Faculty of Engineering

Department of Textile Engineering

Topic/Title: Study on Testing Requirements of Denim Fabric

Course code: TH-519 Course title: Thesis (Project)

Submitted by:
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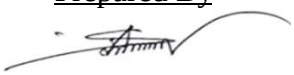
A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Textile Engineering

May, 2023

DECLARATION

I hereby declare that, this project has been done by me under the supervision of Dr. Md. Mahbubul Haque, Professor & coordinator for research and industrial collaboration, Department Of TE, Daffodil International University. I also declare that neither this project nor any part of This project has been submitted elsewhere for award of any degree.

Prepared By



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ACKNOWLEDGEMENT

I humbly thank Allah, the Almighty, for giving us the capacity and freedom to complete this thesis. My respected and knowledgeable teacher and guide Professor Dr. Md. Mahbubul Haque, Professor and coordinator for research and industrial collaboration, Department of TE, Daffodil International University, Dhaka, deserves my sincere gratitude and deep sense of indebtedness, which I have the pleasure of expressing.

In order to complete the task effectively, I would want to express my sincere gratitude to esteemed instructor and mentor professor Dr. Engr. Md. Mahbubul Haque for his steady and unwavering supervision, helpful suggestions, and constructive criticism. Without his adequate leadership, monitoring, helpful suggestions it would not have been possible to me to take even a single step forward to attain our intended goal in time. I shall always be grateful to him.

I'm also grateful to our esteemed teachers for their unwavering encouragement and practical assistance throughout the project. I'm also grateful to the entire staff of the textile engineering department for their insightful counsel throughout the writing of my thesis. I would like to thanks our entire course mate in daffodil International University, who took part in this discuss while completing the course work.

I also want to express my gratitude to the autoclave operators, who were in charge, for their ongoing support and technical assistance. I also gather a lot of data before visiting the labs at the university and in the company.

Last but not least, I must respectably appreciate my mother's unwavering assistance and patience.

ABSTRACT

The project focuses on the fabric's testing needs. This study investigates the denim fabric test specifications. Based on this, reclamation statistics compilations, interviews, and good quality testing were produced in order to determine whether or not high quality standards are essential for producing denim good quality testing and lowering the amount of complaints. Since our denim business is an integrated one, testing must begin at the beginning. From the yarn to the finished product, it progresses. Here, we made an effort to illustrate how the test parameter is used in the denim division. A company's daily operations should include textile denim testing, which should permeate the entire structure and all procedures.

Testing is a crucial component of quality management in order to produce denim of the highest caliber. To ensure that the items live up to the requirements and expectations for their properties, quality tests are performed. Additionally, testing is essential to the collection and analysis of customer complaints. Despite the tests, there is a chance that unhappy customers will try to return the goods or products they are unhappy with. A good technique to determine what the issue is, or even if there is an issue, is to compare client claims to the caliber of tests.

According to the study, excellent quality could be the key to ensuring high-quality denim production. The remedy to lessen claims and high-quality items must instead be something else or a component of the solution because the issue is complex. Any organization should be familiar with the fundamental quality dimensions and, using those analyses, understand where the crucial stages of their product development and production process are located.

The authors of this report believe that increasing testing requirements is not the best course of action for their firm. Since tests cannot establish whether a piece of content is short on quality, the authors believe that many of the statements are motivated by goodwill.

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CHAPTER 1

INTRODUCTION

The word "textile testing" refers to a comprehensive set of tests that look at a fabric's mechanical, chemical, and physical characteristics. These tests may be carried out prior to a textile's widespread use or on textiles that are being imported for sale in American markets. Standards for what should and should not be in textile items have been developed in countries like the United States. Tests can reveal whether or not textile manufacturing companies are compliant.

CHAPTER 2

PURPOSE OF THESIS

Numerous textile tests exist. A sample of textile material is closely evaluated for feel and appearance in some physical tests. Individual fibers or strands of material, as well as yarns—threads comprised of many fibers twisted together—are subjected to these tests.

Additionally, light and other elements are applied to textiles to observe how they respond. Some of these tests are carried out in a weather-meter, a device that evaluates a fabric's resistance to weathering and light. In essence, it is a closed box. Inside, textiles are put and subjected to environmental conditions that mimic the outdoors..

Mechanical tests involve applying various pressures and stresses on textiles, typically in specialist testing equipment these consist of assessments of breaking strength, or the amount of force required to rupture a cloth under strain. These tests can make sure materials are sturdy enough to hold up even under severe stress.

Other tests measure tearing strength, which is the force needed to enlarge an existing rip or tear. Additionally, abrasion tests show how rapidly a fabric ages when brushed against another surface. These tests ensure that the materials used in items like parachutes and car seat belts won't fail when they're most needed to keep the user safe..

There are other chemical tests, in which a cloth is examined chemically to ascertain its composition. These tests, which are frequently carried out in laboratories, are crucial to figuring out whether textiles contain potentially dangerous elements like lead or other heavy metals, prohibited chemical dyes, or pesticides that could hurt the customer.

CHAPTER 3

All the tests that are done on denim pants are given below:

All Physical Test Name

- Tearing-Strength test
- Tensile-Strength test
- Seam-Strength test
- Bar tack reinforcements test
- Pocketing seam strength test
- pocket reinforcement strength test
- Belt loop strength test
- Pocket stress area test
- Fabric Weight –GSM Test
- Abrasion resistance test
- Pilling resistance test
- Stretch & Recovery test
- Home Laundry/Appearance after washing (1 HL,5 HL,10 HL) test.
- Print Durability test
- Dimensional stability to washing test.

All Chemical Test Name

- Color fastness to Washing
- Color fastness to Perspiration (Acid and Alkaline)
- Color fastness to Rubbing or Crocking (Dry and Wet)
- Color fastness to Water
- Color fastness to Light
- Color fastness to Ozone fastness test
- Saliva fastness test
- pH value
- Nickel spot test
- Formaldehyde content
- Azo content
- Phthalates.

3.1 Tearing Strength

The force required to tear the fabric.

TUV Test Report

Oz/yd2	:	11.40	

Tear Strength		
Test Method	:	Next Test Method 17
Type of machine	:	Elmendorf/Elmatear
Fabric weight	:	386.4 GSM

Test Item	M001	Requirement
Warp/Length (gm)	>3200	1000 gm
Weft/Width (gm)	N/A due to elastane	1000 gm

Figure-1

SGS Test Report

SGS / Bangladesh PERFORMANCE PROTOCOL TRM-0000413196 (Version 1) / 2010052418

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
Tear strength	ASTM D 1424/2261	Min. 4.5 x 4.0 lbs	Warp				Average	-	Pass
			#1	/		5.83 lbs	5.61 lbs		
			#2	/		5.4 lbs			
			Weft				Average		
			#1	/		6.41 lbs	6.69 lbs		
			#2	/		7 lbs			
Tensile strength	ASTM D 5034	Min. 60 x 50 lbs	Warp				Average	-	Pass
			#1	/		125.19 lbs	123.92 lbs		
			#2	/		101.82 lbs			
			#3	/		144.76 lbs			
			Weft				Average		
			#1	/		95.81 lbs	95.58 lbs		
			#2	/		96.88 lbs			
			#3	/		94.05 lbs			
Chemical									
pH value	ISO 3071	- Others: 5.5 - 7.0	/ (Body Fabric with Inner Waist Print+Pocketing Fabric)					-	Pass
			#1	/		6.5	-		
Garment Construction									
Seam slippage	ASTM D 1683 modified	Min. 30 X 30 lbs/in @¼" separation	Garment Point					-	Pass
			#1	Inseam	Before ¼ inch Seam Opening	- lbs	-		
				Outseam	Before ¼ inch Seam Opening	- lbs			
				Back rise	Before ¼ inch Seam Opening	- lbs			
				Crotch	Before ¼ inch Seam Opening	- lbs			
				Waist	Before ¼ inch Seam Opening	- lbs			
				Zipper seam	Before ¼ inch Seam Opening	- lbs			
Seam strength	ASTM D 1683 modified	All Seam Types: Min. 35 lbs Bar tacks, reinforcement:	Garment Point					-	Pass
			#1	Inseam	Fabric rapture at seam	87.39 lbs	-		
				Outseam	Sewing thread breakage	52.76 lbs			

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Figure-2

Table-1: Tearing Strength (obtained from figure 1 &2)

Test name	Method name	Requirement	Test result	Pass/Fail	Remarks
Tearing	ASTM D2261	Warp-4.5 lb Weft-4.0 lb	Warp 5.61 lb Weft 6.69 lb	Pass	About 5-8% denim fabric fails in tearing test.
Tearing	ISO 13937-1	Warp/weft 1000 gm.	Warp->3200 gm Weft- N.A due to elastane	Pass	

13.2. Tensile Strength

The maximum force that a fabric can support before breaking.

SGS Test report

SGS / Bangladesh PERFORMANCE PROTOCOL TRM-0000413196 (Version 1) / 2010052418

Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
DARK WASH									
Tear strength	ASTM D 1424/2261	Min. 4.5 x 4.0 lbs	Warp				Average	-	Pass
			#1	/		5.83 lbs	5.61 lbs		
			#2	/		5.4 lbs			
			Weft				Average		
			#1	/		6.41 lbs	6.69 lbs		
			#2	/		7 lbs			
Tensile strength	ASTM D 5034	Min. 60 x 50 lbs	Warp				Average	-	Pass
			#1	/		125.19 lbs	123.92 lbs		
			#2	/		101.82 lbs			
			#3	/		144.76 lbs			
			Weft				Average		
			#1	/		95.81 lbs	95.58 lbs		
			#2	/		96.88 lbs			
			#3	/		94.05 lbs			
Chemical									
pH value	ISO 3071	- Others: 5.5 - 7.0	/ (Body Fabric with Inner Waist Print+Pocketing Fabric)					-	Pass
			#1	/		6.5	-		
Garment Construction									
Seam slippage	ASTM D 1683 modified	Min. 30 X 30 lbs/in @¼" separation	Garment Point					-	Pass
			#1	Inseam	Before ¼ inch Seam Opening	- lbs	-		
				Outseam	Before ¼ inch Seam Opening	- lbs			
				Back rise	Before ¼ inch Seam Opening	- lbs			
				Crotch	Before ¼ inch Seam Opening	- lbs			
				Waist	Before ¼ inch Seam Opening	- lbs			
				Zipper seam	Before ¼ inch Seam Opening	- lbs			
Seam strength	ASTM D 1683 modified	All Seam Types: Min. 35 lbs Bar tacks, reinforcement:	Garment Point					-	Pass
			#1	Inseam	Fabric rapture at seam	87.39 lbs	-		
				Outseam	Sewing thread breakage	52.76 lbs			

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Figure-3

TUV Test Report

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Test Report No.: 1620072367

Mass Per Unit Area			
Test Method	:	NEXT TEST METHOD 20a	
Claimed Fabric Weight	:	Not Claimed	
		M001	**Requirement**
			±5%
g/m²		386.4	
Oz/yd2	:	11.40	

Tear Strength		
Test Method	:	**Next Test Method 17**
Type of machine	:	Elmendorf/Elmatear
Fabric weight	:	386.4 GSM

Test Item	**M001**	**Requirement**
Warp/Length (gm)	>3200	1000 gm
Weft/Width (gm)	N/A due to elastane	1000 gm

Tensile (Grab) Strength		
Test Method	:	**Next Test Method 16**
Type of machine	:	CRE

Test Item	**M001**	Requirement
Length /Warp(Kg)	>50.0	20 kg
Width /Weft (Kg)	N/A due to elastane	20 kg

Test Method	:	**Next Test Method 16a**
Type of machine	:	CRE
Fabric Weight	:	386.4 GSM
Applied Load	:	12 kg

Seam Location				**Requirement**
	M006			
	SO @ 12 kg	Seam Strength	Type of failure	
Out Seam	5.0 mm	31.7 kg	FTS	SO :6 mm
In Seam	0.0 mm	34.0 kg	FR	SS :12 kg
Back Rise	0.0 mm	38.7 kg	FR	
Crotch	0.0 mm	36.4 kg	STB	

Note :	
SO :	Seam Opening
STB:	Sewing Thread Broken
FTS	Fabric Torn At Seam
SS:	Seam Strength

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Figure-4

Table-2: Tensile Strength (obtained from figure 3&4)

Test name	Method name	Requirement	Test result	Pass/fail	Remarks
Tensile	ASTM D5034	Warp-60 lb Weft- 50 lb	Warp 123.92 lb Weft 95.58 lb	Pass	About 5% denim fabric fails in tensile test.
Tensile	ISO 13934-2	Warp/weft -20 kg	Warp->50 kg Weft- N.A due to elastane	Pass	

3.3. Seam Strength

It is the garment's or textile's seam assembly's strength.

