Updation of

Compendium on Centres of Excellence

(November 2012)

Contents

Annex - 1
COE on Agrotech
Lead : Synthetic and Art Silk Mills' Research Association (SASMIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 1. Introduction	**Revised Page No. 2**
Existing section "Agrotech" on the top left under "Different kinds of Technical Textiles" is to be replaced with following	

Different kinds of Technical Textiles

Agrotech

Agrotextiles are Special textiles that are manufactured for agricultural applications. These textile structures are used as controlling environment for plants/animals in applications like Agriculture, Horticulture, Animal husbandry, fisheries and forestry.

Examples of Agrotech technical textiles include shade-nets, mulch-mats, crop-covers, anti-hail nets and bird protection nets, fishing nets, pond lining, packing sacks and wrappers, cut grass collection bags, underlay fabrics, udder support nets, super Absorbent polymer mats, etc.

Agrotech consumption in India in 2012-2013 is valued at Rs. 742 crore amounting to a quantity of 33,390 MT. The fishing nets constitute over 90% of the Agrotech technical textiles.

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Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshot of COEs	**Revised Page No. 7**
Existing section "COE on Agrotech" is to be replaced with following	

COE on Agrotech

The Centre of Excellence for Agrotextiles has been assigned to The Synthetic and Art Silk Mills' Research Association (SASMIRA) as the lead agency jointly with other agencies viz., The Man-made Textiles Research Association (MANTRA), Surat and Navsari Agricultural University (NAU), Navsari.

The vision of the COE:

"To become a world class leading service driven national center for technical textile with international accreditation to serve the industry in general and agriculture sector in particular"

The mission of the COE:

- Creating awareness regarding agrotextiles products amongst agriculturists
- To assist the industry for entrepreneurship in the field of agrotextiles
- To provide training to the potential agrotextile manufacturers and users.
- To create state-of-the-art testing and certification facilities for agrotextile products
- To achieve self –reliance for the Centre of Excellence
- To develop and indigenise cost-effective agrotextile products
- To help the agricultural sector mainly to attain
    - Increased productivity by protection of crops
    - Early harvesting
    - Improved means of controlled irrigation
    - Conservation of natural resources

Under the Centre of Excellence, the following facilities have been created

- ❖ Demonstration Pilot Plant facilities
- ❖ Accredited Testing facilities
- ❖ Information center for Agrotextiles
- ❖ Training Center for Agrotextiles
- ❖ Prototype development
- ❖ Incubation center

The SASMIRA laboratory for Centre of Excellence Agrotextiles is accredited Nationally by National Accreditation Board for Testing and Calibration Laboratories (NABL, India) and Internationally by American Association of Laboratory Accreditation (A2LA, USA) in accordance with the international standard ISO/IEC 17025 – 2005 for Physical and Chemical and Biological evaluation of textiles. MANTRA has acquired NABL Accreditation as per ISO/IEC 17025 – 2005.

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The centre assists the manufacturer in development of standard agrotextile products and users in adopting the agrotextile products in the most scientific way. This is facilitated through specific training workshops, online training and demonstration at field. Also customized courses are made available to address the specific needs of the industry.

List of standards and specifications formulated at the Agrotech COE

1. Glossary of Agrotextiles – finalized and accepted by BIS. Under publication
2. Specification for 50 % shade nets for horticulture applications – Printed under IS 16008:2005
3. Specification for woven ground covers – Printed under IS 16008:2005
4. Specification for 75 % shade nets for horticulture applications – Printed under IS 16008:2005
5. Specification for 90 % shade nets for horticulture applications – Printed under IS 16008:2005

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Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 14**
Existing "Testing Instruments at the COE" under Infrastructure facilities are to be replaced with following	

Infrastructure and Facilities

Testing Instruments at the COE

The list of testing equipment added under the Centre of Excellence at SASMIRA, Mumbai is provided below:

Sr. No.	Equipment
1.	Water Permeability /permittivity – cross plane
2.	High pressure air-permeability tester
3.	Tension creep
4.	CBR puncture test with accessories
5.	Wind blocking percentage
6.	Lux Meter
7.	Thermal Oxidation Test (Oven test, -40^{0}C to100^{0}C)
8.	Thermal insulation tester – TIV
9.	Damage due to Flexing
10.	Laminar Air Flow
11.	Colony Counter
12.	Colorimeter
13.	Refrigerator
14.	Autoclave
15.	Centrifuge
16.	Incubator
17.	Vortex Mixer
18.	Shaking Incubator
19.	Magnetic Stirrer
20.	Differential Scanning Calorimeter & Thermal Gravimetric Analyser
21.	Torsion Balance
22.	pH Meter
23.	Analytical Balance

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24.	Water Bath Shaker
25.	Muffle Furnace
26.	Wascator
27.	Sublimation Fastness Tester
28.	Vertical Padding Mangle
29.	HTHP-GN Dyeing m/c
30.	Infra Color Dyeing m/c
31.	Lab Steamer
32.	Drying, Curing & Setting Chamber
33.	High speed stirrer
34.	Centrifuge
35.	Weatherometer
36.	High Performance Thin Layer Chromatography
37.	Atomic Absorption Spectroscopy
38.	Limiting oxygen tester
39.	Autoflammability tester
40.	High Performance Liquid Chromatography
41.	Scanning Electron Microscope

The list of testing equipments added under the Centre of Excellence at MANTRA, Surat is as follows:

Sr. No.	**Equipment**
1.	Vibrodyne
2.	Moist Heat Hydrolysis Tester
3.	Film Thickness Tester
4.	Shear Tester
5.	Forced Air Laboratory Oven
6.	Water Vapour Transmission Tester
7.	Cold Crack Tester
8.	Light Fastness Testing Instrument
9.	CBR puncture test
10.	Apparent opening size of geotextile
11.	Taber abrasion tester
12.	Rheometer
13.	Contact angle meter
14.	Portable spectrophotometer
15.	Photosynthetic apparatus

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16	Light scattering spectrophotometer
17	Gas Chromatography Mass Spectrophotometer

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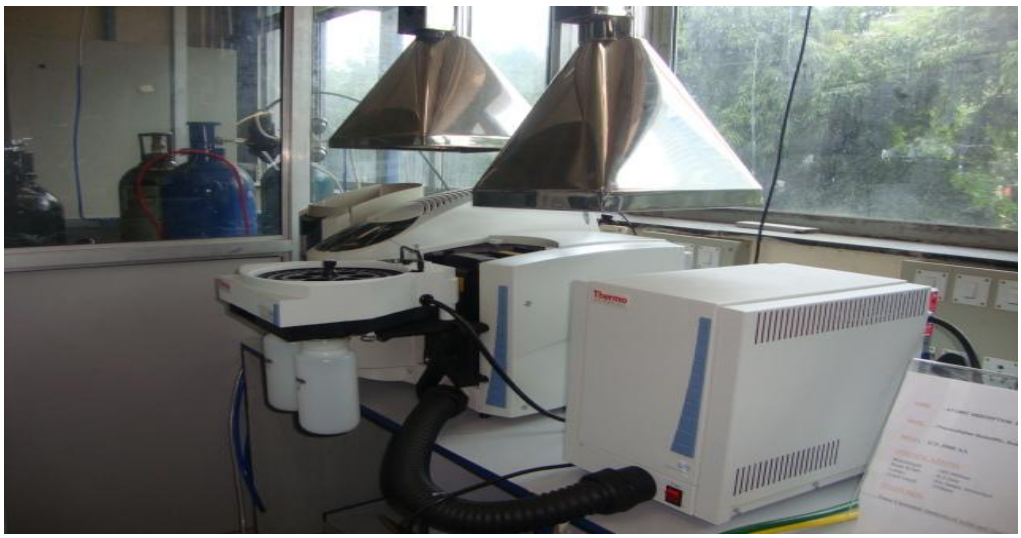
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 15**
Following images are to be included in existing section "Images of Testing Equipment at the COE"	

Images of Testing Equipment at the COE



Atomic Absorption Spectroscopy

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High Performance Liquid Chromatography

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High Performance Thin Layer Chromatography

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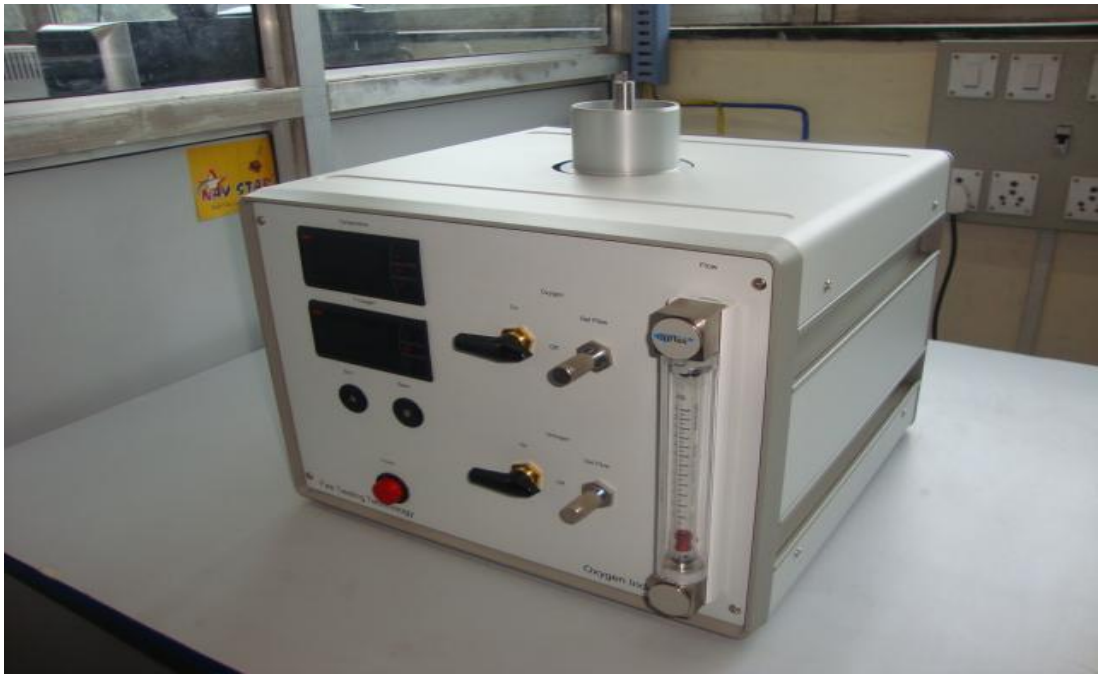

Limiting Oxygen Tester

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Scanning Electron Microscope

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Laboratory Drying, Condensation and Fixation Apparatus

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Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 15**
Existing "Test Parameters" is to be replaced with following	

Test Parameters

SASMIRA laboratory for Centre of Excellence Agrotextiles is accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with the international standard ISO/IEC 17025 – 2005 for Physical, Chemical and Biological evaluation of textiles. Although, NABL accreditation has recognition by world laboratories, for domestic exporters American accreditation has been sought for the COE Agrotextiles. Hence, international accreditation has been attained from American Association for Laboratory Accreditation (A2LA), USA for Physical, Chemical and Microbiological testing of textiles and allied substrates.

Total Number of tests methods under National Accreditation: 119
Total Number of tests methods under International Accreditation: 127

MANTRA is in the process of acquiring NABL Accreditation under the guidance of the Textile Committee, Mumbai. Most of the preliminary work has been completed and they shall soon be sending in the application for NABL Accreditation.

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Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 16**
"Mechanical Scope under NABL Accreditation" is to be added in existing "Scope of Mechanical Test Parameters"	

Mechanical scope under NABL accreditation:

S. No.	Product(s) / Material of test	Specific tests performed	Test Method / Standard against which tests are performed	Range of testing/ Limits of detection	Uncertainty of Measurement (±)
1	Fibers	Staple Length for man made fibres	IS 10014 -1984 Part 1	10 mm to 300 mm.	0.16 mm at 39.8 mm.
2	Fibre	Linear density of single fibres	ASTM D 1577 - 07	0.27 D to 153 D	0.8 D at 1.672 D
3	Fibre	Tensile strength of single fibre	ASTM D 3822 - 07 ISO 5079 - 96	1 gms to 500 gms	± .01 gms at 7.86 gms
4	Yarn	Linear density of yarns	IS 1315-1977 IS 7703 - 1990 PART 1 ASTM D 1907 -07 ISO 2060 - 95	10D to 1000D	1.2 D at 201.7 D
5	Yarn	Crimp and Count of yarn removed from fabrics	IS 3442-1980 ASTM D 1059 -01 ISO 7211 – 84 - 5	0.1 Ne to 150 Ne 10 D to 3000 D Crimp % : 0.1% to 150%	± 1.5 Ne at 12.84 Ne
6	Yarn	Twist in yarn	IS 832-1985 ASTM D 1422 -99 ISO 7211 – 84 - 4 ASTM D 1423 -02	1 to 999 turns per inch	94 TPM at 781.6 TPM
7	Yarn	Single yarn- Breaking load and %elongation at break	IS 1670-1991 ASTM D 2256 - 08	1 N to 1 kN 1% to 800%	10 gms at 542.8 gms.
8	Yarns	Lea strength of yarns spun on cotton system (CSP)	IS 1671-1977	0.01 kN to 2 kN	319.2 CSP at 2427.4 CSP
9	Yarn	Unevenness of polyester and polyamide flat yarn	IS 7703-1987 PART 5	U % & CV % Upto 30 %	± 10 %

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10	Fabrics	Breaking load and % % elongation of woven textile fabrics	IS 1969-1985 ASTM D 5035 - 06 ISO 13934-99 -1	0.1 kN to 50 KN 1% to 200%	Warp:2.14 kg at 88.5 kg. Weft: 2kg at 52.3 kg.
11	Fabric	Air Permeability	ASTM D 737 - 04 ISO 9237 - 95	10 Pa to 2500 Pa	± 10 %
	Non wovens	Air permeability	ISO 9073 – 15 -07	10 Pa to 2500 Pa	± 10 %
12	Fabric /Technical Textile	Abrasion Resistance (Martindale)	ASTM D 4966 - 07 ISO 12947 – 98 – 1	Upto 9999 Cycles & Above	100 cycles at 40,000 cycles
13	Fabric /Technical Textile	Taber Abrasion Resistance	ASTM D 3884 - 07	Upto 9999 cycles & Above	± 0.5 for rating in change in shade
14	Fabric	Puncture Resistance Index CBR	 ASTM D 4833-88 ASTM D 6241 ISO 12236 - 06	 1 N to 10 kN .1 kN to 100 kN	5 N at 563 N
15	Fabric /Technical Textile	Apparent Opening Size	ASTM D 4751 - 95	75 µ to -850 µ	± 10 % at 200 microns
16	Fabric /Technical Textile	Thermal resistance	ASTM D 1518 - 03	1Tog to 12 Tog	0.0348 W/n.K at .031 W/n.K
17	Fabrics	Pilling resistance of fabrics	IS 10971-1984	1 -5 rating	1 /2 Grade rating
18	Fabrics	Length and width of woven fabrics	IS 1954-1990 ASTM D 3774 -04 ISO 22198 ASTM D 1907 ISO 2060 - 95	Complete range	.17 cms at 92.92 cms. for length 0.31 cms. at 112.1 cms for width
19	Fabric	Thickness of woven and knitted fabrics	IS 7702-1975, ASTM D 1777 - 07	0.01 – 10 mm. 0.001 mm to 4 mm.	28 µ at 193.2 µ
20	Fabric	Mass per unit length and mass per unit area in woven fabrics	IS 1964-2001, ASTM D 3776 -07 ISO 7211 – 84 - 6	Complete range	1.96 gms/ sq.metre at 206.96 gms/ sq.metre

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21	Fabric	Threads per unit length in woven fabrics	IS 1963-1981 ASTM D 3775 - 08 ISO 7211 – 84 – 2	1 to 2500/dm	0.8 EPI at 94.6EPI 0..5 PPI at 76.4 PPI
22	Fabric	Recovery from creasing of textile fabrics by measuring the angle of recovery	IS 4681-1981	20-160^0	2^0 at 279.4^0
23	Fabric	Stiffness (Bending Length)	ASTM D 1388 – 07 Option A	0.1 cm to 8 cm	0.4 mm. at 2.602 mm.
24	Fabric /Technical Textile	Breaking strength by Wide width method %Elongation	ASTM D 4595 - 94 ISO 10319 - 96	1 N to 150 kN 1% to 200%	Warp: 0.5 kN at 38.36 kN Weft: 0.2 kN at 37.1 kN
25	Fabric	Grab Strength %Elongation	ASTM D 5034 ISO 13934 - 99 – 2	1 N to 100 kN 0.1% to 200%	13 lbs at 293.6 lbs for warp 7 lbs at 233.98 lbs for weft
	Fabric /Technical Textile	Tensile strength (Grab Method) %Elongation	ASTM D 4632 – 91 ISO 13934-1999 Part-2	1 N to 100 kN 0.1% to 200%	Wp : 57.8 N at 753.6 N Wt : 31.1 n at 1092N
	Non wovens	Tensile strength (Grab Method) %Elongation	ISO 9073 – 18	1 N to 100 kN 0.1% to 200%	
26	Fabric	Tear strength (woven) (Nonwoven)	ASTM D 2261–07(a) ISO 13937 -2000– 2 ASTM D 5733 - 95	5 kN	3.27 lbs at 106.18 lbs for warp 4.68 lbs at 95.68 lbs for weft
27	Fabric /Technical Textile	Trapezoid tear strength	ASTM D 4533 - 91	5 kN	Warp: 14.8 N at 472.4 N Weft: 20.8 N at 440 N
28	Fabric	Failure in sewn	ASTM D 1683:2007	1000 N	3.5 N at

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		seams of woven fabrics			349.5 N for warp 2.0 N at 237.9 N for weft
	Fabric	Seam slippage and Seam strength	ISO 13936-1:2004 ISO 13935-2:1999	1000 N	± 10 %
29	Fabrics	Bursting strength and bursting distension of fabrics: diaphragm method	IS 1966-1975, ASTM D 3786 - 08 ISO 13938 - 99 – 2	1kPa to 7000 Kpa .01kg/cm^2 to 70 kg/cm^2	0.279 kgs/sq.cm at 35.06 kgs/sq.cm.

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Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 17**
"Chemical Scope under NABL Accreditation" is to be added in existing "Scope of Chemical Test Tests"	

Chemical Scope under NABL accreditation:

S No	Product / material of Test	Specific test performed	Test method specification against which tests are performed	Range of testing / limits of Operation / Limits of Detection	MU (±)
1.	Fibre/ Yarn /Fabric	Identification of textile fibers.	IS: 667 -1981 Reaff. 2003 AATCC – 20 : 2007	Qualitative	NA
2.	Fibre/ Yarn /Fabric	Percentage composition of binary mixture of protein fibre with certain other non-protein fibres (Method based on clean dry mass)	IS: 2006-1988 Reaff. 2004 (SASMIRA IHM-01 & IHM-03) AATCC – 20 A : 2008 ISO 1833 Parts 4:2006	3 – 100	± 1 % at 67 % polyester & 33 % wool
.3	Fibre/ Yarn /Fabric	Percentage composition of binary mixture of regenerated cellulose and cotton (Method based on clean dry mass)	IS: 1889-1979, Part IV, Sulphuric acid method Reaff. 2005 (SASMIRA IHM-01 AATCC – 20 A :2008	3 – 100	± 1% at 69% polyester & 31% regenerated cellulose
4	Fibre/ Yarn /Fabric	Percentage composition of binary mixture of nylon 6 or nylon 6,6 with other fibres (Method based on clean dry mass)	IS: 2005-1988 Reaff. 2008 (SASMIRA IHM-01 & IHM-03) AATCC – 20 A :2008 ISO 1833Parts 7: 2006	3 – 100	± 3
5	Fibre/ Yarn /Fabric	Percentage composition of binary	IS: 3416-Part 1, 2008(SASMIRA IHM-01 &	3 – 100	± 1.0 % at 67 %

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		mixture of polyester fibre with cotton and regenerated cellulose (Method based on clean dry mass)	IHM-03) AATCC – 20 A :2008 ISO 1833 Parts 11: 2006		polyester & 33% cotton
6	Fibre/ Yarn /Fabric	Determination of pH value of aqueous extract of textile materials	IS: 1390-1983 Reaff. 2004 AATCC 81:2006 ISO 3071:2005	1 to 14	± 0.5
7	Yarn /Fabric	Determination of colorfastness of textile materials to washing 1. Change in shade 2. Staining on adjacent fabric	AATCC 61:2007 -1A IS/ISO 105 C10 :2006	Rating 1 to 5 Rating 1 to 5	NA
8	Fibre/ Yarn /Fabric	Determination of colorfastness of textile materials to artificial light (xenon lamp) Rating on blue wool scale	IS: 2454-1985Reaff. 2006 AATCC -16: 2004 option 3 ISO : 105 BO2:2002	Rating 1 to 8 Class 1 to 8 Class 1 to 8	NA
9	Fibre/ Yarn /Fabric	Determination of colorfastness of textile materials to perspiration (Acidic & Alkaline) 1.Change in shade 2.Staining on adjacent fabric	IS: 971-1983 (Reaffirmed 2004) AATCC 15:2007 (acidic only) ISO 105-E04-2008	Rating 1 to 5 Rating 1 to 5	NA
10	Fibre/ Yarn /Fabric	Determination of colour fastness of textile materials to dry-heat (using Fix-o-test instrument) (Staining on adjacent fabric)	IS: 4636 - 1988 Reaff. 2004	Rating 1 to 5	NA
11	Fabric	Determination of water repellency of fabrics by cone test	IS: 7941-1976 Reaff.2004	1 to 400 ml i) amount of water penetrated water collected in	1 ml NA

				ml 1 to 400 ml ii) amount of wetting of the outer surface visual observation using AATCC 22-2005 standard photograph as guidelines	
12	Fabric	Determination of water repellency of fabrics by water spray test	IS: 390-1975 Reaffirmed 2003 AATCC 22:2005	Rating 0 to 100	NA
13	Fabric	Determination of rubbing fastness of textile materials (Dry and Wet)	IS 766-1988 Reaff. 2004 AATCC 8:2007 ISO 105 X-12: 2001	Rating 1 to 5	NA
14	Fabric	Colorfastness to water	IS 767RA2004 AATCC 107 :2007 ISO 105 :E01:2010	Rating 1 to 5	NA
15	Fabric	Colorfastness to Sea water	IS 690 R.A2004 AATCC 106:2007 ISO 105 EO2;1996	Rating 1 to 5	NA
16	Fabric	Colorfastness to organic solvent	IS 688 - 1988 RA 2004 ISO 105 –X05 :1994	Rating 1 to 5	NA
17	Fabric	Dimensional changes on soaking in water	IS 2977- 1989 R.A 2005	0 to 20 %	± 0.5 at 2.5 % shrinkage
18	Fibre/ Yarn /Fabric	Moisture Content	ASTM D 2495:2007	Upto 20%	± 0.4 at 9 %
19	Fabric	Flammability	ASTM D 1230:1994 RA.2004	60 seconds	5 second
20	Fabric	Whiteness of Textiles	AATCC 110: 2005	Upto 200	± 3
21	Fabric	CMC Calculation of small color difference for acceptability	AATCC 173:2009	$\Delta E_{cmc} \leq 10$	± 5

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22	Yarn /Fabric	Identification of Class of Dyes on Textiles Material Cotton and other Cellulosic Fibers	IS 4472 –PART I :1967	Qualitative test	NA
23	Yarn /Fabric	Identification of Class of Dyes on Textiles Material Wool , Silk and other Protein Fibers	IS 4472 –PART 2 :1968	Qualitative test	NA
24	Yarn /Fabric	Identification of Class of Dyes on Textiles Material Man Made Fibers	IS 4472 –PART 3 :1973	Qualitative test	NA
25	Yarn /Fabric	Estimation of % Moisture on Finish , Ash and Fatty Matters on Grey and Finished Cotton Textiles Materials	IS 199:1989 R.A 2005	Up to 20 %	± 0.4 at 9 %
26	Yarn /Fabric	Color Fastness to Saliva	DIN – 53160-1:2010	Rating 1to 5	NA
27	Yarn /Fabric	Color Fastness to Rubbing with Organic Solvent	IS 3426:1986 RA 2004	Rating 1to 5	NA

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Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 17**
New section "Biological Scope under NABL accreditation" is to be created after section "Chemical Scope under NABL Accreditation"	

Biological Scope under NABL accreditation:

S No	Product / material of Test	Specific test performed	Test method specification against which tests are performed	Range of testing / limits of Operation / Limits of Detection	MU (±)
1	Fabric	Antibacterial Activity Assessment of Textile Materials: Parallel Streak Method	AATCC 147- 2004	Present/ Absent	-
2	Fabric	Antifungal Activity, Assessment of textile material : (Part 3)	AATCC 30 - 2004	Rating from 0 to 4	--
3	Fabric	Antibacterial Finishes on Textile Materials: Assessment of	AATCC 100 - 2004	0 to 100 %	Under process

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Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 19**
Existing list of machines under Incubation Center is to be replaced with following "List of Demonstration Machineries"	

Incubation Centre

List of Demonstration Machineries:

Sr. No.	Equipment
1.	Non woven needle punching machine
2.	Warp Knitting Machine
3.	Weaving Machine
4.	Laboratory Drying, Condensation and Fixation Apparatus
5.	Twin screw Extruder
6.	High Speed mixer
7.	Hydraulic Lab press
8.	Tape yarn manufacturing- Film slitting
9.	Blown film manufacturing
10.	Monofilament spinning
11.	Beaming machine for warp knitting

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Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 23**
Existing list of "Books" under Information Center is to be replaced with following list under information center	

Books

Sr. No.	Title of Books/Journals	Publisher	Author	Year of Publishing
1.	Properties & Performance of Natural Fibre	Woodhead Publishing,	K. Pickering	2008
2.	Fabric Testing	Woodhead Publishing,	J Hu	2008
3.	3-D Fibrous Assemblies	Woodhead Publishing,	J Hu	2008
4.	Structure & Mechanics of Textile Fibre Assembly	Woodhead Publishing,	P Schwartz	2011
5.	Indian Man Made Fibre Industry	CARE research		2010
6.	Coloration Technology (2009)	SDC		2009
7.	Monthly Periodical on Textile Featuring research in TT (2009)			2009
8.	Textile Research Journal (2009)	SAGE		2009
9.	ACTA Horticulture	ISHS		2011
10.	Floriculture	Media Today Pvt. Ltd.		2012
11.	Textile Month	World Textile Information Network		2011

