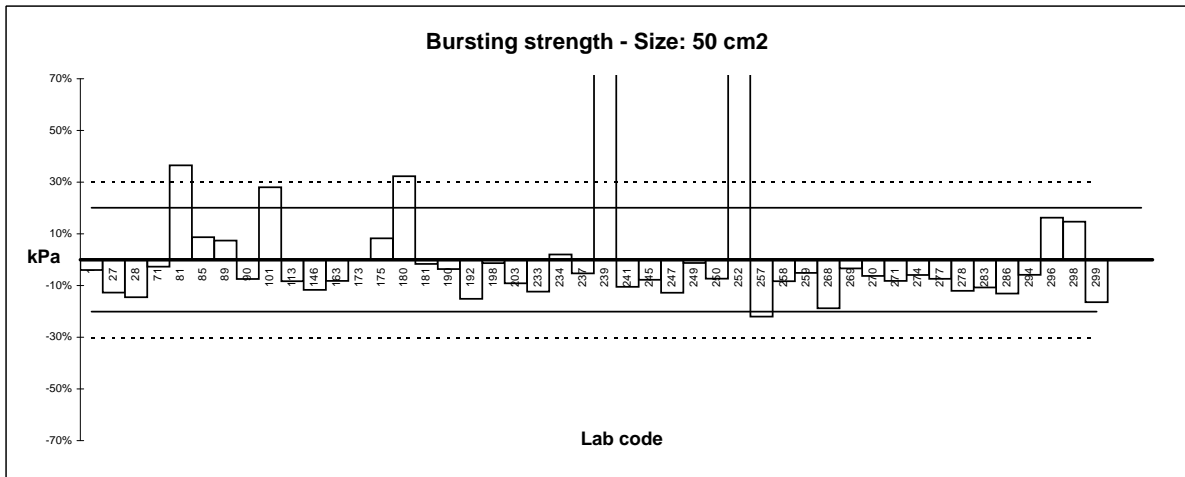
**RUNDTEST FABRIC PROPERTIES NO. 8**

**Bursting strength  
ISO 13938-2**

Lab Code	Testing equipment	No. of tests	test size [cm <sup>2</sup> ]	Bursting strength ø kPa	CV%	Bursting height ø mm	CV%
44	Tru Burst	5	7	345.00	2.30	19.00	0.40
79	J.Heal	5	8	x 790.00	6.10	16.00	
170	Aquati 95	5	10	340.00	8.80		
175	SDL P2000	10	7	o 461.80	2.80	22.50	2.00
192	Tru Burst	3	7	317.00	1.87	24.40	3.06
254	Abamel- L'homargy	5	10	278.73	8.53	o 33.68	3.28
255	?	7	10	336.93	3.92		
262	Bursting Strength Tester	5	7	374.74	1.17		
264	Mullen Burst Tester	10	7	356.30	3.40		
<b>n</b>				<b>8</b>		<b>5</b>	
<b>Ø</b>				<b>351.31</b>		<b>23.12</b>	
<b>s</b>				<b>52.92</b>		<b>6.73</b>	
<b>CV %</b>				<b>15.06</b>		<b>29.12</b>	
<b>s<sub>r</sub><sup>2</sup></b>				<b>241</b>		<b>0.28</b>	
<b>s<sub>L</sub><sup>2</sup></b>				<b>3453</b>		<b>42.18</b>	
<b>s<sub>R</sub><sup>2</sup></b>				<b>3694</b>		<b>42.46</b>	
<b>r</b>				<b>43.45</b>		<b>1.48</b>	
<b>R</b>				<b>170.17</b>		<b>18.24</b>	

RUNDTTEST FABRIC PROPERTIES NO. 8

Bursting strength  
ISO 13938-2



**RUNDTEST FABRIC PROPERTIES NO. 8**

**Seam slippage strength  
ISO 13936-1**

Lab Code	Testing equipment	No. of tests	Pre-tension [N]	Testing length [mm]	Testing speed [mm/min]	Force at seam opening 2 mm				Force at seam opening 3 mm			
						warp ø N	CV%	weft ø N	CV%	warp ø N	CV%	weft ø N	CV%
1	Zwick Z010	3		100	50	o 30.28	26.91			o 51.03	24.94		
27	Zwick ZMART PRO	5	0	100	50	78.02	5.40	68.53	4.81	138.37	4.76	166.43	6.42
28	Zwick 1445	5	5	100	50	53.40	31.90	47.20	16.70	96.70	35.10	116.90	24.00
33	Hounsfield	5								162.90	1.27	167.40	16.35
44	Hounsfield	9	0	100	50	53.00	2.60	83.00	11.90	140.00	10.00	200.00	0.00
59	Autograph	3		100	50	46.00		17.00		121.00		o 55.00	
71	Zwick Z010	4	5	100	50	82.10	17.60	74.90	15.10	160.30	11.80	192.70	12.20
79	Instron	5		100	50	98.00	12.80	113.00	7.40	173.00	13.60	200.00	
81	Zwick Zmart PRO	5		100	50	39.00	32.80	46.00	36.20	113.00	27.50	116.00	14.80
89	Zwick	3		100	50	o 110.00		x 144.00		153.00		203.00	
90	Titan JHH	5	0	100	50	99.92	8.92	74.72	12.38	181.00	8.50	180.76	12.89
91	Instron	4	no	100	50					194.00	6.10	140.00	9.10
101	Titan JHH	3	0	100	50	106.00	16.20	102.00	41.40	200.00		200.00	
121	Zwick	2	5	100	50	o 20.40	42.00	40.60	5.60	o 52.50	3.40	o 80.00	17.70
128	Tinius Olsen HSKT	2	5	100	50	77.30	28.00	108.50	64.00	179.30	50.00	188.30	50.00
151	Mesdan	5	2	100	50	43.30	1.00	34.40	10.90	125.10	11.40	o 79.20	7.20
153	Hounsfield H10KS	5	5	100	50	80.00		85.00		148.00		166.00	15.50
166	Statigraph	5	2	75	50	48.10	8.60	25.90	14.10	130.00	6.70	o 69.90	10.20
175	Titan 2	5	0	100	50	105.80	6.31	91.76	23.11	190.58	2.98	214.80	7.23
180	Zwick	5	1	100	50	o 21.00	7.16	46.00	11.30	o 66.00	6.06	126.00	4.20
181	Zwick Z005	4	5	100	50	47.80	14.04	52.00	32.12	137.80	20.91	129.10	30.59
189	Titan 2	5		100	50	70.40	10.00	73.60	11.00	200.00	0.00	154.72	7.00
190	SDL M-350	3	0	100	50					o 89.00	7.50	138.00	25.50
192	Zwick	3	5	100	100	64.60	33.10	60.70	16.30	114.61		124.27	9.10
193	Titan 510	5	5	100	100	56.70	34.29	64.25	16.72	126.00	18.29	144.00	20.22
198	Zwick Z010	5	0	100	50	60.67	22.86	110.00	8.33	141.75	27.96	190.75	5.37
199	Hounsfield	5	0	100	50	o 126.00	22.40	71.00	5.90				
203	Statigraph 4	4	0	100	50	74.58	22.72	37.84	6.85	171.93	9.04	119.97	2.24
215	Instron 4465	5		100	50	52.10	16.50	56.20	24.60	129.50	4.50	138.10	27.70
237	Titan	5	0	100	50	78.76	5.77	86.40	42.32	213.94	6.94	184.58	32.30
239	Tinius Olsen HSKT	5	2	100	50	49.02	7.66	56.83	8.87	213.58	18.04	193.75	13.72
244	Instron	3	0	100	50	66.87	8.00	54.83	5.70	136.79	18.10	145.40	6.40
245	Titan JHH	5	0	100	50	102.90	3.15	85.10	7.90	182.00	7.50	182.00	4.92
249	Titan	5	5	100	50	85.10	6.81	91.45	5.89	200.30	6.96	216.15	0.95
252	Testometric	3	0	100	50	43.20	2.00	21.00	37.70	115.60	0.00	o 41.90	28.50
258	Hounsfield H10KS	10	5	100	50	58.60	7.82	85.60	10.05				
260	Tinius Olsen H5KT	5	5	100	50					167.30	9.74		
263	MESDAN	5	5	400	50	69.00		64.00		o 239.00		190.00	
267	Tinius Olsen	5								177.00	5.20	200.00	0.00
271	Tinius Olsen H10KT	5	0	100	50	93.00	8.40	100.00	8.50	210.00	4.80	200.00	5.70
274	Instron CRE	5	0	100	50	74.90	5.61	50.64	7.00	204.88	4.00	98.47	6.00
277	CRE	5		100	50	93.46	2.82	96.38	2.40	o 224.60	2.84	183.50	1.14
282	Zwick	5	5	100	50	90.80	5.10	79.60	4.90	163.60	3.10	o 237.60	4.80
283	Titan	5	0	100	50	87.55	8.91	107.86	8.51	188.50	7.60	212.50	3.01
286	Titan 3	5	0	100	50	71.36	14.43	103.08	20.57	168.37	6.67	183.40	0.00
296	Zwick	5	3	100	50	71.60		53.20		130.40		122.10	