SGS Test Report

SGS / Bangladesh | PERFORMANCE PROTOCOL | TRM-0000413196 (Version 1) / 2010052418

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
Tear strength	ASTM D 1424/2261	Min. 4.5 x 4.0 lbs	Warp				Average	-	Pass
			#1	/		5.83 lbs	5.61 lbs		
			#2	/		5.4 lbs			
			Weft				Average		
			#1	/		6.41 lbs	6.69 lbs		
			#2	/		7 lbs			
Tensile strength	ASTM D 5034	Min. 60 x 50 lbs	Warp				Average	-	Pass
			#1	/		125.19 lbs	123.92 lbs		
			#2	/		101.82 lbs			
			#3	/		144.76 lbs			
			Weft				Average		
			#1	/		95.81 lbs	95.58 lbs		
			#2	/		96.88 lbs			
			#3	/		94.05 lbs			
Chemical									
pH value	ISO 3071	- Others: 5.5 - 7.0	/ (Body Fabric with Inner Waist Print+Pocketing Fabric)					-	Pass
			#1	/		6.5	-		
Garment Construction									
Seam slippage	ASTM D 1683 modified	Min. 30 X 30 lbs/in @¼" separation	Garment Point					-	Pass
			#1	Inseam	Before ¼ inch Seam Opening	- lbs	-		
				Outseam	Before ¼ inch Seam Opening	- lbs			
				Back rise	Before ¼ inch Seam Opening	- lbs			
				Crotch	Before ¼ inch Seam Opening	- lbs			
				Waist	Before ¼ inch Seam Opening	- lbs			
				Zipper seam	Before ¼ inch Seam Opening	- lbs			
Seam strength	ASTM D 1683 modified	All Seam Types: Min. 35 lbs Bar tacks, reinforcement:	Garment Point					-	Pass
			#1	Inseam	Fabric rapture at seam	87.39 lbs	-		
				Outseam	Sewing thread breakage	52.76 lbs			

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Figure-5

TUV Test Report

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Test Report No.: 1620072367

Mass Per Unit Area			
Test Method	:	**NEXT TEST METHOD 20a**	
Claimed Fabric Weight	:	Not Claimed	
		M001	**Requirement**
			±5%
g/m²		386.4	
Oz/yd2	:	11.40	

Tear Strength		
Test Method	:	**Next Test Method 17**
Type of machine	:	Elmendorf/Elmatear
Fabric weight	:	386.4 GSM

Test Item	**M001**	**Requirement**
Warp/Length (gm)	>3200	1000 gm
Weft/Width (gm)	N/A due to elastane	1000 gm

Tensile (Grab) Strength		
Test Method	:	**Next Test Method 16**
Type of machine	:	CRE

Test Item	**M001**	Requirement
Length /Warp(Kg)	>50.0	20 kg
Width /Weft (Kg)	N/A due to elastane	20 kg

Test Method	:	**Next Test Method 16a**
Type of machine	:	CRE
Fabric Weight	:	386.4 GSM
Applied Load	:	12 kg

Seam Location				**Requirement**
	M006			
	SO @ 12 kg	Seam Strength	Type of failure	
Out Seam	5.0 mm	31.7 kg	FTS	SO :6 mm
In Seam	0.0 mm	34.0 kg	FR	SS :12 kg
Back Rise	0.0 mm	38.7 kg	FR	
Crotch	0.0 mm	36.4 kg	STB	

Note :	
SO :	Seam Opening
STB:	Sewing Thread Broken
FTS	Fabric Torn At Seam
SS:	Seam Strength

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Figure-6

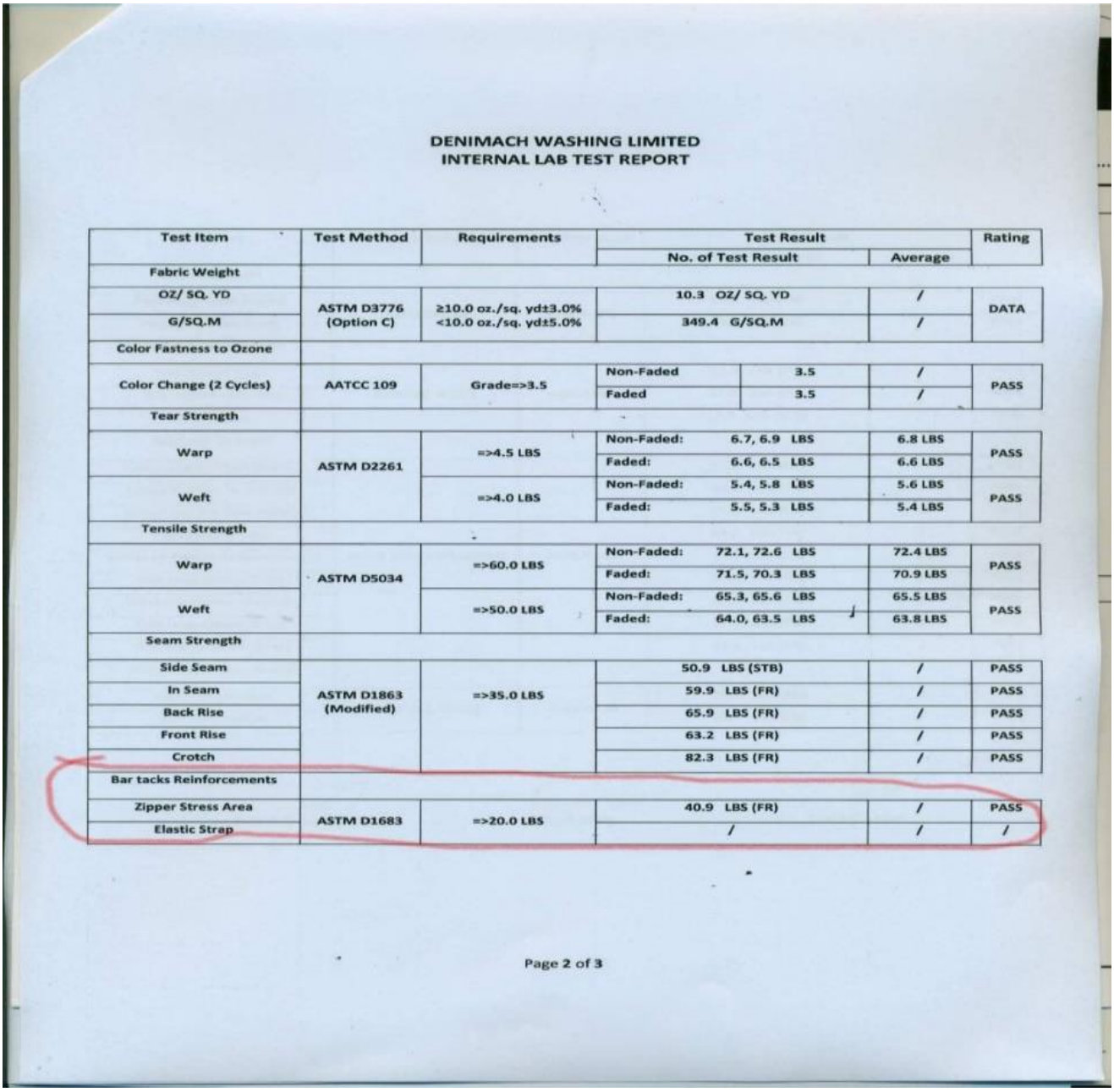
Table-3: Seam Strength (obtained from figure 5&6)

Test name	Method name	Requirement	Test result	Pass/Fail	
Seam Strength	ASTM 1683 M	35.0 lbs	Side seam-52.76 lbs Inseam-87.39 lbs	pass	About 3% denim fabric fails in Seam Strength .
Seam Strength	ISO 13935-2	20 N	Side seam-31.7 kg Inseam-34.0 kg	pass	

3.4. Bar tack reinforcements

Fundamentally, a bar tack stitch is a tight zigzag that is repeated over and over to strengthen a piece that is sewed together.

Test Report



DENIMACH WASHING LIMITED
INTERNAL LAB TEST REPORT

Test Item	Test Method	Requirements	Test Result		Rating
			No. of Test Result	Average	
Fabric Weight					
OZ/ SQ. YD	ASTM D3776 (Option C)	≥10.0 oz./sq. yd±3.0% <10.0 oz./sq. yd±5.0%	10.3 OZ/ SQ. YD	/	DATA
G/SQ.M			349.4 G/SQ.M	/	
Color Fastness to Ozone					
Color Change (2 Cycles)	AATCC 109	Grade=>3.5	Non-Faded 3.5	/	PASS
			Faded 3.5	/	
Tear Strength					
Warp	ASTM D2261	=>4.5 LBS	Non-Faded: 6.7, 6.9 LBS	6.8 LBS	PASS
			Faded: 6.6, 6.5 LBS	6.6 LBS	
Weft		=>4.0 LBS	Non-Faded: 5.4, 5.8 LBS	5.6 LBS	PASS
			Faded: 5.5, 5.3 LBS	5.4 LBS	
Tensile Strength					
Warp	ASTM D5034	=>60.0 LBS	Non-Faded: 72.1, 72.6 LBS	72.4 LBS	PASS
			Faded: 71.5, 70.3 LBS	70.9 LBS	
Weft		=>50.0 LBS	Non-Faded: 65.3, 65.6 LBS	65.5 LBS	PASS
			Faded: 64.0, 63.5 LBS	63.8 LBS	
Seam Strength					
Side Seam	ASTM D1863 (Modified)	=>35.0 LBS	50.9 LBS (STB)	/	PASS
In Seam			59.9 LBS (FR)	/	PASS
Back Rise			65.9 LBS (FR)	/	PASS
Front Rise			63.2 LBS (FR)	/	PASS
Crotch			82.3 LBS (FR)	/	PASS
Bar tacks Reinforcements					
Zipper Stress Area	ASTM D1683	=>20.0 LBS	40.9 LBS (FR)	/	PASS
Elastic Strap			/	/	/

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Figure-7

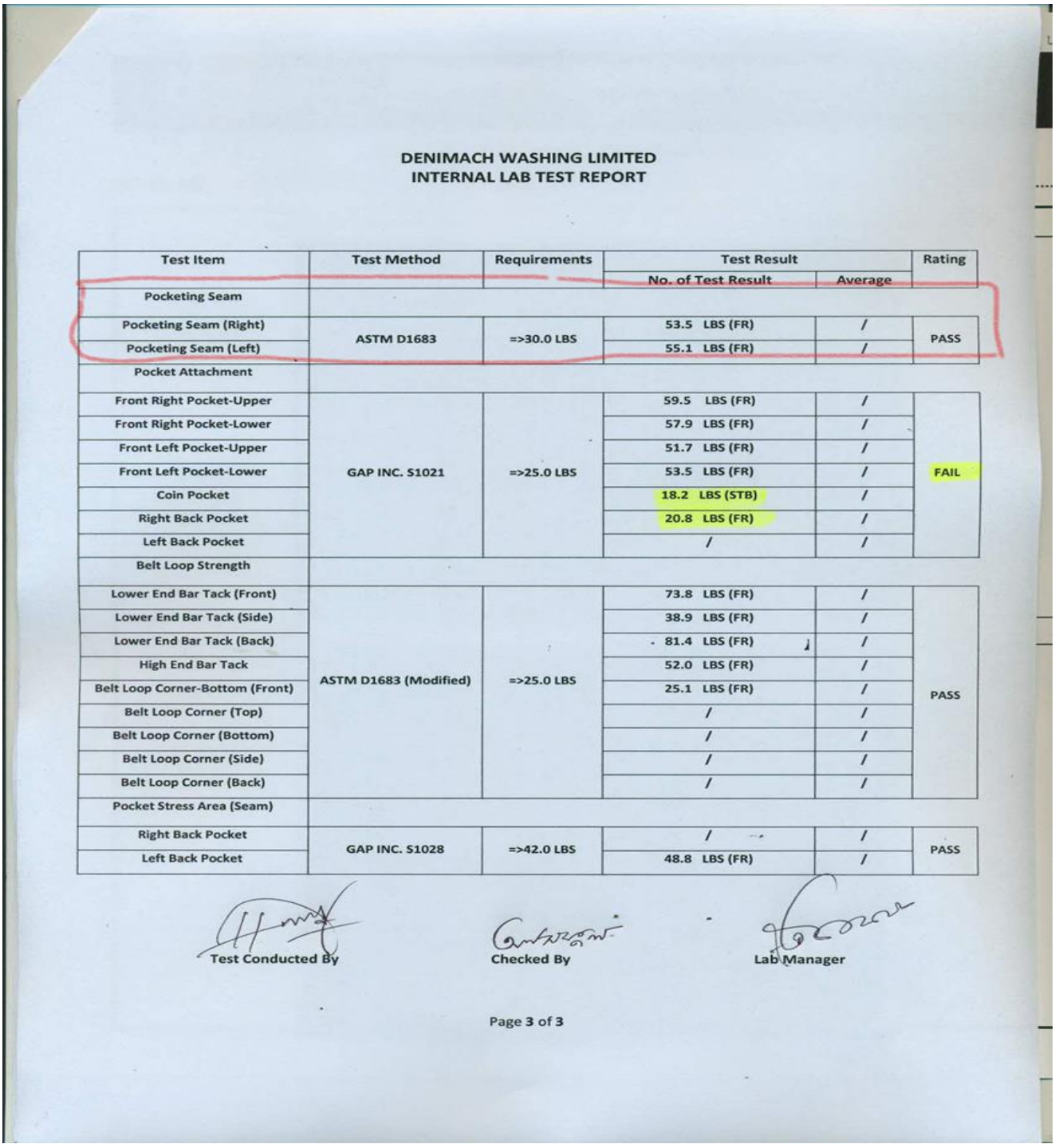
Table-4: Bar tack reinforcements (Obtained from figure 7)

Test name	Method	Requirement	Test result	Pass/fail	Remarks
pocket reinforcement	ASTM 1683	20.0 lbs	Zipper stretch area=40.9 lbs	pass	About 3% denim fabric fails in pocket reinforcement.

