

DIFFERENCE IN SHRINKAGE BETWEEN 1 AND 5 CYCLES WASH AND TUMBLE DRY TEST METHODS
WITH 100% COTTON KNITTED FABRICS.

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1. INTRODUCTION

People talk about shrinkage in either fabric or garments without stipulating the exact test method to be used. It is a known fact that different test methods give different results and at this particular moment in time there is no universally accepted test method for either knitted fabrics or knitted garments.

This report looks at some of TRD's test data which shows the differences between a single wash and tumble dry cycle and a 5 wash and tumble dry cycle (stipulated as the IIC relaxation procedure for 100% cotton fabrics).

Quite a lot of buying concerns will only test to a one-cycle test because of the time factor with multi-cycle testing and also the cost of the same. This is no problem as long as the difference between a single and a multi-cycle test is a known constant.

This particular report deals only , with three fabric types through standard finishing routes and the differences shown may differ if chemicals such as caustic or resins are applied during the finishing sequence. They also cover singles yarns.

The examples shown are extracts from various case studies and all the samples have been tested by IIC in laboratory conditions.

Each of the three fabric types are described and analysed separately. This is because each fabric seems to have its own behaviour pattern and therefore knitted cotton fabrics or garments do not have a standard shrinkage overall behaviour pattern and every fabric type has to be assessed independently. So for the purpose of this report it is in three sections.

Section 1 covers single jersey

Section 2 covers 1 x 1 rib

Section 3 covers interlock

No attempt was made to compare line drying against tumble drying as the intention is to cover this in a separate report.

The differences quoted are between five wash (60 C) and tumble cycles and a one wash (60) and tumble cycle (i.e. 5X - 1X).

2. SECTION 1 - SINGLE JERSEY

		<u>Difference 5X-1X</u>		
			<u>Min</u>	<u>Max</u>
(a)	Swallow Hosiery ATYC dyed 6 Samples	Length	1.44%	(1.06% 1.99%)
		Width	1.30%	(0.71% 1.82%)
(b)	Meridian Single Jersey 46 Samples	Length	1.10%	(0.31% 2.07%)
		Width	0.5%	(0 1.24%)
(c)	Corah Single Jersey 85 36 Samples	Length	1.20%	(-0.3% 2.36%)
		Width	0.17%	(-0.12% 1.15%)
(d)	CETIQT Fabrics 5 Samples	Length	1.47%	(1.06% 1.74%)
		Width	0.21%	(0.14% 0.69%)
(e)	SJ86 Winch bleach 33 Samples	Length	1.48%	(0.63% 2.1%)
		Width	0.30%	(-0.52% 1.28%)
(f)	Single jersey winch dyed 33 Samples	Length	1.53%	(0.3% 2.57%)
		Width	0.44%	(0.42% 1.46%)
(g)	UNIDO/Chilton 22 Samples	Length	0.14%	(-1.2% 1.3%)
		Width	0.42%	(-0.8% 2.5%)
(h)	First Tebe trial (not merc) 3 Samples	Length	1.6%	(1.28% 1.82%)
		Width	0.85	(0.66% 1.1%)

(i)	Corah Pad-Batch study	Length	3.1%	(2.01% 4.31%)
		Width	0.17%	(0.66 1.1)

2.1 ANALYSIS OF SINGLE JERSEY BEHAVIOUR

From the results it would appear that if the fabric is finished in either Winches or Jets the difference between the 5 and 1 cycle is approximately just over 1% in length and 0.5% in width.

If however the fabric during dyeing and finishing received excessive lengthways tension as in a Pad-Batch finish the difference can then be in the region of 3% in length and 0 in width.

Therefore, although for most common finishing routes one can expect the 1% in length and 0.5% in width difference, this is not to be regarded as a universal guideline.