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Existing "Technical Manpower" is to be replaced with Following	

Technical Manpower

Sr. No	Name	Field of Specialisation
SASMIRA, Mumbai		
1	Mr. U. K. Gangopadhyay	Textiles & Technical Textiles
2	Dr M R Mathur	Textile Polymers & Chemistry
3	Dr. K. Tandon	Marketing & Project
4	Mr. A. Oak	implementation
5	Mr. H. Soni	Marketing & Project
6	Mrs. A. S. Sudam	implementation
7	Mr. S. Saini	Marketing & Project
8	Mrs Manisha Hira	implementation
9	Dr R Ramakrishnan	Textile testing and technical textiles
10	Mr. R. P. Singh	Development of Textiles
11	Ms. S. N. Shinde	R & D in Technical textiles
12	Mr. P.R.Survase	Polymer Chemistry
13	Mr. P. R. Salunke	Fibre Science and Technical Textiles
14	Mr. M.Tiwari	Biotechnology
15	Ms P. Prajapathi	Textiles & Technical Textiles
16.	Mr. M.D.Walinjkar	Biotechnology
17	Mr. H.D.Shah	Fibre Science and Technical Textiles
18	Mr. A.S. Mann	Fibre Science and Technical Textiles
19	Ms Purnima Chauhan	Textile testing and technical textiles
20	Shri J S Sawant	Textile Chemistry
21	Shri A C Bhuta	Textile Fibre Science & chemistry
22	Shri V D Naik	Textile Chemistry
23	Ms A A Desai	Textile Chemistry & training
24	Shri A S Patil	Testing and evaluation
25	Shri H S Pandit	Testing and evaluation
26	Shri A R Talekar	Testing and evaluation
27	Shri N T Mistry	Testing and evaluation
28	Shri P G Kochrekar	Testing and evaluation
29	Shri D M Jani	Testing and evaluation
30	Ms A T Jhaveri	Testing and evaluation
31	Ms K A Hallur	Testing and evaluation
32	Ms L V Mhatre	Testing and evaluation
33	Shri R.K.Kulkarni	Testing and evaluation

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		Testing and evaluation Testing and evaluation Testing and evaluation
MANTRA, Surat		
1 2 3 4 5 6 7 8 9 10 11 12	Dr. S. K. Basu Dr. Hima D. Joshi M. G. Patel B. S. Pancholi M. G. Parikh A. M. Choksi A. D. Chauhan D. M. Prajapati S. R. Upadhyay D. V. Kantharia J. K. Patel K. N. Jadhav	Textiles & Technical Textiles Textile Chemistry Textile Chemistry Textiles Textile testing Textile chemistry Textile Testing Textile Testing Textile Testing Textile Testing Textile Testing Textile Testing
NAU, Navsari		
1 2 3 4	Dr. A. R. Pathak Dr. R. G. Patil Er. E. M. Solia Dr. S.G. Patil	Application of Agrotextile products and field application

Annex - 1
COE on Agrotech
Lead : Synthetic and Art Silk Mills' Research Association (SASMIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 26**
Following name of manual is to be added as fifth point in existing "List of Manuals Prepared"	

List of Manuals Prepared

5. A ready reckoner for shade nets

Annex - 1
COE on Agrotech
Lead : Synthetic and Art Silk Mills' Research Association (SASMIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 26**
Following "R&D Projects on Agrotech" are to be added as 11th & 12th point in existing "R&D Projects on Agrotech Undertaken/Under Progress" under SASMIRA	

R&D Projects on Agrotech Undertaken/Under Progress under SASMIRA

11) Development of UV fluorescent yarn for use in agrotextile to detect counterfeits
12) Design and development of an instrument set-up for measuring the photo energy transmitting capability of horticultural shading nets.

Annex - 1
COE on Agrotech
Lead : Synthetic and Art Silk Mills' Research Association (SASMIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 28**
Following is to be added in existing "Agrotextile Seminars (SASMIRA)" as point no. 10 to 13 under the heading Awareness Program Conducted	

Agrotextile Seminars (SASMIRA)

10) 13th September 2011, Nashik, Workshop for farmers (2000 participants)
11) 19th September 2011, Dharwad, One day seminar on Protective agrotextiles **–** Advantages and Future prospects", (150 participants)
12) 16th December 2011, Seminar at Kisan 2011, Pune, (200 participants)
13) 22nd March 2012, Kolkatta, One day seminar on Protective agrotextiles**–** Advantages and Future prospects", (150 participants)

Annex - 1
COE on Agrotech
Lead : Synthetic and Art Silk Mills' Research Association (SASMIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 28**
New section "Exhibition participation" is to be created after section "Awareness Programs Conducted"	

Exhibition participation:

1) 25th to 27th August 2011, Technotex 2011 at Bombay Exhibition Center, Goregaon.
2) 22nd to 29th September 2011, International Exhibition of Textile Machinery (ITMA) 2011 at Fira de Barcelona Gran Via, Barcelona, Spain.
3) 10th to 12th October 2011, Techtextil India 2011, at Bombay Exhibition Centre, Goregaon.
4) 14th to 18th December 2011, 'Kisan 2011' at International Exhibition Center, Pune-Nashik Highway, Moshi.
5) 20th to 22nd January 2012, Western States Regional Agriculture Fair fromat Vyara Dist. Tapi.

Annex - 1
COE on Agrotech
Lead : Synthetic and Art Silk Mills' Research Association (SASMIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 3. COE on Agrotech	**Revised Page No. 29**
Following list of prototypes developments is to be added as point no. 6 & 7 in existing section "A few of the envisaged prototype developments are" under the heading "Agrotech Prototype to be Developed"	

A few of the envisaged prototype developments are:

6) Reflective ground cover
7) Barrier packaging for agrochemicals

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshot of COEs	Revised Page No. 7
Following is to added as last para in existing section "COE on Geotextiles"	

COE on Geotextiles

BTRA is going to set up a separate testing laboratory for soil, aggregates & asphalt.

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 32**
Following "Testing Equipment" are to be added under Infrastructure facilities	

Infrastructure facilities

Testing equipment (procured under COE):

Sr. No	Name Of Equipment	Model/type/ year of make	Range & Accuracy
1.	Universal Testing Machine	H300KU Tinius Olsen 2008	300KN 1%
2.	Peel Bond Tester	1kN Tinius Olsen 2008	1 KN 1%
3.	Melt Flow Indexer	AC type Stop watch LSW-72 International Equipments	Temp. up to 400 oC ± 0.1oC
4	ESCR	Controller -VT 4826 International Equipments	Temp. 100 oC ±0.1 oC
5	Carbon Black Content Tester	Controller -VT 4826 International Equipments	Temp.up to1000oC Rotameter 2.0 LPM
6.	Porometer	Quantachrome, 3Gz, USA	1 to 250 microns ± 0.01 micron
7	Particle Size Analyser	Malvern Master Sizer 2000	0.02 to 2000 microns ± 0.01 micron
8	Water Vapour Transmission Rate Tester	TextTest FX 3150 Gravitest	Air flow ±0.01m/sec Weight ±0.1mg Humidity ± 0.1 % Temp ±0.1 oC
9	CBR Puncture Test Apparatus	Aimil	Max. stroke 150mm
10	Index Puncture Test Apparatus (Pneumatic)	Tinius Olsen	Max. stroke 50mm
11	Air permeability Tester	Qualitest-Frazier	Up to 500 LPM
12	Thermal Conductivity Tester	Laser Comp	Product up to 100 mm max
13	Pneumatic press (with cutting dies)	Pneumatic Dumbell Cutter	Capacity 1 Ton
14	UV Weatherometer	Q-Sun	--

Annex - 2

COE on Geotech

Lead : Bombay Textile Research Association (BTRA)

15	Profile Projector	Sipcon / SVI-IMG MSU 3D	30 x to 200x
16	Hydrostatic pressure head tester	Mesdan	Water head up to 100cm
17	Upgradation of DSC	HP	Up to 1000oC
18	Martindale Abrasion tester	James & Heals	--
19	Stress Cracking Resistance Tester	WIRA	Temp 50 & 100 oC $\pm$ 0.1oC
20	Pyramid Puncture Tester	Tinius Olsen	Capacity 5 Ton
21	Dry powder analyser	Malvern	0.02 to 2000 micron
22	Filtration efficiency tester	--	--
23	Hydraulic transmissivity tester	BT Technology	--
24	Soil Geotextile Clogging potential Tester	BT Technology	-

Test equipment expected (under COE):

25	Water permeability under load		
26	Vertical strip drain tester in crimped condition		
27	Filtration efficiency tester		
28	Multi axial tension tester		

Additional Test equipment for Geosynthetic testing (Procured by BTRA):

1.	Instron	4206	50kN $\pm$1 %
2.	Cone Drop Tester	BTRA	2 to 50 mm $\pm$ 2 mm
3.	BTRA Thickness Tester	BTRA	10 mm $\pm$ 0.01 mm
4.	Water Permeability Tester	BTRA	Flow rate 1 to 30 LPM $\pm$0.1 LPM WH up to 100 mm
5.	Digital Density Balance	ER200A Afcoset	up to 100 g $\pm$ 0.0001 g density from 0.88 to 22 g/cc
6.	Digital Bursting Strength Tester	Qualitest QC115D	Up to 60kg/cm2 $\pm$ 0.1kg/cm2
7.	SDL Thickness Tester	SDL Carpet thickness gauge	Thick 0 to 25 mm $\pm$0.01mm Pressure 2 to 200kPa
8.	Index Puncture Test	BTRA	Max. stroke 50mm

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

	Apparatus (mechanical)		
9.	Digital Platform Scale	CS 100 CITIZEN	Up to 100 kg ± 20 g
10	Sieve Shaker	C. Abhaykumar	--

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 33**
Following equipment "Water Vapour Transmission Rate Tester and its photo" is to be added in "Images: Geotech COE Equipment at BTRA"	

Water Vapour Transmission Rate Tester

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 34**
Existing "Geotech Test Parameters Supported and Corresponding Cost" is to be replaced with following	

Geotech Test Parameters Supported and Corresponding Cost

Accreditation as per ISO 17025

- International : BTRA Testing Lab is accredited by GRI, USA
- National : BTRA Testing Lab is accredited by NABL

Products tested at BTRA

- GEOTEXTILES
- GEOCELL
- GEONETS
- GEOGRIDS (Geogrid,Geomat, Geostrap)
- GEOMEMBRANES (Smooth & Texturized)
- GEOCOMPOSITES
- Geosynthetic Clay Liner (GCL)
- GABIONS (Metal & Rope)
- Turf Reinforcement Mats (TRM)
- DRAINS
  :Prefabricated Vertical Drains (PVD)
  :Geodrain

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 35**
Existing Table of "Test Parameters" are to be replaced with following Table	

Geotech Test Parameters Supported and Corresponding Cost

Test Parameters

	Test Parameters	ASTM	ISO	IS	BS EN	quantity	Rs.
1	AOS	D 4751		14294		2 M²	600
2	Abrasion	D 4886		14714		0.5 M²	4000
3	Bursting strength	D 3786				0.5 M²	350
4	CBR puncture	D 6241	12236			2 M²	1250
5	Carbon Black Content	D 1603				1 sq.ft	1200
6	Cone Drop		13433	13162-4	918	2 M²	400
7	Density	D 792				1 sq.ft	500
8	ESCR	D 1693				1 sq.ft	1200
9	Grab Strength	D 4632	13934-2			1 M²	1000
10	Index Puncture	D 4833				0.75 M²	1200
11	Mass	D 5261	9864	14716		0.5 M²	500
12	Melt flow index	D 1238				10 gm	900
13	Pore Size	D 6767				0.5 M²	1250
14	Rope Strength			7071-4	1140	6 M	900
15	Seam strength	D 4884	10321	15060		2 M²	1500
16	Tear Strength of geomembrane	D 1004				0.5 M²	1200
17	Tensile strength 50mm strip	D 5035	13934-1	1969		0.5 M²	900
18	Tensile strength of geogrid-single rib	D 6637 A				3 M²	1000
20	Tensile strength of geogrid-multi rib	D 6637 B				3 M²	2000
21	Tensile strength of geomembrane	D 6693				0.5 M²	1200
22	Thickness	D 5199	9863-2	13162-3		0.5 M²	250
23	Trapezoid tear strength	D 4533		14293		1 M²	1000
24	UV stabilization	D 4355		13162-2	12225	1 M²	80/hr

Annex - 2

COE on Geotech

Lead : Bombay Textile Research Association (BTRA)

25	Water permeability	D 4491	11058	14324	6906-3	0.75 M²	1800
26	2% secant modulus of geomembrane	D 5323				0.5 M²	1200
27	Metal Gabion (size, thickness, tensile)	D 975				1 piece	1700
28	Wide width of geotextile	D 4595	10319	13162-5		2 M²	1500
29	Wide width of geomembrane	D 4885				2 M²	1500
30	pyramid puncture resistance	D 5494				2 M²	2000
31	Thermal Conductivity	C 518		3144		1 M²	2000
32	Weld strength of geomembrane	BTRA dev.	-	-	-	1m	2000
33	Horizontal pull out test	D 6706				3M²	5000
34	Stress cracking resistance	D 5397				0.5 M²	2000
35	Hydraulic transmissivity	D 4716				1 M²	2000
36	Soil geotextile clogging potential	D 5101				1 M²	2000

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 35**
Change of the name of equipment given in Incubation Centre	

Name of the middle image given in Incubation Centre is to be changed to "WARPING MACHINE" from ~~"Water Vapour Transmission Rate Tester (Warping Machine)"~~

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 37**
Existing "Technical Manpower" is to replaced with following	

Technical manpower

Name of technical personnel & field of specialization:

1	Dr. A. N. Desai	Ph.D in nonwoven Field of specialization: nonwoven & technical textiles Experience: 31 years
2	Mr. Venkatrayan .	MSc. Field of specialization : Consultancy in Lab Accreditation, Total Quality Management, Lead Assessor for NABL Audit. Over 35 years experience in all aspects of textile testing and Certification / accreditation & quality management .
3	Mr. V.K.Patil	LTM , VJTI Field of specialization: nonwoven & technical textiles, development of products, Development of test equipments, consultancy in nonwoven etc. No. of technical papers presented: 6 No.of publications : 32 Experience: 31 years No. of project handled : 8
4	Mr. Rajit Menon	B.Sc (Chemistry) Experience: 19 years in testing of technical textiles
5	Mr. G.R.Mahajan	LTM , VJTI Testing of geosynthetics Experience: 2 years in testing of technical textiles & Manufacturing 14 years

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 37**
Existing "List Of Standards and Specifications Formulated" is to replaced with following	

List Of Standards and Specifications Formulated

Specifications finalized

1. Specifications of geosynthetics for highways
   1.1 Geotextile for Reinforcement applications
   1.2 Geotextile for Seperation purpose
   1.3 Geotextile for Filtartion purpose
   1.4 Geotextile for drainage applications
2. Specifications of PVC geomembrane (IS 15909) for water proofing lining purpose for use in canal, ponds, reservoirs, industrial effluents & roofing
3. Specifications for coir bhoovastra (IS 15869)

Specifications under preparation

Draft standard prepared

1. Specifications for geogrid used as soil reinforcement in mechanically stabilized earth(MSE) retaining structures
2. Specifications for geogrid used as reinforcement of base and sub-base layers in pavement structures
3. Specifications for geotextile used in pavement overlays
4. Specifications for geotextile used as protection (or cushioning) material

Revision

Jute geotextile-part 1 for strengthening of sub grade in road (IS 14715)

Part 2 for control of bank erosion in rivers & waterways (IS 14715)

Proposed draft for ;

1. Specifications for geotextile used in sub-surface drainage application
2. Specifications for geotextile for permanent erosion control in hard armor system
3. Specifications for geotextile used in sub-grade separation in pavement structures
4. Specifications for geotextile used in sub-grade stabilization in pavement structures

Test standards finalized :

Annex - 2

COE on Geotech

Lead : Bombay Textile Research Association (BTRA)

1. Determination of water permeability normal to the plane, without load
2. Determination of the characteristics opening size
3. Determination of water flow capacity in their plane
4. Static (CBR) puncture resistance
5. Apparent opening size by wet sieving

Test standards under review :

Test method for the determination of the filtration behaviour of geotextiles under turbulent water flow conditions

Geotextiles and Geotextile-related products- Determination of water permeability characteristics normal to the plane, under load

Draft standards formulated by COE & submitted to BIS

Sr. No.	Test method	Title / test
1	ASTM D 1987	Biological clogging of geotextile
2	ASTM D 4632	Grab breaking strength & elongation
3	ASTM D 4594	Effect of temperature on stability of geotextile
4	ASTM D 5322	Chemical resistance of geosynthetics to liquids
5	ASTM D 6706	Pull out resistance
6	ASTM D 5493	Permeability of Geotextile under Load
7	ASTM D 6574	Hydraulic Transmissivity
8	ASTM D 5970	Geotextile deterioration from out door exposure
9	ASTM D 6693	Tensile properties of geomembrane
10	ASTM D 4833	Index puncture
11	ASTM D 5397	Stress cracking resistance of Geomembrane using notched constant tensile load test
12	ASTM D 6767	Pore Size Characteristics of Geotextiles by Capillary Flow Test
13	ASTM D 5818	Installation Damage of Geosynthetics
14	ASTM D 6637	Tensile strength of geogrid
15	ASTM D 5747	Chemical Resistance of Geomembranes to Liquids
16	ASTM D5494	Pyramid Puncture Resistance of Geomembranes
17	ASTM D 5596	Dispersion of Carbon Black in Polyolefin Geosynthetics.
18	ASTM D 4885	Performance strength of Geomembrane by wide width tensile strength method
19	In house	Determination of Weld strength of Geocell
20	ASTM D 5323	Determination of 2 % Secant modulus for polyethylene geomembrane

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	Revised Page No. 38
New section "List of manuals prepared" to be added	

List of manuals prepared:

1. Geotextile in Roads

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 38**
Existing "R & D Projects on Technical Textiles undertaken / under progress" is to be replaced with following	

R & D Projects on Technical Textiles undertaken / under progress

i. Development of geotextile (natural & synthetic fibres) for various clients. (completed)

ii. Development of Filters for various clients (completed).
iii. Design & development of creep rupture tester as per ASTM D 5262 (completed).
iv. Development of protective nonwoven (completed).
v. Development of woven geotextile (under progress).

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 38**
Existing "Training programs offered by COE" is to be replaced with following	

Training programs offered by COE

Training in Nonwovens & Geosynthetics given to 70 persons so far.

Training modules :

- Technical Textiles
- Nonwovens
- Geosynthetics

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 39**
Existing "Foreign collaboration details " is to be replaced with following	

Foreign collaboration details

Collaborated with foreign Institutes / organsation:

- FITI (Testing Laboratory – GRI, USA accredited), South Korea
- GRI (Geosynthetic Research Institute), USA
- BTRA is a member of IGS (International Geosynthetic Society), USA
- BTRA is a member of EDANA, Europe
- BTRA is a member of INDA, USA
- BTRA is a member of AATCC, UK

Annex - 2
COE on Geotech
Lead : Bombay Textile Research Association (BTRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 4. COE on Geotech	**Revised Page No. 39**
New section "Details of prototypes developed in COE " is to be added	

Details of prototypes developed in COE

- Woven geotextile
- Other technical textiles Under progress

Annex - 3
COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 1. Introduction	**Revised Page No. 2**
Existing section "Meditech" in the left box under "Different kinds of Technical Textiles" is to be replaced with following	

Different kinds of Technical Textiles

Meditech

Combination of textile technology and medical sciences has resulted into a new field called medical textiles. Medical textile is one of the most rapidly expanding sectors in the technical textile market.

Medical textile products can be classified as:

- Healthcare and hygiene products: Surgical clothings, Covers, Beddings, Sanitary napkins, Baby diapers, Adult incontinence
- Non-implantable materials: Bandages, Wound care, Plasters, Gauze
- Implantable materials: Sutures, Soft tissue implants, Hard tissue implants, Cardio vascular implants
- Extra corporeal materials: Artificial kidney, Artificial Liver, Mechanical Lungs
- Meditech consumption is estimated at Rs 3388 crore. Surgical dressing alone accounts for over 50% of the total.

Annex - 3
COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshot of COEs	**Revised Page No. 9**
Existing section "COE on Meditech" is to be replaced with following	

COE on Meditech

The Centre of Excellence on Medical Textiles is being led by the South India Textile Research Association, popularly known as "SITRA".

SITRA has formulated standards for the following Meditech related products:

1. Surgical gowns- Disposable
2. Surgical drape - Disposable
3. Surgical face mask - Disposable
4. Cellulose wadding
5. Vapor permeable water proof plastic wound dressings
6. Non-woven gauze bandage
7. Paraffin gauze dressings
8. Knitted viscose primary dressings
9. Perforated film absorbent dressings
10. Tubular bandages
11. Orthopaedic stockinette

In addition, the following prototypes have been developed by SITRA:

1. Woven surgical gowns treated with nano finishes

Annex - 3
COE on Meditech
Lead : South India Textile Research Association (SITRA)

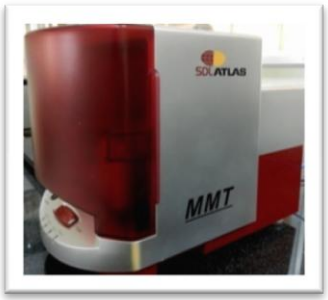
2. Hernia mesh
3. Heart valve fabric
4. Functional spacer fabrics for medical inlays in orthopaedic shoes
5. Woven arterial prosthetic graft
6. Clinical heart patch
7. Bandages using bamboo fibres
8. Ankle support
9. Development of 4-layered Face-mask
10. Development of 8-layered mopping pad
11. Development of Face Mask with Eye-Guard
12. Face Mask with Nylon 6-nanomembrane

Annex - 3
COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 41**
Following list is to be added in existing list of "Testing Instruments" under infrastructure Facilities	

Infrastructure Facilities

Testing instruments

S.No	Name of the Instrument	Photograph of Instrument	Make	Model	Description
1.	Moisture management tester		SDL Atlas	-	Used for the measurement of liquid moisture management properties of textile fabrics.

Annex - 3
COE on Meditech
Lead : South India Textile Research Association (SITRA)

2.	Tensiometer		Data physics	DCAT 11	To measure the surface tension o f liquid
3.	Capillary flow porometer		PMI	CFP – 1200 A	To measure the pore size of the Meditech products
4.	Horizontal laminar airflow		Microflow	-	Used to transfer the culture in an aseptic manner. Biological evaluation of Medical Products testing for antimicrobial assessment.

	Annex - 3
COE on Meditech	
Lead : South India Textile Research Association (SITRA)	

5.	Incubator shaker		ORBITEK	-	Ideal for mixing and development of cultures for Antimicrobial activity of Medical Textile products like surgical gowns, face masks etc..,.
6.	ETO gas sterilizer		RUJIKON	-	-To destroy bacteria, virus & fungus present in the Meditech products -To sterilize the medical textile products.

	Annex - 3
COE on Meditech	
Lead : South India Textile Research Association (SITRA)	

7.	Biological safety cabinet		Micro flow	-	Cell growth area for in vitro cytotoxicity testing of medical products.
8.	Rotary Evaporator		Buchi	F-105	To extract the solvents from the medical textile samples/others to find out the desired compound analysis.

	Annex - 3
COE on Meditech	
Lead : South India Textile Research Association (SITRA)	

9.	Flame photometer		ELICO	CL 378	To determine the Sodium, Potassium content in the water samples from medical textile unit where water is in use.
10.	BOD Incubator		ORBITEK	-	To maintain the temperature and humidity for the analysis of water.

	Annex - 3
COE on Meditech	
Lead : South India Textile Research Association (SITRA)	

11.	Water Purification System		SIEMENS	Ultra Clear	To purify the water for laboratory use to carry out the test parameters.