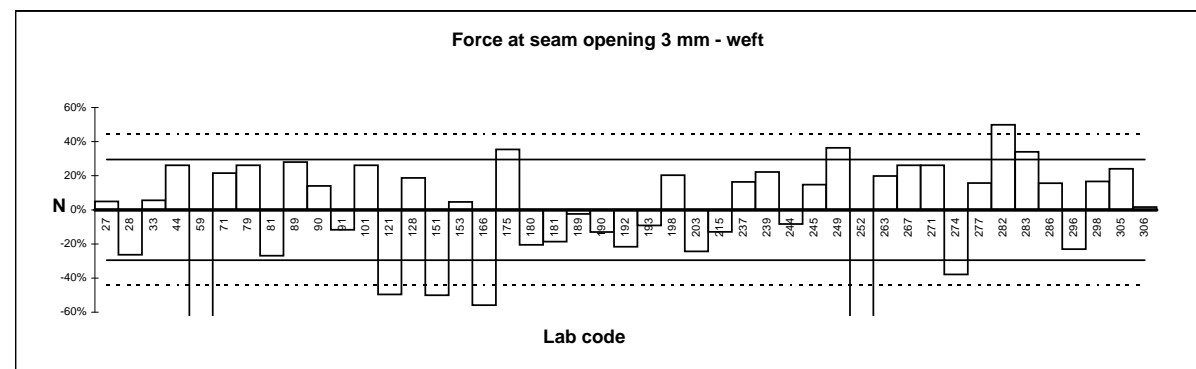
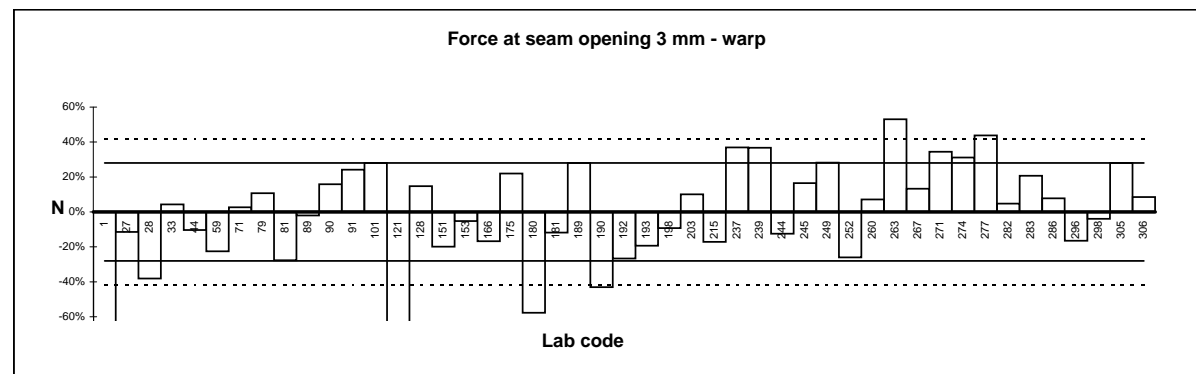
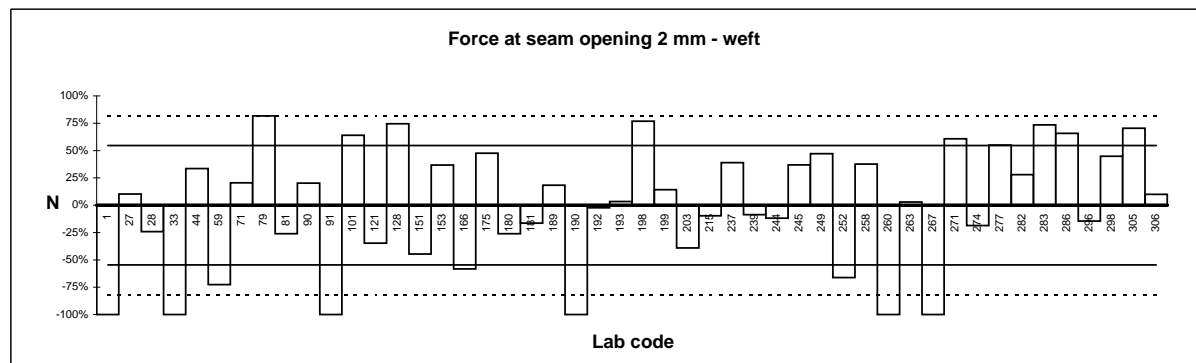
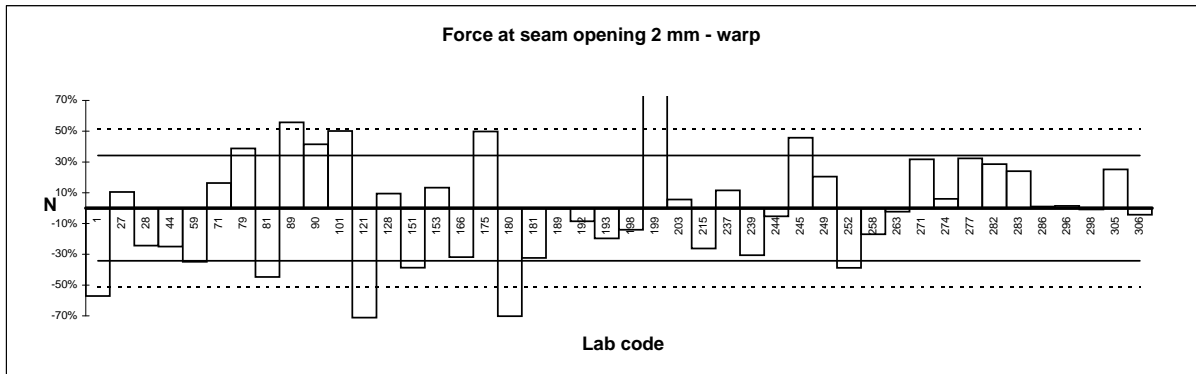
**RUNDTTEST FABRIC PROPERTIES NO. 8**

**Seam slippage strength  
ISO 13936-1**

Lab Code	Testing equipment	No. of tests	Pre-tension [N]	Testing length [mm]	Testing speed [mm/min]	Force at seam opening 2 mm				Force at seam opening 3 mm			
						warp ø N	CV%	weft ø N	CV%	warp ø N	CV%	weft ø N	CV%
298	Instron	2		100	50	70.00	0.10	90.00	0.00	150.00	0.00	185.00	3.82
305	Tinius Olsen H10KL	3	5	100	50	88.40	11.80	106.00	2.00	200.00	0.00	196.80	2.20
306	Titan 3	5	0	100	50	67.62	3.62	68.40	1.40	169.48	8.05	161.20	8.20
<b>n</b>						<b>44</b>		<b>48</b>		<b>47</b>		<b>45</b>	
<b>Ø</b>						<b>70.60</b>		<b>62.18</b>		<b>156.21</b>		<b>158.57</b>	
<b>s</b>						<b>24.15</b>		<b>33.95</b>		<b>43.78</b>		<b>46.75</b>	
<b>CV %</b>						<b>34.21</b>		<b>54.61</b>		<b>28.03</b>		<b>29.48</b>	
<b>s<sub>r</sub><sup>2</sup></b>						<b>94.07</b>		<b>116.69</b>					
<b>s<sub>L</sub><sup>2</sup></b>						<b>523.77</b>		<b>1069.19</b>					
<b>s<sub>R</sub><sup>2</sup></b>						<b>617.84</b>		<b>1185.88</b>					
<b>r</b>						<b>27.16</b>		<b>30.25</b>					
<b>R</b>						<b>69.60</b>		<b>96.42</b>					

RUNDTTEST FABRIC PROPERTIES NO. 8

Seam slippage strength  
ISO 13936-1





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**RUNDTTEST FABRIC PROPERTIES NO. 8**

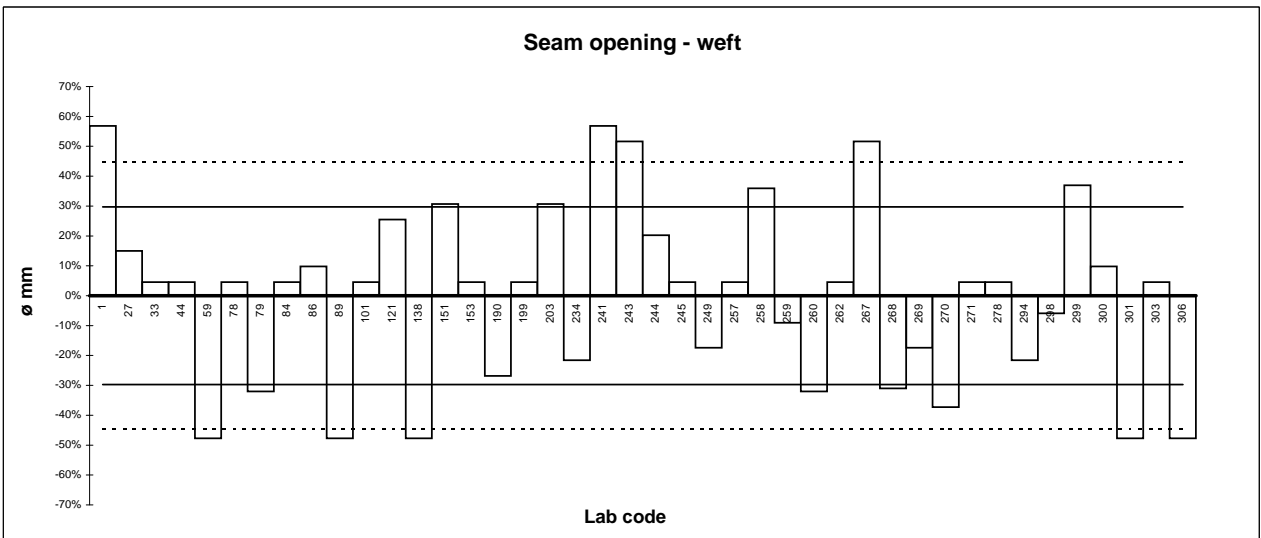
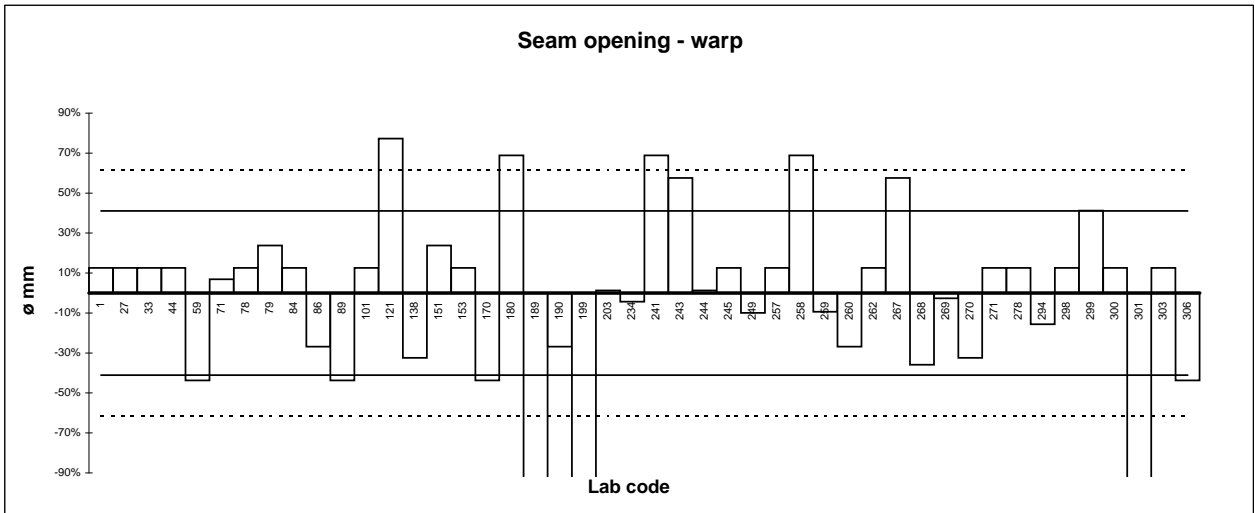
**Seam slippage strength  
ISO 13936-2**