3.5. Pocketing seam

It is a garment's seam assembly strength. It is a responsibility of, among other things, the strength of the thread used for the seam, the type of seam act in a garment, and the type of cloth employed.

Test report



DENIMACH WASHING LIMITED
INTERNAL LAB TEST REPORT

Test Item	Test Method	Requirements	Test Result		Rating
			No. of Test Result	Average	
Pocketing Seam					
Pocketing Seam (Right)	ASTM D1683	=>30.0 LBS	53.5 LBS (FR)	/	PASS
Pocketing Seam (Left)			55.1 LBS (FR)	/	
Pocket Attachment					
Front Right Pocket-Upper	GAP INC. S1021	=>25.0 LBS	59.5 LBS (FR)	/	FAIL
Front Right Pocket-Lower			57.9 LBS (FR)	/	
Front Left Pocket-Upper			51.7 LBS (FR)	/	
Front Left Pocket-Lower			53.5 LBS (FR)	/	
Coin Pocket			18.2 LBS (STB)	/	
Right Back Pocket			20.8 LBS (FR)	/	
Left Back Pocket			/	/	
Belt Loop Strength					
Lower End Bar Tack (Front)	ASTM D1683 (Modified)	=>25.0 LBS	73.8 LBS (FR)	/	PASS
Lower End Bar Tack (Side)			38.9 LBS (FR)	/	
Lower End Bar Tack (Back)			81.4 LBS (FR)	/	
High End Bar Tack			52.0 LBS (FR)	/	
Belt Loop Corner-Bottom (Front)			25.1 LBS (FR)	/	
Belt Loop Corner (Top)			/	/	
Belt Loop Corner (Bottom)			/	/	
Belt Loop Corner (Side)			/	/	
Belt Loop Corner (Back)			/	/	
Pocket Stress Area (Seam)					
Right Back Pocket	GAP INC. S1028	=>42.0 LBS	/	/	PASS
Left Back Pocket			48.8 LBS (FR)	/	

Test Conducted By Checked By Lab Manager

Page 3 of 3

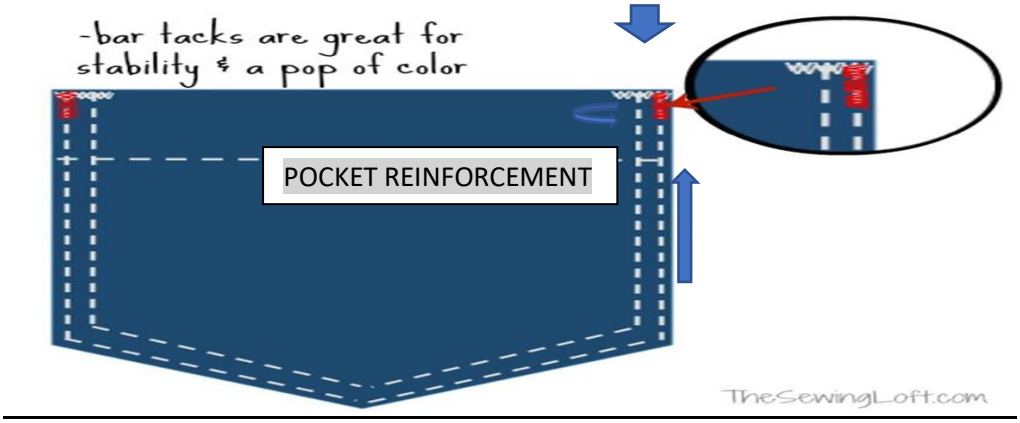
Figure 8

Table-5: Pocketing seam (Obtained from figure 8)

Test name	Method	Requirement	Test result	Pass/fail	Remarks	
Pocketing seam	ASTM 1683 M	25.0 lbs	Side seam-53.5 lbs Inseam-55.1 lbs	pass	About 3% denim fabric fails in Pocketing seam	

3.6. Pocket reinforcement

The most common way to reinforce a pocket edge is with a bar tack. Set your sewing machine to a zigzag stitch with a length of 0.2mm and a width of 3-3.5mm to sew a bar tack. Shorten the row of stitches to secure it, and then backstitch once to twice to finish the row. Any corner may also have the bar tack stitched diagonally.



Test Report

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
				Back Pocket Corner -Inside	Right-Fabric rapture	57.14 lbs			
Pocket attachment strength	Gap Inc. S1027	Min. 25 lbs	/					-	Pass
			#1	Front Left Pocket -Left	Fabric rapture	116.63 lbs	-		
				Front Left Pocket - Right	Fabric rapture	104.22 lbs			
				Front Right Pocket -Left	Fabric rapture	60.86 lbs			
				Front Right Pocket -Right	Fabric rapture	78.54 lbs			
				Coin Pocket – Right	Fabric rapture	48.18 lbs			
				Back Pocket – Left	Left-Fabric rapture	36.86 lbs			
				Back Pocket – Left	Right-Fabric rapture	39.92 lbs			
				Back Pocket – Right	Left-Fabric rapture	32.13 lbs			
				Back Pocket – Right	Right-Fabric rapture	30.79 lbs			
Button attachment strength	Gap Inc. S 1023	15.0 lbs for 10 seconds	/				Average	-	Pass
			#1	/	Front waist shank button-Hardware failure	87 lbs	- lbs		
Small parts attachment strength	Gap Inc. S 1023	15.0 lbs for 10 sec.	/					-	Pass
			#1	/	Front rise zipper puller-Hardware failure	86 lbs	-		
			#2	/	Left cross pocket rivet-Hardware failure	92 lbs			
			#3		Left cross pocket rivet-Hardware failure	91 lbs			
			#4		Right cross pocket rivet-Hardware failure	90 lbs			
			#5		Right cross pocket rivet-Hardware failure	93 lbs			
			#6		Front right coin pocket rivet-Hardware failure	86 lbs			
			#7		Front right coin pocket rivet-Hardware failure	94 lbs			

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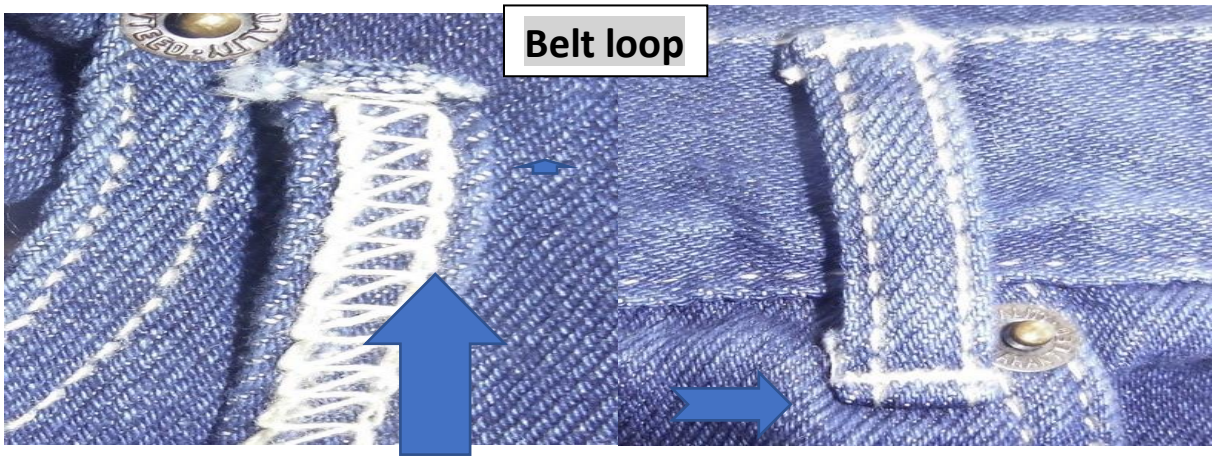
Figure 9

Table-6: Pocket reinforcements (Obtained from figure 9)

Test name	Method	Requirement	Test result	Pass/fail	Remarks
pocket reinforcement	Gap incS1627	25.0 lbs	Front left pocket left-116.63 lbs Front left pocket right -104.22 lbs Front right pocket left-60.86 lbs Front right pocket right-78.54 lbs Coin pocket-48.18 lbs Back pocket left-36.86 lbs Back pocket left -39.32 lbs Back pocket right-32.13 lbs Back pocket right -30.79 lbs	pass	About 3% denim fabric fails in Pocketing Seam.

3.7. Belt loop strength

Belt loops are a feature that aids in maintaining a belt's position at the trouser or jeans waistband.



Lab Test Report

SGS / Bangladesh PERFORMANCE PROTOCOL TRM-0000413196 (Version 1) / 2010052418

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
		Min. 20 lbs		Back rise	Fabric rapture at seam	94.28 lbs			
				Crotch	Fabric rapture at seam	117.15 lbs			
				Waist	Fabric rapture	79.11 lbs			
				Zipper seam	Sewing thread breakage	102.59 lbs			
Belt loop attachment strength	ASTM D 1683 (modified)	Min. 25 lbs	/				-	-	Pass
			#1	High end bartack	Fabric rapture	88.18 lbs	-		
				High end corner	Fabric rapture	56.5 lbs			
				Low end bartack @ Front	Fabric rapture	51.79 lbs			
				Low end bartack @ Side	Fabric rapture	41.85 lbs			
				Low end bartack @ Back	Fabric rapture	87.51 lbs			
				Low end corner @ Front	Fabric rapture	98.5 lbs			
				Low end corner @ Side	Fabric rapture	67.78 lbs			
				Low end corner @ Back	Fabric rapture	59.73 lbs			
Seam slippage and seam strength of pocket fabric	ASTM D 1683 (Modified)	Seam Slippage: 15 lbs x 15 lbs Seam Strength: 30 lbs minimum	Seam slippage				-	-	Pass
			#1	/	Left front pocketing bottom seam-1/4"	- lbs	-		
					Right front pocketing bottom seam-1/4"	- lbs			
			Seam strength						
			#1	/	Left front pocketing bottom seam-Sewing thread breakage	56.99 lbf	-		
					Right front pocketing bottom seam-Sewing thread breakage	60.57 lbf			
Pocket Stress area	Gap Inc. S1028	30% below original warp tensile standard. (Min. 42 lbs)	/				-	-	Pass
			#1	Back Pocket Corner - Outside	Left-Fabric rapture	61.63 lbs	-		
				Back Pocket Corner -Inside	Left-Fabric rapture	101.02 lbs			
				Back Pocket Corner - Outside	Right-Fabric rapture	93.41 lbs			

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Figure 10

Table-7: Belt loop strength (Obtained from figure 10)

Test name	Method	Requirement	Test result	Pass/fail	Remarks
Belt loop strength	ASTM 1683 M	25.0 lbs	High end bartack 88.18 lbs High end corner 56.6 lbs Low end bar tack front 51.79 lbs Low end bar tack side 41.85 lbs Low end bartack corner front 98.5 lbs Low end corner side 67.78 lbs Low end corner back 59.73	pass	About 2% denim fabric fails Belt Loop strength.

3.8. Pocket stress area

SGS Lab Test Report

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
		Min. 20 lbs		Back rise	Fabric rapture at seam	94.28 lbs			
				Crotch	Fabric rapture at seam	117.15 lbs			
				Waist	Fabric rapture	79.11 lbs			
				Zipper seam	Sewing thread breakage	102.59 lbs			
Belt loop attachment strength	ASTM D 1683 (modified)	Min. 25 lbs	/				-	-	Pass
			#1	High end bartack	Fabric rapture	88.18 lbs	-		
				High end corner	Fabric rapture	56.5 lbs			
				Low end bartack @ Front	Fabric rapture	51.79 lbs			
				Low end bartack @ Side	Fabric rapture	41.85 lbs			
				Low end bartack @ Back	Fabric rapture	87.51 lbs			
				Low end corner @ Front	Fabric rapture	98.5 lbs			
				Low end corner @ Side	Fabric rapture	67.78 lbs			
				Low end corner @ Back	Fabric rapture	59.73 lbs			
Seam slippage and seam strength of pocket fabric	ASTM D 1683 (Modified)	Seam Slippage: 15 lbs x 15 lbs Seam Strength: 30 lbs minimum	Seam slippage				-	-	Pass
			#1	/	Left front pocketing bottom seam-1/4"	- lbs	-		
					Right front pocketing bottom seam-1/4"	- lbs			
			Seam strength						
			#1	/	Left front pocketing bottom seam-Sewing thread breakage	56.99 lbf	-		
					Right front pocketing bottom seam-Sewing thread breakage	60.57 lbf			
Pocket Stress area	Gap Inc. S1028	30% below original warp tensile standard. (Min. 42 lbs)	/				-	-	Pass
			#1	Back Pocket Corner - Outside	Left-Fabric rapture	61.63 lbs	-		
				Back Pocket Corner -Inside	Left-Fabric rapture	101.02 lbs			
				Back Pocket Corner - Outside	Right-Fabric rapture	93.41 lbs			

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Figure 11

Table-8: Pocket stress area (Obtained from figure 11)

Test name	Method	Requirement	Test result	Pass/fail	Remarks
Pocket stress area	Gap inc s1028	42.0 lbs	Left Back pocket corner outside 61.63 lbs Left Back pocket corner outside inside 101.02 lbs Right Back pocket corner outside 93.4 lbs	Pass	About 3% denim fabric fails Pocket stress area.