Annex - 3
COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 44**
Existing "Test Parameters" are to be replaced with following	

Test Parameters

Testing services offered by SITRA in the field of medical textiles:

Test name	International standards Applied	Sample Size Required	Testing Charges in (RS)
Hydrostatic resistance	AATCC 127	½ square Metre cloth	300
Bacterial filtration efficiency	ASTM F 2101	½ Metre cloth	2500
Thermal resistance	ISO 11092	1 square Metre cloth	3000
Water-vapour resistance	ISO 11092	1 square Metre cloth	3000
Water-vapour permeability	ISO 11092	1 square Metre cloth	3000
Liquid strike through time	EDANA 150.5 & ISO 9073 - 13	½ square Metre cloth	450
Wet back	EDANA 151.2 & ISO 9073 - 8	½ square Metre cloth	200
Run – off test	ISO 9073 - 11	½ square Metre cloth	400
Flushability	-	½ square Metre cloth	500
Knot strength	-	-	400
Threads/Unit length	ASTM 3775	½ square Metre cloth with selvedge's	190
Yarn count	ASTM D 1059	½ square Metre cloth	250
GSM	ASTM D 3776/ IS 1964	½ square Metre cloth	160
Tear strength	ASTM D 1424	½ square Metre cloth	315

Annex - 3

COE on Meditech

Lead : South India Textile Research Association (SITRA)

Tensile Strength	ASTM D 5035	½ square Metre cloth	315
Thickness	ASTM D 1777	½ square Metre cloth	65
Stiffness	ASTM D 4032/BS 3356	½ square Metre cloth	315
Pilling	IS 10971	½ square Metre cloth	315
Co-efficient of drape – Woven	BS 5058	½ square Metre cloth	315
Air permeability	ASTM D 737	½ square Metre cloth	315
Busting strength	IS 1966	½ square Metre cloth	250
Antibacterial activity assessment (Qualitative)	AATCC 147	½ Metre cloth	1200
Antibacterial activity assessment (Quantitative)	AATCC 100	½ Metre cloth	1600
Antifungal Evaluation, Qualitative	AATCC 30, Part III	½ Metre cloth	1500
Soil Burial Test	AATCC 30, Part I	½ Metre cloth	3000
Total Colony Unit	APHA – 9215B	½ Metre cloth	1500
Most probable Number of E.Coli	IS 1622	½ Metre cloth	1200
Fastness Properties			
Light	AATCC 16/IS 686/IS 2454/BS 1006	½ Metre cloth	500
Rubbing	IS 766/AATCC 8/AATCC 165	½ Metre cloth	190
Washing	AATCC 61/IS 687/IS 3361/IS 764/IS 765/IS 3417/IS 984	½ Metre cloth	190
Perspiration	IS 790/AATCC 15	½ Metre cloth	375
Water repellency	AATCC- 22	½ Metre cloth	315
Water soluble substances	IS 3456/AATCC 97	½ Metre cloth	250
Presence of surfactants	-	½ Metre cloth	250
Residual total dissolved solids	-	½ Metre cloth	300
Sulphate content	IS 4203	½ Metre cloth	250
Ash content	IS 199	½ Metre cloth	250

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Presence of fluorescence		½ Metre cloth	190
Absorbency	IS 2369/AATCC 79/IS 14579	½ Metre cloth	190
Wicking rate	-	½ Metre cloth	375
Ether soluble substances	IS 4390	½ Metre cloth	625
Overall moisture management capacity	AATCC 195	0.5 m^2	1000
Antibacterial evaluation	JIS L 1902	0.5 m^2	1800
Antibacterial evaluation Qualitative – carpets	AATCC 174 Part I	0.5 m^2	1200
Antibacterial evaluation Quantitative – carpets	AATCC 174 Part II	0.5 m^2	1600
Antifungal evaluation Qualitative – carpets	AATCC 174 Part III	0.5 m^2	1500
Antibacterial evaluation Qualitative (Kirbey Bauer susceptibility)	In-house	0.5 m^2	1200

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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 45**
Existing matter on "Incubation Centre" is to be replaced with following	

Incubation Centre

The following is the list of machineries procured under the Centre of Excellence to support the incubation efforts:

S.No	Name of the Machinery	Type of products that can be produced
1	Rieter JETLACE (Hydroentaglement nonwoven plant)	Wound care products, surgical gowns, different types of wipes, face masks, health care and hygiene products
2	Karl Mayer Tricot Warp Knitting Machine	Burn garments, bandages, heart valve fabric and clinical heart patch fabric, Hernia mesh
3	Compression Stockings Knitting Machine	Medical compression stockings for leg and arm
4	Core Yarn System for Ring Frame	Different types of core and cover yarns
5	Hot melt Multipurpose Laminating & Coating Pilot Plant	To produce Water proof, antimicrobial, breathable, fire proof and different kind of functional finished products
6	High Speed Shuttleless Narrow Fabric Needle Weaving Loom	Bandages like Compression, Elastic ,Crepe etc
7	Electro Spinning Apparatus for producing Nano Fibres from Polymers	Wound dressings, Filter media, Tissue Engineering etc
8	3 Dimensional Cartesian Braiding Machine	Braided suture
9	Sulzer projectile Weaving Machine	Pillow cover, OT fabric and hospital bed

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		fabrics
10	Ultrasonic Fabric Sealing System	Edge sealing the Surgical gowns and health care fabric
11	Cotton Wool Roll Making Machine	To produce surgical cotton wool roll
12	Face mask making machine	To produce the surgical face mask

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Images of the Incubation Centre Machineries

Rieter JETLACE (Hydroentaglement nonwoven plant)

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Karl Mayer Tricot Warp Knitting Machine

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Compression Stockings Knitting Machine

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Core Yarn System for Ring Frame

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Coating and laminating machine

High speed shuttleless narrow fabric needle weaving loom

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Electrospinning setup

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Braiding machine

Projectile Weaving Machine

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Ultrasonic Fabric Sealing System

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Cotton wool roll making machine

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Face mask making machine

Incubation activities

- Development of post partum drape

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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 45**
Following "Illustrative Meditech Products" are to be added in existing list	

Illustrative Meditech Products

S. No.	Product Name	Photography	Description	End Use	Manufacturers
1.	Adhesive wound dressing		Nonwoven material with adhesive coat	Used for acute wound	3M India, Bangalore.

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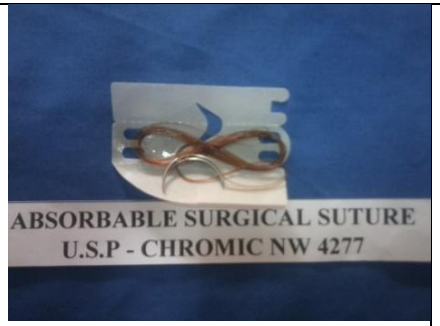
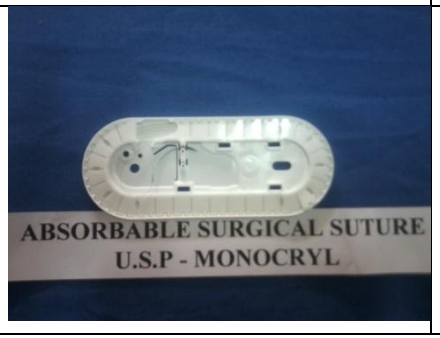
2.	Absorbable surgical sutures mersutures		Catgut	Used for wound closure	Ethicon
3.	Absorbable surgical sutures monocryl		Poliglecaprone	Used for wound closure	Ethicon

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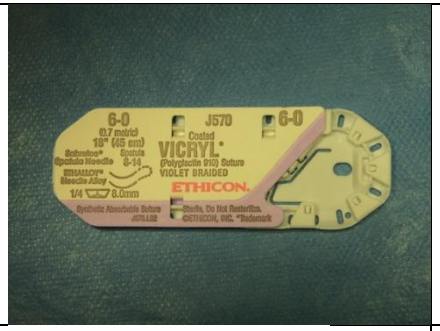
4.	Absorbable surgical sutures vicryl		Polyglatic acid	Used for wound closure	Ethicon
5.	Adhesive bandage		Weaving & Coating	The bandage is applied such that the pad covers the wound, and the fabric or plastic sticks to the surrounding skin to hold the dressing in place and prevent dirt from entering the wound.	Johnson & Johnson

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6.	Adhesive tape		Made of cotton treated with zinc oxide.	Fixation of Dressing	BIERSDORF India Pvt Ltd
7.	Adult incontinence pad		Spunbond nonwoven & SAP	Incontinence pad can be used by men and women to absorb urine	Stayfree, USA. Actifit Hygiene concepts, India

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8.	Alcohol swabs		70% isopropyl alcohol	Alcohol swabs can be used to clean the injection site, to wipe clean the surface used to prepare for injection.	RD industries, Delhi
9.	Ankle brace		Designed to be worn comfortably inside laced shoe. Controls abduction and adduction while allowing flexion and extension.	Prevention of ankle injuries during sports and normal activities To protect ankle in the case of ligament tears, and hairline fractures Post operative use and early cast removal	Apothecaries Sundries Manufacturing Co. New-Delhi, India.

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10.	Ankle support		Knitted structure	Protection of ankle joint against sprains in sports and during normal activities. Post-operative rehabilitation	MGRM, Hyderabad
11.	Anklet		Neoprene for uniform compression. Velcro closure for secure application.	Mild sprain & strain. Ligaments injuries. Preventive care for sports activities.	Apothecaries Sundries Manufacturing Co. New-Delhi, India. Grip Rehabilitation pvt.ltd, India.

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12.	Baby wipes		Spunlace nonwoven, Alovera treated	Primarily used for wiping infants backsides in diaper changing	Himalaya, Mysore
13.	Bath wipes		Spun lace, Pure water, Aloe Vera Extract	Used as a cleaning and moisturizing disposable cloth for patients.	Prime fortune co., ltd
14.	Callus removal pad		Salicylic acid, Polyvinyl alkyl, ether adhesive, Tio_2, Liquid paraffin, Thiophenol antioxidant	Targeted medicated action for the safe and effective removal of calluses.	TTK Ltd, Amrutanjan

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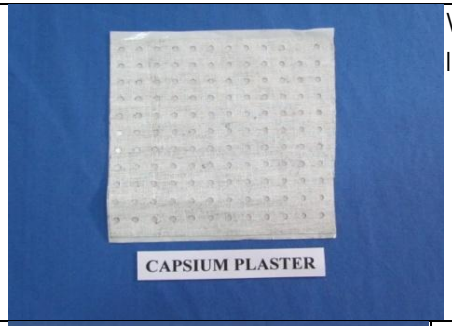
15.	Capsium plaster		Woven, Capsium oieoresin I.P coated on one side	To relieve pain and reduce counter itching in patients.	Precision coatings (P) ltd
16.	Cast padding		Viscose nonwoven	Used where swelling is expected. Used before application of any type of bandages to protect the skin	MEDRAD INC, Bangalore
17.	Cast shoe		Polyvinyl, Polyester, Polyurethane and Polyamide.	Cast shoe replaces the functions of the normal shoe when patient is on plaster cast of the foot. Prevents excessive wear & tear of the cast and reduces impact on the injured foot.	Tynor Orthotics Pvt Ltd, Vissco Rehabilitation Aids (P) Ltd

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18.	Cervical collar with chin support		Made from high density Polyurethane foam, Bonded with plastic moulded support, Exterior covered with soft cotton knitted fabric to absorb perspiration and provide cool and comfortable support	Provide comfortable immobilization without the harsh uncomfortable firmness	Vissco Rehabilitation Aids Pvt Ltd
19.	Cervical Immobilizer		Two piece design – Easy application / Adjustable X-ray lucent – Allows X-ray to be taken without removing the collar Anterior tracheal opening – Provision for emergency tracheotomy and provides access to carotid pulse	Post cervical surgery Severe cervical sprain Cervical fracture Cervical disc herniation	Dynamic Techno Medicals Pvt. Ltd, India. Apothecaries Sundries Manufacturing Co. New-Delhi, India.

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20.	Chlorohexidine gauze dressing		Gauze weave and coated with Soft paraffin wax B.P, Chlorhexidine acetate	Primary wound dressing for burns, ulcers, skin grafts and other injuries.	BSN medicals
21.	Cock up splint		made of Light metal maintains dorsi flexion Constructed of high quality fabric with soft padding with two sets of buckle and velcro gives proper immobilization and easy application	Indicated for minor fractures of the wrist & distal forearm, early cast removable or strain and sprain in the wrist.	Royal chemists, India Gst corporation, India
22.	Collagen wound dressing		Collagen impregnated Nonwoven	Used as a dressing for burns & wounds.	Cologenesis HealthCare Products P.Ltd, Salem, Tamil nadu

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23.	Combine dressing surgical pad		Pad of Absorbent cotton in an absorbent over warp sterilised	Combine dressing pad where high absorbency is required to handle heavy drainage, promote healing and keep the wound dry.	Kornish surgical Industries, Ahemadabad
24.	Compression stockings (Mid thigh)		Nylon, spandex and rubber, Circular weaving	Compression Stockings provide controlled compression to the legs to squeeze abnormal back flow of blood towards the heart. They provide requisite pressure to the superficial affected veins.	Tynor orthotics Pvt Ltd
25.	Contoured lumbo scaral support		Made of a special breathable elastic material.	Helps to relieve lower back pain or can be used simply whenever additional support is called for.	Vissco rehabilitation Aids Pvt ltd

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26.	Corn caps		Normalic amal, gandaviroja, oilment base	Corn Caps works by loosening the "cement" holding the hardened skin together and loosening the nucleus, to allow for clean removal. The soft felt corn ring also helps it relieve pressure from the corn.	Amrutanjan
27.	Cotton pads		Cotton	Cotton pads are used to stop or prevent bleeding from minor punctures such as injections etc	Bella premier happy hygienic care Pvt Ltd, Dindigul
28.	Cotton ball		Cotton fibre	Make-up remover and cleaning the injected site with isopropyl alcohol.	Bella

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29.	Cotton and rubber elastic bandage		Woven, material used - cotton	Elastic bandages are also used to treat bone fractures. Padding is applied to the fractured limb, then a splint (usually plaster) is applied. The elastic bandage is then applied to hold the splint in place and to protect it.	Dynamic techno medical Pvt Ltd, Aluva, Kerala
30.	Cohesive bandage		Generally made of elasticized yarn and latex, a cohesive bandage is lightweight and flexible, contouring to the part of the body on which it is being used.	A cohesive bandage is one of the most common materials found in a first aid kit. Used in sports such as football, soccer, tennis and golf, a cohesive bandage is ideal for taping the joints to provide more support to what may be an already weakened area	3M Health care

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31.	Diabetic silver socks		78% Aeromax cotton, 12% Elastane & 10% silver yarn	Protection and care while at work & play Eliminates odour causing bacteria and athletes Foot fungus	Dynamic techno medical Pvt Ltd, Aluva, Kerala
32.	Diclofenac transdermal patch		Diclofenac diethylamine dipped nonwoven.	For relief of pain and inflammation.	Sparsha Pharma International Pvt Ltd
33.	Disposable large sheet		Polypropylene nonwoven	Used as a barrier fabric in surgeries.	Mediprro, coimbatore

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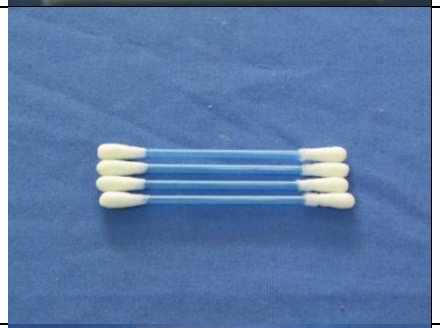
34.	Disposable trolley sheet		Polypropylene nonwoven	Used as a trolley cover in operation theatre.	Mediprro, coimbatore
35.	Ear cleaning buds		Cotton fiber	Cleaning ears	Bella, Johnson & Johnsons limited
36.	Elastic adhesive bandage		Cotton Crepe weave, Zinc oxide adhesive coating on one side	It provide compression support for joints during high-stress sport activity. Minimise swelling and provide additional support as an over wrap. Porous adhesive, allowing the skin to breathe for maximum adherence.	Alves Healthcare p ltd, Johnson & Johnsons Ltd

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37.	Elastic knee support		Ventilated cotton backed elastic which allows air flow.	For semi knee immobilisation For flexibility as well as rigidity in support Post-operative knee problems Protection against abrasions and impacts	Vissco Mumbai – India. Apothecaries Sundries Manufacturing Co. New-Delhi, India.
38.	Elastic shoulder immobiliser		Woven	Lightweight, sleek and smart design to provide immobilization in shoulder dislocation and post operative rehabilitation. It reduces abduction and arm rotation by positioning the arm close to the body.	Tynor Orthotics Pvt Ltd

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39.	Elastic tennis elbow support		The elastic provides compression and support Hook and loop fasteners facilitate different degrees of tension.	To protect and support elbow with compression Used in Tennis elbow, golfers elbow, thrower elbow, tendonitis and for any soft tissue tears and injuries.	Vissco Mumbai – India. Apothecaries Sundries Manufacturing Co. New-Delhi, India
40.	Elastic wrist band		Knitting	Treatment for Strain and sprain in the wrist. Minor fractures of the wrist and distal forearm	Vibash Coimbatore Surgicals Pvt Ltd

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41.	Elastic wrist splint		Made of High modulus of elasticity yarn	Elastic Wrist Splint is designed to immobilize and provide firm support to hand and wrist in various orthopedic conditions. It maintains the wrist in the dorsi flexion functional position while allowing full range of motion to fingers and thumb.	Vissco
42.	Finger splint		Foam	Keeps the finger immobilized in straight position. Used for Fingertip injuries, Nail bed injuries, Burns care etc.,	MGRM Medicare Ltd, Samson Scientifics & Surgicals

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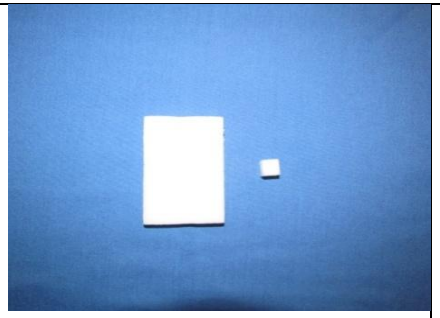
43.	Gelatin sponge		Absorbale gelatine base foam, sterilised with gamma irradiation	Holds many times its weight in blood Completely absorbed within four to six weeks These Sponges can be implanted during surgery and will be completely absorbed within four to six weeks.	Sri gopalkrishna labs Pvt Ltd, Mumbai
44.	Gynaec universal binder		The binder is made from cotton based fabrics and elasticared pressure is added on the rear and on the sides. The binder is designed to fit the entire abdomen and will not restrict the movement when worn.	The support provided lifts and carries the extended abdomen, relieving strain on the muscles and diaphragm. The binder helps restore the displaced internal organs to their proper position without squeezing and cramping.	Vissco rehabilitation Aids Pvt ltd

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45.	Hand kerchiefs		Nonwoven	This is disposable nonwoven Handkerchief using for washing face or wiping hands.	Bilt
46.	Hand strips and label adhesive		Nonwoven and film	Used as a fixture for catheter hub. Transparent and vapour permeable.	Smith & Nephew

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47.	Hard cervical collar		Two piece design for height adjustment Air vents allow better air circulation Velcro closures for easy application and removal	Moderate to severe Cervical sprain Degenerative or inflammatory diseases of the cervical spine such as spondylosis and spondylolisthesis Torticollis	Dynamic Techno Medicals Pvt. Ltd, India. Apothecaries Sundries Manufacturing Co. New-Delhi, India
48.	Hemostat		Oxidised regenerated cellulose sterlised	It is used to stop bleeding	Johnson & Johnson
49.	Hollow fibre dialyser		Membrane material: polysulfone Membrane	Excellent Small Molecule and Exceptional Middle Molecule Clearance	Jiangsu Lengthen Life Science And Technology Co., Ltd. China Gambro AB, Sweeden

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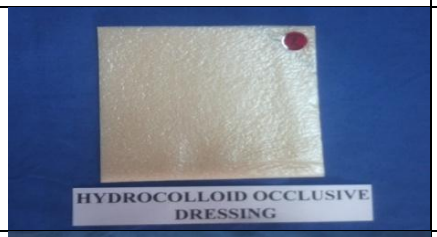
50.	Humerus brace		Woven Laminated foam and metal splints.	Early cast removal in case of Humerus fractures. To splint stable, mid-shaft fracture of Humerus	MGRM Medicare Ltd
51.	Hydrocolloid occlusive dressing		Film	Used as a wound dressing. Protect wounds from bacteria's, pollution and captures wound malodors.	3M India
52.	Insect repellent wipes		Active Ingredient– DEET (Diethyl metatolumide) Wet Wipe Material—Non woven spunlace with 45gsm	To protect from mosquitoes, biting flies, ticks, gnats, no-see-ums and chiggers. Easy to use wipe application Pleasant Experience Safe and Effective	CareNow Medical Pvt. Ltd, Coimbatore Tamil Nadu, India

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53.	Knee brace long		Made up of water proof cloth outer covering and soft inner cotton lining for firmness and comfort. Spring Steel Bars for immboilisation and straightening. Elastic tape with Velcro Enclosures for easy application and removal. The two way elasticized stretch materials provide both support and compression.	Protecting the injured knee joint in emergency. Stabilising surgically or non surgically treated knee	Ostwal agencies, new delhi, India. Tynor orthotics limited, India.

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54.	Knee cap		Knitting	Compression and support to prevent mild strain and sprain. To control painful knee movements in the case of arthritis	Samson Scientifics & Surgicals
55.	Knee cap open patella		Made from high quality nylon, interlocking weave and single spiral elastic yarn, double layered	Uniform compression even on uneven limb surface. Warmth improves healing. Provides firm support and gentle compression.	• Tynor orthotics pvt ltd, India. • Track manufacturing Co.Pvt.Ltd

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56.	Knee high stockings		Complex stitch in tips of compression Softer and non protruding wear feeling. Non pressure knit in tips and heels to create the most comfortable wear feeling.	Helps move blood and fluid that is sitting on the outermost layers of the ankle and calf to move to deeper tissues and veins, in order to allow the calf muscle, to move the blood back towards the heart and the systemic circulation.	Harvest SPF textile ltd , china JSTAR global company, Taiwan.
57.	Knee immobilizer		Has special grade malleable aluminium stays Made up of soft breathable fabric Multiple Velcro for proper adjustment	Knee Surgery (Total Knee Replacement) & Knee injuries might require immobilizing the knee joint. Knee Immobilizer helps to immobilize & gives proper support to the knee joint.	Amron Lifestyle orthotics, India. Norma DND products pvt, ltd, India.

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58.	Knee support (Hinged)		Neoprene, Nylon, Hinge Breathable soft foam cuffs Adjustable aluminium hinges with lock Bilateral flexible wings with Velcro closure	Thermo-compression, relief, protection, stability	D.N. Products, India. Super knitting co.ltd, India
59.	Knee support plain		Knitted	It is recommended for Strain, Sprain, Pain due to Arthritis and joint enfusions	Dynamic techno medical Pvt Ltd, Aluva

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60.	Ladies choice abdominal binder		Elastic, flexible metal splint, Foam fused fabrics	Maintaining cosmetic waistline for females. Compression support to the weakened abdominal wall following surgery and caesarian child birth.	MGRM Medicare Ltd
61.	Maternity compression garments		nylon and spandex yarns with a silicone blend softener	Designed for support during pregnancy. Helps manage pelvic instability and vulval variocosities.Facilitate pelvic muscle function. Improve mobility and function. Reduces pain and provides support.	SRC,

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62.	Medical compression stockings		Knitted	Compression stockings are elastic garments worn around the leg compressing the limb, exerting pressure against the legs reducing the diameter of distended veins causing an increase in venous blood flow velocity and valve effectiveness.	Medi GmbH & Co,German
63.	Medical stockings (Knee high stockings)		70 % cotton, 25% Lycra & 5% Polyamide	Compression stockings are elastic garments worn around the leg compressing the limb, exerting pressure against the legs reducing the diameter of distended veins causing an increase in venous blood flow velocity and valve effectiveness.	Hindustan life care private Ltd

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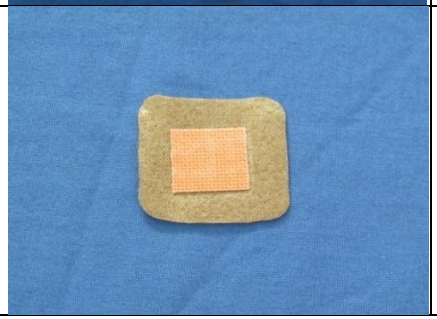
64.	Medical stockings (Thigh high stockings)		72% Polyamide, 28% Lycra	Compression stockings are elastic garments worn around the leg compressing the limb, exerting pressure against the legs reducing the diameter of distended veins causing an increase in venous blood flow velocity and valve effectiveness.	Hindustan life care private Ltd
65.	Medicated dressings		Extensible Permeable to air Painless when removed, even in hairy surfaces	Hypoallergenic For all minor wound Suitable for sensitive skin	Hansaplast, Indonesia. Precision coatings Pvt.ltd, India.

