ITEM SPECIFICATION ITM CD :2101614084

ITEM CODE :- 2101614084 submit

ITM CODE	DETAILED SPECIFICATION
2101614084	FABRICS FOR BDU T-SHIRT 1)Cloth Polyester Cotton Lycra (40/55/5) single Jersy 205GSM Anti Microbial Finish 160CM width Steel Grey Pantone No. TCX 18-4005 - 0.2519KG 2)Cloth Polyester Cotton Lycra blend (40/55/5) Warp knitted 1X1 Rib Steel Grey (250-280 GSM) with Anti Microbial finish width 160CM Pantone No.TCX 18-4005 -0.01KG Specification : As per Appendix "E" IAFS01003 (BDU T-SHIRT HALF SLEEVES) MAY 2024
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Appendix 'E'
(Refers to Clause 6.2)

RAW MATERIAL (FABRIC , SEWING THREAD) & BROAD STITCHING/HEMMING/BAR TACKING REQUIREMENTS FOR BDU T-SHIRT (HALF SLEEVES)

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
Blend Composition of the Fabric	**PCL (Polyester, Cotton, Lycra)** (i) Cotton : **55%** ***(minimum)*** (ii) Lycra : **5 % (maximum)** but cannot be less than **3 %** (iii) Polyester : **Remaining %** ***(but not exceeding 42 %)***	IS/ AATCC	IS 3416 (Part 1) : 1988 (*based upon dry mass)* (RA 2017) , and IS 667 : 1981 or AATCC 20 : 2011, AATCC 20 A : 2012
Type of finish on the fabric	**Antimicrobial**	AATCC	AATCC - TM100
Type of yarns to be used while knitting of the fabric **(i) Course wise** **(ii) Wales wise**	(i) Course wise: PCL blend *Elastomeric Core Spun yarn* (ii) Wales wise: PCL blend *Elastomeric Core Spun yarn* ** **Note 1** *: Yarn made of only* ***Super Combed Cotton*** *OR* ***Compact cotton*** *(as well as* ***Polyester;*** *since polyester being a part of the blend too) , with* ***Very High Tenacity****, post* ***removal of short fibres*** *after* ***double combing****, ensuring* ***minimal hairiness*** *and* ***negligible tendency*** *to* ***pilling*** *and* ***fuzziness*** *should be used (Average Cotton Fibre length of minimum 5 cm and*		Visual for (i) & (ii) / End point traceability documents during Bulk Production Lot Inspection stage for Note-1

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
	Polyester Staple Fibre length of 6.5 cm is recommended to be maintained during yarn manufacturing)		
Approximate value of 'Nominal Count' of Yarns (i.e Yarn size to be used in knitting of the fabric):- **(i) Course direction of the fabric** **(ii) Wales direction of the fabric** *{To be checked from the yarn; taken out from the finished garment i.e BDU T Shirt}*	(i) Course wise : **28_s / 1 Ne + 20 D** to **30_s/ 1 Ne + 20 D** **of** *Elastomeric Core Spun Yarn of PCL blend* (ii) Wales wise : **28_s / 1 Ne + 20 D** to **30_s/ 1 Ne + 20 D** **of** *Elastomeric Core Spun Yarn of PCL blend*	IS	IS 3442: 2023 Amdt No.1 (RA 2018) & End point traceability documents during Bulk Production Lot Inspection stage (Refer Note1 in the Row above)
Approximate value of 'Twist' of the yarns (to be used in knitting) of fabric: - **(i) Course direction of the fabric** **(ii) Wales direction of the fabric** *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	(i) Course wise: **700 twists/m** *(in **'Z'** direction **for 'Single' Yarn)*** (ii) Wales wise : **700 twists/m** *(in **'Z'** direction **for 'Single' Yarn)*** *(**Note**: These values are for illustration of the format only, and is to be disregarded. The actually observed values in the yarn used in the fabric used in garmenting the T-Shirt are to be reported)*	IS/ ISO	IS 832: 2021 (Part-1) / ISO 2061 : 2015