Lab Code	Testing equipment	No. of tests	Pre-tension [N]	Testing length [mm]	Testing speed [mm/min]	Testing force [N]	∅ seam opening warp [mm]	∅ seam opening weft [mm]
1	Zwick Z010	5		100	50	80	2.0	o 3.0
27	Zwick ZMART PRO	5	0	100	50	60	2.0	o 2.2
33	Hounsfield	5		100	50	60	2.0	o 2.0
44	Hounsfield	10	0	100	50	60	2.0	o 2.0
59	Autograph	5		75	50	60	1.0	o 1.0
71	Zwick Z010	4		100	50	60	1.9	
78	Instron	5	0	100	50	60	2.0	o 2.0
79	Instron 4301	5		100	50	60	2.2	o 1.3
84	Instron 3369	5	5	100	50	60	2.0	o 2.0
86	Hounsfield	5		100	50	60	1.3	o 2.1
89	Zwick	5		100	50	60	1.0	o 1.0
101	Titan SHH	4	0	100	50	60	2.0	o 2.0
121	Zwick	2	5	100	50	60	o 3.2	o 2.4
138	Instron 5569	5	2	100	50	60	1.2	o 1.0
151	MESDAN	3		100	50	60	2.2	o 2.5
153	Hounsfield H10KS	5	5	100	50	60	2.0	o 2.0
170	Zwick Z005	3	5	100	50	60	1.0	x 0.0
180	Zwick	5	1	100	50	60	o 3.0	x 4.0
189	Titan 2	5		100	50	60	o 0.0	x 0.0
190	SDL M-350	5	0	100	50	60	1.3	o 1.4
199	Hounsfield	5	0	100	50	60		o 2.0
203	Zwick 1455	5	0	100	50	59.74	1.8	o 2.5
234	Hounsfield	5		100	50	60	1.7	o 1.5
241	Instron	5	0	100	50	60	o 3.0	o 3.0
243	Lloyd LR5K	5		100	50	60	2.8	o 2.9
244	Instron	3		100	50	60	1.8	o 2.3
245	Titan JHH	5	0	100	50	60	2.0	o 2.0
249	Titan	5	5	100	50	60	1.6	o 1.6
252	Testometric	3	0	100	50	200	x 4.3	x 4.5
257	Hounsfield H10KS	5		100	50	60	2.0	o 2.0
258	Hounsfield H10KS	10	0	100	50	60	o 3.0	o 2.6
259	Tinius Olsen HSKT	5	0	100	50	60	1.6	o 1.7
260	Tinius Olsen HSKT	5	5	100	50	60	1.3	o 1.3
262	CRE Type Tensile Tester	5		100	50	60	2.0	o 2.0
264	CRE Machine	5	5	100	50	180	x 6.5	x 4.6
267	Tinius Olsen	2				120	2.8	o 2.9
268	Hounsfield (CRE)	5	0	100	50	60	1.1	o 1.3
269	* See bottom of page!	5	0	100	50	60	1.7	o 1.6
270	CRE	5		100	50	60	1.2	o 1.2
271	Tinius Olsen	5	0	100	50	60	2.0	o 2.0
278	SDL H10KL	5		100	50	60	2.0	o 2.0
294	Tinius Olsen	5	0	75	50	60	1.5	o 1.5
298	Instron	5		100	50	60	2.0	o 1.8
299	Hounsfield CRE	5		200	50	60	2.5	o 2.6
300	Tinius Olsen	5		100	50	60	2.0	o 2.1
301	Tinius Olsen	5		100	50	60	o 0.0	o 1.0
303	Titan	10		100	50	60	2.0	o 2.0
306	Titan 3	5	0	100	50	60	1.0	o 1.0
<b>n</b>							<b>46</b>	<b>42</b>
<b>∅</b>							<b>1.78</b>	<b>1.91</b>
<b>s</b>							<b>0.73</b>	<b>0.57</b>
<b>CV %</b>							<b>41.06</b>	<b>29.73</b>

LAB 269: Instrument for testing indicated as "Instant rate of extension textile testing machine"

RUNDTTEST FABRIC PROPERTIES NO. 8

Seam slippage strength  
ISO 13936-2







TESTEX®

**RUNDTEST FABRIC PROPERTIES NO. 8**

<b>Abrasion resistance Martindale ISO 12947-2</b>					
Lab Code	Testing equipment	No. of tests	Load [kPa]	Pre-abrasion	ø abrasion cycles
1	James Heal	4	9	no	10750
27	Martindale	4	9	no	17875
28	Martindale	3	9	no	7667
33	Martindale	4	9	no	12000
44	Nu-Martindale	4	9	no	13500
59	Martindale	4	9	no	16000
63	Martindale	3	9	no	x 31667
71	Nu-Martindale	4	9	no	15500
78	Martindale	4	9	no	15000
79	James Heal	4	9	no	12500
81	Martindale	4	9	no	15500
84	James Heal 403	4	9	no	9000
84	SD Atlas M235	4	9	no	9500
85	Martindale	6	9	no	10300
86	Martindale	4	9	no	o 6000
89	Martindale	3	9	no	8667
90	Martindale	4	9	no	19000
91	Nu-Martindale	3	9	no	15000
101	James Heal Martindale	3	9	no	16000
107	James Heal Martindale	4	9	no	o 25000
113	James Heal Nu 403	4	9	no	o 22500
118	James Heal Nu 403	3	9	no	x 28150
121	Martindale	3	9	no	19000
128	Nu-Martindale 404	4	9	no	10911
138	Nu-Martindale Mode 864	4	9	no	16000
142	SDL Abrasion Tester	4	9	no	12000
145	Martindale	1	9	no	8150
146	Martindale SDL	4	9	no	11000
147	MESDAN	6	9	no	10000
151	James Heal Martindale	4	9	no	16500
153	Nu-Martindale James Heal	6	9	no	8500
163	Abrasion Martindale Tester	6	9	no	17333
166	James Heal Martindale	4	9	no	11500
170	James Heal 403	4	9	no	12000
173	James Heal Nu Martindale	3	9	no	8300
175	Mesdan	4	9	no	11500
180	Nu-Martindale	3	9	no	14000
181	Martindale James Heal	3	9	no	16000
189	Martindale James Heal	3	9	no	x 29000
190	Martindale	3	9	no	10000
192	Martindale	5	9	no	o 22500
193	Nu-Martindale 406	3	9	no	x 30000
198	Nu-Martindale	4	9	no	o 7400
199	Martindale	4	9	no	o 25000
203	James Heal	3	9	no	10333
210	Martindale	4	9	no	10500
215	James Heal	3	9	no	10000
221	Martindale	4	9	no	16875
224	Martindale	5	9	no	o 24000
233	Nu Martindale	3	9	no	20000
234	James Heal Nu-Martindale	3	9	no	8600
237	Martindale	3	9	no	20667
239	Martindale	4	9	no	17000
241	Martindale	9	9	no	12000
243	Martindale	4	9	no	10000
244	Sodemat	4	9	no	9000
245	Martindale	3	9	no	8300

(x) unexpected value  
(o) beyond control limit



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**RUNDTEST FABRIC PROPERTIES NO. 8**

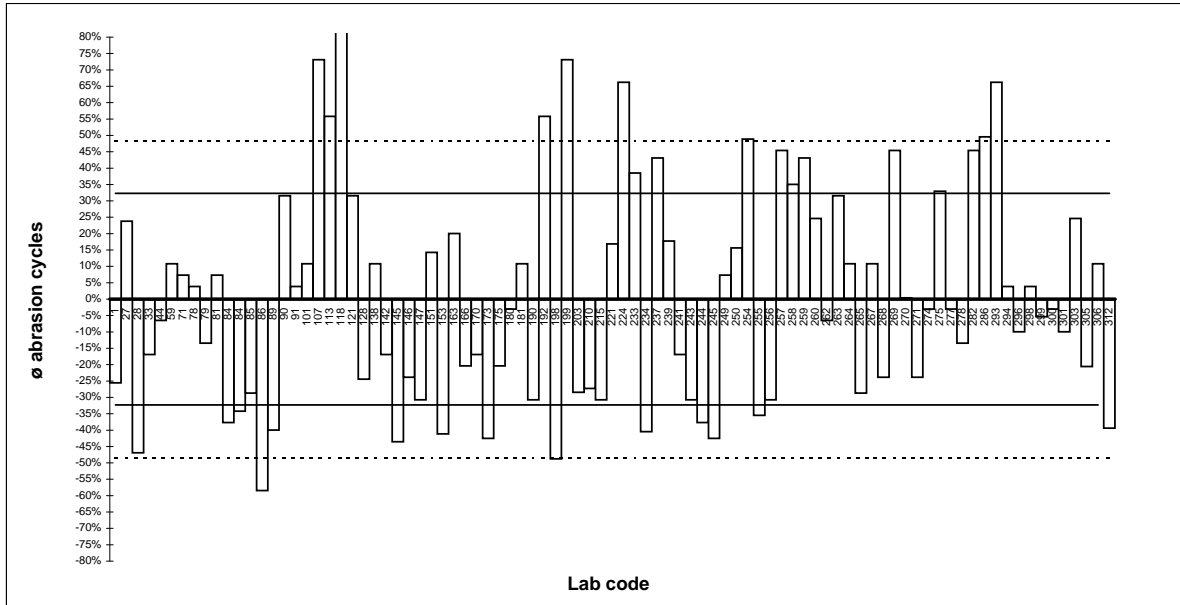
<b>Abrasion resistance Martindale ISO 12947-2</b>					
Lab Code	Testing equipment	No. of tests	Load [kPa]	Pre-abrasion	ø abrasion cycles
249	NU-Martindale	4	9	no	15500
250	Martindale M235	5	9	no	16700
252	SDL Atlas	2	9	no	x 30000
254	James Heal Martindale	4	9	no	o 21500
255	SDL Martindale	7	9	no	9318
256	Martindale	4	9	no	10000
257	Martindale	4	9	no	21000
258	Maxi Martindale	4	9	no	19500
259	Nu-Martindale	3	9	no	20666
260	Nu-Martindale	3	9	no	18000
262	Martindale SDL Atlas	4	9	no	13500
263	Martindale	3	9	no	19000
264	Martindale James Heal 864	4	9	no	16000
265	Martindale 403	6	9	no	10300
267	Martindale	2	9	no	16000
268	Nu-Martindale	3	9	no	11000
269	Martindale	3	9	no	21000
270	Martindale MIC	4	9	no	14500
271	Nu-Martindale	3	9	no	11000
274	SDL Atlas Martindale	3	9	no	14000
275	C&B	5	9	no	19200
277	Martindale	3	9	no	14000
278	SDL M235	3	9	no	12500
282	James H. Heal	3	9	no	21000
286	Martindale	9	9	no	o 21600
293	Martindale	6	9	no	o 24000
294	Martindale	3	9	no	15000
296	James Heal	5	9	no	13000
298	Martindale	3	9	no	15000
299	Martindale	3	9	no	13667
300	Martindale James Heal	3	9	no	14000
301	Nu-Martindale	3	9	no	13000
303	James Heal	3	9	no	18000
305	Martindale James Heal	3	9	no	11467
306	Midi-Martindale	3	9	no	16000
312	Martindale 235	4	9	no	8750
<b>n</b>					<b>88</b>
<b>Ø</b>					<b>14441</b>
<b>s</b>					<b>4664</b>
<b>CV %</b>					<b>32.29</b>