3.9. Fabric Weight

Fabric weight is the total mass of a textile fabric or piece of clothing across a certain area.

Internal Lab Test Report

BUYER	STYLE	COLOR/WASH	B.W GSM(OZ/SQ.YD)	A.W GSM(OZ/SQ.YD)NON-FADED	SAMPLE STATUS
ONW	413207	BLACK JACK	10.87	10.97	GPT
ONW	413207	BLACK JACK	10.85	10.95	BULK
ONW	413207	BLACK JACK	10.85	10.86	BULK
ONW	413207	BLACK JACK	10.62	10.7	BULK
ONW	413207	BLACK JACK	10.6	10.67	BULK

Figure-12

Table-9: Fabric Weight (Obtained from figure 12)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Fabric Weight	ASTM D3776-C / ISO3801	≥10 oz/yd2-+-3% ≤10 oz/yd2-+- 5%	Before wash 10.87 oz/yd2 After wash 10.97 oz/yd2	Pass	About 35 % denim light color fabric fails Fabric Weight

3.10. Abrasion and Pilling Resistance

Martindale Abrasion & Pilling Tester: This device is used to evaluate the abrasion and pilling resistance of all types of textile products.

TUV Lab test report

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Abrasion Resistance **Next Test Method 18**		**Requirement**
	M001	
Shade Change at 5000 Revs :-	3	3
1st Specimen Breakdown	Over 10,000 Revs	10,000 revs
2nd Specimen Breakdown	Over 10,000 Revs	

Pilling Resistance
NEXT TEST METHOD 19
(Machine Wash 40 ºC, 5A, Tumble Dry Low)
Detergent Used: 20gm ECE Reference detergent 'B'; 5gm Sodium Perborate Tetrahydrate

	M001	**Requirement**
Observation after washing:-	No fuzzing	
After 18000 Revolutions:-	4	4

INTERPRETATION:-
5- No visible change
4- Slight surface fuzzing.
No fully formed pills evident
3- Moderate fuzzing/Isolated fully formed pills
2- Distinct fuzzing and / or pilling
1- Dense fuzzing and / or pilling which covers the specimen

Figure10

Table-10: Abrasion and Pilling Resistance (Obtained from figure 12)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Abrasion resistance	Next test method 18	10000 revs Shade change 3.0	First specimen break down over 10000 Revs Second specimen break down over 10000 revs	Fail	About 2% denim fabric fails Abrasion and Pilling Resistance
Pilling resistance	Next test method 19	4	Observation after washing –no fuzing After 18000 revolutions slight surface fuzing not fully formed pill evident.	pass	
Pilling resistance	Next test method 19	4	Observation after washing –no fuzing After 18000 revolutions slight surface fuzing not fully formed pill evident.	pass	

3.11. Stretch & Recovery

Flexibility and recovery testing is used to assess a fabric's stretch, comfort, and fit as well as its ability to rake up.

11.1 TUV Lab Test Report

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Abrasion Resistance **Next Test Method 18**		**Requirement**
	M001	
Shade Change at 5000 Revs :-	3	3
1st Specimen Breakdown	Over 10,000 Revs	10,000 revs
2nd Specimen Breakdown	Over 10,000 Revs	

Pilling Resistance **NEXT TEST METHOD 19** (Machine Wash 40 °C, 5A, Tumble Dry Low) Detergent Used: 20gm ECE Reference detergent 'B'; 5gm Sodium Perborate Tetrahydrate		
	M001	**Requirement**
Observation after washing:-	No fuzzing	
After 18000 Revolutions:-	4	4

INTERPRETATION:-
5- No visible change
4- Slight surface fuzzing. No fully formed pills evident
3- Moderate fuzzing/Isolated fully formed pills
2- Distinct fuzzing and / or pilling
1- Dense fuzzing and / or pilling which covers the specimen

Extension and Recovery		
Test Method	:	**Next Test Method 21a**
Cycle Load	:	**4 Kgf**

	M001	Requirement
	Extension (%)	Min 15%
Width/Weft	29.4	
	Recovery (%)	Min 95%
Width/Weft	**93.8**	

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Denimach Washing Ltd.
Internal Lab Test Report

Test Performed: Stretch, Recovery & Power of Elastic Fabric (Part-1)				
Test Method: GAP INC. S1066				
Sample	**Requirements**	**Result**		**Conclusion**
		No. of Test Result	**Average**	
Elongation-Weft @ 10lbs load	**General Specifications:** **- Elongation: (±10%) of mill specification** **-Recovery: >=85% after 30 minutes** **-Growth: <=5% after 30 minutes**	**62.4%, 62.4%**	**62.4%**	**Fail**
Growth-Weft @ 85% elongation after 30 minutes		**5.0%, 5.0%**	**5.0%**	**Pass**
Growth-Weft @ 85% elongation after 4 hours		**4.0%, 4.0%**	**4.0%**	**Data**
Recovery-Weft @ 85% elongation after 30 minutes		**90.7%, 90.7%**	**90.7%**	**Pass**
Recovery-Weft @ 85% elongation after 4 hours		**92.6%, 92.6%**	**92.6%**	**Data**

Test Conducted By **Checked By** **Lab Manager**

End of the Report

Page 5 of 5

Figure 13

SGS Lab Test Report

GREEN			MENS 5 PKT PANT						
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
				Right		0 %			
			After washed						
			#1	Left		0 %	-		
				Right		0 %			
Durability to repeated laundering (10 Home Launderings)	AATCC 150	After 10 HL Check for durability through 10 washes. Rate with AATCC evaluation procedure 1 and/or 2. Record results and attach the original and one sample after 10 wash cycles to the test report. Color Change - Grade 3.5 Self Staining - Grade 4 - No adverse affects affecting the end product performance & appearance, including but not limited to detaching, lifting of print or foil, considerable loss of glitter. Record all.	Wash Procedure: Machine Wash Warm, Normal Cycle, Tumble Dry Medium, Warm Iron; Detergent used: Tide (Original)					-	Fail
			Color Change				Result		
			#1	/	Print	4 Grade	- Grade		
			Self Staining				Result		
			#1	/	Dark to light color	4.5 Grade	- Grade		
			Other Observation						
			#1	/	Noticeably loss of print observed.	Unsatisfactory	-		
Physical Durability									
Stretchability, Recovery and Power of Elastic Fabrics	Gap Inc S1066	-Elongation: +/- 10% of mill spec; Mill spec: 27% -Recovery: >=85% after 30 minutes -Growth: <=5% after 30 minutes	Elongation - Weft (Max elongation@10lb)				Average	-	Pass
			#1	/		28.7 %	28.7 %		
			#2	/		28.7 %			
			#3	/		28.7 %			
			Growth @85% Elongation after 30 min relaxation - Weft				Average		
			#1	/		2 %	2 %		
			#2	/		2 %			
			#3	/		2 %			
			Growth @85% Elongation after 4 hrs relaxation - Weft				Average		
			#1	/		1 %	1 %		
			#2	/		1 %			
			#3	/		1 %			
			Recovery @85% Elongation after 30 min relaxation - Weft				Average		

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Figure 14

Table-11: Stretch and recovery (Obtained from figure 13&14)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Stretch & Recovery	Gap inc S1066	General specification 1.Elongation +- 10% mill specification 2.Recovery 85% after 30 minutes 3.Growth <=5% after 30 minutes	64.2% 5% 4% 90.7% 92.6%	Fail	About 25% denim fabric fails Stretch & Recovery
Stretch & Recovery	Next test method 21	Extension min 15% Recovery min 95%	29.4 % 93.8%	Pass	

3.12. Dimensional Stability to Washing

A pair of benchmarks, such as length, width, leg opening, etc. for garment affixed to the fabric before washing, are used to measure the dimensions changes of the textile garment or fabric under washing.

TUV AB Test Report

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Test Report No.: 1620072367

Dimensional Stability to Washing and Drying		
Test Method	:	**NEXT TEST METHOD 12**
Type Of Machine	:	Wascator
Test Programme	:	5A
Washing Temperature	:	40° C
Detergent	:	Detergent Used: 20gm ECE Reference detergent 'B'; 5gm Sodium Perborate Tetrahydrate
Loading	:	2kg
Drying Procedure	:	Tumble Dry Low
Others	:	/

	M006			
	Before wash	After one wash	Dimensional Change	Requirement
	(cm)	(cm)	(%)	Length :±3%
				Width:±3%
Waist Width	30.0	29.7	-1.0	
Inseam	57.1	56.4	-1.2	
Side Seam (EWB)	74.2	73.3	-1.2	
½ Hip	32.5	32.2	-0.9	
½ Bottom	12.4	12.3	-0.8	

Remark: (+) means extension and (-) means shrinkage

EWB: Excluding waist band

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Figure 15

Internal Lab Test Report

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
				Wool		4.5 Grade			
				Viscose		4.5 Grade			
				Silk		4.5 Grade			
Colorfastness to light	ISO 105-B02 (method 3) modified	- Color: Grade 3.5	/					-	Pass
			#1	/		4 Grade	-		
Colorfastness to ozone	AATCC 109	2 cycles Color Change: Grade 3.5	/					-	Pass
			#1	/		4.5 Grade	-		
Durability to Washing									
General appearance before and after laundering	Per care label	Color Change: - Fabric: Grade 3.5 - All SD/Print: Grade 3 Self Staining: - Grade 4 Observations: - No obvious defects/observations affecting the end product performance/appearance, including but not limited to frosting. Fail for slight appearance changes. - General assessment, before and after laundering & ironing. No obvious defects/observations affecting the end product performance & appearance.	Wash Procedure: Machine Wash Cold, Normal Cycle, Tumble Dry Low, Warm Iron, Detergent used: Tide (Original)					-	Pass
			After 3 Home Laundering or Hand Wash						
			#1	Color Change	Body Fabric	Grade 4	-		
				Color Change	Print	Grade 4.5			
				Self Staining	Dark To Light Color	Grade 4.5			
				Observation - Before Ironing		Satisfactory			
				Observation - Iron Safe	Warm Iron: Safe	Satisfactory			
				Other Observation	No loss of print	Satisfactory			
Dimensional stability (3 Home Launderings or 3 Hand Washes)	AATCC 150	Lengthwise -2.5% / +1.0% max. Widthwise -2.5% / +1.0% max.	Wash Procedure: Machine Wash Cold, Normal Cycle, Tumble Dry Low, Warm Iron, Detergent used: Tide (Original)					-	Pass
			Inseam				Result		
			#1	Original		31.625 Inch	-1.2 %		
				After Washed		31.25 Inch			
			Seat				Result		
			#1	Original		18.25 Inch	-1.4 %		
				After Washed		18 Inch			
			Waist				Result		
			#1	Original		16.5 Inch	-1.5 %		

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Figure 15

Table-12: Dimensional Stability to Washing (Obtained from figure 15&16)

Test name	Method	Requirement	Test result
Dimensional stability to washing	ISO 5077 2008 / AATCC 135/150	Length +-3% Width +-3%	Width -1.0% Inseam -1.2% Side seam -1.2% ½ hip -0.9% ½ bottom -0.8%

3.13. Appearance after Laundering/ Home Laundry (3 HL/5 HL/10 HL)

Appearance after Washing: This term is used to describe how clothes or fabrics look or feel after washing.