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
Type of knit (to be used while knitting of fabric) **(i) Main classification *(Warp or Weft Knit)*** **(ii) Sub classification**	**(i)** Main classification **: Weft Knit** **(ii)** Sub classification: **Single Jersey knit** *(however, it should be **extremely closely knit,** with **high knit stitch density**)*		SP 45:1988 (Handbook on glossary of terms issued by BIS)
Size of each loop (i.e Loop / Stitch length) in the knitted fabric *{**Note**: Though, **the Lab testing values / Manufacturer's authenticated values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**2.5 mm** (Maximum) **at 1300 turns/m** *(**Note:** This value is for illustration of the format only, and is to be disregarded. The actually observed value in the fabric used in the T Shirt is to be reported)*		To be furnished by the NABL Lab
Type of stitch (used while knitting the fabric)	**Single Jersey Knit stitch** *(Interlock stitch is not required)*		To be furnished by the NABL Lab
Thread count (Knit Stitch density of the loops) of the fabric per dm **(i) Course direction *(Courses / dm)*** **(ii) Wales direction *(Wales/dm)*** *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	(i) Courses / dm : 270 **(Min.)** (ii) Wales /dm : 200 **(Min.)** *(**Note**: These values are for illustration of the format only, and are to be disregarded and not to be treated even for guidance. The actually observed values of the fabric used in the T-Shirt are to be reported)*	IS	IS1963 : 1981 (RA 2023)

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
Mass of the fabric per unit area (i.e. in GSM or g/m²)	***185 g/m² - 205 g/m²***	IS	IS 1964: 2001 (RA 2017)
Usable width in cm *of the fabric* ***(Note** : *This is for guidance only.** *To be considered for evaluation, in case **only fabric** is being **procured**)*	**160 cm (Min.)***	ISO/ IS	ISO 22198:2006 IS 1954:1990
Bursting Strength of the Fabric	**550 kN/m² (Min)**	ISO / ASTM	ISO : 2960 / ASTM D 3786 / ASTM
Abrasion resistance* of the fabric *{*__Note__: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	- **No thread break** should be observed **after 35000 cycles** * *(Actual number of cycles at which the thread broke needs to be reported)* - **Colour change during abrasion** should be **4 or better** *(as per Grey Scale)**	IS	12673 (Part 2): 2022
Pilling resistance / Pilling rate of the fabric *(tumble pilling for 2 hours)* ***using tumble type pilling tester***	**Average rating of 4-5** or better	IS	IS 10971: 2011 (RA 2022) OR ASTM D 3512
Pilling resistance / Pilling rate of the fabric *(after **5000 revolutions as well as after 2 hours of test) using Martindale tester***	**Average rating of 3.5** or better	ISO	ISO 12945-2:2020

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
Fuzziness rating of the fabric	**Average rating of 4** or better	IS	IS 10971: 2011 (RA 2022)
Fabric's Colour fastness to light (Blue Wool rating)	**5 or better**	IS/ISO	IS 2454 : 1985 IS/ISO 105 B 02 : 2014
Fabric's Colour fastness to washing *(after 5 repeated washing / drying cycles at 38 °C to 44 °C)*	(a) **Change in Shade : 4-5** (b) **Staining on** *(i)Acetate :* ***4-5*** *(ii) Cotton* ***: 4-5*** *(iii) Nylon* ***: 4-5*** *(iv) Polyester* ***: 4-5*** *(v) Acrylic:* ***4-5*** *(vi) Wool* ***: 4-5***	IS/ ISO	IS/ISO 105 C 10 : 2006 Test A1 (RA 2021)
Fabric's Colour fastness to perspiration *(to be checked both in* ***acidic*** *and* ***alkaline*** *simulated conditions)*	**ACIDIC** (a) **Change in Shade : 4-5** (b) **Staining on** *(i)Acetate :* ***4-5*** *(ii) Cotton* ***: 4-5*** *(iii) Nylon* ***: 4-5*** *(iv) Polyester* ***: 4-5*** *(v) Acrylic:* ***4-5*** *(vi) Wool* ***: 4-5*** **ALKALINE** (a) **Change in Shade : 4-5** (b) **Staining on** *(i)Acetate :* ***4-5*** *(ii) Cotton* ***: 4-5*** *(iii) Nylon* ***: 4-5***	ISO	ISO 105 E 04 : 2008 (RA 2019) **(Note :** *This standard has replaced IS 971 : 1983)*

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
	(iv) Polyester ***: 4-5*** *(v) Acrylic* ***: 4-5*** *(vi) Wool* ***: 4-5***		
Fabric's Colour fastness to perspiration & light *(both to be* ***checked simultaneously****)*	**4**	ISO	ISO 105 B 07 : 2009
Fabric's Colour fastness to rubbing	(i) Dry **: 4-5** (ii) Wet :**4-5**	IS/ ISO	IS 766 : 1988 / ISO 105 X12 : 2016
Fabric's Colour fastness to hot pressing at 110° C ± 2°C, maintaining a pressure of 4 ± 1 kPa	(i) Immediately after **Dry pressing** *for 15 s* **: 4** (ii) Immediately after **Damp pressing** *for 15 s* **: 4** (iii) Immediately after **Wet pressing** *for 15 s* **: 4** (iv) After conditioning of all three test specimens for 4 hours**: 4** (v) Staining on the cotton (adjacent) fabric**: 4**	IS/ ISO	(RA 2009) / ISO 105 X11: 1994 ***(Note:*** *This standard has replaced IS 689: 1988)*
Fabric's Dimensional Change / stability (i.e ***Relaxation residual shrinkage / expansion)*** **upon SOAKING in water (along with Wetting agent) for 3 hours and flat drying; as per the procedure mentioned in the specified test method; in** **(i) Course direction** **(ii) Wales direction** ***(Note:*** *This is to be checked after*	**In case checked with the garmented T-Shirt** ***(in which the fabric has been pre-treated / washed before garmenting to cater for the dimensional variation)*** (i) Lengthwise : **± 3.0 %** *(i.e Max. Range is 3% inclusive of Shrinkage + Expansion)* (ii) Widthwise :	IS	IS 2977 :1989 (RA 2020)