(x) unexpected value  
(o) beyond control limit



RUNDTTEST FABRIC PROPERTIES NO. 8

Abrasion resistance Martindale  
ISO 12947-2



**RUNDTEST FABRIC PROPERTIES NO. 8**

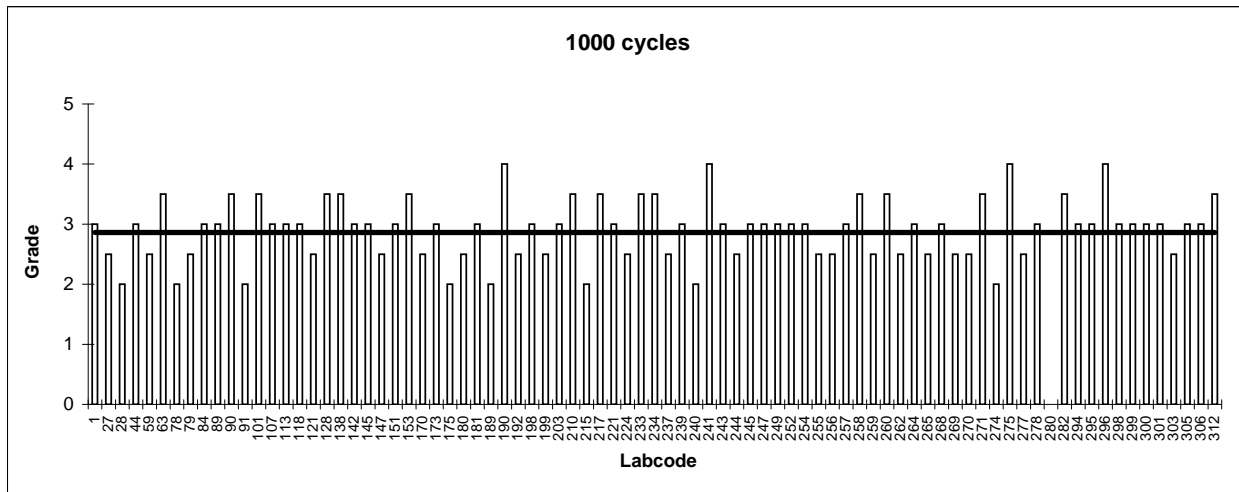
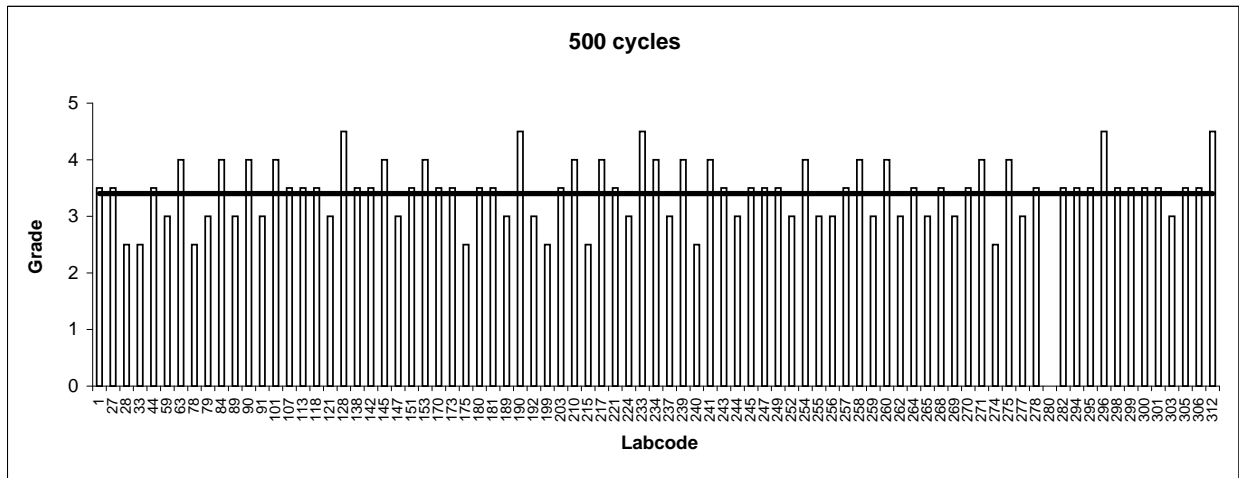
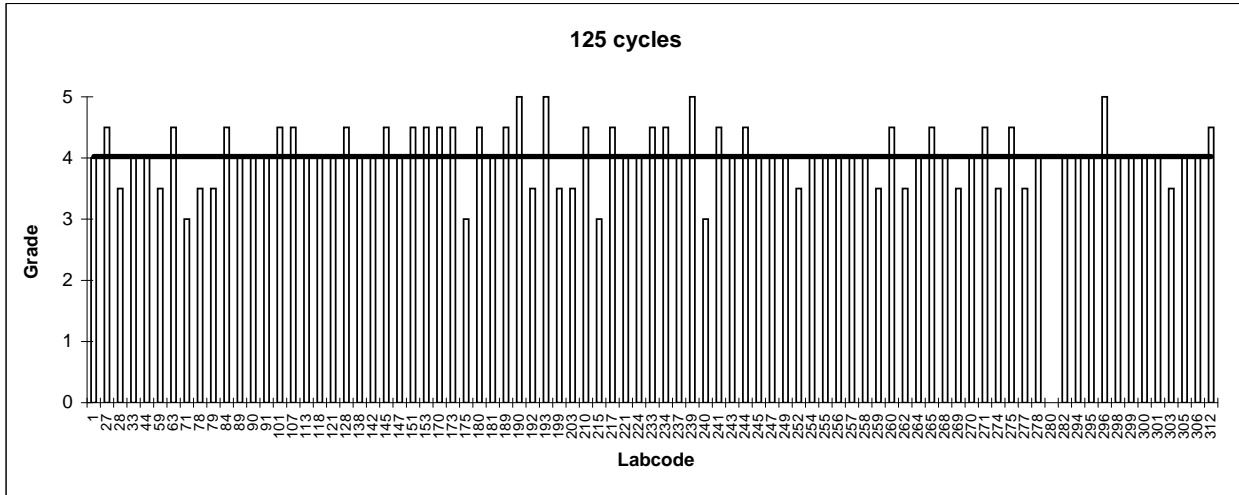
**Pilling propensity - Martindale  
ISO 12945-2**