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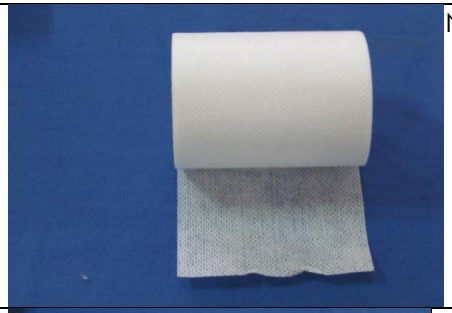
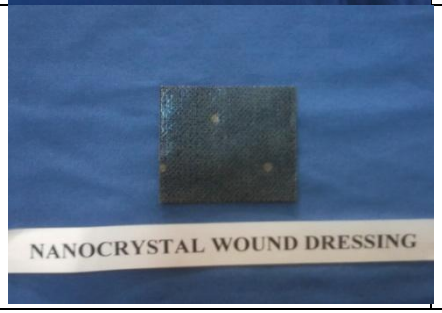
66.	Micropore surgical adhesive tape		Nonwoven	Securing small to medium dressings especially on damp skin. Securing lightweight tubing. Securing ostomy pouches.	3M India
67.	Mopping pad		Open weave	Used for wound dressing and general cleaning in hospitals. Heavy drainage, promoting healing, keeping the wound dry, optimal comfort and relief.	Pankajavale products
68.	Nanocrystal wound dressing		Polyester coated with polypropylene mesh	Used for burn injuries.	Smith & Nephew

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69.	Neoprene support elbow sleeve		Woven laminated Neoprene	Provides compression, padding and warmth to the elbow region. Targeted pressure relief.	ACMC (p) Ltd
70.	Neoprene support anklet		Neoprane fabric	Provides comfortable support during or after physical activity to reduce risk of injury.	ACMC Pvt Ltd, Chennai

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71.	Neoprene support (open patella knee brace with belt)		Neoprane material, 4 way stretch contoured design	Provides comfortable support during or after physical activity to reduce risk of injury.	ACMC Pvt Ltd, Chennai
72.	Neoprene support (universal wrist wrap)		Neoprane fabric	Provides comfortable support during or after physical activity to reduce risk of injury.	ACMC Pvt Ltd, Chennai

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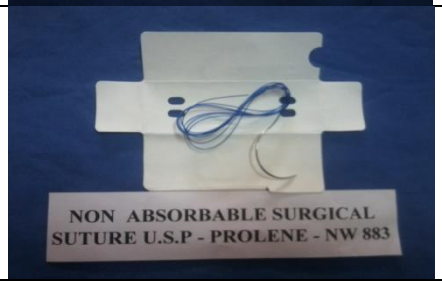
73.	Non absorbable suture ethilon		Nylon 6 monofilament	Used for wound closure	Johnson & Johnson
74.	Non absorbable suture mersilk		Braided Silk	Used for wound closure	Johnson & Johnson
75.	Non absorbable suture - prolene		Polypropylene	Used for wound closure	Johnson & Johnson

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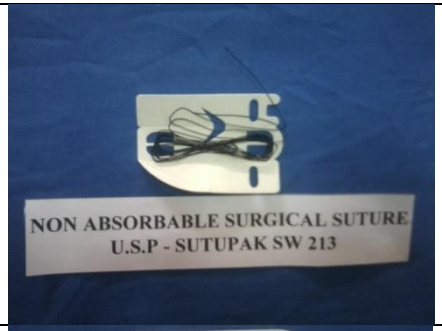
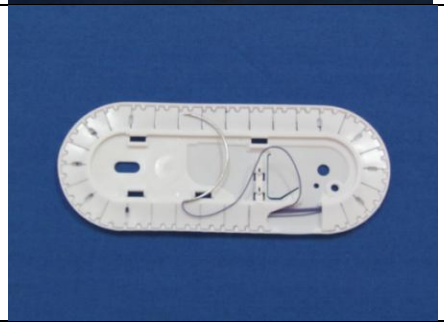
76.	Non absorbable suture - sutupak		Braided polyester suture	Used for wound closure	Johnson & Johnson
77.	Non absorbable suture Trulon		Monofilament polyamide	Used for wound closure	Sutures India Pvt Ltd
78.	Non absorbable suture monocryl		poliglecaprone 25	Used for wound closure	Johnson & Johnson

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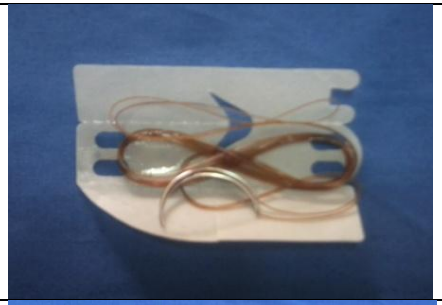
79.	Non absorbable suture chromic		Catgut suture	Used for wound closure	Johnson & Johnson
80.	O.A Knee support		Neoprane fabric	Help support individuals who have osteoarthritis in the knee.	Tynor orthotics

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81.	Open woven gauze bandage		Woven	Used for wound dressing support layer.	Ramaraju, Surgicom
82.	Panty liners		Nonwoven, SAP	Used for feminine hygiene. It is worn in the gusset of a woman's panties. Some uses include: absorbency for daily vaginal discharge, light menstrual flow, tampon and menstrual cup backup, spotting, post-intercourse discharge and urinary incontinence.	Johnson & Johnson, Thailand

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Lead : South India Textile Research Association (SITRA)	

83.	Paraffin gauze dressing		Gauze weave with paraffin wax coat	Treatment of ulcers, burns, skin grafts (both donor and receptor sites) and various traumatic injuries.	Komal health care P Ltd.,
84.	Patellar support		Uniquely shaped silicone pad fits over the patellar tendon Soft material is comfortable against skin and behind the knee Fully adjustable Velcro exterior for custom sizing	The patella brace is designed to provide symptomatic relief of pain and inflammation	D.N. Products, India LP supports, UK
85.	Patella knee support		Neoprene fabric	The patella brace is designed to provide symptomatic relief of pain and inflammation	Royal Chemists Mumbai

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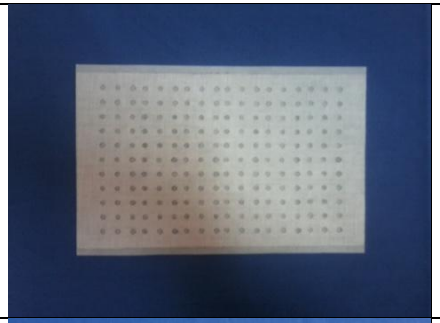
86.	Plaster		Active Ingredient – Alkaloids of belladonna	Relief from swelling pain, backache, swelling of nerves, Joint swelling	Lion, Goa
87.	Plaster of paris bandage		Weaving & Coating	Used as a dressing for bone fracture and immobiliser.	Beiersdorf India

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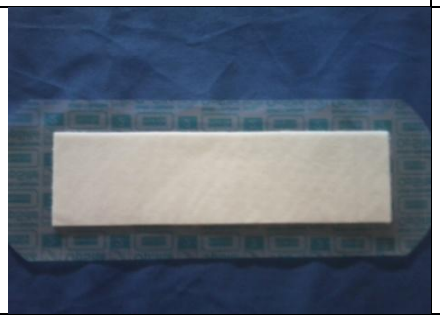
88.	Pouch arm sling		Nylon, PE, PP, Ethafoam, PU	Keeping your arm immobile can aid the healing process and can minimize the pain of the injury. A broad arm sling holds your arm against your chest in a fixed position, and can be applied by using a large triangular-shaped bandage.	Tynor orthotics
89.	Post- op		Nonwoven	Wound dressings	Smith & Nephew

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Lead : South India Textile Research Association (SITRA)	

90.	Pre controlled back spilint		Polyester, Cotton, Ethafoam, Polyamide, Rubber. Woven	Support to the lumbo-sacral region. Maintaining proper back posture.	Tynor Orthotics Pvt Ltd
91.	Pressure garments		Elastic garments worn for exerting pressure against the body-parts reducing the diameter of distended veins causing an increase in venous blood flow velocity and valve effectiveness.	For athletes, Oedema patients (eg. Lymphoedema) For patients with poor blood circulation For burnt parts to improve circulation	Pharmatech Distributors, New Delhi India. Technomed India (pvt) Ltd.

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COE on Meditech	
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92.	Sanitary napkin		Nonwoven, SAP	Used in mensual period.	Stay free, whisper ultra
100	Shape wear garments		Nylon/Spandex/ Cotton fabric and cotton lining. 3-Ply Fabrication: Cotton-Rubber-Cotton Double hook & eye closure	Accelerated weight loss Firm compression vest Reduces waistline and flattens abdomen Corrects posture and helps relieve back pain For smoothing and flattening the abdomen, waist, thighs and back and for post-surgery needs.	Insight Products, Delhi, India.

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Lead : South India Textile Research Association (SITRA)	

101	Shoulder Immobiliser		Made of Sanforized cotton Shoulder straps with padding for secure positioning Circumferential arm wrap to immobilize the shoulder Velcro closures for easy application and removal	To give support to the arm and hand along with limiting movements at the shoulder joint To immobilize the arm and shoulder joint post fractures	Dynamic Techno Medicals Pvt. Ltd, India. Apothecaries Sundries Manufacturing Co. New-Delhi, India.
102	Sling with tie		Soft foam in sleeved stockinette Plastic fastening ties for easy applications	To provide effective support without the need for additional padding	Dynamic Techno Medicals Pvt. Ltd, India. Sai pharma, India

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103	SMS nonwoven gown		Polypropylene	Operation theatre apparels	Medipro
104	Surgical gown sterilised		Woven	Operation theatre apparels	

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105	Spinal brace		Two rigid upright para-spinal and lateral bars of light-weight are pre-contoured to keep spine in it's natural position. Elastic abdominal panels provide the required compression. Clavicle straps with cotton stockinet covered foam pads correct shoulder posture.	Mild thoracic-lumbar injuries Herniated disc problems Post operative rehabilitation	Apothecaries Sundries Manufacturing Co. New-Delhi, India Track manufacturing co.pvt, ltd, India

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106	Surgical abdominal corset		Made of cotton with sturdy elastic, which fits along the body contours perfectly. Special elastic in the anterior region offers compression Foam padding for comfort fit	Post operative conditions of the abdomen Post umbilical and ventral hernia	Dynamic Techno Medicals Pvt. Ltd, India. Apothecaries Sundries Manufacturing Co. New-Delhi, India.
107	Tampons		made of rayon, or a blend of rayon and cotton	The most common type in daily use (and the topic of the remainder of this article) is designed to be inserted into the vagina during menstruation to absorb the flow of menstrual fluid..	Bella premier happy hygiene care Pvt Ltd, Dindigul

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Lead : South India Textile Research Association (SITRA)

108	Therapeutic energising stocks		The ideal pressure for reducing foot fatigue symptoms. Over the calf graduated compression stocking are effective in reducing the actual swelling and subjective feeling of heavy and tired legs.	Cramps in calf muscles. Mild oedema. Tired and aching leg. Swollen ankles. Post Plaster conditions.	Dynamic Techno Medicals, India. Avishkar international pvt, ltd, India.
109	Thigh high stockings		Complex stitch in tips of compression Softer and non protruding wear feeling. Non pressure knit in tips and heels to create the most comfortable wear feeling.	Helps move blood and fluid that is sitting on the outermost layers of the ankle and calf to move to deeper tissues and veins, in order to allow the calf muscle, to move the blood back towards the heart and the systemic circulation.	Harvest SPF textile ltd , china JSTAR global company, Taiwan.

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Lead : South India Textile Research Association (SITRA)

110	Varicose vein stockings		Knitting- 80% - Polyamide 20% - Elastane	Controlled and graduated compression ensure faster return to normal circulation	Dynamic techno medicals
111	Waist reduction belt		Woven with neoprene lining	Used for reducing waist region	ACMC (p) Ltd

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112	Wet wipe		Spun lace nonwoven	Face freshener	Daycare Products, Origami
113	Wrist brace with thumb		Weaving, Nylon, Polyester, Rubber materials	Nonsurgical care of sprain wrist and thumb joint	Samson Scientifics & Surgicals

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COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 50**
Following list of "Books and Publications" is to be added in existing list under Information Centre	

Information Center

Books and publications

1	Ayurvedic healing. By David Frawly
2	Textbook of medical physiology. By Guyton and Hall
3	Ganong's review of medical physiology. By Kim Barret
4	Essentials of human anatomy and physiology. By Elaine Marieb
5	Fundamentals of Biochemistry. By Jain
6	Essentials of Biochemistry. By Satyanarayana
7	Biochemistry. By Satyanarayana
8	Elements of Biotechnology. By Dubey
9	Elements of Biotechnology. By Gupta
10	Anatomy of Physiology in Health and Illness. By waugh
11	Principles and Techniques of Biochemistry and Molecular Biology. By Wilson
12	Biomaterials for artificial organs. By Webster
13	International Nonwovens Symposium 2009. by EDANA
14	International Nonwovens Symposium 2007. by EDANA
15	International Nonwovens Symposium 2006. By EDANA

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COE on Meditech
Lead : South India Textile Research Association (SITRA)

16	Outlook 2009. by EDANA
17	Nonwovens Research Academy 2008. by EDANA
18	Nonwovens Research Academy 2007. by EDANA
19	Nonwovens Research Academy 2006. by EDANA
20	Nonwovens Research Academy 2005. by EDANA
21	Standard Test Methods for the Nonwovens Industry–Edition2011.by EDANA
22	Worldwide Outlook for the Nonwovens Industry 2007-2012. by EDANA
23	World Markets for Technical Textiles to 2017.

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COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 51**
Following "List of Journals" is to be added in existing list under Information Centre	

List of Journals

1. BCH Tech Tex India
2. Nanotech Insight
3. Nano Vision
4. Nonwoven & Technical Textiles Technical Textile International

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COE on Meditech
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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 51**
Following "List of Standards" is to be added in existing list under Information Centre	

List of Standards

1	ASTM E 2180 – 07	Activity of incorporated antimicrobials agents in polymeric or hydrophobic materials
2	ASTM E 1881 – 06	Standards guides for cell culture analysis with SIMS
3	ASTM F 0813 - 07	Standards practice for direct contact cell culture evaluation of materials for medical devices
4	JIS L 1902:2008	Testing for antibacterial activity and efficacy on textile products
5	BS EN 13726-1:2002	Test methods for primary wound dressings – Aspects of absorbency
6	BS EN 13726-2:2002	Test methods for primary wound dressings – Moisture vapour transmission rate of permeable film dressings
7	BS EN 13726-3:2003	Test methods for primary wound dressings – Waterproofness
8	BS EN 13726-4:2003	Test methods for primary wound dressings – Conformability
9	BS EN 13726-6:2003	Test methods for primary wound dressings – Odour control

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10	BSEN 13795:2011	Surgical drapes, gowns and clean air suits, used as medical devices for patients, clinical staff and equipment general requirements for manufacturers, processors and products, test methods, performance requirements and performance levels
11	BSEN 14683:2005	Surgical masks requirements and test methods
12	ISO 811:1981	Textile fabrics – Determination of resistance to water penetration – Hydrostatic pressure test
13	AS 3789.1-1991	Textiles for health care facilities and institutions: Part 1 General ward linen.
14	AS 3789.2-1991	Textiles for health care facilities and institutions: Part 2 Theatre linen and pre-packs.
15	AS 3789.4 – 1994	Textiles for health care facilities and institutions: Part 4 Wool blankets.
16	AS 3789.5 – 1996	Textiles for health care facilities and institutions: Part 5 Wool blankets – laundering procedures.
17	AS 3789.6 – 1998	Textiles for health care facilities and institutions: Part 6 Fabric specifications.
18	AS 3789.8 – 1997	Textiles for health care facilities and institutions: Part 8 Recyclable barrier fabrics.
19	AS 3789.9 – 1998	Textiles for health care facilities and institutions: Part 9 Curtains and patient bed screens – Fabric performance properties.
20	AS3789.10 – 2000	Textiles for health care facilities and institutions: Part 10 Blankets – cotton woven cellular blankets.

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21	ISO 9073	Textiles – test methods for nonwovens. (15 Standards)
22	ISO 10993	Biological evaluation of medical devices. (7 Standards)

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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	Revised Page No. 51
Following "Technical Manpoower" is to be replaced in existing	

Technical Manpower

S.No	Name	Qualification	Experience (Years)
1	Dr.Prakash Vasudevan (Director)	Ph.D	21
2	Sakthivel Perumalsamy (Head)	MBA D.H.T	25
3	Dr . K.P. Chellamani.	Phd	32
4	R.Krishnan	M.E	30
5	Dr.Santhini	PhD (Biotechnology)	1
6	S.Thirupathi	M.Tech (Textile Technology)	19
7	V.Kumaravel	B.E (Mechanical Engineering)	26
8	S.Sounderraj	M.Tech (Textile Technology)	14
9	T.Sureshram	M.Tech (Textile Technology)	8
10	P.Sundramoorthy	M.Tech (Textile Technology)	2
11	Dr. Thirumala srinivas P	B.A.M.S, M.F.M NIFT	2
12	S.P.Sivasubramanian	M.Tech (Technical Textiles)	2
13	A.Neha	M.Tech (Technical Textiles)	-
14	V.J.Rajendren	D.T.T	32
15	D.Ranganathan	M.Sc (Chem)	16
16	C.Sathishkumar	M.Sc (Chem)	6
17	B.Renuka	M.Sc (Chem)	5
18	K.Nandhini	M.Sc M.Phil (Microbiology)	1
19	S.Ravichandran	D.T.P	3

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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 52**
Following "List of Standards Formulated" is to be added in existing list	

List of Standards Formulated

SITRA has formulated the standards for the following Meditech related products:

1. Tubular bandages
2. Orthopedic stockings

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COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 52**
Existing "R & D Projects on Technical Textiles Undertaken/Underprogress" is to replaced with following "R & D Projects on Medical Textiles Completed/Ongoing"	

R & D Projects on Medical Textiles completed/ongoing

S. No.	R & D Project Title	Status of the Projects
1	Development of bifurcated vascular graft	Completed
2	Design and development of hernia mesh	Completed
3	Development of barbed, bi-directional surgical sutures	Completed
4	Development of functional spacer fabrics for medical inlays in orthopedic shoes	Completed
4	Development of specialty 3 D compression bandages for lymphedema	Completed
5	Development of spunlaced non-woven wound dressings using bamboo fibres	Completed
6	Breathability of woven surgical gowns treated with nano finishes	Completed
7	Design and fabrication of an instrument to assess the barrier properties of operation theatre surgical apparels with specific reference to blood and other body fluids	Completed
8	Development of special wound care dressing made of PVA / Chitosan and PVA/Silver nitrate nano membrane	completed

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9	Development of compression bandage pressure measurement systems	completed
10	Controlled drug release on Chitosan-coated cotton gauze	Completed
11	Development of rotator cuff repair devices for shoulder re-construction	Completed
12	Development of wound dressing made of electro spun herbal drug and allopathic drug incorporated in PCL nano membrane	Ongoing
13	Hospital bed linens with enhanced thermal properties for coma patients	Ongoing
14	Design and fabrication of an instrument to assess the resistance of materials used in medical face masks to penetration against aerosol particles using latex spheres	Ongoing
15	Development of textile matrices for the effective wound management	Ongoing
16	Development of a 'Hi-protection' nanomembrane incorporated & Nano-coated Surgical facemask	Ongoing
17	Design and Development of an automated equipment to produce knotless incision closures,	Ongoing
18	Development of a Leukodepletion Blood Filter	Ongoing

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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 53**
Following "Details of Prototypes Developed" is to be added in existing list	

Details of prototypes developed by COE

1. Development of 4- layered face mask
2. Development of 8-layered mopping pad

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COE on Meditech
Lead : South India Textile Research Association (SITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 53**
New section "Programs Conducted" is to be created after section "Training Programs Offered"	

Programs Conducted

- Diversification possibilities in Meditech held at Thiruchengode on 09.02.2012
- Diversification possibilities in Meditech held at Bhavani on 23.02.2012
- Diversification possibilities in Meditech held at Thirupur on 09.03.2012
- One day all India medical textiles stakeholders meet at SITRA on 24.03.21012
- Workshop on Medical compression stocking production using Merz machine – Germany 25.04.2012 to 27.04.2012 at SITRA
- One – day Workshop titled "Business Opportunities in Medical Textiles" was conducted at Palladam Hi-tech Weaving Park on 21.07.2012
- One day training programme entitled on " Business opportunities in technical textiles at Karnataka" was conducted at Bangalore on 14.09.2012
- One day training programme entitled on " Business opportunities in Meical Textiles" was conducted at Karur on 29.11.2012

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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 53**
Existing "Foreign Collaboration Details" is to be replaced with following	

Foreign Collaboration Details

SITRA has executed a MoU on 25th January, 2010 with the University of Bolton, UK. The MoU is valid for 2 years and it has been renewed for another 2 years, and covers research in healthcare and medical textiles.

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Updation Details as on Nov 2012	
Chapter No. & Name: 5. COE on Meditech	**Revised Page No. 54**
Existing "Contact Details" is to be replaced with following	

Contact Details

Name : Sakthivel Perumalsamy
Position : Head, Centre for Excellence in Medical Textiles
Educational Qualification : M.B.A, D.H.T
Industrial experience : 25 years

13/37, Avinashi Road, Coimbatore Aerodrome, Coimbatore- 641 041, Tamil Nadu
Email: sitraindia@dataone.in
Phone:+91-422-2574367-9, 6544188, 4215333

Annex - 4
COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshot of COEs	**Revised Page No. 10**
Existing matter on "COE on Protech" is to be replaced with following	

COE on Protech

The Project Evaluation Committee constituted by the Ministry of Textiles, Government of India designated the Northern India Textile Research Association (NITRA) and Indian Institute of Technology, New Delhi with NITRA as lead partner as Centre of Excellence for Protective Textiles.

NITRA has successfully completed following projects on Technical Textiles:

1. Development of fire resistant equipment
2. Development of industrial fabrics
3. Protective clothing from jute
4. Development of antimicrobial fabric
5. Development of UV resistant fabric
6. Protection against pesticides
7. Development of cut resistant & abrasion resistant protective textile by using composite metallic yarn
8. Developing shield of corn fabrics for enhancing the protection from flame
9. Developing armor using Hi-Modulus Polyethylene (HMPE) fibre
10. Development of water purification device using textile material for military and paramilitary personnel
11. Development of protective material from nylon 66 and corn
12. Development of flame resistant and chemical resistant laboratory coat/apron
13. Selection of combat uniform cloth on the basis of comfort, wear and safety properties

Following products have been developed at NITRA:

1. NYCO fabric for Paramilitary and Military combat uniforms
2. Personal protective textile using novel fibre
3. Functional fabric to provide bacterial & ultraviolet protection to the skin (bamboo)
4. Extra soft knitted fabric for inner wear / kids wear by using 'High Performance Modal Fibre'
5. Stab Resistant Fabric from Dyneema - Hi-Modulus Polyethylene (HMPE)
6. Cut Resistant Fabric using Composite Metallic Yarn
7. Cut resistant glove from Nylon/Steel composite Metallic Yarn
8. Cut resistant glove from polyester/Steel composite Metallic
9. Cut resistant glove from Cotton/Steel composite Metallic Yarn

Annex - 4
COE on Protech
Lead : Northern India Textile Research Association (NITRA)

With respect to prototypes, the following instruments have been developed:

- **Flammability Tester (As per BS 5438)**

This instrument is developed as per BS 5438 and is used to determine the effect of fire on textile materials in vertical mode.

- **Flammability Tester (As per IS 11871 Method A)**

This instrument is developed As per IS 11871 Method A and is used to determine flammability behaviour of textile material when specimen is placed in vertical position.

- **Smoke visibility test apparatus (As per UIC code 562 – 2 Appendix 15)**

This instrument is developed as per UIC 564-2 Appendix 15 and is used to determine the effect of smoke generated on visibility.

- **Fire resistant test apparatus (As per UIC code 562 – 2 Appendix 5 and 12)**

This instrument is developed as per UIC 564-2 and is used to determine the effect of fire on various materials.

- **Limiting Oxygen Index Tester**

This instrument is used to determine Limiting The limiting oxygen index of textiles and plastic material. oxygen index (LOI) is the minimum concentration of oxygen, expressed as a percentage, that will support combustion of a small vertical test specimen under specified test conditions. It is measured by passing a mixture of oxygen and nitrogen over a burning specimen. This instrument is based on IS 13501.

- **Toxicity Tester**

This instrument tests the toxicity of the products of combustion in terms of small molecular species arising when a small sample of a material is completely burnt in excess air under specified conditions

- **Fabric Hand Tester**

The main features of this instrument are that it Quantifies handle and results are formatted analytically and graphically which are easy to interpret.

- **Dimensional Stability to Dry Heat Tester**

Annex - 4
COE on Protech
Lead : Northern India Textile Research Association (NITRA)

This instrument is very useful to determine the effect of full garment iron (dry heat) on the dimensional stability of fabric. The instrument is based on IS 12170 (referred specification IS 15853).

- **Soil release efficiency Tester**

This instrument is used to determine the ability of soil release of textile material after treatment with various types of soils. The instrument is based on IS 11813 (referred specification IS 15853).

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 55**
Existing section "Background and Information of Parent Organization(s)" is to be replaced with following	

COE on Protech

Lead: Northern India Textile Research Association (NITRA)

Background and information of parent organization(s)

The Centre of Excellence for Protective Textiles is led by NITRA. The first phase of the COE implementation also saw involvement from the Indian Institute of Technology, New Delhi.

Northern India Textile Research Association (NITRA)

NITRA is one of the four textile research associations established in the year 1974 with the objective to carry out scientific research in the field of textiles as well as to promote and foster scientific research studies for the extension of knowledge related to or connected with textile industry. NITRA is linked to the Ministry of Textiles and recognized by the Department of scientific and Industrial Research for providing services to centralized as well as decentralized sectors.

NITRA is rendering services to centralized sector through various R&D projects, consultancies, training programmes and publications. These services span across areas such as energy audit, manpower studies, pollution control, machine and design development, designing of effluent treatment plants and software development. Besides, NITRA helps the industry in solving their operational problems. NITRA is also rendering services to the decentralized sector through seven Powerloom Service Centers established by the Ministry of Textiles, Govt. of India in the Northern Region under administrative control of NITRA, Ghaziabad.

Indian Institute of Technology (IIT), Delhi

IIT Delhi was created as centre of excellence for higher training, research and development in science, engineering and technology in India. Established as college of Engineering in 1961, the Institute was later declared an institution of National Importance under the 'Institutes of Technology (Amendment) Act, 1963' and was renamed 'Indian Institute of Technology Delhi'.

The Textile Technology Department at IIT Delhi enjoys a special status in the country and has the distinction of being the only Textile Technology Department among the IITs. The Department aims to achieve excellence in education in Textile Technology through continuous up gradation of textile syllabi, conducting fundamental research in established and emerging technologies as well as applied/developmental research by closely interacting with the industry and thus provides highly competent technical manpower to the industry, R&D organisations and academic institutes.