TUV Lab test report

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Test Report No.: 1620072367

Appearance After Washing		
Test Method	:	**Next Test Method 9**
Type Of Machine	:	Wascator
Test Programme	:	5A
Washing Temperature	:	40° C
Detergent	:	Detergent Used: 20gm ECE Reference detergent 'B'; 5gm Sodium Perborate Tetrahydrate
Loading	:	2kg
Drying Procedure	:	Tumble Dry Low
Others	:	/

Parameter	Results	Requirement
	M006	
Colour Change	4-5 (Patch/Print), 4 (Body Woven)	4
Cross Staining	4-5	4-5
Differential Shrinkage of Components	Not Noticeable	Not Noticeable
Spirality	/	Not Noticeable
Seam Pucker	Slight puckering observed	Not Noticeable
Free Running of Zips	Runs Freely	Runs Freely in both directions
Detachment of Trims, Embellishments & Components	N/A	None Detached
Fraying of Fabric / Trims	No Fraying	No Fraying
Grinning of Seams	No grinning	3mm or less
Surface Disturbance ~ Pilling or Fuzzing	4-5	4
Pile Loss	N/A	Not Noticeable
Loose Stitching / Threads	Not Noticeable	Not Noticeable
Movement of Wadding	N/A	No Movement within Garment
Corrosion to Metallic Trims	No Corrosion observed	Not Noticeable
Delamination of Fused Components	Not Detached	Not Noticeable
Others	Satisfactory Hand–feel and Fabric Surface Appearance. No significant change was found on print area/zipper of the washed sample after washing. Tiny creases were found on body of the washed sample.	No Noticeable Change
Overall Appearance	Satisfactory	Satisfactory

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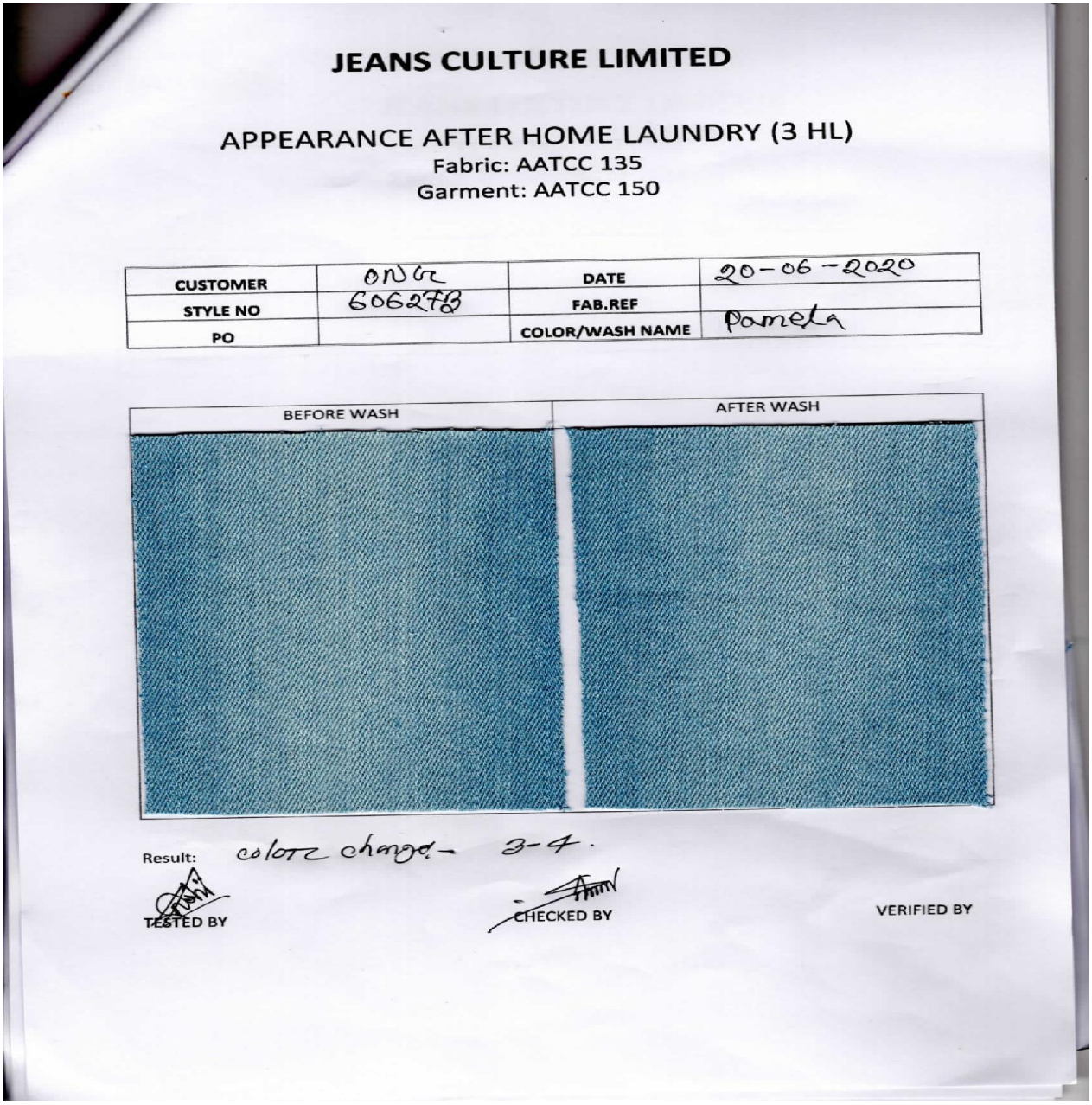
Figure 17

Internal Lab test report



JEANS CULTURE LIMITED

APPEARANCE AFTER HOME LAUNDRY (3 HL)

Fabric: AATCC 135

Garment: AATCC 150

CUSTOMER	ONN	DATE	20-06-2020
STYLE NO	606278	FAB.REF	
PO		COLOR/WASH NAME	Pamela

BEFORE WASH	AFTER WASH

Result: color change- 3-4.

TESTED BY

CHECKED BY

VERIFIED BY

. Table-13: appearance after wash or HL (Obtained from figure 17&18)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Home Laundry/Appearance after washing (1 HL,5 HL,10 HL)	AATCC 135/150	3.0/3.5	3.5	Pass	About 10 % denim Fabric fails Home Laundry/Appearan washing.
Home Laundry/Appearance after washing (1 HL,5 HL,10 HL)	Next test method 09	4.0	4.0	Pass	

3.14. Print Durability

Evaluation of the aspect or appearance of fabrics or clothes, print, heat seal, etc., is done using the appearance after washing.

SGS lab test report

GREEN			MENS 5 PKT PANT						
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
				Right		0 %			
			After washed						
			#1	Left		0 %	-		
				Right		0 %			
Durability to repeated laundering (10 Home Launderings)	AATCC 150	After 10 HL Check for durability through 10 washes. Rate with AATCC evaluation procedure 1 and/or 2. Record results and attach the original and one sample after 10 wash cycles to the test report. Color Change - Grade 3.5 Self Staining - Grade 4 - No adverse affects affecting the end product performance & appearance, including but not limited to detaching, lifting of print or foil, considerable loss of glitter. Record all.	Wash Procedure: Machine Wash Warm, Normal Cycle, Tumble Dry Medium, Warm Iron; Detergent used: Tide (Original)					-	Fail
			Color Change				Result		
			#1	/	Print	4 Grade	- Grade		
			Self Staining				Result		
			#1	/	Dark to light color	4.5 Grade	- Grade		
			Other Observation						
			#1	/	Noticeably loss of print observed.	Unsatisfactory	-		
Physical Durability									
Stretchability, Recovery and Power of Elastic Fabrics	Gap Inc S1066	-Elongation: +/- 10% of mill spec; Mill spec: 27% -Recovery: >=85% after 30 minutes -Growth: <=5% after 30 minutes	Elongation - Weft (Max elongation@10lb)				Average	-	Pass
			#1	/		28.7 %	28.7 %		
			#2	/		28.7 %			
			#3	/		28.7 %			
			Growth @85% Elongation after 30 min relaxation - Weft				Average		
			#1	/		2 %	2 %		
			#2	/		2 %			
			#3	/		2 %			
			Growth @85% Elongation after 4 hrs relaxation - Weft				Average		
			#1	/		1 %	1 %		
			#2	/		1 %			
			#3	/		1 %			
			Recovery @85% Elongation after 30 min relaxation - Weft				Average		

Figure 19

Table-14: Print Durability(Obtained from figure 19)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Print Durability	AATCC 135/150	Print color change 3-4, Self-staining 4, No adverse effects affecting the end product performance and appearance.	Print color change 4,Self-staining 4-5, Adverse effects affecting the end product performance and appearance.	Pass	About 30 % denim fabric fails Print Durability
Print Durability	Next test method 09/ISO 6330	Print color change 4, Self-staining 4-5, No adverse effects affecting the end product performance and appearance.	Print color change 4,Self-staining 4-5, Adverse effects affecting the end product performance and appearance.	Pass	

3.15. Color fastness to Washing

It refers to the color-washing with household detergent resistance..

TUV Lab Test Report

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Test Report No.: 1620072367

Test Conducted:

Fibre Composition

Test Method	:	ISO 1833-1: 2006 (Cor-1: 2009); ISO 1833-12:2006
Tested Item	:	M006

Test Result:		Requirement
Labeled Fiber Content	98% Cotton 2% Elastane	No Tolerance For Single Fibre Blend: ±3%
Lab Analysis	98.5% Cotton 1.5% Elastane	
Recommendation	98% Cotton 2% Elastane	

Remark	:	The result relates to the overall composition of the material Based on moisture regain weight Moisture regain of Cotton: 8.5%, Elastane: 1.5% (Based on EU Directive 1007/2011)

Colour Fastness to Washing

Next Test Method 2 (B25)

Temperature 50 °C, Liquor Vol.:150ml, Time 30min, Steel Balls: 25, ECE: 4g/l, Sodium Perborate:1g/l

	M006	Requirement
Colour Change	4	4
Self-Staining	/	4-5
Color Staining on Multi-fiber		
Staining on Acetate	4-5	4
Staining on Cotton	4	
Staining on Nylon	4	
Staining on Polyester	4-5	
Staining on Acrylic	4-5	
Staining on Wool	4-5	

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Figure 20

SGS Lab Test Report

SGS / Bangladesh PERFORMANCE PROTOCOL TRM-0000413196 (Version 1) / 2010052418

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
				Nylon		4.5 Grade			
				Wool		4.5 Grade			
				Viscose		4.5 Grade			
				Silk		4.5 Grade			
			Color Change (Alkaline)						
			#1	/		4.5 Grade	-		
			Multi-fiber Staining (Alkaline)						
			#1	Acetate		4.5 Grade	-		
				Cotton		4.5 Grade			
				Nylon		4.5 Grade			
				Wool		4.5 Grade			
				Viscose		4.5 Grade			
				Silk		4.5 Grade			
Colorfastness to water (static wetting)	ISO 105-E01 Modified	Color change - Grade 3.5 Multi-fiber staining - Grade 3.5	Color Change					-	Pass
			#1	/		4.5 Grade	-		
			Multi-fiber Staining						
			#1	Acetate		4.5 Grade	-		
				Cotton		4.5 Grade			
				Nylon		4.5 Grade			
				Wool		4.5 Grade			
				Viscose		4.5 Grade			
				Silk		4.5 Grade			
Colorfastness to accelerated laundering	ISO 105-C06 MODIFIED	Color change: - Fabric: Grade 3.5 Multi-fiber staining: - Grade 3	Color Change					-	Pass
			#1	/		4.5 Grade	-		
			Multi-fiber Staining						
			#1	Acetate		4.5 Grade	-		
				Cotton		4.5 Grade			
				Nylon		4.5 Grade			

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Figure 21

1.3 Table-15: Color fastness to Washing (Obtained from figure 20&21)

Test name	Method	Requirement	Test result	Pass/fail	Remarks
Color fastness to Washing	ISO 105 C06-A2S	Color change 3-4 Color staining3-4	Color change 4 Color staining 4	Pass	About 10% denim fabric fails Color fastness to Washing
	ISO 105 C06-B2S	Color change 4 Color staining 4	Color change 4 Color staining 4	Pass	

3.16. Color fastness to Perspiration (Acid & Alkaline)

Color resistance to perspiration is referred to as color fastness. ability to resist fading and staining while perspiring on colored cloth.