Lab Code	Testing equipment	No. of tests	No. of observers	Load [g]	Pre-abrasion	ø pilling after cycles.....					
						125 [grade]	500 [grade]	1000 [grade]	2000 [grade]	5000 [grade]	7000 [grade]
1	James Heal	3	5		no	4	3-4	3	2-3	2	1-2
27	Martindale	3	3	155	no	4-5	3-4	2-3	2	2	2
28	Martindale	3	2	155	no	3-4	2-3	2	1-2	1-2	1
33	Martindale	4	2	155	no	4	2-3	x 1-2	x 1	1	1
44	Nu-Martindale	3	2	155	no	4	3-4	3	2-3	2	2
59	Martindale	3	3	155	no	3-4	3	2-3	2	2	2
63	Martindale		2	155	no	4-5	4	3-4	3-4	2-3	1-2
71	Nu-Martindale	3	4	155	no	3	x 2	x 1-2	x 1	1	1
78	Martindale	4	2	155	no	3-4	2-3	2	2	1-2	1-2
79	James Heal	3	2	155	no	3-4	3	2-3	2	1-2	1-2
81	Martindale	4	3	155	no	x 2-3	x 1-2	x 1-2	1-2	1	1
84	James Heal 403	3	3	155	no	4-5	4	3	2-3	1-2	1
89	Martindale	3	2	2.4 / cm <sup>2</sup>	no	4	3	3	2-3	2	2
90	Martindale	4	2	155	no	4	4	3-4	3	3	2-3
91	Nu-Martindale	4	2	155	no	4	3	2	1-2	1	1
101	James Heal Martindale	3	2	155	no	4-5	4	3-4	3-4	2-3	2-3
107	James Heal Martindale	3	1	155	no	4-5	3-4	3	2-3	2	1-2
113	James Heal Nu 403	2	6	155	no	4	3-4	3	2-3	2	1-2
118	James Heal Nu 403	3	6	155	no	4	3-4	3	2-3	2	1-2
121	Martindale	3	3	155	no	4	3	2-3	2	1-2	1-2
128	Nu-Martindale 404	4	3	155	no	4-5	4-5	3-4	2-3	1-2	1-2
138	Nu-Martindale Mode 864	4	8	155	no	4	3-4	3-4	3	2-3	2
142	James Heal Martindale	4	2	155	no	4	3-4	3	2-3	2	1
145	Martindale	1	1	155	no	4-5	4	3	3	2	2
147	MESDAN	3	2	155	no	4	3	2-3	2	1-2	1
151	James Heal Martindale	3	3	155	no	4-5	3-4	3	2-3	2	1-2
153	Nu-Martindale James Heal	6	2	155	no	4-5	4	3-4	3	2	1-2
166	James Heal Martindale	3	4	155	no	x 2-3	x 1-2	x 1	x 1	1	1
170	James Heal 403	3	2	155	no	4-5	3-4	2-3	1-2	1	1
173	James Heal Nu Martindale	1	3	155	no	4-5	3-4	3	3	2-3	2-3
175	Mesdan	6	3	155	no	3	2-3	2	1-2	1	1
180	Nu-Martindale	3	2	0	no	4-5	3-4	2-3	2	2	1-2
181	Martindale James Heal	3	2	155	no	4	3-4	3	2-3	2	2
189	Martindale James Heal	3	3	155	no	4-5	3	2	2	1-2	1-2
190	Martindale	3	3	155	no	5	4-5	4	3	2-3	2
192	Martindale	5	2	155	no	3-4	3	2-3	2-3	1-2	1-2
193	Nu-Martindale 406	2	2	155	no	5	x 5	x 4-5	x 4	x 3-4	x 3
198	Nu-Martindale	1	6	155	no	4	4	3	2-3	2	1-2
199	Martindale	3	4	155	no	3-4	2-3	2-3	2	1-2	1-2
203	James Heal	3	11	155	no	3-4	3-4	3	3	2-3	2-3
210	Martindale	4	3	155	no	4-5	4	3-4	3-4	3	2-3
215	James Heal	3	3	155	no	3	2-3	2	2	1-2	1-2
217	NU-Martindale	3	2	155	no	4-5	4	3-4	2-3	2	1-2
221	Martindale	4	2	155	no	4	3-4	3	2-3	2	2
224	Martindale	3	3	155	no	4	3	2-3	2-3	2	1-2
233	James Heal Nu-Martindale	3	2	155	no	4-5	4-5	3-4	3	2	2
234	James Heal Nu-Martindale	1	3	155	no	4-5	4	3-4	3	2-3	2-3
237	Martindale	3	2	153	no	4	3	2-3	2	1-2	1
239	Martindale	3	2	155	no	5	4	3	3	2	2
240	James Heal	3	3	155	no	3	2-3	2	x 1	1	1
241	Martindale	3	3	155	no	4-5	4	4	3-4	3	x 3
243	Martindale	3	2	155	no	4	3-4	3	2-3	2	2
244	Sodemat	3	3	155	no	4-5	3	2-3	2	2	1-2
245	Martindale	1	4	155	no	4	3-4	3	2-3	2	1-2

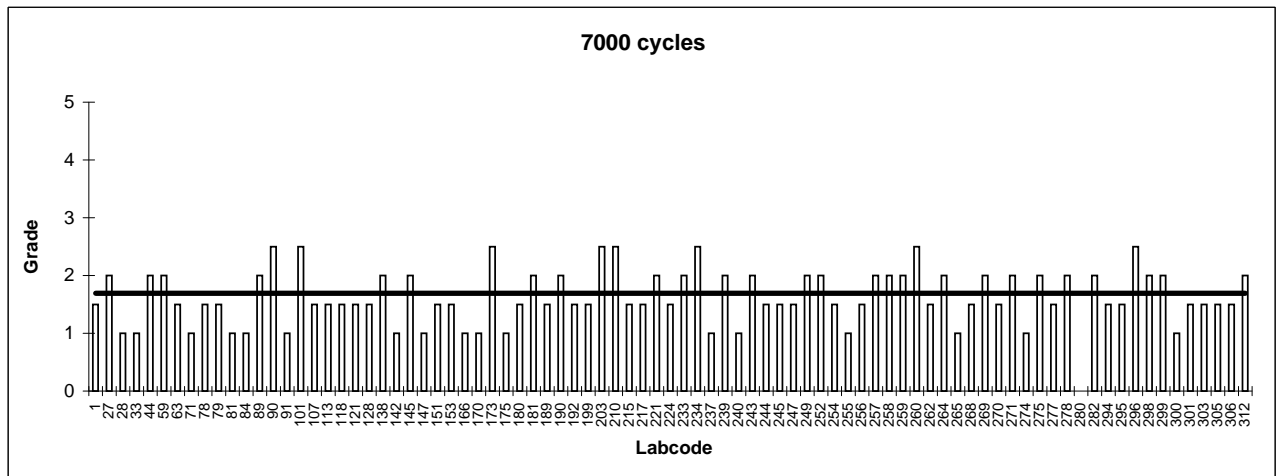
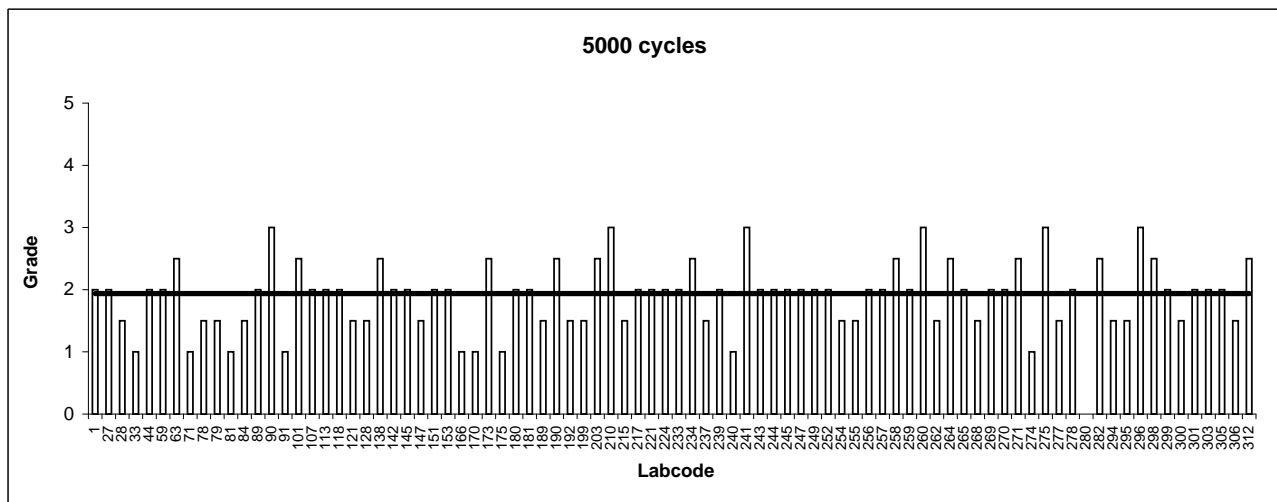
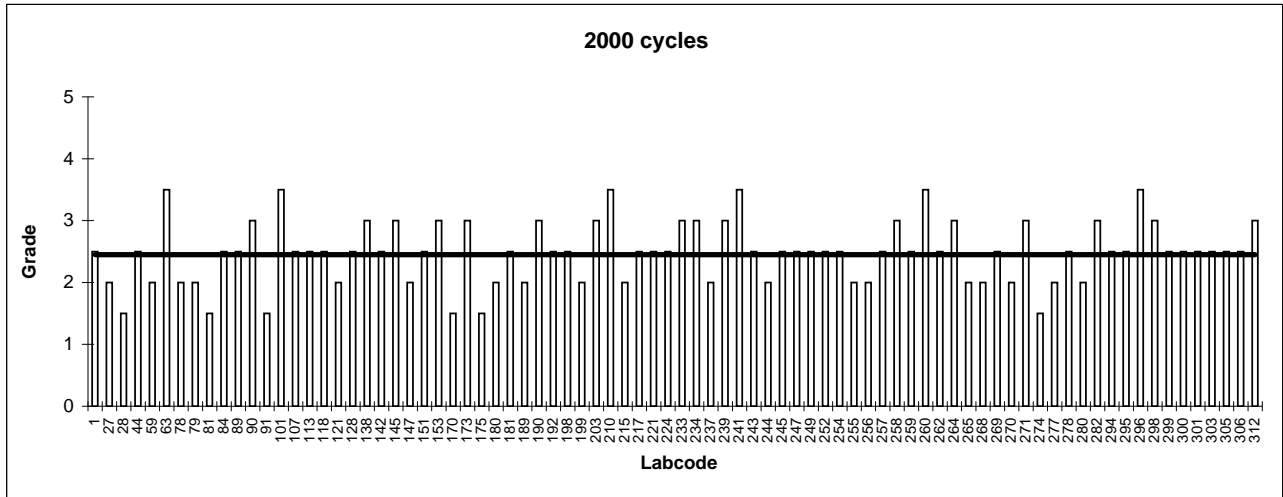
**RUNDTTEST FABRIC PROPERTIES NO. 8**
**Pilling propensity - Martindale  
ISO 12945-2**