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 55**
Existing "Testing Instruments Installed at NITRA" under Infrastructure facilities are to replaced with following	

Infrastructure Facilities

Testing Instruments Installed at NITRA

	Equipment	**Purpose**
1	Flammability tester (Surface & edge ignition)	This instrument is useful to test work wear as per national and International standards.
2	Limited Oxygen Index Tester	This instrument is used to test flame retardant behavior of fabric under varying oxygen and nitrogen concentrations
3	Contact Heat Tester	This instrument is used to test the protective textile material against contact heat.
4	Washing and dry cleaning cylinder	This instrument is used to determine the effect of washing and dry cleaning on flame resistance properties of protective clothing.
5	Moisture analyzer	This instrument is used to determine moisture content in the protective textiles.
6	Mechanical pre-treatment device for metalized material	The effectiveness of metalized coatings in reflecting radiant heat can be drastically reduced by the effect of wear. In this instrument protective textiles are mechanical pretreated to simulate wear.
7	Rapid oil extraction apparatus	This instrument is used to determine quantity of spin finish oil in the textile materials.
8	Bundesmann Water repellency Tester	This instrument is used to determine the resistance to the passage of simulated rain by fabrics being rubbed and rotated.
9	Rotary crock meter	This is used to determine wet or dry rubbing fastness properties of printed fabric.
10	Humidity and temperature control Chamber	This is used to condition textile material before performing tests.
11	Inclined Automatic Flammability Tester	To determine the burning characteristics of textiles under controlled conditions, when the textile material is in inclined (45°) stage.
12	Molten metal splash Tester	This instrument is used to assess the resistance of protective clothing to molten metal splash.
13	Vertical Flammability Tester	This instrument is used to measure the vertical flame

Annex - 4

COE on Protech

Lead : Northern India Textile Research Association (NITRA)

	Equipment	Purpose
		spread for children sleepwear, fabrics and other textile materials.
14	Horizontal Flammability Tester	To determine the comparative burn rates and burn resistance of textiles.
15	Radiant Heat transmission tester	This instrument is used to compare the heat transmission on exposure of radiant heat through materials used in protective clothing. By this instrument heat transmission index is measured
16	Convective heat Tester	This instrument is used to compare the heat transmission on exposure of flame through materials used in protective clothing. By this instrument heat transmission index is measured.
17	Moisture Management Tester	This instrument is used to measure liquid moisture management properties of knitted, woven and nonwoven textile fabrics.
18	Fogging Tester	This instrument is used to determine fogging characteristics of automotive interior trim of textiles, plastic or leather.
19	Hydrostatic Head Tester	This is used to determine the resistance of fabric to water penetration under pressure while firmly clamped in the test rig of standard area, by means of dynamic test method and static test method.
20	Spray Tester-Water Repellency	To determine the surface wetting resistance of fabric.
21	Water Cooled Xenon Tester	This instrument is used to determine weathering effect on textile and plastic material.
22	High Visibility clothing testing equipment	These instruments are used to determine the high visibility clothing (Retro reflective and background material).
23	Electronic crock meter	This is used to determine the colour fastness of textile materials to dry or wet rubbing.
24	Vibroscope & Vibrodyne (Lenzing)	Vibroscope : To determine fineness of manufactured fibres Vibrodyne : To determine fibre tensile properties viz breaking strength , tenacity , Elongation , Modulus etc.
25	Vibrotex (Lenzing)	To determine crimp stability of manufactured fibres
26	Microscope & Microtome (Zeiss)	For microscopic studies
27	Uster Tester-5	To determine yarn unevenness , imperfections & hairiness
28	Uster Tensorapid -4	For tensile properties of yarn / Thread viz breaking force , tenacity , elongation , modulus etc
29	Constant Tension Transport	To determine frictional properties of yarn

Annex - 4

COE on Protech

Lead : Northern India Textile Research Association (NITRA)

	Equipment	Purpose
	(CTT) Lawson- Hemphill	
30	Universal Tensile Testing M/C (SDL)	To determine tensile properties of yarn / Fabric and also used for seam strength , puncture strength , Peel / bond strength , constant load elongation and Tear strength etc
31	Martindale Abrasion Cum Pilling tester (SDL)	To determine abrasion & Pilling properties of fabric / garments
32	CSI Abrasion Tester	To determine wear properties of fabric and garment
33	Wyzenbeek Abrasion tester (Oscillatory abrasion Tester) SDL-ATLAS	To determine abrasion Resistance property of textiles
34	ICI Mace Snag Tester SDL-ATLAS	To determine snagging resistance property of fabric /garments
35	Tear strength Tester (Textest)	To determine tear strength of fabric / Garments (Elmendorf Tear)
36	Surface Resistance Tester (Rothschild static Voltmeter)	To determine antistatic properties of textiles
37	Brush Pilling Tester (SDL-ATLAS)	To determine fuzz & Pilling Propensity of textiles .
38	Air Permeability Tester (WIRA)	To determine air permeability of fabric / Garments
39	Toxicity Tester	To determine toxicity of various materials.
40	D.S.C. Instrument	To determine thermal properties of polymers.
41	T.G.A. Instrument	To determine thermal properties of polymers.
42	Universal Tensile Machine	To determine tensile properties of materials.
43	Seam Fatigue Tester	To determine the effect of cycles on seam.
44	Resistance to Heat under Load Tester for Zipper	To determine the effect of heat and load on zippers.
45	Reciprocating Movement of Slider under Load Tester for Zippers	To determine the effect of zippers movement under load.
46	Endurance Test for Hook & Loop Fastener	To determine the usability of hook & loop fastener.
47	Deterioration of Smoke Visibility Tester	To determine the effect of smoke generated on visibility.
48	Vertical flammability tester (as per NFPA- 701, Method-2)	This instrument is used to evaluate the burning behaviour of coated, laminated, multilayered fabric, films and plastic blinds having mass more than 700 g/sq meter.
49	Salt spray chamber	This apparatus is to be used in conducting the neutral salt spray, acetic acid salt spray and copper-accelerated acetic acid salt spray

		tests for assessment of the corrosion resistance of metallic materials, with or without permanent or temporary corrosion protection especially automotive industry..
50	Electrical resistance tester	This instrument is used to determine electrical resistance of the protective material
51	Impact of spatter tester	This instrument is used to evaluate the behaviour of protective clothing on impact of small splashes of molten metal
52	Accelerated weathering tester	This instrument is used to determine weather resistance of a material
53	Gas fume chamber	This instrument is used for assessing the resistance of the color of textiles of all kinds and in all forms when exposed to atmospheric oxides of nitrogen as derived from the combustion of natural gas
54	Thermal & water vapour resistance tester	This instrument is useful to determine thermal and water vapour resistance of protective textiles.
55	IMO tester (as per International maritime organization)	This instrument is used to determine Lateral spread of flame on building and transport products in vertical configuration
56	Thermal protection performance tester (TPP)	It measures the thermal performance properties of textile materials when exposed to a dual open burner heat source combined with quartz heater radiant exposure
57	Digital printing machine	This machine is used in continuous printing of fabrics and garments.
58	Jigger	This machine is used for chemical processing the material in open width.
59	Tumble Pilling Resistance Tester	To assess pilling tendency of the fabric
60	Blade cut resistance Tester	To determine Blade cut resistance property of the fabric
61	Thermal Shrinkage Tester	To determine thermal shrinkage of yarn / plastics tapes
62	Schopper Abrasion Tester	To determine abrasion resistance of fabric
63	Yarn on Yarn abrasion	To determine abrasive property of yarn/ thread
64	Fabric Friction Tester	To determine static & kinetic friction of the fabric
65	Toxic Index Analysis Chamber	To determine toxic index of materials
66	Temperature Chamber for UTM	To determine tensile properties at different temperatures
67	Deep Freezer	To study affect of low temperature on protective textiles
68	Crumple Resistance Tester	To determine crumple resistance of protective and automotive fabrics

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	Revised Page No. 60
Following image is to be added in existing "Images: Testing Equipment at the COE"	

Images: Testing Equipment at the COE

IMO Tester

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 60**
Existing "Parameters that can be tested at the Protech COE" are to be replaced with the following	

Parameters that can be tested at the Protech COE

Heat and Flame resistance tests

Personal Protective Clothing	
Ease of ignition of vertically oriented specimen	BS EN ISO 6940
Flame spread properties of vertically oriented specimen	BS EN ISO 6941, BS EN 1103
Night wear clothing	BS 5438, BS 5722
450 inclined specimen	16FR 1610, ASTM D 1230, NFPA 702
Vertical flammability test	IS:11871, BS 3119, NFPA 1971
Horizontal flammability test	IS:15061, ASTM D 4804
Limited flame spread test	ISO 15025, BS 5438:1976 test 1, test 2 and test 3, IS:15758 (part-4)
Surface flammability test	ISO 5658-2, IMO A 653
Convective heat test	ISO 9151, IS:15758 (part-1)
Radiant heat test	ISO 6942, IS:15758 (part-2)
Molten metal splash test	ISO 9185, IS:15758 (part-5)
Contact heat test	ISO 12127
Thermal Protective Performance Tester (TPP)	NFPA-2112, ISO 17492, NFPA 1971, NFPA 1981, ASTM F 2700, ASTM 2703
Thermal & water vapour resistance tester	ISO 11092
Impact of spatter test	ISO 9150, IS:15758 (part-1)
Electrical resistance	EN 1149-2
High visibility	EN 471, IS:15809
Upholsteries	
Ignitability of vertically oriented specimen	BS EN 1101, IS:15612, IS:15741
Flame spread vertically	BS EN 1102, NFPA 701, BS 5867, BS EN 13772
Smoldering cigarette test	IS: 15727, BS 5852 (Source 0)
Match flame, cribs	BS 5852 (Source 1 to 7)
Automotive Fabrics	
Horizontal test	FMVSS 302, DIN 75200, IS 15061

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COE on Protech

Lead : Northern India Textile Research Association (NITRA)

Fabric Supplies to Railways	
Limiting oxygen index	IS:13501, ISO 4589-2
Smoke visibility test	UIC 564-20R appendix 15
Toxicity Index	NCD 1409
Fire resistance test	UIC 564 OR
Floor Coverings	
Methanamine tablet test	BS 6307, IS: 12722
Hot metal nut test	BS 4790
Vertically oriented	IS: 15764

Colour fastness and weathering effect

Colour fastness to light	IS 2454, ISO 105 B02, B 03, B04, AATCC-16
Colour fastness to laundering	IS 105-C10, C06, AATCC 61
Colour fastness to Rubbing	IS 766, ISO 105-X12, AATCC-8
Colour fastness to Perspiration	IS 971, ISO 105 E04, AATCC 15

Water resistance

Bundesmann/shower test	IS 392
Cone Test	IS 7941
Spray Test	IS 390, AATCC 22, ISO 4920
Hydrostatic pressure Head Test	IS 7016 (Part-VII), AATCC 79, ASTM D 4772
Water vapour transmission test	ASTM E 96

Mechanical Testing on fabric / Garments

Tensile Strength -Cut Strip Method -Wide width Method -Ravelled Strip Method -Grab Method	IS :1969 ASTM D 5034 ASTM D 5035 ASTM D 4355 ASTM D 4595 ISO 5081 ISO 10319
Tear strength -Falling Pendulum Method -Single Tongue Tear -Double Tongue Tear -Trapezoidal Tear Method	IS : 6489 ASTM D 1424 ASTM D 2261 ASTM D 4533 ASTM D 5587 ISO 9290
Bursting Strength	IS: 1966

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-Ball Bursting Method -Diaphragm Bursting Method	ASTM D 3787 ASTM D 3786
Abrasion Resistance -Martindale Abrasion -Flax & Flat Abrasion -Wyzenbeek Abrasion Schopper Abrasion Test	IS : 12673 ASTM D 3885 ASTM D3886 ASTM D 4966 ASTM D 4157 DIN 53863 Part – 2 GMW 3283, GME 60345
Puncture Strength Test -Falling cone Method -CBR Puncture Method	ASTM D 4833 ASTM D 6261 ASTM D 6241
Seam strength Test & Seam Slippage Test	ASTM D 1683 ASTM D 434 ISO 13935-1 &2 ISO 13936 -1&2
Snag Resistance Test	ASTM D 3939
Fabric Stretch & Growth	ASTM D 6614 ASTM D 5278 ASTM D 3107;2594
Stiffness & Flexural Rigidity	IS 6490 ASTM D 1388 BS 3356
Constant Load Elongation & permanent set	ASTM D 6614
Bond / Adhesion strength / Peel Strength / Shear strength Cut resistance	ASTM D 2724 ASTM D 3936 ASTM D 3135 ISO 4637 EN 388

Mechanical Testing on Yarn / Thread

Yarn / Thread Strength Loop strength & Knot strength	ASTM D 2256 IS :1671
Yarn / Thread Elongation	ASTM D 2256 IS :1671
Yarn Un-evenness & Imperfections	ASTM D 1425 ISO 16549
Yarn Twist	ASTM D 1422/1423 IS 832
Yarn / Thread Shrinkage due to exposure to boiling water or dry heat	ASTM D 204 ASTM D 4974 ASTM D 2259
Thread Diameter	ASTM D 204

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Yarn on yarn abrasion (Dry & Wet)	ASTM D 6611
Yarn to Yarn & Yarn to metal friction	ASTM D 3108 ASTM D 3412

Mechanical Tests on Fibre Properties

Microscopic study on fibre structure -Longitudinal / Cross sectional structure	
Fibre length	ASTM D 5103 IS 10014 Part 1
Fibre Fineness	ASTM D 1577 IS 10014 Part 2 BISFA
Fibre Strength , Elongation and Modulus	ASTM D 3822 ISO 5079 DIN 53816
Fibre Crimp & crimp stability	ASTM D 3937
Fibre Shrinkage -Bundle Test -Single Fibre Test	ASTM D 2102-07 ASTM D 5104
Fibre Diameter	-
Breaking Tenacity of manufactured fibres in loop & knot configuration	ASTM D 3217

Additional tests

Zipper Test	IS 14181, IS 3148, IS 9748 and BS 3084
Endurance Test for Hook & Loop Fastener	IS 8156
Seam Fatigue Test	JASO M 403, HES D 6511, SES N 3298 & 3294 and NES M 7081
D.S.C. & T.G.A.	ASTM D 3418 and ASTM D 6370
Crease Flex Test	HES D 6511 and SES N 3298
Tensile Properties	IS 7016, IS 1969, ASTM D 638
Thermal Insulation	Thermal Conductivity Apparatus
Ultra Violet Protection factor	AATCC 183 and AS/NZS 4399
Peel Strength	IS 7016, IS 8156 and IS 1259
Ignitibility Test (includes Cigarette, Butane Gas, Wooden Crib Test)	BS 5852
Zipper(Slide Fastener)	
Remeshability of Fastener	IS 14181
Fold Over Security of Textile Chain	IS 14181
Resistance to Abrasion under Load Cycles	IS 14181
Security of Attachment of Bottom Stop	IS 14181

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Lead : Northern India Textile Research Association (NITRA)

Security of Attachment of Puller to Slider	IS 14181
Security of Attachment of Top Stop	IS 14181
Security of Inter-Locking of Textile Chain to Lateral Load	IS 14181
Security of Slider Lock Holding	IS 14181
Chain Crosswise Strength	IS 14181
Security of Attachment of Retainer to Longitudinal Load	IS 14181
Security of Attachment of Retainer to Lateral Load	IS 14181
Resistance to Heat under Load	IS 14181
Reciprocating Movement of Slider under Load	IS 14181

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Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 63**
Following "Spinning Equipment" is to be added in existing list	

Spinning Equipment

Parallel Winding Machine	Lab Model

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Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 64**
Following "Weaving Equipment" are to be added in existing list	

Weaving Equipment

Single Shuttle Leno Loom	Dashmesh
Double plush Loom	Dashmesh

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 64**
Heading "Images: Testing Equipment at the COE" is to be changed to "Images: Spinning Equipment at the COE"	

Heading ~~"Images: Testing Equipment at the COE"~~ is to be changed to "Images: Spinning Equipment at the COE"

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Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 68**
Following "Incubation Activities" are to be included under Incubation Centre	

Incubation Centre Activities

- Development of yarn for protective textile
- Development of knitted textile material for medical textiles
- Development of nettle/acrylic blended yarn and fabric

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Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 69**
Following Development of Products are to be added in existing section "Details of Products Developed by COE"	

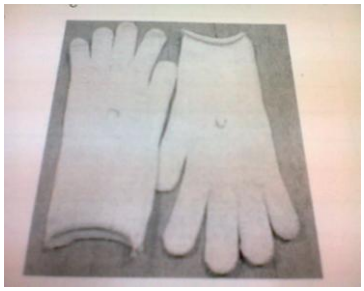
Details of Products Developed by COE

Stab Resistant Fabric from Dyneema (Hi-Modulus Polyethylene) (HMPE)

Cut Resistant Fabric using Composite Metallic Yarn

Cut resistant glove from Nylon/Steel composite Metallic Yarn

Cut resistant glove from polyester/Steel composite Metallic



Cut resistant glove from Cotton/Steel composite Metallic Yarn

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Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 70**
Existing "List of Books and Standards" is to be replaced with following	

List of Books

S. No.	Book Title	Author	Publisher
1	Advanced Textiles for Wound Care	S Rajendaran	Woodhead Publications
2	Advances in Apparel Production	Catherine Fairhurst (Ed.)	WP
3.	Advances in Fire Retardant Materials	Horrocks, A R & D Price	Woodhead Publications
4	Advances in Textile Biotechnology	V Nierstrasz	Woodhead Publications
5	Advances in Yarn Spinning Technology	C A Lawrence	Woodhead Publications
6.	Applications of Nonwovens in Technical Textiles	R A Chapman	WP
7.	Basic Sewing	DK	D K
8.	Color Schemes	Lesley Taylor	New Holland
9	Colour Measurement : Principle advances and….	M L Gulrajani	Woodhead Publications
10.	Design and Manufacturing of Textile composites	Long, A C	Woodhead Publications
11.	Dry Cleaning Scouring Dyeing of Garments Furs & Rugs	William T. Brannt (Ed.)	Abhishek
12	Eco Textiles : The way of the forward	Mir Miraftab & A Horrocks, R (Ed.)	Woodhead Publications
13.	Engineering Textiles	Mohahse, Y Ee El	Woodhead Publications
14	Fabric Testing	Jinlian, H U	Woodhead Publications
15	Fatique Failure of Textile Fibres	Mohsen Miraftab (Ed.)	WP
16	Fundamentals of Fire Fighter Skills	NFPA	NFPA
17	Global Market Review of Workwear : Forecasts to 2016	-	Online

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18.	H B of Non Wovens	Russell S	Woodhead Publications
19.	H B of Technical Textiles	Horrocks A R	Woodhead Publications
20	H B of Tensile Properties of Textile and Technical Fibres	A R Bunsell	WP
21	H B of Textile Fibre Structure : Fundamentals and manufactured polymer fibres (Vol. 1)	S Eichhorn	Woodhead Publications
22	H B of Textile Fibre Structure : Natural, regenerated, inorganic and specialist fibres (Vol. 2)	S Eichhorn	Woodhead Publications
23	H B of Weaving	W S Murphy	Abhishek
24	HB of Worsted Wool and Blended Suiting Process	R S Tomar	WPI
25	High Speed Spinning Of Polyester and its Blends with Viscose	S Y Nanyal	WPI
26	Identification of Fibres	Houck, Max M (Ed.)	Woodhead Publications
27	Identification of Textile Fibres	Max M Houck (Ed.)	WP
28	Intelligent Textiles of Clothing	Mattila H R	Woodhead Publications
29	Interior Textiles : Design and development	T Rowe	Woodhead Publications
30	Management of Technology Systems in Garment Industry	Gordana Colovic	WPI
31	Medical & Healthcare Textiles	SC Anand	WP
32	Medical Textiles and Bio-Material for Health Care	Anand, S C, (Ed.)	Woodhead Publications
33	Military Textiles	Eugene Wilusz	Woodhead Publications
34	Modeling and Predicting Textile Behaviour	X Chen	Woodhead Publications
35	Modern Approach to Maintenance in Spinning	Neeraj Niijjaawan	WPI
36	Non Woven Textiles	Jirsak, O	Woodhead Publications
37	Personal Protection Textiles Report		Textile Media Services, UK
38	Personnel Protective Clothing :	-	Online

	Ensuring workers safety		
39	Polymer Data Hand Book	Mark, James E (Ed.)	Oxford University Press
40	Protective Clothing	Pushpa Bajaj	Woodhead Publications
41	Sewing for Fashion Design	Nurie Relis	Printice Hall
42	Smart Textile Coatings and Laminates	W c Smith	Woodhead Publications
43	Smart Textiles for Medicine & Health Care	Longenhove, L Van (Ed.)	Woodhead Publications
44	Sustainable Textiles : Life cycle and environmental impact.	R S Blackburn	Woodhead Publications
45	Technical Textile Yarns : Industrial and medical applications	R Aligirusamy	WP
46	Textile Technology	Burkhard Wulfhorst	Hancer
47	Textiles for Cold Weather Apparel	J T Williams	Woodhead Publications
48	Textiles in Sport	Shishoo R	Woodhead Publications
49	Textiles, Polymers and Composites for Buildings	G Pohl	Woodhead Publications
50	Thermal and Moisture Transport in Fibrous Material	Pan, N and Gibson, P	Woodhead Publications
51	Tribology of Natural Fiber Polymer Composites	Navin Chand	WP
52	Ullman's Fibres (2 vol.)	-	Wiley-VCH Verlag
53	Wearable Electronics and Photonics	Tao, Xiaoming (Ed.)	Woodhead Publications
54	Smart Cloth and Wearable Technolog	McCann, J and Bryson, D (Ed.)	Woodhead Publications

List of Standards

S. No.	Book Title (No. of Copies)	Author	Publisher
1	AATCC Technical Manual – 2009	AATCC	AATCC
2	AATCC Technical Manual – 2011	AATCC	AATCC

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3	ASTM SEC 11 (Vol.11.03) – 2007	ASTM	ASTM
4	ASTM SEC 4 (Vol.4.13)- 2008	ASTM	ASTM
5	ASTM SEC 7 (Vol.7.1 & 7.2)- 2008	ASTM	ASTM
6	ISO 12402 – 1 : 2005	ISO	ISO
7	ISO 12402 – 2 : 2006	ISO	ISO
8	ISO 12402 – 3 : 2006	ISO	ISO
9	ISO 12402 – 4 : 2006	ISO	ISO
10	ISO 12402 – 5 : 2006	ISO	ISO
11	ISO 12402 – 6 : 2006	ISO	ISO
12	ISO 12402 – 7 : 2006	ISO	ISO
13	ISO 12402 – 8 : 2006	ISO	ISO
14	ISO 12402 – 9 : 2006	ISO	ISO
15	ISO 12402 –10 : 2006	ISO	ISO

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Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 71**
Existing "Technical Manpower" is to be replaced with following	

Technical Manpower

S. No.	Name of Employee	Qualification	Experience (Years)
1	Dr. J.V. Rao	B.Tech., M.Tech., Ph.D., FIV	42
2	Mr. Abhijit Pal	B.Sc. (Text. Tech), MS (by research), FIE, FIV	28
3	Dr. A.V. Agrawal	M.Text. (Text. Tech.), Ph.D., FIE, FIV	23
4	Dr. M.S. Parmar	M.Sc., Ph.D., PGDMM, DCPA	20
5	Dr. A.A. Ansari	M.Sc., M.Phil., Ph.D.	19
6	Dr. Surender Kumar	M.Sc., Ph.D.	27
7	Dr. B.K. Sharma	M.Sc., M.Tech., Ph.D., FIETE, SMCSI	21
8	Mr. A.K. Aggarwal	M.Sc.	35
9	Mr. A.K. Singh	B.Text. (Tech.)	33
10	Mr. Anil Kumar Pandey	B.Text. (Tech.)	33
11	Mr. Ankur Makhija	B.App.Sc. (Instrumentation), B.F.Tech. (Apparel Prodn.)	4
12	Mr. Avnish Kumar Sharma	M.Sc., Dip. in Op. Mgt., PGD in Comp. Progr., MCA	21
13	Mr. C.B. Chourasia	M. Tech.	22
14	Mr. K.K. Dewan	B.A., PGDBM, M.Sc.(Comp.Sc.). BHM, e-Commerce	13
15	Mr. M.K. Bansal	Dip. in Text. Tech., MBA	23

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Lead : Northern India Textile Research Association (NITRA)

16	Mr. M.M. Tiwari	B.Sc., Dip. in Text.	31
17	Mr. Maheshwar Singh	B.Sc., Diploma in Tex. Chem.	29
18	Mr. Neeraj Aggarwal	B.Text., MS (by Research)	20
19	Mrs. Neha Kapil	M.Sc.	9
20	Mr. R.K. Gaur	B.Text., M.Tech. (IT), Dip. in Mgmt., Dip. in TQM&ISO 9000, Dip. in Prodn.Mgt., MIE	31
21	Mr. R.K. Sharma	B.Sc., ATA	29
22	Mr. R.S. Yadav	B.Tech. (Text.), MS (by Research), MIE	23
23	Mr. Rajiv Kumar	M.Tech. (Text. Tech.)	8
24	Mr. Sanjeev Shukla	B.Sc., B.Text., M.Tech., PGDBM	19
25	Mrs. Shweta Saxena	M.Sc.	9
26	Mr. U.C.Sharma	B.Sc., AMIE (Text.), MS (by Research), MIE, FIV	30
27	Mr. Vikas Sharma	B.E. (Mech.), Adv.Dip. in MM&CM	13
28	Mr. Vivek Agarwal	B.Tech., PGDBM, MS (by Research)	18

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 71**
Existing "List of Standards Formulated" is to be replaced with following	

List of Standards Formulated

COE – Protech has reviewed/developed standards of technical textile items in Indian context. These are submitted to the Office of the Textile Commissioner, Government of India, Mumbai

Review of Draft specifications of BIS:

(i) Protective clothing for fire fighters
(ii) Textiles-Resistance to ignition of Mattresses, Diwans and Bed Bases

Specification developed by COE-Protech:

(iii) Nylon life jacket with expandable polyethylene foam, buckle and whistle plastics
(iv) Woven suiting made of cotton, man made fibres/filaments and their blends-IS 15853 : 2009
(v) Disruptive pattern (camouflage pattern) cloth for jungle operations made of nylon and cotton blended (NYCO) material
(vi) Unarmed combat dress
(v) Anti mosquito veil

Annex - 4
COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 71**
New section "Draft white paper on Formulation of Regulations in Respect of Safety Industrial Work-wear (Heat & Flame)" is to be created after section "List of Standards Formulated"	

Draft white paper on Formulation of Regulations in Respect of Safety Industrial Work-wear (Heat & Flame)

NITRA has prepared a draft white paper on Formulation of Regulations in Respect of Safety Industrial Work-wear (Heat & Flame). In order to provide safe working environment for workers engaged in high risk and hazardous environment, NITRA suggested amendments in 16 industrial acts. The paper is forwarded to Ministry of Textiles, GoI to implement the suggestions given in the paper by bringing it to the notice of concerned ministries for ensuring safe working conditions in the factories.