SGS Lab report Alkali Perspiration

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
				Nylon		4.5 Grade			
				Wool		4.5 Grade			
				Viscose		4.5 Grade			
				Silk		4.5 Grade			
			Color Change (Alkaline)						
			#1	/		4.5 Grade	-		
			Multi-fiber Staining (Alkaline)						
			#1	Acetate		4.5 Grade	-		
				Cotton		4.5 Grade			
				Nylon		4.5 Grade			
				Wool		4.5 Grade			
				Viscose		4.5 Grade			
				Silk		4.5 Grade			
Colorfastness to water (static wetting)	ISO 105-E01 Modified	Color change - Grade 3.5 Multi-fiber staining - Grade 3.5	Color Change					-	Pass
			#1	/		4.5 Grade	-		
			Multi-fiber Staining						
			#1	Acetate		4.5 Grade	-		
				Cotton		4.5 Grade			
				Nylon		4.5 Grade			
				Wool		4.5 Grade			
				Viscose		4.5 Grade			
				Silk		4.5 Grade			
Colorfastness to accelerated laundering	ISO 105-C06 MODIFIED	Color change: - Fabric: Grade 3.5 Multi-fiber staining: - Grade 3	Color Change					-	Pass
			#1	/		4.5 Grade	-		
			Multi-fiber Staining						
			#1	Acetate		4.5 Grade	-		
				Cotton		4.5 Grade			
				Nylon		4.5 Grade			

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Figure 22

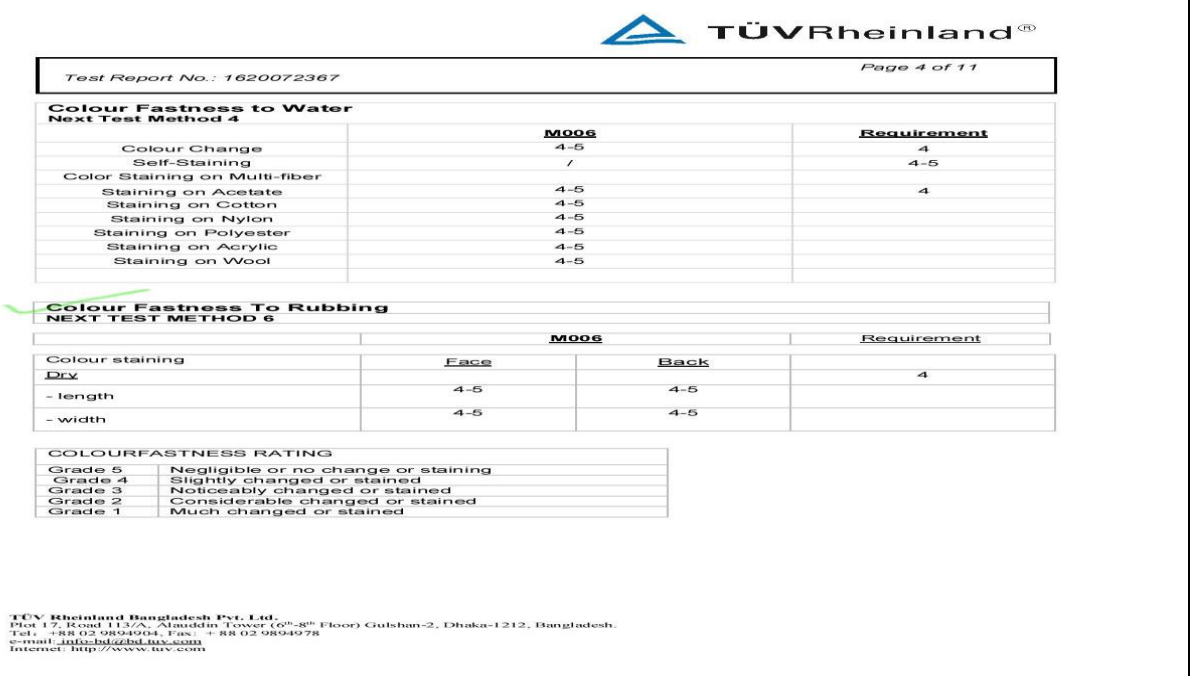
Table-16: Color fastness to Perspiration (Obtained from figure 22)

Test name	Method	Requirement	Test result	Pass/fail	Remarks
Color fastness to Perspiration (Acid & Alkaline)	ISO105 EO4	Color change 3-4 Color staining 3-4	4	Pass	About 10% denim fabric fails Color fastness to Perspiration (Acid & Alkaline)

3.17 Color fastness to Rubbing or Crocking (Dry & Wet)

The capacity of dyed fabrics to maintain their original color when rubbed on the fabric surface is referred to as rubbing-color fastness to rubbing.

TUV Rubbing Test report



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Test Report No.: 1620072367 *Page 4 of 11*

Colour Fastness to Water
Next Test Method 4

	M006	Requirement
Colour Change	4-5	4
Self-Staining	/	4-5
Color Staining on Multi-fiber		
Staining on Acetate	4-5	4
Staining on Cotton	4-5	
Staining on Nylon	4-5	
Staining on Polyester	4-5	
Staining on Acrylic	4-5	
Staining on Wool	4-5	

Colour Fastness To Rubbing
NEXT TEST METHOD 6

	M006		Requirement
Colour staining	Face	Back	
Dry			4
- length	4-5	4-5	
- width	4-5	4-5	

COLOURFASTNESS RATING	
Grade 5	Negligible or no change or staining
Grade 4	Slightly changed or stained
Grade 3	Noticeably changed or stained
Grade 2	Considerable changed or stained
Grade 1	Much changed or stained

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Figure 23

SGS Rubbing Test Report

SGS / Bangladesh PERFORMANCE PROTOCOL TRM-0000413196 (Version 1) / 2010052418

DARK WASH									
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
Fabric Identification									
Fabric Weight	ASTM D 3776	±3% Claim A/W: 12.1 oz/yd²	g/sq. m (Option C - All other knits and woven)				Average	-	Fail
			#1	/		440.8 g/sq. m	440 g/sq. m		
			#2	/		438.4 g/sq. m			
			#3	/		439.3 g/sq. m			
			oz/sq. yd (Option C - All other knits and woven)				Average		
			#1	/		13 oz/sq. yd	12.96 oz /sq. yd		
			#2	/		12.93 oz/sq. yd			
			#3	/		12.96 oz/sq. yd			
Color Durability									
Colorfastness to non-chlorine bleach	Gap Inc. S1004	Color Change: Grade 4						4.5GRADE	Pass
Colorfastness to crocking	ISO 105-X12/X16	- Dry: Grade 3.5 - Wet: Grade 2	Dry (As Recevied)					-	Pass
			#1	Lengthwise		4.5 Grade	-		
				Widthwise		4.5 Grade			
			Wet (As Recevied)						
			#1	Lengthwise		3.5 Grade	-		
				Widthwise		3.5 Grade			
Colorfastness to perspiration	ISO 105-E04 Modified	Color change - Grade 3.5 Multi-fiber staining - Grade 3.5	Color Change (Acidic)					-	Pass
			#1	/		4.5 Grade	-		
			Multi-fiber Staining (Acidic)						
			#1	Acetate		4.5 Grade	-		
				Cotton		4.5 Grade			

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Figure 24

Table-17: Color fastness to Rubbing (Obtained from figure 23&24)

Test name	Method	Requirement	Test result	Pass/fail	Remarks
Color fastness to Rubbing or Crocking (Dry & Wet)	AATCC 8/ AATCC 116	Dry Rubbing :3-4 Wet Rubbing :2	Dry Rubbing :4-5 Wet Rubbing :4	pass	About 15% denim fabric fails Color fastness to Rubbing or Crocking (Dry & Wet). Most of the wet rubbing fail but dry rubbing not Fail.
	ISO 105 C06x12/ ISO 105 C06x16/ GBT 3920	Dry Rubbing :4 Wet Rubbing :N.A	Dry Rubbing :4-5 Wet Rubbing :N.A	Pass	

3.18 Color fastness to Water

Water resistance of dyed, printed, colored textile yarns and fabrics/garments is referred to as color fastness to water.

TUV Test report

TÜVRheinland®

Test Report No.: 1620072367 Page 4 of 11

Colour Fastness to Water
Next Test Method 4

	M006	Requirement
Colour Change	4-5	4
Self-Staining	/	4-5
Color Staining on Multi-fiber		
Staining on Acetate	4-5	4
Staining on Cotton	4-5	
Staining on Nylon	4-5	
Staining on Polyester	4-5	
Staining on Acrylic	4-5	
Staining on Wool	4-5	

Colour Fastness To Rubbing
NEXT TEST METHOD 6

	M006		Requirement
Colour staining	Face	Back	
Dry			4
- length	4-5	4-5	
- width	4-5	4-5	

COLOURFASTNESS RATING	
Grade 5	Negligible or no change or staining
Grade 4	Slightly changed or stained
Grade 3	Noticeably changed or stained
Grade 2	Considerable changed or stained
Grade 1	Much changed or stained

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Figure 25

Internal Test report

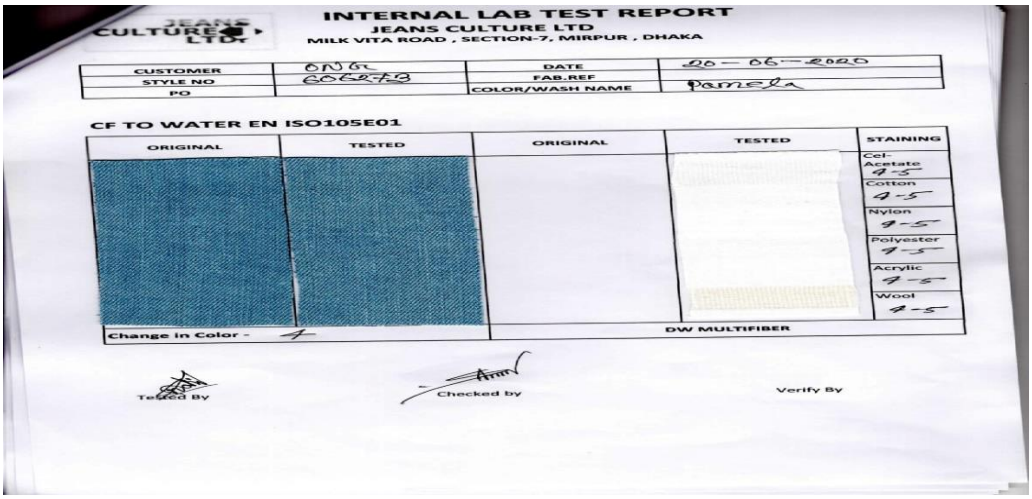


Figure 26

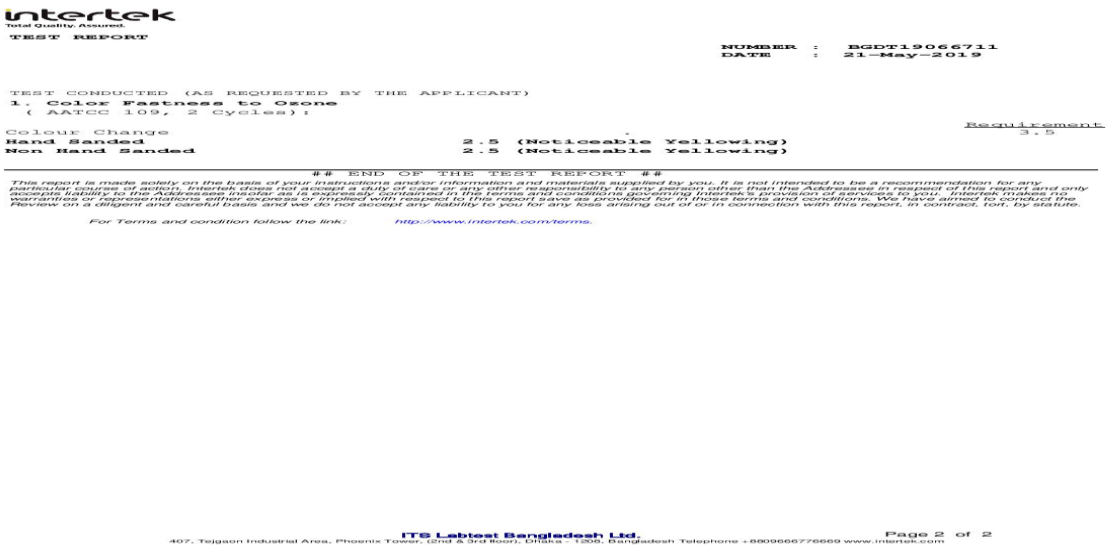
Table-18: Color fastness to water (Obtained from figure 25&26)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Color fastness to water	ISO105 EO1	Color change 3-4 Color staining 3-4	4-5	Pass	About 15% denim fabric fails Color fastness to Water.
	Next test method 4	4	4-5	Pass	

3.19 Color fastness to Ozone fastness test

Color fastness to ozone is the capacity to prevent oxidizing substances from fading in an atmosphere that is hostile to dye. There are two different types of situations, and the ozone fading storeroom has a different ozone concentration.

ITS Test Report



intertek
Total Quality Assured.