Lab Code	Testing equipment	No. of tests	No. of observers	Load [g]	Pre-abrasion	ø pilling after cycles.....					
						125 [grade]	500 [grade]	1000 [grade]	2000 [grade]	5000 [grade]	7000 [grade]
247	NU-Martindale	3	3	155	no	4	3-4	3	2-3	2	1-2
249	NU-Martindale	3	3	155	no	4	3-4	3	2-3	2	2
252	SDL Atlas	1	3	155	no	3-4	3	3	2-3	2	2
254	James Heal Martindale	3	2	155	no	4	4	3	2-3	1-2	1-2
255	SDL Martindale	4	2	155	no	4	3	2-3	2	1-2	1
256	Martindale	3	2	155	no	4	3	2-3	2	2	1-2
257	Martindale	3	4	155	no	4	3-4	3	2-3	2	2
258	Nu-Martindale	3	3	155	no	4	4	3-4	3	2-3	2
259	Nu-Martindale	3	2	155	no	3-4	3	2-3	2-3	2	2
260	Nu-Martindale	3	3	155	no	4-5	4	3-4	3-4	3	2-3
262	Martindale SDL Atlas	3	3	155	no	3-4	3	2-3	2-3	1-2	1-2
264	Martindale James Heal 864	4	2	155	no	4	3-4	3	3	2-3	2
265	Martindale 403	3	4	155	no	4-5	3	2-3	2	2	1
267	Martindale	2	2	9	no						x 3
268	Nu-Martindale	3	2	155	no	4	3-4	3	2	1-2	1-2
269	Martindale	3	2	155	no	3-4	3	2-3	2-3	2	2
270	Martindale	3	2	155	no	4	3-4	2-3	2	2	1-2
271	Nu-Martindale	3	3	155	no	4-5	4	3-4	3	2-3	2
274	SDL Atlas Martindale	3	2	155	no	3-4	2-3	2	1-2	1	1
275	C&B	5	2	155	no	4-5	4	4	x 4	3	2
277	Martindale	3	3	155	no	3-4	3	2-3	2	1-2	1-2
278	SDL M235	3	2	155	no	4	3-4	3	2-3	2	2
280	SDL M235	3	2	155	no				2		
282	James H. Heal	3	3	155	no	4	3-4	3-4	3	2-3	2
294	Martindale	6	3	155	no	4	3-4	3	2-3	1-2	1-2
295	Martindale	3	2	155	no						
296	James Heal	3	3	155	no	5	4-5	4	3-4	3	2-3
298	Martindale	3	3	155	no	4	3-4	3	3	2-3	2
299	Martindale	3	3	155	no	4	3-4	3	2-3	2	2
300	James H. Heal	3	2	155	no	4	3-4	3	2-3	1-2	1
301	Nu-Martindale	6	3	155	no	4	3-4	3	2-3	2	1-2
303	James Heal	3	4	155	no	3-4	3	2-3	2-3	2	1-2
305	Martindale James Heal	3	5	155	no	4	3-4	3	2-3	2	1-2
306	Midi-Martindale	3	3	155	no	4	3-4	3	2-3	1-2	1-2
312	Martindale 235	4	3	155	no	4-5	4-5	3-4	3	2-3	2
<b>n</b>						<b>87</b>	<b>87</b>	<b>87</b>	<b>88</b>	<b>87</b>	<b>88</b>
<b>ø</b>						<b>4.02</b>	<b>3.40</b>	<b>2.86</b>	<b>2.45</b>	<b>1.94</b>	<b>1.69</b>
<b>s</b>						<b>0.51</b>	<b>0.63</b>	<b>0.61</b>	<b>0.63</b>	<b>0.54</b>	<b>0.51</b>
<b>Median</b>						<b>4</b>	<b>3-4</b>	<b>3</b>	<b>2-3</b>	<b>2</b>	<b>1-2</b>

**Pilling propensity - Martindale  
ISO 12945-2**



**Pilling propensity - Martindale  
ISO 12945-2**





TESTEX®

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Pilling propensity - Pilling box  
ISO 12945-1**

Lab Code	Testing equipment	No. of tests	No. of observers	no. of revolutions	ø pilling [grade]
1	Orbitor	4	5	36'000	2
28	James Heal	4	2	36'000	2
33	James Heal Pilling Box	4	2	36'000	3-4
44	Pilling tester James H. Heal	4	2	36'000	2
71	Pilling tester James H. Heal	4	3	36'000	2
78	James Heal Pilling Box	4	2	36'000	2-3
79	James Heal	4	2	36'000	1-2
84	James Heal 116	4	3	36'000	x 4
86	ICI Pill box - warp	2	2	36'000	2
89	Pilling box	2	2	36'000	2
90	Pilling box	4	2	36'000	1-2
91	ICI Pilling Box	4	2	36'000	3
101	Pilling box	4	2	36'000	3-4
113	James Heal ICI Pilling Box	4	6	36'000	2
118	James Heal ICI Pilling Box	4	3	36'000	3-4
128	James H. Heal	3	3	36'000	3-4
138	ICI - Pilling tester	4	8	36'000	2-3
142	SDL Pilling box	4	2	36'000	3-4
146	Pilling box Orbitor	4		36'000	3
151	ICI Pilling box James Heal	4	3	36'000	x 4
153	Pilling Tester James Heal	4	2	36'000	2-3
163	SDL Pilling tester	4	2	36'000	1-2
170	ICI Pilling Box Tester	2	2	27'000	x 4
173	Orbitor James Heal	4	3	36'000	x 4
175	ICI Pilling SDL	4	3	36'000	3
180	ICI Pill box	4	2	36'000	2
189	Pilling Tester Box	4	3	36'000	2
190	ICI Pilling Tester James Heal	4	3	36'000	x 4
199	James Heal ICI Pilling Box	4	4	36'000	2
203	James Heal	2	7	36'000	3-4
215	Instron 4465	2	3	36'000	x 4
224	ICI Pilling Tester	3	3	36'000	2-3
234	James Heal Orbitor	4	3	36'000	x 4
237	Pilling Box	4	3	36'000	2-3
239	?	?	?	36'000	x 4-5
244	Sodemat	4	3	36'000	2-3
245	ICI Pilling Box	4	4	36'000	2
249	ICI Pilling Box James Heal	4	3	36'000	2-3
254	James Heal	4	2	36'000	1-2
257	ICI Pilling Box	4	2	36'000	x 4
258	JHH Pilling Box	4	3	36'000	2
259	JHH Pilling Box	4	2	36'000	2-3
262	ICI Pilling Box	4	3	36'000	2
268	SDL Atlas M227 ICI Pilling & Snagging Tester	4	2	36'000	2-3
269	ICI Pilling Tester	4	3	36'000	2-3
270	ICI Pilling Box	4	2	36'000	2
271	ICI Pilling Box- lenght side	4	3	36'000	2
271	ICI Pilling Box- width side	4	3	36'000	3
274	ICI Pilling & snagging Box J. Heal	4	2	36'000	2-3
277	ICI Pilling Box	4	3	36'000	1-2
278	Orbitor	4	2	36'000	2
282	SDL Atlas	4	3	36'000	3
283	SDL Atlas M227 ICI Pilling & Snagging Tester	4	2	36'000	2
286	ICI Pilling & Snagging Tester	4	2	36'000	2-3
294	Orbitor Pilling & Snagging Tester	4	3	36'000	2-3
295	Pilling Box Tester	2	3	36'000	2
296	Schüttelkasten, Kork	3	3	36'000	x 4-5
298	ICI Pilling Box	4	3	36'000	1-2
299	ICI Pilling Tester	4	3	36'000	2-3
300	ICI Pilling Tester	4	2	36'000	2
301	Pill Box	4	3	36'000	2-3
303	James Heal	4	4	36'000	2-3
<b>n</b>					<b>52</b>
<b>Ø</b>					<b>2.37</b>
<b>s</b>					<b>0.58</b>
<b>Median</b>					<b>2.5</b>

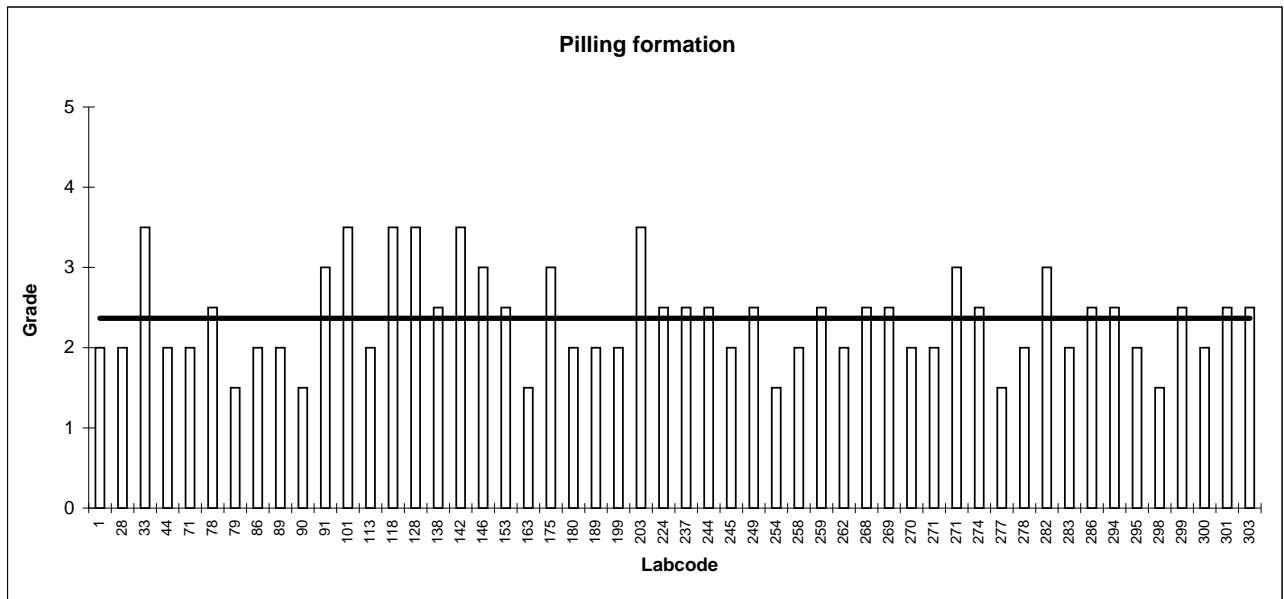
(x) unexpected value  
(o) beyond control limit