Annex - 4
COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	Revised Page No. 71
New section "List of Manuals Prepared" is to be created after section "Draft white paper on Formulation of Regulations in Respect of Safety Industrial Work-wear (Heat & Flame)"	

List of Manuals Prepared

Manual on manufacturing techniques, testing methods and procedures has been prepared on following:

- Manufacturing of fabrics using Hi-Modulus Polyethylene(HMPE) fibres

Annex - 4
COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 73**
Following are to be added in existing "Technical Specifications Prepared for other Agencies" as point no. 4 to 8	

Technical Specifications Prepared for other Agencies

4. CRPF: Specification of "Sleeping Bag"
   Specification of "Under Pant"
   Specification of "Towel Hand"
   Specification of "Cap Comfort Woolen"
   Specification of "P/V Dope Dyed"
5. Assam Rifles: Specification of "P/V Dope Dyed"
6. NSG: Specification of "P/V Dope Dyed"
7. Central Armed Police force: Specification of "P/V Dope Dyed"
8. Refrigeration House, Agra: Specification of colour code of "P/C 50:50"

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 73**
Existing "R&D Projects on Technical Textiles Undertaken/Under Progress" is to be replaced with following	

R&D Projects on Technical Textiles Undertaken/Under Progress

	R&D Project Title	Status
1	Development of fire resistant equipment	Completed
2	Development of industrial fabrics	Completed
3	Protective clothing from jute	Completed
4	Development of antimicrobial fabric	Completed
5	Development of UV resistant fabric	Completed
6	Protection against pesticides	Completed
7	Development of cut resistant & abrasion resistant protective textile by using composite metallic yarn	Completed
8	Developing shield of corn fabrics for enhancing the protection from flame	Completed
9	Developing armor using Hi-Modulus Polyethylene (HMPE) fibre	Completed
10	Development of water purification device using textile material for military and paramilitary personnel	Completed
11	Development of protective material from nylon 66 and corn	Completed
12	Development of flame resistant and chemical resistant laboratory coat/apron	Completed
13	Selection of combat uniform cloth on the basis of comfort, wear and safety properties	Completed
14	Development of special functional fabric for bedding and sportswear for providing extra-ordinary comfort with excellent micro climate	On-going
15	Development of an instrument to measure light and heat cutting properties of black out (coated Fabrics)	On-going
16	Development of special functional fabrics for bedding and sport wears for providing extra ordinary comforts with excellent micro climate	On-going

Following products have been developed at NITRA:

1 NYCO fabric for Paramilitary and Military combat uniforms
2 Personal protective textile using novel fibre
3 Functional fabric to provide bacterial & ultraviolet protection to the skin (bamboo)
4 Extra soft knitted fabric for inner wear / kids wear by using 'High Performance Modal Fibre'
5 Stab Resistant Fabric from Dyneema - Hi-Modulus Polyethylene (HMPE)
6 Cut Resistant Fabric using Composite Metallic Yarn
7 Cut resistant gloves from Nylon/Steel composite Metallic Yarn

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8 Cut resistant gloves from polyester/Steel composite Metallic
9 Cut resistant gloves from Cotton/Steel composite Metallic Yarn

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Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 73**
New section "Training Programs Conducted" is to be created after section "Training Programs Offered"	

Training Programs Conducted

1. Workshop on protective textiles at NITRA on 31.10.2009 with Textile Association of India (Delhi Unit)
2. Training programme on flame retardant textiles for M/s. Banswara Syntex at NITRA on 19.04.2010 to 24.04.2010
3. Training programme on quality evalution at NITRA on 14.06.2010 to 16.06.2010
4. Workshop on Aerospace textiles by 16 BRD Air Force on 29.10.2010
5. Seminar on "Protective Textiles" organized jointly by NITRA and M/s. Waxman Fibres at NITRA on 11.04.2011
6. Seminar on "Sewing Threads-Quality Requirements and Significance in Sports Goods Industry" organized jointly by NITRA and PPDC Meerut on 15.06.2011
7. Seminar on "An insight to industrial safety work wear" organized jointly by NITRA and Institutions of engineers at NITRA on 16.07.2011Workshop on "Personal protective fabrics for indian armed forces" to Ministry of Home Affairs on 04.10. 2011
8. Workshop on "Protective textiles-personal and aerospace" to Air Force,Palam on 11.10.2011
9. Training on protective textiles to M.Sc. students in 2011
10. Training on "Testing of textile materials for heat & flame resistance in workshop on Innovative methods in textile manufacturing and clothings" at TIT, Bhiwani on 11 & 12th February, 2012
11. Workshop on "Emerging opportunities in technical textiles in India" at Baddi on 24.03.2012
12. Seminar on Functional Textiles, 3 June 2012, organised by The Merchants' Chamber of Commerce & The Institution of Engineers, Kanpur
13. Seminar on technical textiles, 13 September 2012 in 15th India International Security Expo 2012, New Delhi
14. Workshop on safety & survival equipment, 18 October 2012 organised by Air Force New Delhi
15. Seminar on Vastra-2012, 23 November 2012,Jaipur

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Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 74**
Following to be added in existing "Foreign Collaboration Details"	

Foreign Collaboration Details

NITRA has also entered into an agreement with Manchester Metropolitan University, UK to conduct R & D activities in the area of protective textiles.

NITRA has also entered into an agreement with M/s West Yorkshire Materials Testing Services, U.K for the provision of EC type certification and testing facility for protective textiles.

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COE on Protech
Lead : Northern India Textile Research Association (NITRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	Revised Page No. 74
Existing "Details of Prototypes Developed" is to be replaced with following	

Details of Prototypes Developed

Following instruments have been developed by NITRA

- **Flammability Tester (As per BS 5438)**

This instrument is developed as per BS 5438 and is used to determine the effect of fire on textile materials in vertical mode.

- **Flammability Tester (As per IS 11871 Method A)**

This instrument is developed As per IS 11871 Method A and is used to determine flammability behaviour of textile material when specimen is placed in vertical position.

- **Smoke visibility test apparatus (As per UIC code 562 – 2 Appendix 15)**

This instrument is developed as per UIC 564-2 Appendix 15 and is used to determine the effect of smoke generated on visibility.

- **Fire resistant test apparatus (As per UIC code 562 – 2 Appendix 5 and 12)**

This instrument is developed as per UIC 564-2 and is used to determine the effect of fire on various materials.

- **Limiting Oxygen Index Tester**

This instrument is used to determine Limiting The limiting oxygen index of textiles and plastic material. oxygen index (LOI) is the minimum concentration of oxygen, expressed as a percentage, that will support combustion of a small vertical test specimen under specified test conditions. It is measured by passing a mixture of oxygen and nitrogen over a burning specimen. This instrument is based on IS 13501.

- **Toxicity Tester**

This instrument tests the toxicity of the products of combustion in terms of small molecular species arising when a small sample of a material is completely burnt in excess air under specified conditions

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- **Fabric Hand Tester**

The main features of this instrument are that it Quantifies handle and results are formatted analytically and graphically which are easy to interpret.

- **Dimensional Stability to Dry Heat Tester**

This instrument is very useful to determine the effect of full garment iron (dry heat) on the dimensional stability of fabric. The instrument is based on IS 12170 (referred specification IS 15853).

- **Soil release efficiency Tester**

This instrument is used to determine the ability of soil release of textile material after treatment with various types of soils. The instrument is based on IS 11813 (referred specification IS 15853).

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Updation Details as on Nov 2012	
Chapter No. & Name: 6. COE on Protech	**Revised Page No. 76**
Existing "Contact Details" is to be replaced with following	

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e-mail: mail@nitratextile.org,

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COE on Composites
Lead: Ahmedabad Textile Industry's Research Association (ATIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshot of COEs	**Revised Page No.: 11**
Existing section "COE on Composites" is to be replaced with following	

COE on Composites

With regards to Composites, ATIRA's stated objective is to create a Centre of Excellence (COE) for development of advanced composites applications through advanced process in order to achieve weight reduction, high mechanical properties and cost competitiveness. Furthermore the goal is also to enhance the knowledge base in composites through research, development and training.

The following projects are being undertaken at ATIRA:

- SMC Manufacturing using Jute as the major reinforcing fibre & Compression molding.
  (sanctioned by National Jute Board, Kolkata)
- Improving properties of Jute fibres for use in Composites as Automotive parts.
  (under consideration of National Jute Board, Kolkata)

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COE on Composites
Lead: Ahmedabad Textile Industry's Research Association (ATIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 7. CoE on Composites	**Revised Page No.: 77**
Following list is to be added in existing section "Testing Instruments" under Infrastructure facilities	

Testing Instruments

The following test instruments are available at the CoE in ATIRA for composite mechanical testing

1. Dual Column Floor Mounted Electromechanical Testing System (UTM-100KN 	**2. Dual Column Floor Mounted Electromechanical Testing System (UTM-400KN)** 

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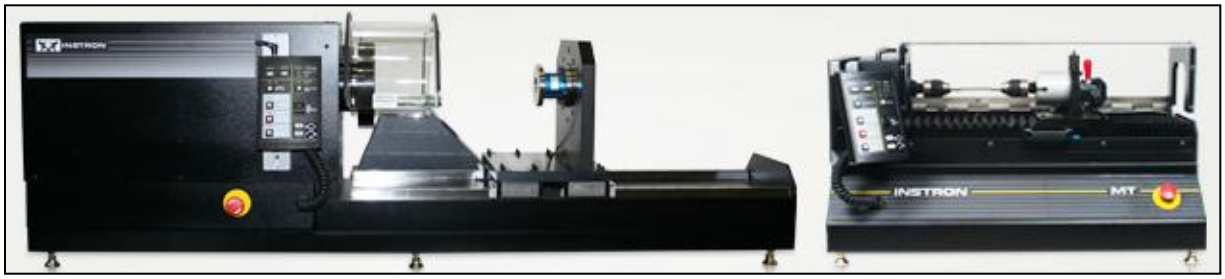
3. Tension Torsion Hydraulic Machine (100KN/1KNm)



4. Drop Weight Impact Tester (1800 J)

5. Pendulum Impact Tester (25 J)

6. Hardness Tester

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7. Notch Cutter (Motorised)

8. HDT/VICAT Apparatus

9. Dynamic Mechanical Analyser: DMA 150 Plus

For polymers Composites elastomers, to test under tension (for films, bars, fibers), compression, shear, 3 point bending and bending double cantilever mode, with software for Master curves, Fatigue, customized waveform.

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Updation Details as on Nov 2012	
Chapter No. & Name: 7.CoE on Composites	**Revised Page No.: 78**
Following list is to be added in existing list of "Test Parameters"	

Test Parameters

Mechanical Testing Parameters:

- Measure the load string misalignment in accordance with ASTM E1012.
- Bending strain requirement for brittle materials in Nadcap AC7101/3
- Compression, anti-buckling, fixture complying to Boeing specification support standard (BSS 7260) or SACMA recommended method (SRM-1) or ASTM D 695 (modified) standards.
- Flexural and Interlaminar Shear Bend fixture: Suitable for testing to ASTM D2344, D790, EN 2562, EN 2563, ISO 14125 and ISO 14130 with suitable anvils.
- ISO 7500-1 Class 0.5 Standard
- ASTM D7136
- D 7136 M-05
- PR-EN 6038
- AIRBUS AITM 1.0010
- ASTM D3763
- ISO 6603
- ISO 13802
- ASTM D 256
- ISO 180
- ASTM D 6110
- ASTM D6110.
- Charpy, Izod, and Tensile impact tests according to ISO 179-1, ISO 180, ISO 8256, ISO 9854, DIN 53453, DIN 53753, BS 2782-359,BS 7413, ASTM D 256, ASTM D 4812, ASTM D 6110, ASTM D 1822, ASTM E23, DIN 50115 and equivalent standards
- Heat Distortion Temperature (as per ISO 75 and ASTM D648)
- VICAT Softening Point (as per ISO 306 and ASTM D1525). Machine
- Hardness Tester: EN-ISO 6508 and ASTM E-18 and JIS Z2245

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Updation Details as on Nov 2012	
Chapter No. & Name: 7.CoE on Composites	**Revised Page No.: 79**
New Section "Incubation Centre" is to be created after section Test Parameters	

Incubation Centre for Technical Textiles under CoE for Composites in ATIRA:

1. **Dornier (190 cm width) with Texmer Creel**

2. Dornier (340 cm width)

3. Dornier (430 cm width)

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4. Jakob Muller Belt Weaving Machine (CKM)

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5. Jakob Muller Direct Warping Machine MW400 (Beaming for Belt Weaving)

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6. Jakob Muller Rope Weaving Machine (NC2M)

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7. Karl Mayer Sectional Warping Machine (Opto-matic 3600mm)
(Beaming for Weaving Machines)

8. LACOM Machine for laminating and coating

Composite Prototype Lab for Pultrusion

Pultrusion Machine:

Pultrusion machine: with 24 in wide & 10 in tall production envelop, 20 tons of pulling power & with 06 heating zones.

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Lead: Ahmedabad Textile Industry's Research Association (ATIRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 7.CoE on Composites	**Revised Page No.: 79**
Following list is to be added in existing "List of Books" under Information Centre	

Books

The list of books available at the CoE Information Centre is indicated below:

No.	Books Title	Author
1	Technical textile yarns: Industrial and medical applications	ALAGRUSAMY (R.) & DAS (A.) eds.
2	Advances in yarn spinning technology	LAWRENCE (C. A.) ed.
3	Polymer enhancement of technical textiles (Rapra review report no. 165), Vol. 13, No. 9, 2003	BUCKLEY (R. W.)
4	Introduction to automotive composites	TUCKER (N.) & LINDSEY (K.) eds.
5	Automotive composites : A design and manufacturing guide (with supplement)	Ray Publishing
6	Opportunities in Indian composites market 2008-2013 : Trend, forecast and competitive analysis	LUCINTEL
7	Recent advances in textile composites (proceedings of the 10th International conference on textile composites) : TEXCOMP 10, October 26-28, 2010	BINETRUY (C.) & BOUSSU (F.) eds.
8	Medical and healthcare textiles	ANAND (S. C.), KENNEDY (J. F.), MIRAFTAB (M.) & RAJENDRAN (S.) eds.
9	Improving comfort in clothing	SONG (G.) ed.
10	Practical guide to the assessment of the useful life of plastics	BROWN (R. P.) & GREENWOOD (J. H.)
11	Textiles, polymers and composites for buildings	POHL (G.) ed.
12	Handbook of fiber science and technology Volume II : High technology fibers Part D	LEWN (M.) & PRESTON (J.) eds.

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13	Fibrous and composite materials for civil engineering applications	FUNGUEIRO (R.) ed.
14	Composites in automotive : How far are composites materials from mass production (automotive survey)	JEC Group
15	4th Aachen -Dresden international textile conference, 25-26, November, 2010 (book of abstracts)	International Congress Center, Dresden
16	JEC Paris 2011 proceeding composites simulation (CD)	JEC Composites
17	JEC Paris 2011 proceeding global carbon fiber market (CD)	JEC Composites
18	JEC Paris 2011 proceeding wind energy forum (CD)	JEC Composites
19	JEC Paris 2011 proceeding bio-based materials forum (CD)	JEC Composites
20	JEC Paris 2011 proceeding Nano materials forum (CD)	JEC Composites
21	JEC Asia 2010 proceedings construction & infrastructure forum (CD)	JEC Composites
22	JEC Paris 2011 proceeding automation forum (CD)	JEC Composites
23	JEC Asia 2010 proceedings wind energy & environment forum (CD)	JEC Composites
24	JEC Paris 2011 proceeding aeronautics forum (CD)	JEC Composites
25	JEC Asia 2010 proceedings automotive & mass transportation forum (CD)	JEC Composites
26	Composites in automotive : How far are composites materials from mass production (automotive survey)	JEC Group
27	JEC Paris 2011 proceeding non- destructive testing global conference, March 29-31, 2011, Paris (CD)	JEC Composites
28	JEC Paris 2010 aeronautics forum, 13-15 April, 2010 Paris (CD)	JEC Composites

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29	JEC Singapore 2011 : Automotive ground transportation forum, 18-20, October, 2011, Singapore (Innovative composites summit) (CD)	JEC Group
30	JEC Singapore 2011 : Automotive ground transportation forum, 18-20, October, 2011, Singapore (Innovative composites summit) (CD)	JEC Group
31	JEC Singapore 2011 : Wind energy forum, 18-20, October, 2011, Singapore (Innovative composites summit) (CD)	JEC Group
32	JEC Singapore 2011 : Infrastructure forum, 18-20, October, 2011, Singapore (Innovative composites summit) (CD)	JEC Group
33	JEC Singapore 2011 : Aeronautics, 18-20, October, 2011, Singapore (Innovative composites summit) (CD)	JEC Group
34	JEC Singapore 2011 : Composites design conference, 18-20, October, 2011, Singapore (Innovative composites summit) (CD)	JEC Group
35	JEC Singapore 2011 : Automation forum, 18-20, October, 2011, Singapore (Innovative composites summit) (CD)	JEC Group
36	Handbook of tensile properties of textile and technical fibres	BUNSELL (A. R.) ed.
37	Handbook of sustainable textile production	TOBLER-ROHR (M. I.)
38	Flame resistant fibres and fabrics 2011	Textile Intelligence Ltd.
39	Vacuum infusion process (VIP) (DVD)	COCQUYT (A.)
40	Practical guide to composites	Multi Sport Composites Ltd., Unit 2
41	Advances in nanofibre research	HAGHI (A. K.) & ZAIKOV (G.)
42	Flax and hemp fibres : A natural solution for the composite industry	JEC Composites
43	Composites in construction (Building & construction Survey) 2011	JEC Group

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44	Strong features to support the lift-off, 33rd International technical conference & forum, 26-27, March, 2012, Paris, (CD-ROM)	SAMPE Europe
45	Nanotechnology for surface coatings : Fundamentals & applications in paints & allied products	NATU (V. M.)
46	Manufacturing processes for advanced composites	CAMPBELL (F. C.)
47	GEOKUNSTSTOFFE IM ERD- UND VERKEHRSWEGEBAU (Geoplastics in ground- and traffic route construction)	MULLER-ROCHHOLZ (J.)
48	Composite reinforcements for optimum performance	BOISSE (P.) ed.
49	Annual book of ASTM standards 2011 : Section 7, Volume 07.01, Textiles (i) : D 76 - D4391	ASTM International
50	Annual book of ASTM standards 2011 : Section 7, Volume 07.02, Textiles (ii) : D 4393 – Latest	ASTM International
51	AATCC Technical manual, Vol. 87, 2012	American Association of Textile Chemists and Colorists, (AATCC)
52	Annual book of ASTM standards 2012 : Section 4, construction, Volume 04.13 Geosynthetics	ASTM International
53	Certified composite technician : Basic composites study guide	American Composites Manufacturers Association (ACMA), USA
54	Certified composite technician : Open molding study guide	American Composites Manufacturers Association (ACMA), USA
55	Handbook of Geosynthetic engineering : Geosynthetics and their applications	SHUKLA (S. K.) ed.

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Updation Details as on Nov 2012	
Chapter No. & Name: 7.CoE on Composites	**Revised Page No.: 82**
Following list is to be added in existing "List of standards" under Information Centre	

Standards

S. No.	Standards
1	IS 7151 : 1991 (Reaffirmed 2008)Corrugated fibre board boxes for para-dropping of supplies – Specification
2	IS 624 : 2003 (Reaffirmed 2008) Bicycles - Rims - Specification
3	IS 626 : 2009 Bicycles - Seat Pillars – Specification
4	IS 2742 (Part 1) : 1994 (Reaffirmed 2009) Automotive vehicles - Break linings (Non-rubberized) Part 1 Specification
5	IS 2742 (Part 2) : 1999 (Reaffirmed 2009) Automotive vehicles - Break linings -Rubberized Part 2 Specification
6	IS 5352 : 1988 (Reaffirmed 1995) Specification for glass-fibre woven tape for electrical purposes
7	IS 5746 (Part 3) : 1987 (Reaffirmed 2009) Specification for woven glass fibres fabric for plastic laminates for aerospace purposes Part 3 Finished fabrics for use with polyester resin systems
8	IS 6218 : 2008 Bicycle - Mudguards – Specification
9	IS 10661 : 1993 (Reaffirmed 2008) Specification for glass fibre reinforced polyester chemical resistant tanks
10	IS 11246 : 1992 (Reaffirmed 2007) Glass fibre reinforced polyester resin (GRP) Squatting pans – Specification
11	IS 11273 : 1992 (Reaffirmed 2008) Woven roving fabrics of "E" glass fibre – specification
12	IS 12436 : 1988 (Reaffirmed 2010) Specification for preformed rigid polyurethane (PUR) and polyisocyanurate (PIR) foams for thermal insulation
13	IS 12643 : 1989 (Reaffirmed 2010) Corrosion protection of steel by fibre glass reinforced polyester lining - Code of practice
14	IS 12709 : 1994 (Reaffirmed 2009) Glass fibre reinforced plastics (GRP) pipes, joints and fittings for use for potable water supply - specification
15	IS 13620 : 1993 (Reaffirmed 2009) Fusion bonded epoxy coated reinforcing bars - specification (Incorporating Amendment No. 1)
16	IS 14402 : 1996 (Reaffirmed 2007) Glass fibre reinforced plastics (GRP) pipes, joints and fittings for use for Sewerage, industrial waste and water (Other than potable) – specification

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17	IS 15476 : 2004 (Reaffirmed 2009) Bamboo mat corrugated sheets – Specification
18	IS 10500 : 2012 Drinking water specification
19	BS EN 388 : 2003 Protective gloves against mechanical risks
20	IS 2888 : 2004 Toilet soap - Specification (Third revision) with Amendment 1- July 1986 & Amendment 2 - September 2008
21	IS 13498 : 1997 Bathing bar Specification with Amendment No. 1 May 2002
22	IS 286 : 1978 (Reaffirmed 1999) Methods of sampling and test for soaps (second revision) (fifth reprint July 2007, Including Amendment Nos. 1, 2, 3 & 4)
23	BS EN 388 : 2003 Protective gloves against mechanical risks
24	BS EN 407 : 2004 Protective gloves against thermal risks (heat and/or fire)
25	BS EN 420 : 2003 + A1 : 2009 Protective gloves - General requirements and test methods
26	ISO 2061 : 2010 Textiles Determination of twist in yarns - Direct counting method
27	ISO 2062 : 2009 Textiles Yarns from packages determination of single end breaking force and elongation at break using constant rate of extension (CRC) Tester
28	ISO 3759 : 2011 Textiles Preparation marking and measuring of fabric specimens and garments in tests for determination of dimensional change
29	ISO 4920 : 2012 Textiles fabrics determination of resistance to surface wetting (spray test)
30	ISO 5077 : 2007 Textiles Determination of dimensional change in washing and drying
31	ISO 6330 : 2012 Textiles domestic washing and drying procedures for textile testing
32	ISO 11058 : 2010 Geotextiles and geo textile related products determination of water permeability characteristics normal to the plane without load
33	ISO 12956 : 2010 Geotextiles and geotextile related products determination of the characteristic opening size
34	ISO 14419 : 2010 Textiles - Oil repellency hydrocarbon resistance test
35	IS 15303 : 2003 Determination of antimony iron and selenium in water by electro-thermal atomic absorption spectrometric method
36	IS 3025 (Part 40) : 1991 (Reaffirmed 2003) water and wastewater methods of sampling and test (physical and chemical) Part 40 - Calcium
37	IS 3025 (Part 42) : 1992 (Reaffirmed 2009) methods of sampling and test (physical and chemical) for water and wastewater Part 42 - Copper
38	IS 3025 (Part 53) : 2003 (Reaffirmed 2009) methods of sampling and test (physical and chemical) for water and wastewater Part 53 - Iron

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39	IS 1350 (Part II) 1970 (Reaffirmed - 2010) Methods for test for coal and coke Part II determination of calorific value
40	IS 1963 : 1981 (Reaffirmed - 2008) Methods for determination of threads per unit length in woven fabrics
41	IS 3400 (Part 5) - 1986 (Reaffirmed 2008) Methods of test for valcanized rubbers part - 5 Adhesion of rubbers to textile fabrics
42	ISO 14184 - 1-2011 Textiles determination of formaldehyde - Part 1 : Free and hydrolysed formaldehyde (water extraction method)
43	ISO 14184-2-2011 Textiles determination of formaldehyde - Part 2 : Released formaldehyde (vapour absorption method)

Annex-6
COE on Indutech
Lead: PSG College of Technology

Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshot of COEs	**Revised Page No.: 11**
Existing section "COE on Indutech" is to be replaced with following	

COE on Indutech

PSG College of Technology houses the recently announced Centre of Excellence on Industrial Textiles. The COE on Indutech was sanctioned in March 2011 and the process for setting up of infrastructure facilities is in progress.

