Laboratory	**The Bombay Textile Research Association, L. B. S. Marg, Ghatkopar (West), Mumbai, Maharashtra**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Discipline	**Mechanical Testing**	**Issue Date**	**28.02.2014**
Certificate Number	**T-0364**	**Valid Until**	**27.02.2016**
Last Amended on	**-**	**Page**	**1 of 7**

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
I. TEXTILES & RELATED PRODUCTS				
1.	**FIBRES**	Neps in Cotton Fibres (AFIS-N-Instrument)	ASTM D: 5866-2012	Upto 9999/g
		Physical Properties of Cotton Fibres by High Volume Instrument (HVI)	ASTM D: 5867-2012	
		2.5% Span Length Uniformity Ratio Tenacity, g/tex Micronaire (Microgram/Inch)		15 mm to 40 mm 40% to 60% 10 g/tex to 35 g/tex 2 to 9
		Length of Man-made Staple Fibres	ISO 6989-1981	(2 to 60) mm
2.	**YARN**	Lea Strength and Lea Count of Spun Yarns	IS 1315-1977, (RA 2000) IS 1671-1977, (RA 2004)	Lea Count: (1^S to 200^S) Ne Lea Strength: (10 to 200) kg (20 to 400) lbs
		Twist in Yarn Direct Counting Method	IS 832 (Part 1) 2011 ISO 2061-2010 ASTM D:1423-2002 (2008)	Upto 9999 turns/cm or (80 to 4000) TPM (2 to 100) TPI
		Untwist/ Retwist method	IS 832 (Part 2) 2011 ISO 17202:2002 ASTM D: 1422-13	
		Unevenness and Imperfections per unit length of Textile Strand	ASTM D:1425-2009 ISO 16549-2004	U%: 1 to 30 Upto 9999 per km for Thin (-50%), Thick (+50%), and Neps (+200%), Hairiness index and Sh (-)

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	YARN	Single Thread Strength and Elongation at Break (CRE Principle)	IS 1670–1991, (RA 2002) ASTM D:2256-M 2010 ISO 2062-2009	Strength: (0.5 to 450) N Elongation: 1% to 140%
3.	**FABRIC**	Width of the Fabric	IS 1954-1990 (RA 2002) ASTM D 3774-96, (RA 2012)	10 mm to 5000 mm
		Length of the Fabric	IS 1954-1990, (RA 2002) ASTM D 3773-M 2010	10 mm to 5000 mm
		Weight per Square Meter and Weight per Linear Meter of Fabric	IS 1964-2001, (RA 2006) ASTM D:3776-M09a option C ISO 3801-1977 Method 5 BS EN ISO 12127-98	25 gsm to 5000 gsm
		Threads per inch in Woven Fabrics	IS 1963-1981, (RA 2004) ASTM D:3775-2012 ISO 7211-2-1984 BS EN 1049-2-1994	(2.54 to 1016) per cm (1 to 400) per inch
		Crimp of Warp and Weft Yarns	IS 3442-1980, (RA 2004)	Woven Fabric: 0.5% to 20% Knitted Fabric: 0.5% to 500%
		Count of Yarn Removed from Fabric	IS 3442-1980, (RA 2004) Inhouse Method BTRA/MECH/FAB/IM 01/2013	2 Ne to 200 Ne
		Tear Strength of Textile Fabric by Elmendorf Tester	IS 6489-2011, (RA 2008) ASTM 1424-2009 ISO 13937-1-2000	1.6 N to 102.4 N (160 gf to 10240 gf)

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	FABRIC	Breaking Load and Elongation	IS 1969-1985 (RA 1999) ASTM D:5035-11 BS EN ISO and ISO 13934-1-99 ISO 13934-2-99 ASTM D:5034-09	Breaking Strength: 20 N to 100 kN Elongation: 1% to 250%
		Crease Recovery Angle by Measuring Angle of Recovery	IS 4681-1981, (RA 2004)	Upto 180°
		Pilling Resistance	IS 10971 (Part 1) 2011 ISO 12945-1:2000	Grade: 1 to 5
		Resistance to Slippage of Yarns in Woven Fabrics using a Standard Seam	ASTM D 434-1995 W 2004	At 6.4 mm Opening –Load 20 N to 50 kN
		Single Rip Tear Strength	ASTM D:2261-13	20 N to 50 kN
		Trapezoid Tear Strength	ASTM D:5587-08	20 N to 50 kN
		Abrasion Resistance of Textile Fabrics (Martindale Abrasion Tester Method)	ASTM D 4966-2012 (Option 1 and 3) ISO 12947 (Part 1, 2 and 3) 1998	Upto 50,000 cycles
		Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Martindale Tester	ASTM D 4970-2010	1 to 50,000 cycles Qualitative (Grade: 1to 5)
		Fabric propensity to surface fuzzing and to pilling - Part 2: Modified Martindale method	ISO 12945-2-2000 IS 10971 (Part 2) 2011	1 to 50,000 cycles Qualitative (Grade: 1 to 5)