3. SECTION 2 1 x 1 RIB

		<u>Difference 5X-1X</u>		
			<u>Min</u>	<u>Max</u>
(a)	CETIQT fabrics 4 samples	Length	2.33%	(1.27% 3.31%)
		Width	0.41%	(0.04% 0.95%)
(b)	British Home Stores Atkins + Klynton Davis 59 samples	Length	2.03%	
		Width	0.95%	
(c)	JBS Case Study 14G winch bl. 16 samples	Length	2.24%	(1.71% 3.2%)
		Width	0.96%	(1.74% -0.02%)
(d)	JBS Winch dyed 4 samples	Length	2.70%	(2.57% 2.83%)
		Width	0%	(-0.2% 0.24%)
(e)	JBS ATYC & Gaston County 7 samples	Length	1.98%	(1.7% 2.35%)
		Width	0.12%	(-0.72% 0.36%)
(f)	JBS-22G Winch bleached 8 samples	Length	1.84%	(1.44% 2.25%)
		Width	-1.63%	(-2.25% -1.10%)
(g)	JBS-22G Winch dyed 4 samples	Length	2.28%	(1.98% 2.62%)
		Width	0.19%	(-0.50% 1.23%)
(h)	JBS-ATYC Dyed 13 samples	Length	1.06%	(0.33% 1.61%)
		Width	-1.56%	(-2.19% -1.08%)
(i)	Schuesser Rotostream 1/50Nm,1/55Nm 9 samples	Length	1.46%	
		Width	-0.5%	
(j)	Schuesser Rotostream 1/70Nm 5 samples	Length	1.63%	
		Width	-1.47%	
(k)	Schuesser Cont. Bleach 1/50Nm,1/55Nm 9 samples	Length	2.84%	
		Width	0.95%	
(l)	Schuesser Cont. Bleach 1/70Nm 5 samples	Length	3.09%	
		Width	1.36%	
(m)	Schuesser Winch bleach 1/50Nm,1/55Nm 9 samples	Length	1.57%	
		Width	-1.88%	
(n)	Schuesser Winch bleach 1/70Nm 5 samples	Length	1.61%	
		Width	-1.42%	

3.1. ANALYSIS OF 1 x 1 RIB BEHAVIOUR

If one looks at the overall means of all the samples it indicates that the difference in length is in the region of 2.0% and the width going slightly wider after 5 cycles (but only about -0.25%).

However, as can be seen from the data the actual finishing route can be an influence with fluctuations of about 1.0 to 1.5 percentage points either side of the mean.

4. SECTION 3 - INTERLOCKDifference 5X-1X

			<u>Min</u>	<u>Max</u>
(a)	Corah Int. Case Study 17 samples	Length 3.98	(2.53%	5.77%)
		Width 0.27%	(-0.69%	1.42%)
(b)	UNIDO/Chilton Int. 26 samples	Length 2.7%		
		Width -0.53%		
(c)	Factory Variation trial Qual 1/422 RR 180 7 samples	Length 3.23%	(2.2%	4.14%)
		Width 0.51%	(-0.009%	1.07%)
(d)	Factory Variation trial Qual 1/600 carded Qual 1/422 combed 19` samples	Length 3.13%	(1.94%	4.91%)
		Width 0.41%	(-0.91%	2.0%)

4.1 ANALYSIS OF INTERLOCK BEHAVIOUR

With the limited information on interlock at the present time one can only use these figures as guidelines.

The mean difference is 3,26% in length and 0.16% in width.

As with other fabric constructions one can expect a 2% spread from the mean if individual samples are taken.

5. SUMMARY

As stated throughout this report the differences between a 1 cycle and a 5 cycle test are very dependent upon factors other than the actual shrinkage test method.

The actual finishing procedure can create a situation in which more energy is required to fully relax a fabric, thus making the situation variable. However, the report shows the general changes with finishes which do not include mercerising or resin.

The following table shows the expected differences between the two test methods and if we assume a 10% shrinkage level to a 5-cycle test then the following can be expected:

SHRINKAGE TO 5 TUMBLE DRY CYCLES = 10%

		<u>1 cycle</u>	<u>5 cycles</u>
Single Jersey	Length	9%	10%
	Width	9.5%	10%
1 x 1 Rib	Length	8%	10%
	Width	10.25%	10%
Interlock	Length	6.7%	10%
	Width	10%	10%