Some of the following projects are in progress related to Industrial Textiles

- Development of Natural fiber nonwovens for Acoustic Applications
- Development of Jute/Wool blend nonwovens
- Development of natural fiber nonwovens for application as car interiors for noise control
- Bamboo blended nonwovens for automobile interiors
- Utilisation of chicken feathers for the development of nonwovens and value added products
- Development of natural fiber nonwovens for application as car interiors
- Production of an hydrophobic oleophilic kapok nonwoven fabric for its potential application
- Analysis of Natural Nonwoven Geo Textiles used in Erosion control.
- Design & Development of Nonwoven Products using recycled fibers
- Nonwoven Textiles as Health Care products
- Development of odor free Antimicrobial hospital linens
- Production and properties of Nonwovens using comber noils.
- Design and Development of Home Textiles using nonwoven fabrics.
- Design and Development of Absorbent Products using Rayon Filament waste.
- Design and Development of Fuel Filter
- Development of pp fiber reinforced concrete Structures
- Development of Functional Gadgets for Automotive Textiles.
- Development of Specialty finishes to fibers.
- Development of Scrubs using natural fibers

Annex-6
COE on Indutech
Lead: PSG College of Technology

Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 85**
Existing "Testing Instruments" under Infrastructure Facilities are to be replaced with following	

Testing Instruments

List of testing equipments available:

1. Air permeability tester
2. Elmendorf Fabric tearing tester
3. Digital thickness gauge
4. Contact angle tester
5. Fabric stiffness tester
6. Tensile testing machine 10 kN
7. Tensile testing machine 100 kN

List of testing equipments proposed:

1. Auto burst bursting strength tester
2. Hydrostatic head tester
3. Water vapour permeability and Thermal conductivity tester
4. Weatherometer
5. Water Permeability testerThermal resistance tester
6. FTIR Spectrometer
7. UV Spectrometer
8. Viscometer
9. pH meter
10. Digital Hot air oven
11. Hot plate with stirrer
12. Impedance tester
13. Moisture management tester
14. Automatic Flammability tester(Horizontal, Vertical & Inclined)
15. Water repellency tester
16. FE SEM
17. Conditioning chamber
18. Abrasion tester (Taber- Rotary type)
19. Analytical balance
20. Friction Tester
21. Electrical surface resistivity for the fabric
22. Spray rating tester

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COE on Indutech
Lead: PSG College of Technology

Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 85**
Following "Images of Testing Machines" are to be included in existing "Testing Instruments" under Infrastructure Facilities	

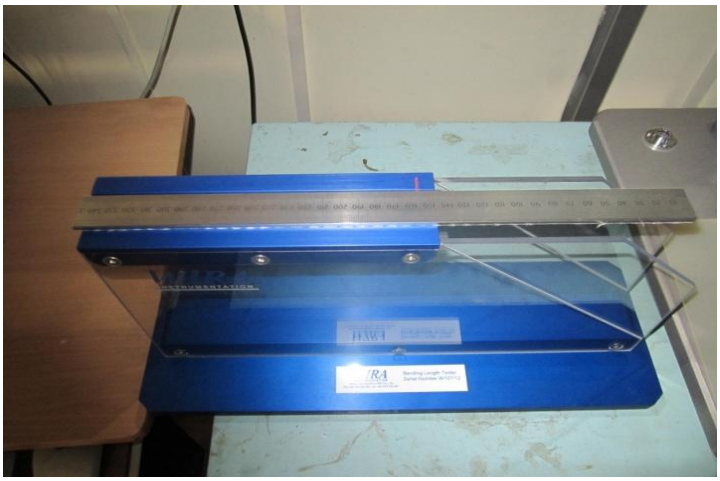
Images of Testing Machines

Testing machines available at COE Indutech

CONTACT ANGLE TESTER

AIR PERMEABILITY TESTER

Annex-6
COE on Indutech
Lead: PSG College of Technology



STIFFNESS TESTER

ELMENDORF TEARING TESTER

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DIGITAL THICKNESS GAUGE

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Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 86**
New section "Machines" is to be added after section "Testing Instruments"	

Machines

List of machines available:

1. Needle punching line

List of machines proposed:

1. Needle punching line for coarser natural fibres
2. Melt coating and lamination line
3. Chemical coating line
4. Chemical bonding line
5. Hot air oven
6. Rope making machine
7. Braiding machine
8. Electro spinning machine
9. Yarn coating machine
10. Wet wipe manufacturing machine

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Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 81**
Existing "List of Books" under information center is to be replaced with following	

Books

List of Books available at Information Center:

S.No	Book Title
1	Application of Nonwovens in Technical Textiles
2	Handbook of Nonwovens
3	Smart Textile Coatings and Laminates
4	Fibrous & Composite Material for Civil Engineering Application
5	Advanced Textiles for Wound Care
6	Handbook of Nonwoven Filter Media
7	Absorbent Technology Vol.13
8	Technical Textile Yarns
9	Coating Technology Handbook
10	Nonwovens Fabrics Raw Materials Applications Testing Processes

List of Books Proposed For Information Centre:

S.No	Name of the Book
1	Handbook of Natural Fibres Vol. 1
2	Handbook of Natural Fibres Vol. 2
3	Modification of Fibres for Technical Applications
4	Composites Forming Technologies
5	Handbook of Technical Textiles
6	Automotive Textiles
7	Textile Terms & Definitions
8	Wellington Sears Handbook of Industrial Textiles
9	Advanced Technical Textile Product
10	Coatings of Polymer & Plastics
11	Industrial Applications of Natural Fibers
12	ASTM Volume 07.01 Textile Vol. 1

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13	ASTM Volume 07.02 Textile Vol. 2
14	Absorbent Incontinence Products
15	Thermal Bonding of Nonwoven Fabrics
16	Industrial Applications of Textiles
17	Standard Test Methods for Determining Average Grain Size
18	Test methods for nonwovens
19	Textiles in Automotive Engineering
20	Bast & Other Plant Fibers
21	Regenerated Cellulose Fibres
22	Handbook of Textile Fibres Natural Fiber Vol. 1
23	Improving comfort in clothing
24	Functional textiles for improved performance, protection and health
25	Handbook of sustainable textile production
26	Advances in textile biotechnology
27	Fibrous and composite materials for civil engineering applications
28	Advances in yarn spinning technology
29	Textile Design : Principles, advances and applications
30	Woven textile structure: theory and applications
31	Computer technology for textiles and Apparel
32	Technical textile yarns: industrial and medical applications
33	Fatigue failure of textile fibers
34	Eco textiles: the way forward for sustainable development in textiles
35	Specialist yarn and fabric structures: developments and applications
36	Medical and healthcare textile
37	Advances in knitting technology
38	The sewing book: Dress making, soft furnishing, best tools. Step by step technique, creative projects.
39	High performance fibers: textile Progress volume 25 number ¾ (P/B
40	Fashion retail:2nd edition
41	Narrow fabrics group conference (p/b)
42	Wet laid and short fiber airlaid nonwovens (p/b)
43	Handbook of fiber science and technology: volume III high technology fibers part D
44	Theory of structure and mechanics of fibrous assemblies
45	Thermal and moisture transport in fibrous materials
46	Micro structural Characterization of Fibre-Reinforced Composites
47	Textiles in Automotive Engineering
48	Coated and Laminated Textiles
49	Harmonized Test Methods Nonwovens 2010-HardCopy and CD
50	The Nonwoven fabrics Handbook

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51	Spun bonded and Melt Blown Technology Handbook
52	Needle punch nonwoven primer
53	Filtration Technology Handbook
54	Air laid Pulp Nonwoven Primer
55	Standard Test methods for Nonwoven
56	Automotive Textiles textile progress Vol.29 number 1/ 2
57	New fibres 2nd Edition
58	Coated Textiles - Principles and Applications 2nd Edition
59	Indian Nonwovens outlook
60	Nonwoven fabrics
61	Handbook of textile Fibre Structure,Vol-1: Fundamentals and manufactured polymer fibres
62	Handbook of Textile Fibre Structure,Vol-2:Natural.Regenerated,Inorganic and Specialist Fibres
63	Film Formation in Coating : Mechanisms, Properties and Morphology
64	Textile Coating & Laminating, 6th International Conference
65	Textile Coating & Laminating : Technology Driving the Future
66	Developments in Non-woven Fabrics
67	Standard Test Methods for Nonwoven Industry BY: INDA and EDANA
68	Smart textile coatings and laminates

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Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 88**
Existing "Training Programs Offered" is to be replaced with following	

Training Programs Offered

- One day Workshop on "Industrial Technical Textiles – Products, Application & Testing"0n 17 August 2011.
- One day National conference on "Protective Textiles" was conducted on 25th Jan 2012.
- One Day workshop on "Manufacture and Marketing of Wipes" was conducted on 16.03.2012
- One Day workshop on "Coated, Flocked and laminated Textiles" was conducted on 30th June 2012.
- One day" STAKE HOLDERS MEET Cum Entrepreneur development program on "BUSINESS OPPORTUNITIES IN FILTRATION TEXTILES" was conducted on 2nd August 2012.
- Two Day International conference on "Industrial Textiles (Indutech-2012) on Industrial Textiles Products, applications and prospects" was conducted on 3rd and 4th August 2012

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Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 88**
Following images are to be added under "Training Programs Offered"	

Images: Training Programs Offered

EDP on Manufacture of Textile Coated, Flocked and Laminated Textiles

STAKE HOLDERS MEET Cum Entrepreneur development program on "BUSINESS OPPORTUNITIES IN FILTRATION TEXTILES"

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International Conference (Indutech 2012)

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National Conference on Protective Textiles

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Lead: PSG College of Technology

Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 88**
New section "Visits carried out for Technical Knowledge Upgradation" is to be created after section "Training Programs Offered"	

Visits carried out for Technical Knowledge Upgradation

Following visits were carried out for Technical knowledge up gradation:

1. M/s. Supreme Nonwovens Pvt Ltd, Mumbai.
2. M/s. Birla Cellulose Pvt ltd, Surat.
3. M/s. TATA Nonwovens Pvt Ltd, Mumbai
4. M/s. Grindwel Norton Pvt Ltd, Bangalore.
5. M/s. SRF Ltd, Gummidipoondi and Manali.
6. M/s. Elofic Filter, Faridabad.
7. M/s. Sterling Nonwoven Ltd, New Delhi.
8. M/s. Nuovafil & Infoteck Pvt ltd. Coimbatore.
9. Visited to MANTRA, NITRA and BTRA

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Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 88**
New section "Programmes Attended" is to be created after section "Visits carried out for Technical Knowledge Upgradation"	

Programmes attended

1. Participated in Symposium on Woven Filtration and Geotextiles at Mumbai on 18th October 2012.

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Updation Details as on Nov 2012	
Chapter No. & Name: 8.CoE on Indutech	**Revised Page No.: 93**
New section "Technical Manpower" is to be created after section "Knowledge & Industry Partners"	

Technical Manpower

Sr No.	Name	Designation	Full Time/Part Time	Qualification
1.	Dr.R.Rudramoorthy	Director	Part Time	M.E. Ph.D
2	Dr.G.Thilagavathy	Joint Director	Part Time	M.Tech, Ph.D.
3	Dr.S.Neelakrishnan Subramanian	Joint Director	Part Time	M.S., Ph.D.
4	Mr.R.G.Shekar	Centre Head,	Full Time	B.Tech
5	Mr.V.Muthukumar	Project Engineer ,	Full Time	M.Tech,MBA
6	Mr.R.Jayaprakash	Project Engineer,	Full Time	B.Tech.
7	Mr.T.Karthik	Asst. Professor.	Part Time	M.Tech.
9	Mrs P Kandavadivu	Associate Professor	Part Time	M.Tech. Phd.
10	Mr S Parthasarathi	Asst. Professor	Part Time	M.Tech
11	Mr R Ramachandran	Asst. Professor	Part Time	M.Tech
12	Mr R Surjit	Asst. Professor	Part Time	M.Tech
13	Mr N Muthukumar	Asst. Professor	Part Time	M.Tech
14	Mrs K J Vishnu Vardhini	Asst. Professor	Part Time	M.Tech
15	Mr S Karthikeyan	Asst. Professor	Part Time	M.S
16	Mr M P Bharathimohan	Asst. Professor	Part Time	M.E.
17	Mr Benjamin S Davidson	Asst. Professor	Part Time	M.E.
18	Mr R Karthikeyan	Asst. Professor	Part Time	M.Tech
19	Mr.Gunashekar	Mechnanical Asst.,	Full Time	ITI
20	Mr.Chandrashekar	Electrical Asst.,	Full Time	ITI

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COE on Non-wovens
Lead : DKTE Society's Textile & Engineering Institute (DKTE)

Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshot of COEs	**Revised Page No. 12**
Existing section "COE on Non-wovens" is to be replaced with following	

COE on Non-wovens

The D.K.T.E. Society's Textile & Engineering Institute based in Ichalkaranji has been designated as Center of Excellence in Nonwovens by the Ministry of Textiles, Government of India.

The COE in the process of procuring state of art machineries for research, incubation, provide technical know-how and hands on training for industrial personal.

Activities of COE

- Research & Development
- Training
- Testing
- Consultancy
- Technology business incubation
- Rapid Prototyping
- Library & Information centre
- Liasioning
- Survey report

The COE is still being set-up and DKTE will be building upon the following R&D activities that are in progress / have been completed:

1. Study of performance characteristics of sugarcane fibre composites.
2. Studies in wound care & bandages
3. Studies in Moisture Management in textiles
4. Application of Nanotechnology in Textile Finishing
5. Studies in application of super absorbent polymers on textiles.
6. Coating of nonwoven materials for specialty applications.
7. Studies in surgical non-woven Gown.
8. Natural Fibres as Reinforced material in false ceiling.
9. Studies in nonwoven fabrics for water filtration.
10. Studies in nonwoven air filter fabrics.

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11. Microencapsulation technique for technical textiles.
12. Application of Chicken Feather.
13. Studies on fiber reinforced concrete.

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Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 89**
Existing Background and Information of Parent Organization(s) are to be replaced with following	

Lead: DKTE Society's Textile & Engineering Institute (DKTE)

Background and Information of Parent Organization(s)

DKTE

The D.K.T.E. Society's Textile & Engineering Institute was founded in 1982. It is based in Ichalkaranji (popularly known as 'Manchester of Maharashtra') which is one of the prominent hubs of the decentralized textile segment. The Institute has 8 departments, 175 full time academic staff and 2960 full time students.

The Institute is engaged in a wide array of activities as summarized below:

- Academic
- Research and Development Activity
- Consultancy (Trouble shooting, Turn key projects, Project appraisal)
- Training for Industry (Management, Technical man power, Machine Technician and Operators)
- Testing Facilities
- Seminars/ Workshops and Conferences (Dissemination of Technical knowledge and information)
- Training and Placement for Students
- Co-curricular activities for Students (Paper presentation contests, Project Contests, Quiz Contest etc.)
- Entrepreneurial Development Activity and Business Incubation

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COE on Non-wovens

Lead : DKTE Society's Textile & Engineering Institute (DKTE)

In addition to the Centre of Excellence in Nonwoven, the college also has the following additional Government funded projects:

Sr. No	Name of the Projects	Sponsoring Agency
1.	Centre of Excellence in Nonwovens	Government of India, Ministry of Textiles
2.	Technology Information, Forecasting & Assessment Council (TIFAC)	Department of Science & Technology, Govt. of India
3.	DKTE Technology Business Incubation (TBI)	Department of Science & Technology, Govt. of India
4.	Science & Engineering Research Council	Department of Science & Technology, Govt. of India
5.	Testing of Nonwovens	Department of Science & Technology, Govt. of India
6.	MODROB (for PCB Software	AICTE, New Delhi
7.	Robotics Research Lab	MHRD, New Delhi & IIT, Bombay
8.	Ministry of Micro, Small & Medium Enterprises (MSME)	Ministry of Micro, Small & Medium Enterprises, Govt. of India
9.	Entrepreneurship Development Cell	AICTE, New Delhi
10.	Industry Institute Partnership Cell (IIPC)	AICTE, New Delhi
11.	Technology based Entrepreneurship Programme	DST New Delhi & EDI, Ahmedabad
12.	National Conference on Recent Trends in Electronics and Tele-Communication Engg	AICTE, New Delhi
13.	National Conference in Electronics and Communication Engg	DRDO, New Delhi
14.	Faculty Development Porgramme	AICTE, New Delhi
15.	Industrial Product Design Center under Nationally Coordinated project (NCP) Scheme	AICTE, New Delhi

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Lead : DKTE Society's Textile & Engineering Institute (DKTE)

Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 89**
Existing Table of testing instruments under infrastructure facilities are to be replaced with following	

Infrastructure Facilities

Testing instruments:

The COE on Nonwovens has following testing instruments:

In the Phase – I of the procurement, the following testing equipments were received

SR.NO.	NAME OF THE INSTRUMENT
1.	Microscope with microtome
2.	LOI tester
3.	Digital tearing strength tester
4.	Hydrostatic water head tester
5.	Digital bursting strength tester
6.	Digital thickness tester
7.	Air permeability tester
8.	Water Vapor Transmission Rate Tester
9.	Water repellency tester
10.	GSM tester
11.	UV accelerated weathering tester
12.	Fiber orientation web measurement
13.	Liquid strike through time and wet back property of nonwoven
14.	Linear density & fibre crimp – measurement
15.	Pore size analyzer
16.	Water transmissivity tester
17.	Gradient ratio test apparatus
18.	Direct shear box
19.	Thermal conductivity tester
20.	Universal testing machine
21.	Melt flow index
22.	Particle size analyser

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Chapter No. & Name: 9. COE on Non-woven	**Revised Page No. 89**
Para given below the "Table of testing instruments" under infrastructure facilities are to be replaced with following	

In addition to the above, the Institute already has the following technical textile testing instruments and manufacturing machineries

Mathis Lab Coating Machine

Digital Bursting Strength Tester

Vertical and horizontal Flameability tester

Banana Fibre Extractor

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Universal Tensile Testing Machine With Compression, Ball & Puncture Attachment

Carl-Zeiss Microscope

Universal Wear Tester

Sulzer Projectile

Dornier Rapier

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Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 90**
Existing Table of Incubation Centre is to be replaced with following	

Incubation Center

COE Nonwoven proposed to procure the following manufacturing machineries for the Incubation centre

Sr. No.	Machineries
1	Needle Punching Line
1	Spunlace Line
2	SMS Line
3	Coating and Lamination Line
4	Calendaring Machine
5	Fibre Retreiving line
6	Fusing machine
7	Moulding machine
8	Fabric inspection m/c
9	Curing chamber (thermal- bonding)
10	Chemical sprayer
11	Chemical saturator

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Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 90 & 91**
Table of Information Centre is to be replaced with following	

Information Center

The COE is equipped with the following literature and aligned resources.

List of Books:

Sr. No	Books
1	Advanced Fibres Spinning Technology - by T. Nakajima
2	Composites materials : Engineering & Science by F. L. Matthews & R. D. Rawlings
3	Medical Textile & Bio-materials for health care
4	Textiles in Sports
5	Military Textiles
6	Materials in Sports Equipment
7	Smart Textiles : Coatings & Laminates
8	Turbology of natural fibre polymer composites
9	Smart Textiles for Medicine and health care
10	Biodegradable & sustainable Fibre
11	Properties and performance of natural fibre composite
12	Engineering Textiles
13	Structure & Mechanics of Woven fabric
14	Identification of Textile Fibres
15	Clothing Biosesory Engineering
16	Chemical Finishing of Textiles
17	Textiles for cold weather apparel
18	Environmental impact of Textiles
19	Biomedical engineering of textiles and clothing
20	Ecotextiles
21	Textiles for Protection
22	Fundamentals and Practices in Colouration of Textiles
23	Physical Testing of Textiles
24	Handbook of Textile fibre structure
25	Performance of Home Textiles
26	Clothing appearance and its science and technology
27	Design and Manufacture of Textile Composites
28	Integrated Design and manufacture using fibre-reinforced polymeric composites
29	Surface modification of Textiles
30	Smart Textile Coating and Laminates
31	Textile for Cold Weather Apparel

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32 Advances in Apparel Production
33 Tribology of Natural Fiber Polymer Composites
34 Biological Inspired Textiles
35 Fabric Testing
36 Nanofibres and Nanotechnology in Textiles
37 Handbook of Nonwoven
38 High Performance Fibres
39 Coated and Laminated Textiles
40 Plasma Technologies for Textiles
41 Thermal Moisture Transport in Fibrous Materials
42 Green composites: Polymer Composites and the Environment
43 Intelligent Textiles and Clothing
44 Textiles for Protection by R.A. Scott
45 3-D Textile Reinforcements in composite materials by A. Miravate
46 New Fibres by T. Hongu & G.O. Phillips
47 Hand Book of Technical Textiles by A. R. Horocks
48 Composites Forming Technologies by A.C. Long
49 Fire Retardant Materials by A. R. Horoocks & D. Price
50 Effects of Mechanical & Physical properties on fabric hand by H. M. Behery
51 Handbook of Nonwovens by S.J. Russell
52 Chemical Testing of Textiles by Qinguo Fan
53 Micro structural Characterization of Fibre-reinforced Composites by John Summer scales
54 New Millennium Fibres by Tatsuya Hongu & Glyn O. Phillips
55 Plasma Technology for Textiles by Roshan Shishoo
56 Clothing Bisensory Engineering editd by Y.L. and A.S. W Wang,
57 Smart Fibres,Fabrics and Clothing edited by Xiaoming Tao
58 Medical Textiles 96
59 Coated Textiles, Principles and Applications
60 Chemical Principles of Synthetic fibre Dyeing
61 Geotextile by N W M John
62 Chemical Principles of Textile Conservation
63 Textile Testing: Physical, Chemical & Micoscopical
64 Mechanics of Textile & Laminated Composites by A.E. Bogdanovich & C.M. Pastore
65 Manufactured Fibre Technology
66 Handbook of Advance material testing
67 Fiber Chemistry
68 Engg in Textile Coloration
69 Mass Spectrometry
70 New Fibers by Tatsuya Hongu & Glyn O. Phillips
71 Chemical Technology in the pre-treatment processes of Textiles
72 Handbook of Nonwoven Filter Media
73 Natural Dyes for Textiles & their Eco-friendly Applications
74 Testing and Quality Management Vol.1
75 Theory and Practice of Water & Wastewater Treatment by Ronald L. Droste
76 Analytical Chem. By Open Learning - 34 Volumes
77 Wastewater Microbiology

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Lead : DKTE Society's Textile & Engineering Institute (DKTE)

78	Polyimide : Fundamentals & Applications
79	Fibre Reinforced Composites by P. K. Mallick
80	Polymer Chemistry the basic Concepts by Hiemenz Paul C.
81	Chemical Processing of Fibers and Fabrics Functional Finishes by Menachem Lewin
82	Modern Textile Characterization Methods By Mastura Raheel
83	Chemical Technicians' Ready Reference Handbook
84	Juran's Quality Handbook
85	Polymer Data handbook
86	Encylopedia of Nanoscience & Nanotechnology by Dr. Parag Diwan & Ashish Bharadwaj
87	Textile Testing & Analysis by B. J. Collier
88	Risk Assessment of Chemicals in the Environment
89	Textile Finishing by Derek Heywood
90	Micro Manufacturing & nano technology
91	Waste Water Treatment
92	Textile Chemicals Environmental data & facts
93	Membrane Separation Processes
94	Coated Textiles by A. K. Sen
95	Wellington Sears Handbook of Industrial Textiles by Sabit Adnur
96	Physical Properties of Textile fibres
97	Physical Properties of Textile Fibres by Morton W.E. & Hearle J.W.S.
98	Coated Textiles, Principles & applications by A. K. Sen
99	Ullmann's Fibres Vol.1 & 2 by Wiley-VCH

List of Journals:

Sr. No	Name of journal
1	AATCC Review
2	Clothing & Textile Research Journal
3	Coloration Technology
4	Family & Consumer Sciences Research Journal
5	International Journal of Materials Research
6	Melliand International
7	Sportswear International
8	Textile Network (Magazine)
9	Non-Woven & Technical Textiles
10	Future Materials
11	Asian Technical Textiles
12	Geosynthetics
13	Journal of Natural Fibers
14	Research Journal of Textile & Apparel
15	Journal of Textile Institute

16	Journal of Textile & Apparel, Technology & Management
17	Autex Research Journals
18	Journal of Engineered Fibers & Fabrics
19	Chemical Fibers International
20	Texhnical Textiles International
21	Technical Textiles
22	Journal of Industrial Textile
23	Journal of Composite Material
24	Textile Research Journal

List of Manuals

Sr. No.	Name of manual
1.	ASTM Textile Standards 7.01 & 7.02
2.	Analytical Methods for Textile Laboratory
3.	Annual Book of ASTM Standards on Textile Section .07
4.	ASTM Volume 07.01 Textiles (I): D76 - D4391
5.	ASTM Standards (978-0-8031-8561-6) for Water & Environment Technology
6.	ASTM Volume 13.01 (978-0-8031-8585-2)
7.	ASTM Volume 07.02 Textiles (II): D4393
8.	ASTM Standards Section 15 (978-0-8031-8600-2)
9.	Nonwoven Structures for Absorption of Body Fluids by Jacek DUTKIEWICZ
10.	EN 12447-Geotextiles & geotextile-related products
11.	EN 13361 - Geosynthetic barriers
12.	BIS STANDARD

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Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 91**
Existing Table of Technical manpower is to be replaced with following	

Technical Manpower

Sr No.	Name	Designation	Qualification
1	Prof. C A Patil	Professor	M. Tech. + 29 yrs Exp.
2	Prof (Dr.) A I Wasif	Professor	M.Sc. Tech, Ph.D. Tech + 28 Yrs Exp.
3	Dr. S B Vhanbatte	Associate Professor	M. Tech., Ph.D. + 8 yrs exp.
4	Mr. S S Aparaj	Assistant Professor	M. Text. + 6 yrs Exp.
5	Mr. Pradip Ingale	Jr. Scientist	Pursuing M. Tech + 12 Yrs. Exp.
6	Mr. Abhay Shetti	Sr. Clerk	B. Com + 20 Yrs Exp.

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Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-woven	**Revised Page No. 91**
New section IT Centre is be added as given below	

IT Centre

1	Desktop Pc-25
2	Software
3	Wireless Access Point
4	Scanner
5	Blader Server
6	Colour & B/W Printer
7	Video Conferencing Facility
8	High Speed Camera

High Speed Camera

FASTCAM SA3

The high speed camera proposed is having specifications like Frame rate 50,000 with 128X16 pixel resolution, 12-bit ADC Sensor with 20 µm pixel; 1µs maximum shutter speed. Also contains video output and camera

controls, Dual Speed Recording, Capture 12-bit uncompressed data; 8GB, 16GB or 32GB memory options and Low Light Mode.

High speed cameras are basically to capture the very high speed and short duration processes for detailed analysis which will be played back as a slow motion picture. High speed cameras are advanced imaging systems which are a vital part of all engineering research institutes and has a wide base of applications including mechanical studies, machining application, material testing, machine vision, combustion, fluid mechanics and many more.

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Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 92**
Following R & D Projects are to be added in existing R & D projects on Technical Textiles under taken/under progress	

R & D projects on Technical Textiles under taken/under progress

Following is the list of ongoing research project.

14. Study of performance characteristics of sugarcane fibre composites.
15. Studies in wound care & bandages
16. Studies in Moisture Management in textiles
17. Application of Nanotechnology in Textile Finishing
18. Studies in application of super absorbent polymers on textiles.
19. Coating of nonwoven materials for specialty applications.
20. Studies in surgical non-woven Gown.
21. Natural Fibres as Reinforced material in false ceiling.
22. Studies in nonwoven fabrics for water filtration.
23. Studies in nonwoven air filter fabrics.
24. Microencapsulation technique for technical textiles.
25. Application of Chicken Feather.
26. Studies on fiber reinforced concrete.

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Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 92**
Existing Foreign collaboration details to be replaced with following	

Foreign Collaboration

Communication held with following for collaboration activities.