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	FABRIC	Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method	ASTM D 3786-M 2013 IS 1966-75 (RA 99)	(1 to 100) kg/cm^2
		Air Permeability of Textile Fabrics	ASTM D 737-04, (Reapp. 2012) IS 11056 - 1984, (RA 06)	2 to 560 CF/SF/M
		Thickness	IS 7702-2012 ASTM D:1777-1996, (Reapp. 2011)	(0.01 to 5) mm (0.01 to 8) mm
		Slippage resistance of yarns at a seam in woven fabrics - Part 1: Fixed seam opening method	ISO 13936-1: 2004	Seam Strength: 20 N to 50 kN Seam Efficiency: Upto 90 %
		Failure in Sewn Seams of Woven Apparel Fabrics	ASTM D 1683 M – 2011 a	Seam Strength: 20 N to 50 kN Seam Efficiency: Upto 90 %
		Presence of sharp point in toys and other articles	ASTM F 963-11 (Section 4.9) 16 CFR 1500.48 (1-1-11 Edition)	Qualitative
		Presence of sharp metal or glass edge in toys and other articles	ASTM F 963-11 (Section 4.7) 16 CFR 1500.49 (1-1-11 Edition)	Qualitative
		Choking, aspiration or ingestion hazards because of small parts	ASTM F 963-11 (Section 4.6) 16 CFR 1501 -2013	Qualitative

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	FABRIC	Bow and Skew in Woven and Knitted Fabrics	ASTM D 3882-08 (Reapp. 2012)	(0 to 5) %
		Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Tester	ASTM D 3512-2010	Qualitative Grade: 1 to 5
4.	**GEOTEXTILES**	Seam Strength of Sewn Geotextiles	ASTM D 4884 -2013 ISO 10321-2008	Seam efficiency: 10% to 90%
		Water permeability of Geotextiles by permittivity method	ASTM D 4491-99 (Reapp. 2009) ISO 11058-2010	(1 to 200) ltr./m^2/sec
		Mass per Unit Area of Geotextiles	ASTM D 5261-2010 ISO 9864-2005	(10 to 10000) g/m^2 (GSM)
		Trapezoid Tear Resistance of Geotextile	ASTM D 4533-2011	50 N to 5 kN
		Static Puncture Strength of Geotextiles and Geotextile Related Products Using a 50-mm Probe	ASTM D 6241-04 (Reapp. 2009) ISO 12236-2006	1 N to 50 kN
		Dynamic perforation (Cone Drop) Test	ISO 13433-2006	Diameter : 2 mm to 20 mm
		Pore size characteristics of Geotextiles by capillary flow test	ASTM D 6767 – 2011	(1 to 250) Microns

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
5.	**GEO-MEMBRANES**	Initial Tear Resistance of Plastic Film & Sheeting	ASTM D 1004-2013	50 N to 5 kN
		Flow Rates of Thermoplastics by Extrusion Plastometer (Melt Flow Index)	ASTM D 1238-2013 Method A & B	(0.15 to 30) g/10 min
		Carbon Black in Olefin Plastics	ASTM D 1603-2012	1% to 5%
		Environmental Stress-Cracking of Ethylene Plastics	ASTM D1693-13	Qualitative
		Tensile Strength of Geomembranes Using Wide Strip Testing	ASTM D 4885-01, (Reapp. 2011)	Strength: (10 to 500) kN/m Elongation: 1% to 500%
		2% Secant Modulus for Polyethylene Geomembranes	ASTM D 5323-92, (Reapp. 2011)	10 MPa to 100 MPa
		Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes	ASTM D 6693-04, (Reapp. 2010)	Strength: (5 to 100) kN/m Elongation: 1% to 2000%
		Density & specific Gravity (Relative Density) of plastics by Displacement	ASTM D 792-13	(0.9 to 8) g/cc
6.	**GEO-MEMBRANES GEOTEXTILES**	Index Puncture Resistance of Geomembranes and Related Products	ASTM D 4833 (2013)	50 N to 5 kN

Laboratory	**The Bombay Textile Research Association, L. B. S. Marg, Ghatkopar (West), Mumbai, Maharashtra**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Discipline	**Mechanical Testing**	**Issue Date**	**28.02.2014**
Certificate Number	**T-0364**	**Valid Until**	**27.02.2016**
Last Amended on	**-**	**Page**	**7 of 7**

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
7.	**GEOTEXTILES, PVDs, GCL**	Grab Breaking Load and Elongation of Geotextiles	ASTM D 4632 (2013)	Strength: 50 N to 10 kN Elongation: 1% to 100%
8.	**GEOTEXTILES, GEO-COMPOSITES GEODRAINS**	Tensile Properties of Geotextiles by the Wide-Width Strip Method	ASTM D 4595-2011 ISO 10319-2008	Strength: (5 to 500) kN/m Elongation: 1% to 100%
9.	**GEOGRID**	Tensile Properties of Geogrid by the Single Rib Tensile Method	ASTM D 6637- 2011 Method A	Strength: (10 to 500) kN/m Elongation: 1% to 50%

-X-X-X-X-X-X-X-X-X-X-X-X-X-X-