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
single soaking & drying cycle only)	**± 3.0 %** *(i.e Max. Range is 3 % inclusive of Shrinkage + Expansion)* **In case checked with the fabric used in the garmented T-Shirt** (i) Course : **± 5.0 %** *(i.e Max. Range is 5% inclusive of Shrinkage + Expansion)* (ii) Wales : **± 5.0 %** *(i.e Max. Range is 5 % inclusive of Shrinkage + Expansion)*		
Fabric's Fabric's Dimensional Change / stability (i.e *Relaxation residual shrinkage / expansion)* to repeated Domestic LAUNDRY i.e repeated washing & drying **(i) Course direction** **(ii) Wales direction** ***(Note**: This is to be checked after five repeated home laundering cycles i.e washing & drying)*	**In case checked with the garmented T-Shirt *(in which the fabric has been pre-treated / washed before garmenting to cater for the dimensional variation)*** (i) Lengthwise : **± 3.0 %** *(i.e Max. Range is 3% inclusive of Shrinkage + Expansion)* (ii) Widthwise : **± 3.0 %** *(i.e Max. Range is 3 % inclusive of Shrinkage + Expansion)* **In case checked with the fabric used in the garmented T-Shirt**	IS	IS 15370 : 2020 (at 41 ± 3°C, using Type B washer) for domestic washing & drying *(i.e domestic laundry)* and IS 2977 :1989 (RA 2020) for calculation of the percentage shrinkage

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
	(i) Course : **± 5.0 %** *(i.e Max. Range is 5% inclusive of Shrinkage + Expansion)* (ii) Wales : **± 5.0 %** *(i.e Max. Range is 5 % inclusive of Shrinkage + Expansion)*		/expansion OR AATCC 150
Initial Bowness and skewness in the woven fabric *(in the initial , original unlaundered state)* *(**Note**: The manufacturer is to provide **2 m X 1.6 m** i.e **two metres of running length of the fabric , from the fabric roll, for this test along with a stitched garment, during stitching of which the fabric from the roll was not washed / treated to)*	**Fabric Skewness in unwashed state**: **2.5% (max.)**	AST M	ASTM D 3882:2008 (2020) , in case the fabric roll is used for testing OR ASTM D7811-13 (2017) using Bow Skew Tool with open slots (in case the garmented fabric is to be used for testing)
Dimensional stability w.r.t Spirality i.e change in skewness from the initial skew *(due to **skew movement / torqueing** in the garment)* **after home laundering** *(after 03 laundering cycles) of the T-shirt **as per ISO 6330-5A at 40 ° C followed by flat drying***	**Fabric skewness (Spirality) after 3rd laundering cycle : 3.0 % (max.)**	AAT CC	AATCC-179:2004) OR IS/ISO 16322-1: 2005 (*washing as per*

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
			ISO 6330-5A at 40 ° C followed by flat dry) AATCC TM 179 -2023
Stretch and recovery	**15 % stretch** (minimum) **90% recovery** after **30 minutes**	AST M	ASTM D 2594 (knitted fabric)
Fabric's Dimensional stability to Dry Heat, when tested for contact with heated plane metal plate at 120° ± 2° C (i) Course direction (ii) Wales direction	(i) Course : **± 1.5 %** *(i.e Max. Range is 1.5% inclusive of Shrinkage + Expansion)* (ii) Wales : **± 1.5 %** *(i.e Max. Range is 1.5% inclusive of Shrinkage + Expansion)*	IS	IS 12170 : 1987 (RA 2020)
pH value of the aqueous extract of the Fabric *(using Hot method)*	**5.0 – 7.5**	IS/ ISO	IS 1390 : 1983 (RA 2009) / ISO 3071: 2020
Percentage (by mass) of Water soluble matter in the fabric	**1% by mass (Max)**	IS	IS 3456 : 1966
Air permeability of the fabric *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**25 cc/sec/cm^2 (Min.)**	IS	IS 11056 :2013