1. Thiland Textile Institute, Bangkok
2. Tampere Universty of Technology, Finland
3. Mascow State Textile University, Russia
4. Institute of Textile Technology and Process Engineering, Germany
5. CTT Group Canada
6. LIUC University, Castellanza, Itali
7. Technical University of Liberec, Czech Republic
8. Fraunhofer Institute of Chemical Twechnology, Germany
9. Niederrhein University, Germany
10. Ahlstrom Nonwovens, USA
11. Textile BioEngineering and Informatics Society, Hongkong
12. RWTH Aachen University Germany
13. Swiss Textile College, Swistzerland
14. CETEX Institute for Textile Processing Machinery , Germany

Annex - 7
COE on Non-wovens
Lead : DKTE Society's Textile & Engineering Institute (DKTE)

Updation Details as on Nov 2012	
Chapter No. & Name: 9. COE on Non-wovens	**Revised Page No. 93**
Existing details of prototypes developed are to be replaced with following	

Details of Prototypes Developed:

1. Filter Fabric for recycling of Textile Effluent
2. Herbal wound bandages
3. Conductive textile nonwovens as an Actuators
4. Coir composite roofing panels
5. PP homo-composite for crack resistant

Annex - 8
COE on Sportech
Lead : Wool Research Association (WRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 1. Introduction	**Revised Page No. 2**
Existing write-up is to be replaced with the following in the text box given in the right bottom under the topic – "Different kinds of Technical Textiles"	

Different kinds of technical textiles

Sportech

- Special clothing and sports equipment to enhance **protection, comfort** and **performance**.

  Sportech comprises of technical textiles used in sports and leisure, which is broadly classified in three categories.

  - **Sportswear** – Apparel with performance enhancement characteristics such as moisture management, comfort, elastomeric, soil guard, anti-microbial – sports shirt, athletic wear, sport shoes, exercise wear, sport jerseys, gloves, etc.

  - **Sports Goods** – Active sport items for the specific sport like inflatable balls for football, volleyball, Rugby ball, Hockey sticks, Golf club, etc.

  - **Sport accessories** – Games paraphernalia like astro-turfs, nets, rings, etc to provide requisite playing conditions.

  It is predicted that expenditure on sports will grow with a CAGR of 8.9%, from US$ 1 billion in 2005 to US$ 6 billion in 2025.

Annex - 8
COE on Sportech
Lead : Wool Research Association (WRA)

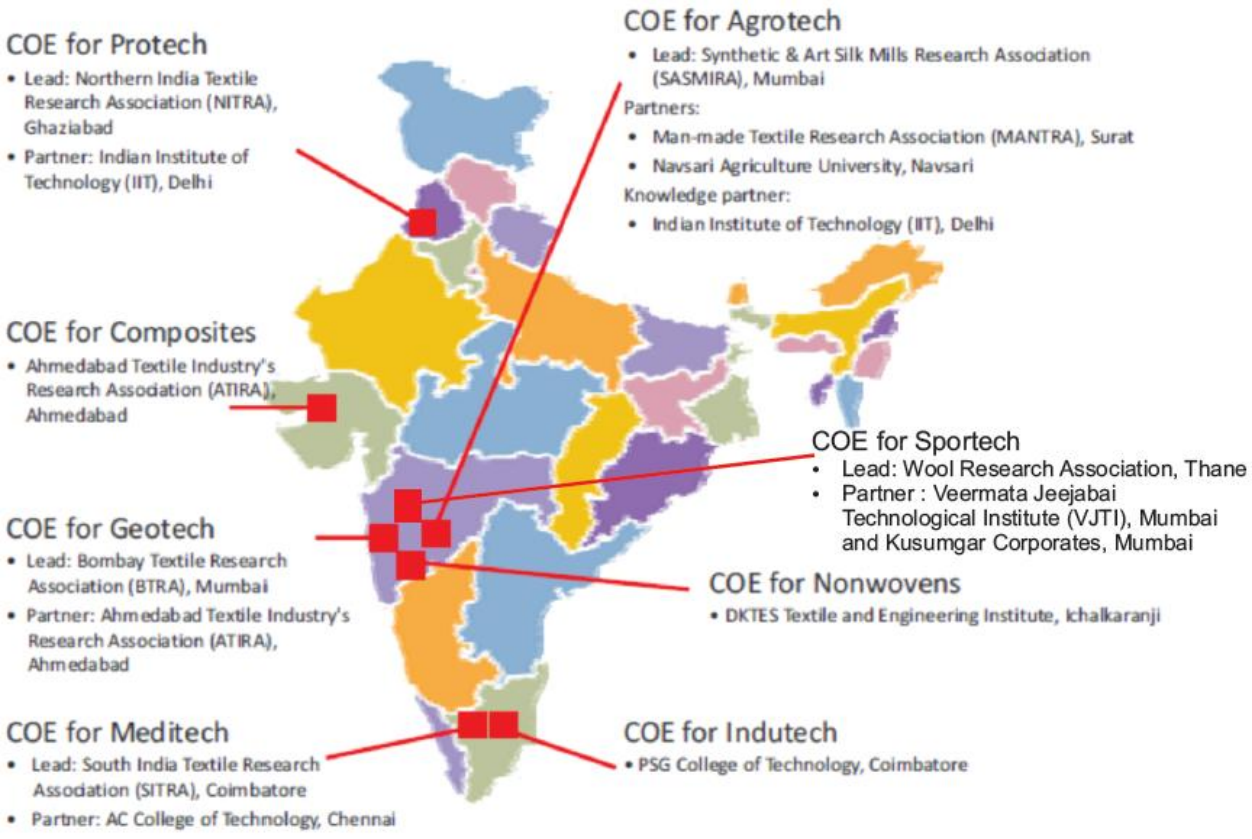
Updation Details as on Nov 2012	
Chapter No. & Name: 1. Introduction	**Revised Page No. 4**
Following is to be added in the Table – "Product Focused Centres of Excellence"	

Product Focused Centres of Excellence

Sportech	Lead: Wool Research Association, Thane Partners: Veermata Jeejabai Technological Institute (VJTI), Mumbai Kusumgar Corporates, Mumbai

Annex - 8
COE on Sportech
Lead : Wool Research Association (WRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 1. Introduction	Revised Page No. 5
Existing map is to be replaced with the map given here	



Annex - 8
COE on Sportech
Lead : Wool Research Association (WRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 2. Snapshots of COEs	**Revised Page No. 12**
Following is to be added as new section "COE on Sportech"	

COE on Sportech

Wool Research Association has been designated as Centre of Excellence for Sports Textiles and allied products as lead partner duly supported by consortium partners viz. Veermata Jeejabai Technological Institute (VJTI), Mumbai and Kusumgar Corporates, Mumbai.

Following R&D Projects related to Technical Textiles and Sport Textiles are Undertaken/Under Progress at WRA:

1. Highly engineered friction spun yarns for brake liners & clutch facing suitable for light weight to heavy weight vehicles.
2. Composite yarns made of glass, kynol and carbon fibers for belt cloth for mines.
3. Non asbestos multi component Heterogeneous yarns used in friction component for industry.
4. Filter cartridges made of cotton, PP, Polyester, Glass & Nylon for water and chemical filtrations
5. Multi layered fabrics (high tensile fabrics) for belting
6. Endless belts (conveyer belts) for carrying high tensile loads
7. Non asbestos abrasive yarns for braids used as insulating material in lifting pumps.
8. Kevlar/basofil bi-component yarns for protective fire fighting suits.
9. 100% carbon woven fabrics for high heat resistance applications up to 1200˚C.
10. Thermal fabrics for protection against cold weather.
11. Kevlar and FR viscose yarns for high altitude pilot suits.
12. Heavy duty fabrics for hand gloves
13. Flame retardant yarns and fabrics made of wool and kanecaron (modacrylic fibers).
14. Heat resistant fabrics for fire curtains made of ceramic/ glass/ metal wire.
15. Itch proof woollens for various use including sportech by using Plasma and enzyme treatment
16. Wool Based flame retardant fabrics
17. Synthesis of Moth Resist Dyes for woollen products including sportech
18. To develop a smart indigenous sleeping bag with heating property
19. Design and development of High Performance, Multifunctional, Protective Sportswear for various sports

Annex - 8
COE on Sportech
Lead : Wool Research Association (WRA)

20. Development of Waterproof Breathable Sportswear with desired functional properties by eco-friendly water based coating techniques
21. Development of thermal responsive high altitude multilayer protective clothing made principally of angora fiber

Annex - 8
COE on Sportech
Lead : Wool Research Association (WRA)

Updation Details as on Nov 2012	
Chapter No. & Name: 10. COE on Sportech	**Page No. 94**
New Chapter 10 - COE on Sportech (under Status of newly announced COEs) is to be created with the following	

COE on Sportech

Lead: Wool Research Association, Thane

Background and Information of Parent Organization(s)

Wool Research Association, Thane

The Wool Research Association, Thane, an autonomous co-operative Research organization under Society's Act and linked to Ministry of Textiles, GOI, was established in the year 1963 by the Woollen Textile Industry in close association with the union government of India. WRA as a society registered under the societies Registration Act XXI 1860 having its central office at Kolshet Road, Thane, Maharashtra.

WRA as an organization is committed to provide technological and scientific solutions to the woollen sector in particular and textiles industry in general besides meeting the super-ordinate goals of scientific and Technological advancements set by the industry leaders and policy makers in India. In this pursuit, the organization has imprinted its own standards to obtain the accreditation of the international status as a R&D institution apart from providing solutions to various technical and techno-economic problems faced by the industry in a very cost effective mechanism and with quick response time.

Major Activities of WRA:

- Research & Development
- Testing/Evaluation Service to the Industry, Export Oriented Organizations, Government Organizations etc.
- Colour Technology (CAD/CAM)
- Training & Education
- Research in the emerging technologies like Technical Textiles, Plasma & Nanotechnology, Phase Change materials, IT, Smart Textiles, Supercritical processing etc.
- Technical Service to the Decentralized Carpet Industry, SMEs, Cottage/Rural industry etc.
- Technology Development in Woollens & Manmade Textiles
- Consultancy
- Technical Survey & Audit of Industrial Units

Annex - 8

COE on Sportech

Lead : Wool Research Association (WRA)

- Technical Feasibility Report Formulation
- Turnkey Projects

Since last two decades, Wool Research Association had modestly engaged itself in the development of technical textiles. It has foreseen the significance of this emerging technology. It had undertaken a few sponsored projects relating to Sportech, Indutech, Mobiltech, etc.

Of late Sportech products have assumed added significance for the following factors:

- Increased activities and participation in sports in the country.
- Outdoor leisure pursuits.
- Availability of high performance fibres, new technologies of coatings and manufacturing processes.
- Higher level of sports standard and challenges within sporting nations.
- Newer sports requiring high dexterity, skill and sporting gears.
- New interest of the youth for outdoor activities and leisures.
- Popularity of traditional sports like athletics, soccer, cricket, skiing, golf, sailing, etc., in the country.
- Growth of sports facility in the country.

Considering the importance, scope and significance of this sector viz Sportech, it is considered expedient to face the challenges of new development, global competition, existing visible gap, technological parameters like globally accredited testing, HRD, prototype development facilities and scaling up of the production, dissemination of information to the stake holders, increasing interest of Indians in sports, etc. WRA having highly qualified excellent team of Scientists and Technologists and modest experience in technical textiles sectors, has ventured, creating facilities of a Centre of Excellence in Sportech.

MISSION:

- ❖ To build a complete institution that supports high quality research and product development on sports textiles for the growth of textile industry.
- ❖ To provide a platform for the industry where they can develop new products, upgrade their existing products and provide them pilot scale facilities for sample development and technology transfer.
- ❖ To provide world class facilities for testing of technical textile materials as per the relevant international standard test methods and to develop new test methods where there are not available.
- ❖ To encourage and assist new entrepreneurs in the sports textiles sector by providing support in project planning, execution, production, and various aspects of management.
- ❖ To organize training programmes from time to time for the technical and managerial staff of the sports textile industry to meet the requirements of the industry
- ❖ To organise workshops, seminars and conferences to impart / transfer the knowledge to the industry.

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COE on Sportech

Lead : Wool Research Association (WRA)

- To impart education in sports textiles to the students of the various institutions/ industry personals so that they are ready for the sports textile industry.

OBJECTIVES:

- The basic objective of Centre of Excellence is to provide infrastructure and facilities at one place for the convenience of the manufacturers of sports textiles. COE facilities will motivate potential entrepreneur.
- To provide such facilities, it would be necessary to establish suitable laboratory, product, process & prototype development facilities, Sample Bank, competent manpower, training facilities, incubation centres, etc in the identified sector of Sportech.
- The purpose of COE is to provide facilities to the entrepreneurs in one hand and the suitable products to the users on the other, so that comparatively near. sector develops with Govt. support and initiative, till this value added sector stands on its own feet to survive and thrive, subsequently having an impact on textiles industry and economy of the country.
- Conceptually, the COE would offer its facilities, knowledge, research support, HRD, consultancy, etc to serious entrepreneurs who would venture into this emerging technology.
- Incubation of new ideas into practical tradable products, dissemination of information through workshop, seminar, etc also will be within the activities of COE.

VEERMATA JEEJABAI TECHNOLOGICAL INSTITUTE (VJTI)

- An Institute engaged in Textile education and other disciplines of Engineering & Technology for last 125 years.
- Equipped with modern laboratories, pilot plants.
- Education & training facilities offering various courses in Engineering & Technology leading to Diploma, Degree, Post Graduate Degree and Ph.D.
- Textile Department is equipped with 24 testing equipment, 32 major Spinning & weaving machines, Fibre & Yarn Development Lab, Fabric Development Lab, Physical Testing Lab and Chemical Testing Lab.
- 19 published papers in Technical Textiles over last 10 years.
- Highly qualified 21 Professors/ Assistant Professors as faculties.

KUSUMGAR CORPORATES PVT. LTD.

- Forefront Technical Textile Manufacturer for last two decades (Geotech, Indutech, Sportech, High Altitude Clothing, Protech, etc)
- Seven highly qualified technocrats and large number of industrial staffs & workers
- Three factories at Umbergaon, Vapi, Paldi with latest weaving, processing & coating facilities for technical textiles.

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COE on Sportech
Lead : Wool Research Association (WRA)

- Manufacturer of Defense Textiles like Parachutes, high altitude clothing, Awning, Tarpaulins, Uniforms and Industrial Uniforms, etc.

Infrastructure Facilities

Testing Instruments

The following instruments are under procurement to facilitate the objectives of the COE:

Name of the machinery / equipment	**Specific purpose**
AFC 45° Automatic Flammability Tester	To determine the burning characteristics of textiles materials under controlled conditions.
Air Permeability Tester	To determine the resistance of fabrics (woven, knitted and non woven textile materials) to the passage of air.
Flammability Tester	To determine the flammability resistance of vertically oriented fabrics.
Busting strength tester	To determine the bursting strength and distension at burst of woven, knitted and non woven fabrics, papers.
Hydrostatic Head Tester	To determine the resistance of fabrics (coated, uncoated & non wovens) to water penetration. To determine pore size of textiles
Rain Tester With 2400mm Column	To determine the penetration resistance of fabrics or composites at different intensities of water impact.
Digital Elmendorf Tearing Tester	A microprocessor controlled falling-pendulum instrument to determine the ballistic tearing strength of textiles, plastics, paper or board.
Digital Thickness Gauge	For thickness & Compressibility Testing
Universal strength tester	For the measurement of strength and elongation of the textiles.
Thermal Tester	To characterize polymer behavior at high temperatures, measuring the heat deflection
Universal weathering testing instrument	Universal weathering instrument for testing the light fastness and weather ability of materials.
Oxygen Index Test Apparatus	Digital readout of oxygen concentration to ± 0.1%.
Dry Guarded Hotplate	The Dry Guarded Hotplate system was designed to measure the thermal resistance (R-value) of fabrics
Universal wear tester	To determine the wear and abrasion resistance of the industrial fabrics
Pneumatic sample cutter	For sample preparation

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COE on Sportech

Lead : Wool Research Association (WRA)

Toxicity Index	To measure toxicity Index of coated textiles
Ultra Violet Condensation Test Apparatus	To determine the UV resistance of coated fabric
Evenness Tester	Measurement of mass variations in yarns
Sweating Guarded Hotplate	Measurement of thermal properties and water vapour resistance under steady state conditions
Atlas Moisture Measurement Tester	Measurement of the dynamic liquid transport properties of knitted and woven fabrics.
KAWABATA Evolution system	Measures the mechanical properties of fabrics like Tensile, Shear, Pure Bending, Compression, Surface friction & Roughness.
Softness Tester	Measures the softness of coated and soft fabrics
Flex Tester	Flex Fatigue
Abrasion Tester	To measure the abrasion resistance
Oxygen and Water Vapour Transmission Rate Tester	To measure the Oxygen and Water Vapour Transmission Rate in Plastic Films or Packaging Material
Coefficient of Friction Tester	Study Coefficient of Friction properties on • Plastic Film • And Packaging • Material
Spectroflurophotometer	To measure fluorescence properties
Scratch Tester- 551	To measure the Scratch resistance of the fabric
AFM	High Resolution Surface Imaging
Physical Vapour Deposition	to deposit thin films for coating polymer or fabric substrate with metal particles
RF sealing machine	For making soles of shoes
Thermal and electrical conductivity measurement machine	To measure thermal & electrical conductivity
Electrospinning system	To make nano fibres
Compression Moulding Machine	Molding rubber, plastic, composites they can be used for wide variety of functions as bonding, laminating, assembling etc.
Thermal and electrical conductivity measurement machine	To measure thermal & electrical conductivity

List of prototype development machines under procurement

Name of the machinery	**Specific purpose**
40/60 inch high speed flat carding machine	For individualization of fibers & sliver preparation
Draw frame / Gill Box	Drafting and blending/ doubling
Comber	Removal of short fibers

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COE on Sportech

Lead : Wool Research Association (WRA)

Needle punching	Sports composites
Roving frame	Preparatory to spinning
Ring frame	Spinning yarn
Winding machine	For winding plied yarns
Filter cartridge winding machine	For winding filter cartridge yarn
TFO / Cabler	Ply twisting
Sectional warping machine	For warping the yarns
Rapier weaving machine	Fabric formation
Warp knitting machine	For knitting technical fabrics
Hose knitting machine	For knitting sports/ industrial hose pipes
Circular knitting machine	For knitting sports/ industrial hose pipes
Braiding machine	To braid the engineered yarns
Vacuum spraying machine	For spraying special chemicals
Industrial sewing machine	For sewing industrial fabrics
Ultra Sonic Sealing Machine	Applied to the non-pin seam of fabrics, non-woven fabrics, thermo-melt fabrics
Shoe stitching	For stitching of Shoe
Sweating Thermal Mannequin	Diagnostic investigation under controlled conditions by simulating human body skin responses to the wearing of textile apparel.
RF sealing machine	For making soles of shoes
Coating Machine	For coating & special finishes
Stenter	For heat setting the technical fabrics

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COE on Sportech

Lead : Wool Research Association (WRA)

Information Center

The Information Center at COE on Sportech has initiated action to procure the following books and standards to enable information access to the industry stakeholders

Name of the books	Year of publication	Name of the publisher
Wellington Sears Handbook of Industrial Textiles	2000	Publisher Technomic publishing company Inc.
Polymer Enhancement of Technical Textiles	2003	Ismithers
Smart Fibers, fabrics, and clothing: Fundamentals and applications	2001	----do----
Thermal and moisture transfer in fibrous materials	2006	----do----
Conductive Polymers and Plastics	1999	Chemtec Publishing
Database of Ant blocking, Release, and Slip Additives	2005	Chemtec Publishing
Developments in the European Injection Moulding Industry	1995	Chemtec Publishing
Handbook of Antistatics	2007	Chemtec Publishing
Advanced textile conference proceedings (2008)	2008	IFAI Headquarters
Synthetic fibres: nylon, polyester, acrylic, polyolefin	2008	Woodhead Publishing Ltd
Handbook of fibre rope technology	2007	Woodhead Publishing Ltd
Handbook of yarn production	2003	Woodhead Publishing Ltd
Coated and laminated textiles	2005	Woodhead Publishing Ltd
Hand book of technical textiles	2000	Woodhead Publishing Ltd
Smart fibres, fabrics and clothing	2003	Woodhead Publishing Ltd
Textiles in automotive engineering		Woodhead Publishing Ltd
The Fifth International Symposium on "How to Enter Technical Textiles Markets - positioning your company for the recovery"	2009	International news letter
Materials in Sports Equipment (Volume 1 & 2)	July 2003	Woodhead Publishing Ltd
Textiles in sport	August 2005	Woodhead Publishing Ltd
The Physics of sports	2000	Head Publishing,

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COE on Sportech

Lead : Wool Research Association (WRA)

		Springer (India) Private Limited
Biomedical engineering principles in sports	2004	---do---
Sport Aerodynamics	2009	-----do-----
Effect of mechanical and physical properties on fabric hand	2005	Woodhead Publishing India
Smart Fibers, fabrics, and clothing: Fundamentals and applications	2001	----do----
Smart clothes and wearable technology	2009	-----do----
Thermal and moisture transfer in fibrous materials	2006	----do----

Standards to be procured for Sports textiles

DIN Standards	ONORM EN- 4416	Indian standards	IS- 2150: 1989
	ONORM EN 12801		IS- 6590:1972
	ONORM EN – 12800		IS- 4375:1975
	ONORM EN 12491		IS-14358:1996
	ONORM EN – 12745		IS-2965:1987
	DIN-EN-12222		IS-2970-1987
	DIN -EN- 15330-1		IS-3449-1984
	DIN-EN-135838-3		IS-4726-1984
	DIN-EN-13538-2		IS-14564-1998
	DIN-EN-13537		IS-8991-1978
	DIN EN 926-1		IS-76091988
AS standards	AS- 4693.8		IS-3345-1989
	AS-4693.5		IS-3800-1983
	AS-2001.2.34		IS-3874-1987
ASTM standards	ASTM-F- 2568-06		IS-8404(PART-2)-1979
	ASTM-F-1955-99		
	ASTM-F-1720-06	ISO standards	ISO 22652
	ASTM-F-1932-98		ISO/TR – 20572
	ASTM-F-1853-03		ISO -20866
	ASTM F 1015-03		ISO-22774
	ASTM- F-1551-03		ISO-18454
	ASTM- D- 737-04		ISO/TR-20883
	ASTM-D 4723-07		ISO 22652

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COE on Sportech

Lead : Wool Research Association (WRA)

R&D Projects on Technical Textiles Undertaken/Under Progress

Projects Completed / Under Progress in T.T. & Sportech

Sr. No.	PRODUCTS
1	Highly engineered friction spun yarns for brake liners & clutch facing suitable for light weight to heavy weight vehicles.
2	Composite yarns made of glass, kynol and carbon fibers for belt cloth for mines.
3	Non asbestos multi component Heterogeneous yarns used in friction component for industry.
4	Filter cartridges made of cotton, PP, Polyester, Glass & Nylon for water and chemical filtrations
5	Multi layered fabrics (high tensile fabrics) for belting
6	Endless belts (conveyer belts) for carrying high tensile loads
7	Non asbestos abrasive yarns for braids used as insulating material in lifting pumps.
8	Kevlar/basofil bi-component yarns for protective fire fighting suits.
9	100% carbon woven fabrics for high heat resistance applications upto 1200˚ C.
10	Thermal fabrics for protection against cold weather.
11	Kevlar and FR viscose yarns for high altitude pilot suits.
12	Heavy duty fabrics for hand gloves
13	Flame retardant yarns and fabrics made of wool and kanecaron (modacrylic fibers).
14	Heat resistant fabrics for fire curtains made of ceramic/ glass/ metal wire.
15	Itch proof woollens for various use including sportech by using Plasma and enzyme treatment
16	Wool Based flame retardant fabrics
17	Synthesis of Moth Resist Dyes for woollen products including sportech
18	To develop a smart indigenous sleeping bag with heating property
19	Design and development of High Performance, Multifunctional, Protective Sportswear for various sports
20	Development of Waterproof Breathable Sportswear with desired functional properties by eco-friendly water based coating techniques
21	Development of thermal responsive high altitude multilayer protective clothing made principally of angora fiber

Note: Sportech Projects -Projects at Sr. No.7, 8, 9, 10, 11, 12,13,15,16, 17,18,19,20 & 21 belong to SPORTECH Sector of T.T.

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COE on Sportech

Lead : Wool Research Association (WRA)

Training activities

WRA conducts several need based training programs at WRA or at site of the organization regarding textile testing, manufacturing technology and emerging technologies. Sportech COE will also actively engage in training of students, faculty members of academic institutions and technicians from the industry to create awareness and knowledge about the technical textiles field as a whole. Short term courses shall be offered round the year to suit the requirements of the industry.

Foreign Collaboration details

WRA's COE on Sportech is in the process of selection of leading international institutions regarding technical consultancy. The institutions are:

1. North Carolina State University
2. RMIT University, Melbourne, Australia
3. Trigon UK

Sportech Prototypes to be developed

Generally, prototypes in COE will be those items for which facilities are either restricted or not available in the county. Besides, the product so developed should have a high value realization. Such Sportech items will be:

- Parachute Canopy Fabrics for sports
- Ballooning Fabric
- Sail Cloth
- Sleeping Bags for adventure sports
- Sports nets
- Tents / Shelters for adventure sports
- Artificial Turfs
- Sportswear

Consortium

1. Wool Research Association (WRA), Thane : Lead Partner
2. Veermata Jeejabai Technological Institute (VJTI), Mumbai : Knowledge Partner
3. Kusumgar Corporates, Mumbai : Expertise Partner

Industry Partners

(To support, technically & financially sustainability of COE)

1. Raymonds Ltd

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COE on Sportech
Lead : Wool Research Association (WRA)

2. Grentex & Co. Pvt. Ltd
3. Banswara Syntex
4. Shri Ram Textile Mills

Other Support

(For conducting Seminars, Workshop, etc)
1. Textile Association of India
2. Technical Textile Association

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