TEST REPORT

NUMBER : BGDT19066711
DATE : 21-May-2019

TEST CONDUCTED (AS REQUESTED BY THE APPLICANT)

1. Color Fastness to Ozone
(AATCC 109, 2 Cycles):

Colour Change		Requirement
Hand Sanded	2.5 (Noticeable Yellowing)	3.5
Non Hand Sanded	2.5 (Noticeable Yellowing)	

END OF THE TEST REPORT

Figure 27

Factory/ internal Test Report

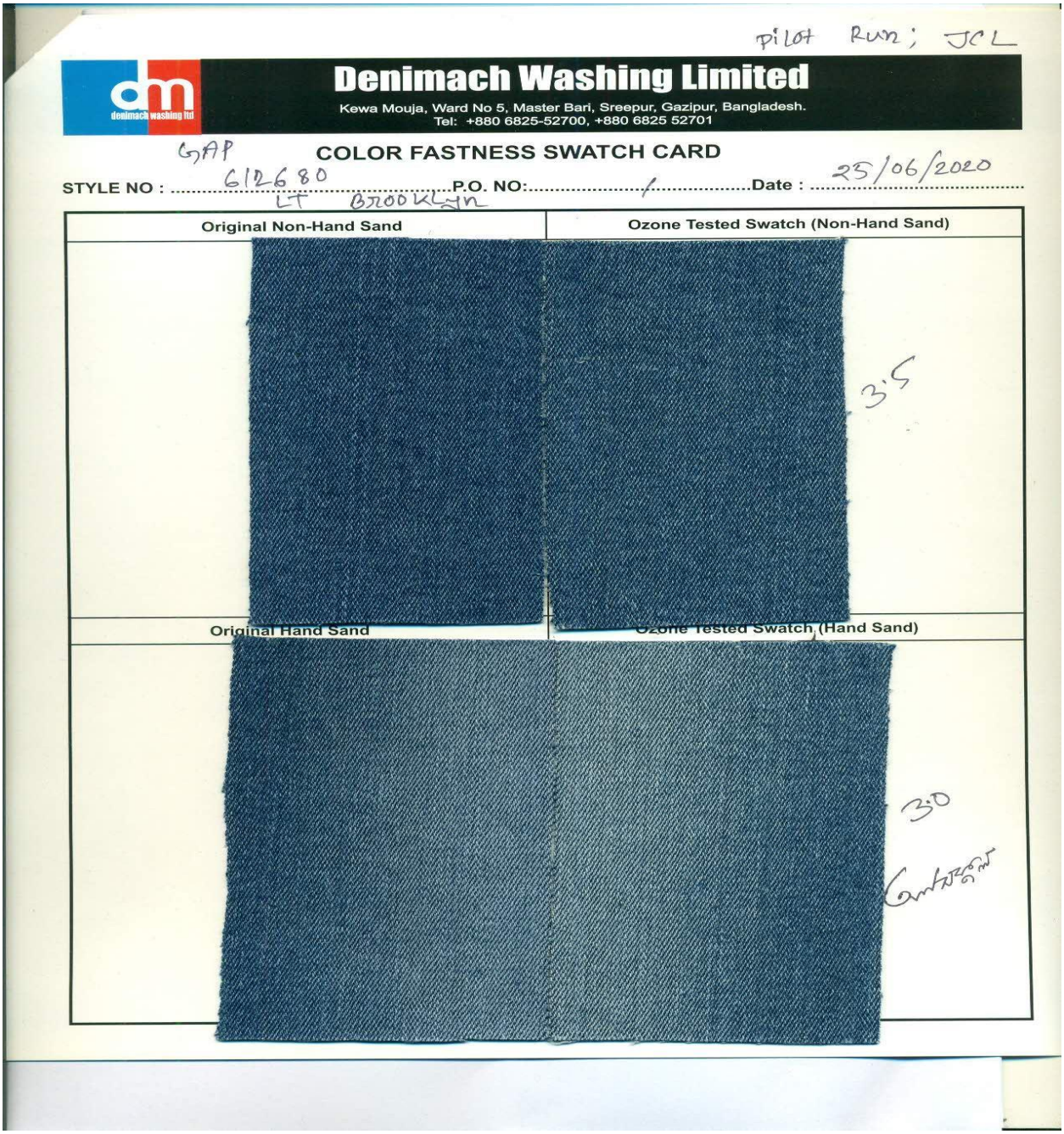


Figure 27

Page 46

Table-19: Color fastness to ozone (Obtained from figure 27&28)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Color fastness to Ozone fastness test	AATCC 109	Color change 3-4	Faded-2.5 Non-Faded-2.5	Fail	About **70 %** denim **light color** fabric fails Color fastness to Ozone fastness test
	AATCC 109	Color change 3-4	Faded-3.5 Non-Faded-3.0	Fail	

3.20 Color fastness to Light

Color fastness to light, also known as light fastness testing, measures a material's resistance to fading and color change brought on by exposure to natural or artificial light sources.

ITS Lab Test Report

intertek
Total Quality. Assured.

TEST REPORT

NUMBER : BGDT19031139
DATE : 10-Mar-2019

TEST CONDUCTED (AS REQUESTED BY THE APPLICANT)

1. Colour Fastness To Light
(ISO 105-B02 (Method 3) Modified):

Up To Grade 4

	Hand Sanded	Requirement
Grade	4.0	3.0
	Non Hand Sanded	Requirement
Grade	4.0	3.5

REMARK:
Total Exposure Time: 23.0 Hours

END OF THE TEST REPORT

Figure 29

Table-20: Color fastness to ozone (Obtained from figure 29)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Color fastness to light	ISO105 BO2	Faded-3.0 Non-Faded-3.5	Faded-4 Non-Faded-4	Pass	About 15 % denim light color fabric fails Color fastness to Light test.
	ISO105 BO1	Faded-3.0 Non-Faded-3.5	Faded-4 Non-Faded-4	Pass	

3.21. Saliva

Babies' mouths create saliva, a liquid. The ability of saliva to affect a fabric's or garment's color is determined by the color's fastness to saliva. Only infant clothing often has its color fastness to saliva tested. If the product has multiple colors, check sure the sample being tested contains each color.

Lab test report

Figure30

Table-21: Color fastness to ozone (Obtained from figure 30)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Color fastness to light	ISO105 BO2	Faded-3.0 Non-Faded-3.5	Faded-4 Non-Faded-4	Pass	About 15 % denim light color fabric fails Color fastness to Light test.
	Next test method N.A	/	/	/	

3.22. pH value

Ph means potential of hydrogen or power of hydrogen.Co logarithm of hydrogen iron.

From 0 to 14, with 7 serving as the neutral point. A pH value of 7 or higher denotes a base, whereas one below 7 suggests acidity.

TUV Lab Test Report

TÜVRheinland®

Test Report No.: 1620072367

Free Formaldehyde

Test Method: : EN ISO 14184 -1:2011 Analyzed By UV-Visible Spectrometer

Test Result:

Test No.	Material	Unit	RL	Customer requirement	Test Result	Conclusion
1	M001+M002+M003+M004	ppm or (%)	16	20 (0.0020)	**75(0.0075)**	**Fail Separate Test Recommended**

Note : N.D. = Not Detected (< Reporting Limit)
RL = Reporting Limit
ppm = parts per million

pH Value

Test Method: : **NEXT TEST METHOD 33;** Analyzed By pH Meter

Test Result:

Test No.	Material	Average pH of aqueous extract	Customer requirement	Conclusion
1	M001	6.8	Clothing & home textile product (Direct skin contact) :5.0-7.5 Decorative & Home textiles - no skin contact: 4.0-9.0	Pass

Note:	pH value of extraction medium	5.9
	Temperature of the extraction solution	23.4°C

-End-

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Figure31

SGS Lab Test Report

SGS / Bangladesh PERFORMANCE PROTOCOL TRM-0000416217 (Version 1) / 2010055541

GREEN			MENS 5 PKT PANT						
Test Item	Test Method	Requirements	Test Item Details					Result	Rating
			#	Sub-Item	Sub-Item Details	Reading			
			#1	/		91.9 %	91.9 %		
			#2	/		91.9 %			
			#3	/		91.9 %			
			Recovery @85% Elongation after 4 hrs relaxation - Weft				Average		
			#1	/		95.9 %	95.9 %		
			#2	/		95.9 %			
			#3	/		95.9 %			
Tear strength	ASTM D 2261	Min. 4.5 x 4.0 lbs	Warp				Average	-	Pass
			#1	/		13.43 lbs	12.67 lbs		
			#2	/		11.91 lbs			
			Weft				Average		
			#1	/		7.498 lbs	7.601 lbs		
			#2	/		7.703 lbs			
Tensile strength	ASTM D 5034	Min. 60 x 50 lbs	Warp				Average	-	Pass
			#1	/		168.41 lbs	166.31 lbs		
			#2	/		159.88 lbs			
			#3	/		170.65 lbs			
			Weft				Average		
			#1	/		80.24 lbs	81.53 lbs		
			#2	/		82.62 lbs			
			#3	/		81.72 lbs			
[illegible]									
pH value	ISO 3071	5.5 - 7.0	/ (BODY FABRIC WITH INNER WAIST CONTRAST+POCKETING FABRIC+Y/D CONTRAST FABRIC)					-	Pass
			#1	/		6.1	-		
Garment Construction									
Seam slippage	ASTM D 1683 modified	Min. 30 X 30 lbs/in @¼" separation	Garment Point					-	Pass
			#1	Inseam	Before ¼ inch Seam Opening	- lbs	-		

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Figure 32

Table-22: Ph value
(Obtained from figure 31 & 32)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
pH value	ISO 3071 / Next test method 33	5.5-7.0 / 5.0-7.5	6.1 / 6.8	PASS	About 5% denim fabric fails pH value
	AATCC 81	4.0-80.5	6.8	PASS	

3.23. Formaldehyde content

Formaldehyde is typically prevalent in indoor and outdoor air at low concentrations (less than 0.03 parts per million), according to the US Consumer Product Safety Commission. Formaldehyde can be released into the air as a gas or vapor by materials that contain it.

.

TUV Lab Test Report

TÜVRheinland®

Test Report No.: 1620072367

ree Formaldehyde

Test Method: : EN ISO 14184 -1:2011 Analyzed By UV-Visible Spectrometer

Test Result:

Test No.	Material	Unit	RL	Customer requirement	Test Result	Conclusion
1	M001+M002+M003+M004	ppm or (%)	16	20 (0.0020)	**75(0.0075)**	**Fail Separate Test Recommended**

Note : N.D. = Not Detected (< Reporting Limit)
RL = Reporting Limit
ppm = parts per million

pH Value

Test Method: : **NEXT TEST METHOD 33;** Analyzed By pH Meter

Test Result:

Test No.	Material	Average pH of aqueous extract	Customer requirement	Conclusion
1	M001	6.8	Clothing & home textile product (Direct skin contact) :5.0-7.5 Decorative & Home textiles - no skin contact: 4.0-9.0	Pass

Note:	pH value of extraction medium	5.9
	Temperature of the extraction solution	23.4°C

-End-

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Figure 33

SGS Lab Test Report

	METHOD	TESTED	NA	COMMENTS
	Reporting Limit: 5 mg/kg for each restricted substance			
Cadmium Content	AOAC 974.02 Modified (Coatings) EPA 3050B / 3051 or EN1122 Modified (Substrates) Compositing allowed up to 3 colors CPSC Lead Test Methods may be used for testing efficiency with proper modifications Reporting Limit: 5 mg/kg		✔	
Chromium VI	ISO 17075 Reporting Limit: 3 mg/kg		✔	
Colorfastness to Saliva	GB / T 18886-2002 Modified (Textiles) DIN 53160-1 (Leather)		✔	
Formaldehyde (Qualitative)	Gap Inc. C-1007	✔		
Formaldehyde (Quantitative)	JIS L 1041 / Law 112 (Textiles) Annex A ISO 17226 - 1 (Leather) Reporting Limit: ADULT & KIDS: 16 mg/kg BABY & TODDLER: 5 mg/kg & 0.01 Af		✔	
	EN 71-3 Modified (Limited heavy metals tested) Reporting Limit: Sb: 5 mg/kg			

Figure 34

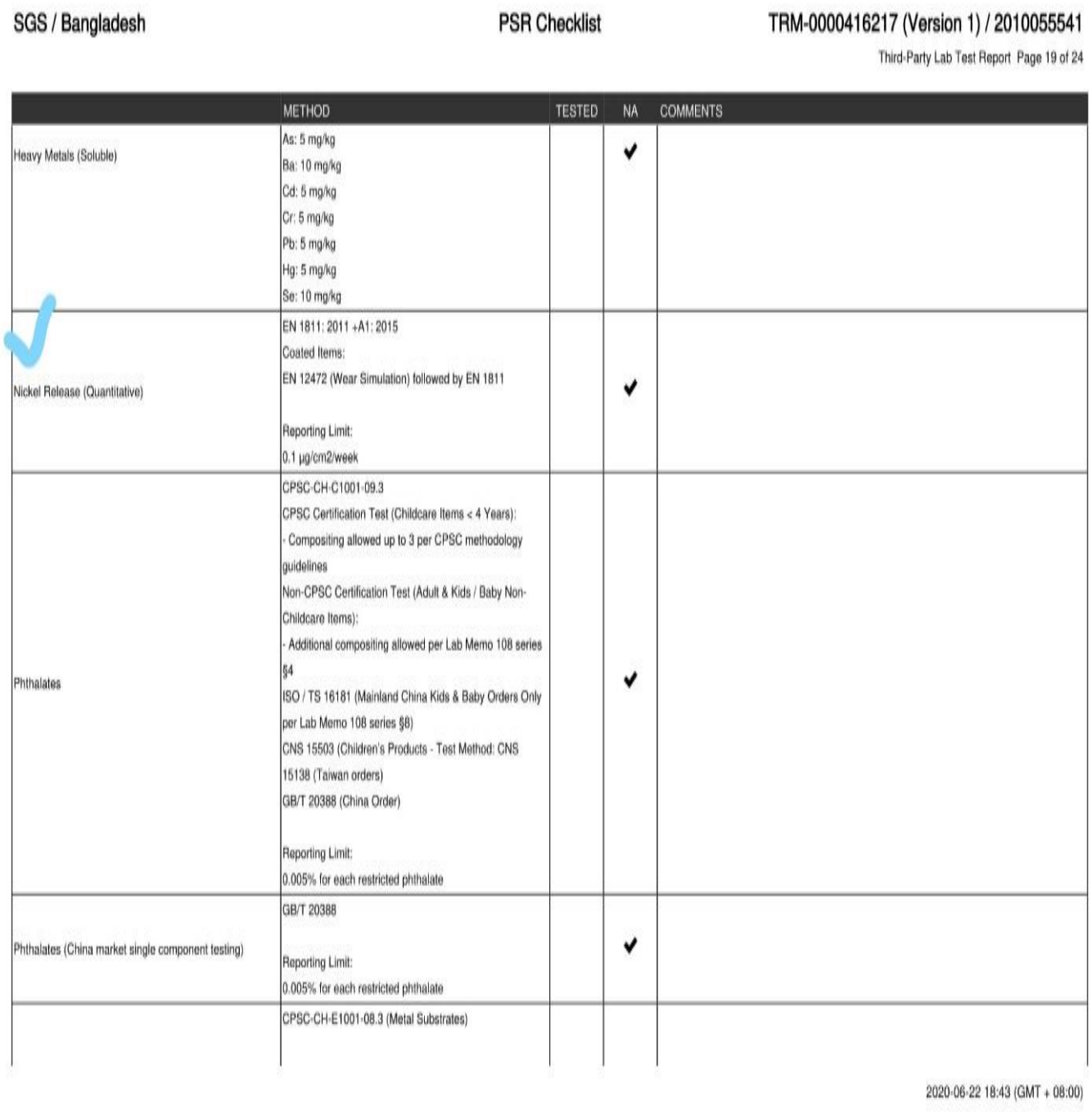
Table-23: Formaldehyde content (Obtained from figure 33 & 34)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Formaldehyde content	Gap inch 1007	16 mgkg	10 mgkg	PASS	About 2% denim fabric fails Formaldehyde content
	ISO14164-1	20 ppm	76 ppm	PASS	

3.24. Nickel test

The main goal of this test technique for the chemical analysis of nickel alloys is to determine whether the material complies with the requirements for iron and nickel.