RUNDTEST FABRIC PROPERTIES NO. 8

Pilling propensity - Pilling box  
ISO 12945-1



**RUNDTEST FABRIC PROPERTIES NO. 8**

**Dimensional change at washing  
ISO 5077/6330**

Lab Code	Testing equipment	No. of washings	Washing temperature [°C]	Washing powder	Type of drying	no. of measurements	∅ dimensional change warp/length [%]	∅ dimensional change weft/cross [%]
1	Wascator FOM 71	5	60	ECE	flat	3	-7.0	o -3.0
27	Wascator FOM 71	5	60	IEC-A	flat	3	-7.7	-5.4
28	Miele W934	5	60	mild deterg.	flat	3	-8.6	-4.9
33	Wascator	5	60	IEC-A	flat	3	o -5.0	-4.0
44	Wascator	5	60	IEC	flat	18	-8.1	-5.6
59	Wascator	5	60	ECE -2	flat	3	o -5.0	-4.5
63	Miele	5	60	Haushaltswaschm.	flat	3	o -9.0	-4.2
63	Miele	1	60	Haushaltswaschm.	flat	3	-8.5	-4.0
71	Wascator	5	60	IEC-A Base	flat	2	-7.3	-4.5
78	Wascator	5	60	ECE	flat	3	o -4.8	-4.3
79	Wascator FOM 71	5	60	ECE	flat	9	-6.5	-5.5
81	Miele Gala Grande	5	60	Tandil fein	flat	4	x -3.7	x -0.3
84	Wascator	5	60	ECE	flat	2	-7.3	-4.4
85	Wascator, Type A	5	60	IEC+Perborate	flat	2	-8.0	-5.0
89	Wascator	5	60	IEC	flat	1	-8.0	-5.0
90	Wascator	5	60	Persil	flat	6	o -5.1	-3.8
91	Wascator FOM 71	5	60	ECE-2	flat	2	-7.4	x -7.8
101	Wascator FOM 71	6	60	ECE-A	flat	3	-7.2	-4.0
107	Wascator FOM 71	5	60	ECE	flat	3	x -3.8	-5.6
113	Electrolux Wascator	5	60	ECE	flat	1	o -9.7	o -6.2
118	Wascator	5	60	AATCC 1993 WOB	flat	1	-7.1	-4.9
121	Commercial w.m.	5	60	ECE	flat	3	-8.0	-5.3
128	Wascator FOM 71	5	60	ECE	flat	6	-7.5	-4.2
138	Wascator FOM 71	2	60	ECE	flat	2	o -5.0	o -3.4
142	Wascator	5	60	ECE non phosphate	flat	3	-7.7	o -3.3
145	Elektrolux	5	60	IEC - Base	flat	1	-8.8	-3.6
151	Wascator FOM 71	5	60	ECE	flat	3	-7.0	-5.0
153	Wascator FOM 71	5	60	ECE	flat	2	-6.3	-4.1
166	Wascator FOM 71	5	60	ECE	flat	3	-6.2	-3.6
173	Wascator FOM 71	5	60	ECE-A	flat	3	o -9.4	o -5.9
175	Wascator	5	60	ECE+TAED Sod. Perb.	flat	3	x -3.3	-4.0
180	Washing machine Miele	5	60	Persil	flat	3	-7.4	-4.0
181	Wascator FOM 71	5	60	ECE	flat	6	-6.1	-3.6
189	Wascator FOM 71	5	60	Referent Detergent 3	flat	3	-6.8	-5.0
192	Washing machine	5	60	Burti	flat	3	-6.8	-5.4
193	Miele	5	60	ECE	flat	3	-7.8	-5.0
198	Schulthess	5	60	?	flat	3	o -9.1	o -5.9
199*	Wascator FOM 71	5	60	ECE	flat	3	-7.3	-4.3
201	Schulthess	5	60	Surf	flat	3	-8.0	-4.0
203	Wascator	5	60	IEC	flat	3	-8.0	-4.2
215	Wascator FOM 71	5	60	ECE-Def. 98 non-phosphate	flat	3	-8.7	-5.2
217	AEG Lavamat	5	60	mild deterg.	flat	1	-7.5	-4.0
221	Automatic Washer	5	60	ECE	flat	3	-7.0	-4.6
224	Whirlpool Top Load Washer	5	60	AATCC WOB	flat	3	-8.3	-5.3
233	Wascator	1	60	ECE A	flat	3	o -4.5	-3.7
233	Wascator	5	60	ECE A	flat	3	-5.3	o -3.3
234*	Wascator FOM 71	5	60	ECE A	flat	3	-8.1	-4.3
237	Wascator	5	60	ECE A non-phosphate	flat	3	-7.0	-5.0
238	Wascator FOM 71	5	60	ECE A	flat	3	-6.7	-5.3
239	Wascator	5	60	77% ECE 98, 20%NaPerb.3% TAED	flat	3	-5.2	-4.8
241	Wascator	5	60	ECE	flat	9	-7.0	-4.5
243	Wascator FOM 71	5	60	ECE2+TAED Sod. Perb.	hanging	3	-7.0	-3.5
244	Electrolux Wascator	5	60	ECE 98	flat	2	-7.0	-5.0
245	Wascator FOM 71	5	60	ECE A	flat	3	-6.5	-3.5
247	Wascator FOM 71	5	60	ECE+TAED+Perborate	flat	12	-7.2	-5.1
249	Wascator FOM 71	5	60	ECE	flat	3	-7.0	-4.9

**RUNDTEST FABRIC PROPERTIES NO. 8**

**Dimensional change at washing  
ISO 5077/6330**

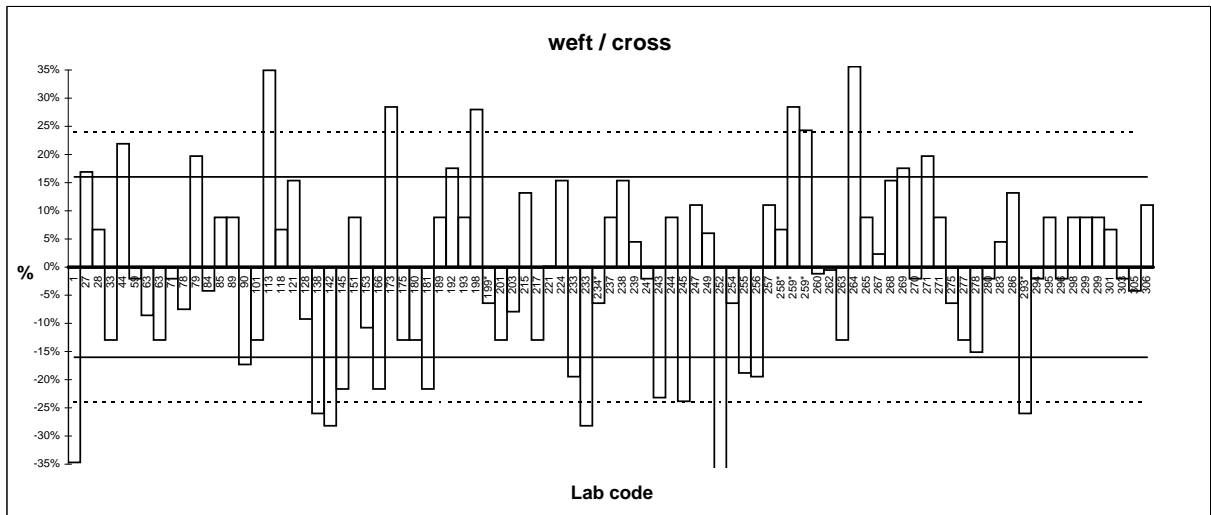
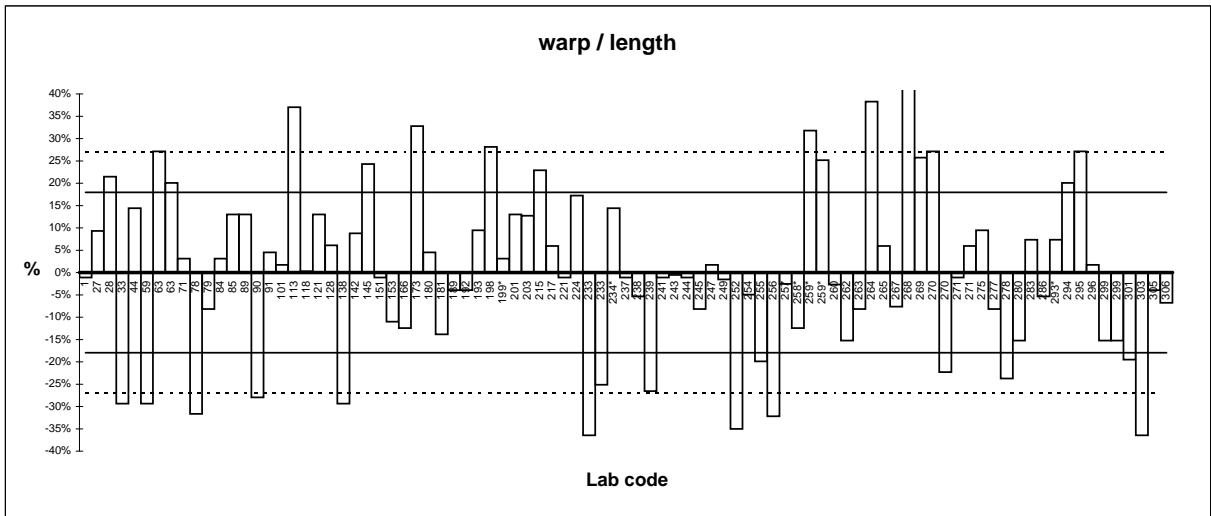
Lab Code	Testing equipment	No. of washings	Washing temperature [°C]	Washing powder	Type of drying	no. of measurements	∅ dimensional change warp/length [%]	∅ dimensional change weft/cross [%]
252	Wascator	5	60	AATC	flat	3	o -4.6	o -2.9
254	Wascator	5	60	ECE	flat	3	-6.7	-4.3
255	Commercial w.m.	5	60	ECE non phosphate	flat	3	-5.7	-3.7
256	Wascator FOM 71	5	60	ECE+TAED+Perborate	flat	6	o -4.8	-3.7
257	Wascator FOM 71	5	60	ECE- Detergent 3 Sod. Perb.	flat	3	-6.9	-5.1
258*	Wascator FOM 71 CLS	5	60	ECE+TAED+Perborate	flat	6	-6.2	-4.9
259*	Wascator FOM 71	5	60	ECE. SP + TAED	flat	6	o -9.3	o -5.9
259*	Whirlpool	5	60	ECE. SP + TAED	flat	6	-8.9	o -5.7
260	Wascator FOM 71 CLS	5	60	ECE-A	flat	3	-6.9	-4.5
262	Wascator Front loading	5	60	ECE+TAED sod. Perb.	flat	3	-6.0	-4.6
263	Wascator	5	60	ECE A	flat	3	-6.5	-4.0
264	Wascator	5	60	77% ECE 98, 20%NaPerb.3% TAED	flat	3	o -9.8	o -6.2
265	Wascator FOM 71 CLS	5	60	ECE 98	flat	6	-7.5	-5.0
267	Wascator	5	60	Det. Ref. #3	flat	3	-6.5	-4.7
268	Electrolux Wascator	5	60	ECE + SP + TAED	flat	3	x -10.0	-5.3
269	Wascator FOM 71 CLS	5	60	ECE + SP + TAED	flat	6	-8.9	-5.4
270	Wascator Washing MIC	5	60	ECE+TAED + Sod. Perb.	flat	3	o -9.0	x -8.0
270	Whirlpool washing MIC	5	60	AATCC WOB	flat	3	-5.5	-4.5
271	Wascator FOM 71 CLS	5	60	ECE+TAED + Sod. Perb.	flat	6	-7.0	-5.5
271	Kenmore 600 series	5	60	AATCC WOB	flat	6	-7.5	-5.0
275	Wascator FOM 71	5	60	ECE	flat	6	-7.8	-4.3
277	Wascator FOM 71 CLS	5	60	ECE A	flat	3	-6.5	-4.0
278	Wascator	5	60	ECE A	flat	6	-5.4	-3.9
280	Wascator FOM 71 CLS	5	60	ECE 2A	flat	3	-6.0	-4.5
283	Wascator FOM 71 CLS	5	60	ECE A +TAED + Sod. Perb.	flat	3	-7.6	-4.8
286	Wascator	5	60	ECE A +TAED + Sod. Perb.	flat	3	-6.7	-5.2
293*	Miele Novotronic	5	60	ECE-2	flat	3	-7.6	o -3.4
294	Wascator	5	60	IEC A + TAED + Sod. Perb.	flat	3	-8.5	-4.5
295	Wascator FOM 71	5	60	ECE A	flat	9	o -9.0	-5.0
296	Miele Gala Grande W4000	5	60	Persil	flat	3	-7.2	-4.5
298	Wascator	5	60	ECE A	flat	3	-7.5	-5.0
299	Type A Washer	5	60	ECE A + TAED + Sod. Perb.	flat	3	-6.0	-5.0
299	Type B Washer	5	60	AATCC	flat	3	-6.0	-5.0
301	Wascator FOM 71 CLS	5	60	ECE A + TAED	flat	3	-5.7	-4.9
303	Wascator FOM 71	5	60	according AC 6330:2012	flat	3	o -4.5	-4.5
305	Wascator FOM 71 CLS	5	60	IEC A	flat	9	-6.8	-4.4
306	Wascator FOM 71 CLS	5	60	ECE A	flat	15	-6.6	-5.1
312	W.M. WA 583 Typ A GORENJE	6	60	IEC A Non Phosp. Ref.Det. A	flat	3	x -3.9	x -1.6
<b>n</b>							<b>89</b>	<b>90</b>
<b>∅</b>							<b>-7.08</b>	<b>-4.59</b>
<b>s</b>							<b>1.27</b>	<b>0.74</b>
<b>CV %</b>							<b>-17.96</b>	<b>-16.02</b>

\*Marking: Labs performed test according to old standard, not 2012 version



**RUNDTTEST FABRIC PROPERTIES NO. 8**

**Dimensional change at washing  
ISO 5077/6330**





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**RUNDTTEST FABRIC PROPERTIES NO. 8**

Climate conditions		
Lab Code	°C	% Relative humidity
1	20	65
27	22	67
28	22.1	63.6
33	20	65
44	20	65
59	20	65
63	20	65
71	20	65
78	20	65
79	20	65
81	20	65
84	20	65
85	?	?
86	20	65
89	20	65
90	20	65
91	21	65
101	20	65
107	20	65
113	20	65
121	?	?
128	20	65
138	20	65
142	21	63
145	20	68
146	20	65
147	20	65
151	20	64.5
153	20	65
163	20	65
166	20	65
170	21	65
173	20	64
175	20	65
180	20.5	63.5
181	20	65
189	20	65
190	20	65
192	22	65
193	22	55
198	20	65
199	21	65
201	21	65
203	23	65
210	20.5	65.5
215	20	64
217	?	?
221	20	65
224	?	?
233	?	?
234	20	64
236	20	65
237	20	65
238	20	65

Climate conditions		
Lab Code	°C	% Relative humidity
239	22	60
240	20	65
241	21.2	66.5
243	20	65
244	20	65
245	20	65
247	20.7	67.4
248	20	65
249	20	64
250	20	65.4
252	20	60
254	20	65
255	20	65
256	20.94	64.75
257	21	65
258	?	65
259	20	65
260	20	65
262	20	65
263	20	65
264	21	65
265	20	65
267	21.5	63.9
268	21.5	66.1
269	21	65
270	21	65
271	20	65
274	?	?
275	?	?
277	20	65
278	21	65
280	21.5	64
282	20	65
283	20	65
286	20	66
293	20	65
294	20	66
295	20	65
296	20	65
298	21	65
299	21	65
300	20	66
301	21	64
303	20.1	66.7
305	19.6	65
306	19.8	64.7
312	?	?



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**RUNDTEST FABRIC PROPERTIES NO. 8**

**Lexikon / Dictionary**

Abkürzungen Abbreviations	English	Deutsch
n	Number of values	Anzahl Werte
Ø	Mean value	Mittelwert
s	Standard deviation	Standardabweichung
CV%	Coefficient of variation (%)	Variationskoeffizient (%)
$s_r^2$	Repetition variance	Wiederholvarianz
$s_L^2$	Variance between laboratories	Varianz zwischen den Labors
$s_R^2$	Comparison variance	Vergleichsvarianz
r	Repetition limit	Wiederholgrenze
R	Comparison limit	Vergleichsgrenze
	Abrasion cycles	Scheuertouren
	Bursting height	Bersthöhe
	Bursting strength	Berstdruck
	Climate conditions	Klimabedingungen
	Cross	Quer
	Dimensional change	Massänderung
	Force	Kraft
	Grade	Note
	Humidity	Feuchtigkeit
	Lab code	Laborkennzahl
	Length	Längs
	Load	Belastung
	No. of measurements	Anzahl Messungen
	No. of observers	Anzahl Beobachter
	No. of revolutions	Anzahl Umdrehungen
	No. of tests	Anzahl Tests
	No. of washings	Anzahl Wäschen
	Pendulum weight	Pendelgewicht
	Pilling after cycles	Pilling nach Touren
	Pre-abrasion	Vorscheuern
	Pre-tension	Vorspannung
	Relative humidity	Relative Feuchte
	Seam opening	Nahtöffnung
	Standard applied	Angewendete Norm
	Test size	Prüffläche
	Testing equipment	Prüfgerät
	Testing length	Einspannlänge
	Testing speed	Prüfgeschwindigkeit
	Testing time	Prüfzeit
	Threads/cm	Faden/cm
	Type of drying	Trocknungsart
	Warp	Kette
	Washing powder	Waschpulver
	Washing temperature	Waschtemperatur
	Weft	Schuss



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**RUNDTTEST FABRIC PROPERTIES NO. 8**

Comments	
Lab Code	
44	Seam slippage: The equipment doesn't give value above 200 Dimensional stability wash performed with ballast type 3
71	Detergent according to ISO 6330 per washing cycle: Sodium perborate 8g, TAED 1g, WFK-IEC-A-Base 31g Reduced testing range for seam slippage due to lack of material
79	Grabtest: Specimens break at the edge of the jams
86	ISO 13934-2; all breaks were jaw breaks
89	Results seam slippage 13936-1 (2 results) with reservation, due to lack of material
101	About the test for "seam slippage strength" (ISO 13936-1 and ISO 13936-2) on the satin plain woven fabric, the laboratory carried out the test on 3&4 specimens only (instead of 5) because the fabric was insufficient.
147	Samples in both directions (weft and warp), during test of ISO 13934-2 "tensile properties grab method", had all cracks near the gripping- jaws.7
163	Bursting strength test carried out according to BS EN ISO 13938-1.
199	Dimension change at washing performed according to the old standard, DIN EN ISO 6330 2010 asing hprogramm 217.
221	Tests for woven fabric: Weight, Construction, ISO 13934-1, ISO 13937-2, ISO 13937-3, ISO 12947-2 Tests for knitted fabric: Weight, Construction, ISO 12945-2, ISO 5077/6330
233	Results of old version performed for dimensional stability tests are: After 1 time washing warp -6.9% , weft -4.1% / After 5 times washing warp -6.5% -4.5%
234	Old version performed for dimensional stability test: BS EN ISO 6330: 2001
239	Force at 4mm seam opening (instead of 3mm), as our apparatus does not implement a 3 mm set up. Tear force across the chain is not specified because of the sample tears, ie not at the requested line.
243	ISO 13937-2 weft direction. The tear didn't continue in the right direction on any of the test specimens.
244	ISO 13937-1: Woven rose fabric: The tear propagates in the direction perpendicular to the force. Not able to perform ISO 13936- 2, not enough material left
255	Sample (?) tears in warp direction for normal and wide samples. Results are discarded.
258	6330 : 2001 + A1: 2009 was used for dimensional stability to wash Only 2mm seam opening was performed for ISO 13936-1
259	2. For dimensional change testing, we used ISO 6330 : 2000.
265	ISO 13934-2: jaw break occurred on all specimens.
268	Applied load was 60 N for BS EN ISO 13936-2, due to class of fabric. The fabric weight was less than 220 g/m <sup>2</sup> .
277	Not enough material for testing both ISO 13936-1 and ISO 13936-2. Therefore, only ISO 13936-1 was conducted on woven fabric.
286	It seems that the sample is not homogeneously in abrasion test.
293	Could not perform tensile properties grab method: sample tearing at the gripping jaws.
294	Applied load was 60 N for BS EN ISO 13936-2, due to class of fabric. The fabric weight was less than 220 g/m <sup>2</sup> .
296	Grabtest: Specimens break at the edge of the jams

**REPORT EVALUATED BY / AUSGEWERTET DURCH:**

Denise Vlach / Industrial &amp; Institute Service

**REPORT APPROVED BY / FREIGEgeben DURCH:**

Adrian Meili / Manager Industrial &amp; Institute Service

**REPORT REVISED ON / BERICHT REVIDIERT AM:**

29.11.2012