SGS Lab Test Report



SGS / Bangladesh PSR Checklist TRM-0000416217 (Version 1) / 2010055541

Third-Party Lab Test Report Page 19 of 24

	METHOD	TESTED	NA	COMMENTS
Heavy Metals (Soluble)	As: 5 mg/kg Ba: 10 mg/kg Cd: 5 mg/kg Cr: 5 mg/kg Pb: 5 mg/kg Hg: 5 mg/kg Se: 10 mg/kg		✔	
Nickel Release (Quantitative)	EN 1811: 2011 +A1: 2015 Coated Items: EN 12472 (Wear Simulation) followed by EN 1811 Reporting Limit: 0.1 µg/cm2/week		✔	
Phthalates	CPSC-CH-C1001-09.3 CPSC Certification Test (Childcare Items < 4 Years): - Compositing allowed up to 3 per CPSC methodology guidelines Non-CPSC Certification Test (Adult & Kids / Baby Non-Childcare Items): - Additional compositing allowed per Lab Memo 108 series §4 ISO / TS 16181 (Mainland China Kids & Baby Orders Only per Lab Memo 108 series §8) CNS 15503 (Children's Products - Test Method: CNS 15138 (Taiwan orders) GB/T 20388 (China Order) Reporting Limit: 0.005% for each restricted phthalate		✔	
Phthalates (China market single component testing)	GB/T 20388 Reporting Limit: 0.005% for each restricted phthalate		✔	
	CPSC-CH-E1001-08.3 (Metal Substrates)			

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Figure 35

Table-24: Nickel test (Obtained from figure 35)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Nickel test	EN1811 2011+A120 15	0.1 µg/cm²/week	No Found	PASS	
	Next test method 4	N.A	N.A	/	About 3 % denim Fabric fails Nickel test .

3.25. AZO TEST

Azo dyes are used to color textile materials such as cotton, silk, wool, viscose, and synthetic fibers. They are thought to be simple to operate, reasonably priced, and capable of producing vivid, clear colors. Azo dyes have the potential to be poisonous to aquatic life and have negative long-term impacts.

TUV Lab Test Report

TÜVRheinland®

Test Report No.: 1620072367

Banned Azo Dyes

Test Method:	EN 14362-1:2012 EN 14362-3:2012 Analyzed By GC-MSD

Test Result:

Test No.	Material No.	Method	Unit	RL	Customer requirement	Test Result	Conclusion
1	M001+M002	EN 14362-1	ppm or(%)	5	20 or (0.002)	N.D.	Pass
2	M003+M005	EN 14362-1	ppm or(%)	5	20 or (0.002)	N.D.	Pass

Note : N.D. = Not Detected (< Reporting Limit)
RL = Reporting Limit
ppm= parts per million

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figure 36

List of azo colorants being tested (according to REACH regulation (EC) No. 1907/2006 and amendment no. 552/2009 Annex XVII Item 43 (formerly known as 2002/61/EC)):

ID	Azo colorant	CAS No.
A1	biphenyl-4-ylamine / 4-aminobiphenyl / xenylamine	92-67-1
A2	benzidine	92-87-5
A3	4-chloro-o-toluidine	95-69-2
A4	2-naphthylamine	91-59-8
A5*	o-aminoazotoluene / 4-amino-2',3-dimethylazobenzene / 4-o-tolylazo-o-toluidine	97-56-3
A6*	5-nitro-o-toluidine	99-55-8
A7	4-chloroaniline	106-47-8
A8	4-methoxy-m-phenylenediamine	615-05-4
A9	4,4'-methylenedianiline / 4,4'-diaminodiphenylmethane	101-77-9
A10	3,3'-dichlorobenzidine / 3,3'-dichlorobiphenyl-4,4'-ylenediamine	91-94-1
A11	3,3`-dimethoxybenzidine	119-90-4
A12	3,3'-dimethylbenzidine / 4,4'-bi-o-toluidine	119-93-7
A13	4,4`-methylenedi-o-toluidine	838-88-0
A14	p-cresidine	120-71-8
A15	4,4'-methylene-bis-(2-chloro-aniline) / 2,2'-dichloro-4,4'-methylene-dianiline	101-14-4
A16	4,4`-oxydianiline	101-80-4
A17	4,4`-thiodianiline	139-65-1
A18	o-toluidine / 2-aminotoluene	95-53-4
A19	4-methyl-m-phenylenediamine	95-80-7
A20	2,4,5-trimethylaniline	137-17-7
A21	o-anisidine / 2-methoxyaniline	90-04-0
A22**	4-aminoazobenzene	60-09-03
A23	aniline	62-53-3
A24	4-aminoaniline	106-50-3

Remarks:

* The CAS-number 97-56-3 (A5) and 99-55-8 (A6) are further reduced to CAS-number 95-53-4 (A18) and 95-80-7 (A19).

** Azo colorants that are able to form CAS-number 60-09-03 (A22), generate under the condition of this method CAS-number 62-53-3 (A23) and 106-50-3 (A24).

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Figure 37

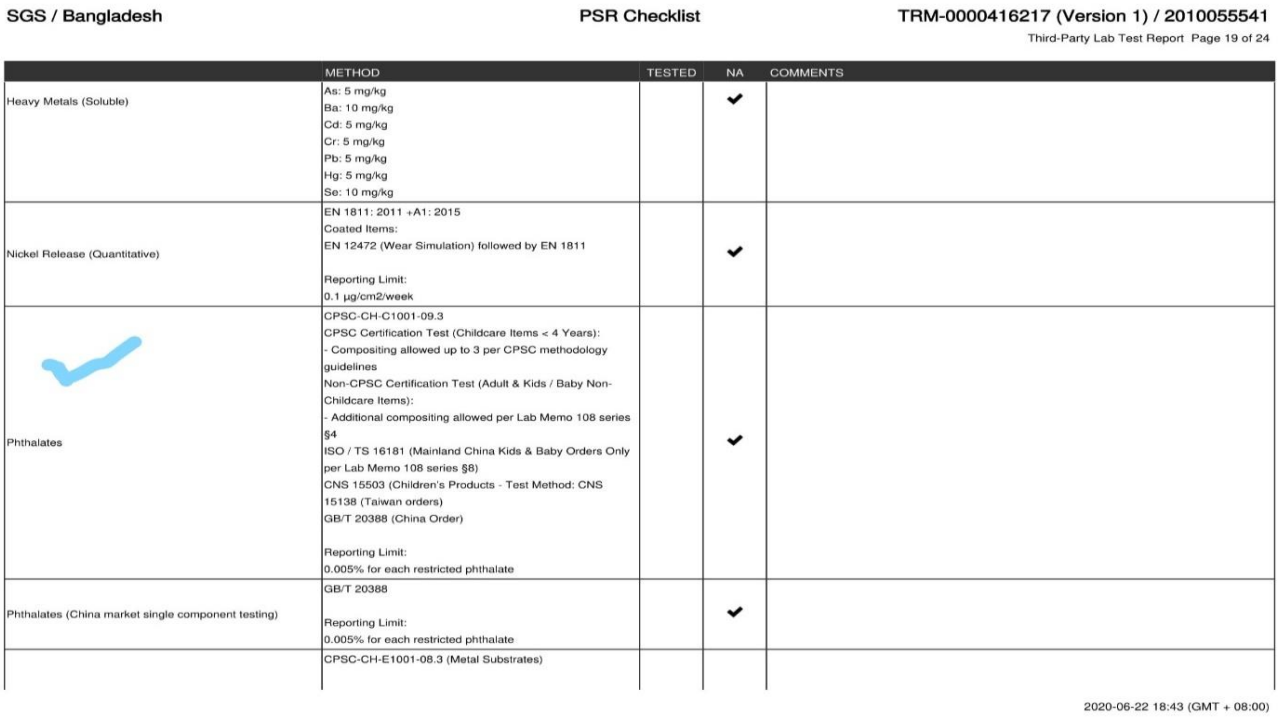
Table-25: AZO Test (Obtained from figure 36&37)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
Azo test	EN 14362-1-2012	20 PPM	N.D	Pass	About 1 % denim fabric fails AZO test
	EN 14362-1-2012/ EN 14362-1-2015	20 PPM	N.D	Pass	

3.26. PHTHALATES

Esters of phthalic anhydride are phthalates. They serve mostly as plasticizers, or ingredients that are added to plastics to increase its flexibility, transparency, toughness, and longevity. Mostly, they are employed to soften polyvinyl chloride.

SGS Lab test report



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	METHOD	TESTED	NA	COMMENTS
Heavy Metals (Soluble)	As: 5 mg/kg Ba: 10 mg/kg Cd: 5 mg/kg Cr: 5 mg/kg Pb: 5 mg/kg Hg: 5 mg/kg Se: 10 mg/kg		✔	
Nickel Release (Quantitative)	EN 1811: 2011 +A1: 2015 Coated Items: EN 12472 (Wear Simulation) followed by EN 1811 Reporting Limit: 0.1 µg/cm2/week		✔	
Phthalates	CPSC-CH-C1001-09.3 CPSC Certification Test (Childcare Items < 4 Years): - Compositing allowed up to 3 per CPSC methodology guidelines Non-CPSC Certification Test (Adult & Kids / Baby Non-Childcare Items): - Additional compositing allowed per Lab Memo 108 series §4 ISO / TS 16181 (Mainland China Kids & Baby Orders Only per Lab Memo 108 series §8) CNS 15503 (Children's Products - Test Method: CNS 15138 (Taiwan orders) GB/T 20388 (China Order) Reporting Limit: 0.005% for each restricted phthalate		✔	
Phthalates (China market single component testing)	GB/T 20388 Reporting Limit: 0.005% for each restricted phthalate		✔	
	CPSC-CH-E1001-08.3 (Metal Substrates)			

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Figure 38

Table-26: PHTHALATES (Obtained from figure 36&37)

Test name	Method	Requirement	Test result	Pass/Fail	Remarks
PHTHALATES	ISO/TS/16181/GBT 20388	16 mgkg	N.D	Pass	About 1 % denim fabric fails PHTHALATES test.
	ISO/TS/16181	0.005%	N.D	pass	

Table-27 Percentage of failure of denim fabric in laboratory test result shown in table 1-26

Test name	Percentage of failure of denim fabric(%)
1. Tearing Strength	5-8
2. Tensile Strength	5
3. Seam Strength	3
4. Bar tack reinforcements	3
5. Pocketing seam	3
6. pocket reinforcement	3
7. Belt loop strength	2
8. Pocket stress area	3
9. Fabric Weight	35
10. Abrasion resistance	2
11. Stretch & Recovery	25
12. Home Laundry	5
13. Print Durability	30
14.Dimensional stability to washing	10
15.Color fastness to Washing	10
16.Color fastness to Perspiration (Acid & Alkaline)	15
17. Color fastness to Rubbing or Crocking (Dry & Wet)	15
18. Color fastness to Water	15
19.Color fastness to Light	5
20.Color fastness to Ozone	70(light color)
21.Saliva fastness test	15
22.pH value	5
23.Formaldehyde spot test	2
24.Nickel spot test	3
25.Formaldehyde content	2
26.Azo content	1
27.Phthalates.	1

Chapter 4

1.Conclusion

Denim Testing entails examining, examining, and verifying certain materials. On the other hand, testing is the process or procedure used to evaluate a product's quality.

1.2 REFERENCES

1.Most of the information gathered from the textile washing plant(Jeans Culture Limited/Zyta Apparels Ltd.).

2.Lecture sheet.

3.Specialized person is provied all enlightening data information.

4.Many test report collect from 3rd party lab (TUV, BV, ITS).

5. Some definition and importance collect from Google.