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
Moisture vapour transmission of fabric (Water vapour permeability) *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**2200 g/m^2/day (Min.)**	AST M	ASTM E-96 (Water method), RH: 50 ± 2% and Temp. : 32 ± 3° C
Glaze and Fading property *(property to withstand frequent abrasive launderings at 100° F ± 5° F)* **after 05 washing cycles – Accelerated laundering test**	**3 - 4 or better** *(After 05th wash)*	AAT CC / ISO	AATCC 61- Method 2A *(as per ASTM F 1506)* / ISO 105 - C06:2010
Initial - Anti bacterial (microbial) activity Value after incubation period of 18 - 24 hrs *(To tested with **absorption method**. The washing is to be carried out as per procedure 5 A and reference detergent specified in 4.1.2 of IS 15370:2005 and followed by drying as per 8.5 of IS 15370)* *(a) **Staphylococcus aureus Strain no. ATCC 6358 (Gram Positive Bacteria)*** *(b) **Klebsiella pneumoniase aureus Strain no. ATCC 4352 (Gram Negative Bacteria)***	***Initial*** *(a) Staphylococcus aureus Strain no. ATCC 6358* ***(Gram Positive Bacteria) - 3.0 (minimum)*** *(b) Klebsiella pneumoniase aureus Strain no. ATCC 4352* ***(Gram Negative Bacteria) - 3.0 (minimum)***	ISO	20743 : 2021
After 30 washes - Anti bacterial (microbial) activity Value after incubation period of 18 - 24 hrs *(To tested with **absorption method**.*	***After 30 washes*** *(a) Staphylococcus aureus*	ISO	20743 : 2021

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
The washing is to be carried out as per procedure 5 A and reference detergent specified in 4.1.2 of IS 15370:2005 and followed by drying as per 8.5 of IS 15370) *(a)* ***Staphylococcus aureus Strain no. ATCC 6358 (Gram Positive Bacteria)*** *(b)* ***Klebsiella pneumoniase aureus Strain no. ATCC 4352 (Gram Negative Bacteria)***	*Strain no. ATCC 6358* ***(Gram Positive Bacteria) - 2.0 (minimum)*** *(b) Klebsiella pneumoniase aureus Strain no. ATCC 4352* ***(Gram Negative Bacteria) – 2.0 (minimum)***		
Oily soil stain release efficiency after home laundering *(after creating the stain on the fabric by using Maize corn oil as per IS 4055 , under weight of 2.26 kg for 55s-65s seconds, and washing thereafter as per procedure 5A and reference detergent specified in 4.1.2of is15370 and followed by drying as per 8.5 of IS 15370)* *{**Note**: Though,* ***the Lab testing values*** *of this parameter are* ***also mandatory*** *to be* ***submitted along with Technical Bids, however,*** *this* ***will not be considered for evaluation****}*	**(a) Initial (after staining the fabric with corn oil)……..** Observed grading – to be reported **(b) After 10 washings …….** Observed grading- to be reported	AAT CC	AATCC TM 130-2018t 130 *(by comparison with standard replicas)* & Annexure C of IS 15853 : 2009 & IS 4055 (for Maize Corn Oil)
Absorbency **(a) Initial (in original fabric without laundering)** **(b) After 05 washes** *{**Note**: Though,* ***the Lab testing***	**(a) Initial :** Observed values are to be reported	AAT CC	AATCC TM 79

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
***values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**(b) After 05 washes :** Observed values are to be reported		
Vertical wicking **(a) Initial (in original fabric without laundering)** **(b) After 05 washes**	**(a) Initial : *Must wick 10 cm in 30 minutes*** **(b) After 05 washes : *Must wick 10 cm in 30 minutes***	AATCC	AATCC TM 197
Horizontal wicking **(a) Initial (in original fabric without laundering)** **(b) After 05 washes**	**(a) Initial : *Must wick 10 cm in 30 minutes*** **(b) After 05 washes : *Must wick 10 cm in 30 minutes***	AATCC	AATCC TM 198
Antistatic properties **(a) Electrostatic clinging** **(b)Electric surface resistivity** *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**(a) Electrostatic clinging:** Observed values are to be reported **(b) Electric surface resistivity:** Observed values are to be reported	AATCC	AATCC TM 115 & AATCC TM 76

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
Type of Dye (Filament Dope/ Fiber/ Yarn/ Fabric) ***(* Note :** The 'quality of the dye' and the 'process quality control' during dyeing will be evaluated by checking the compliance with the achievement of permissible values of Delta E and all colour fastness related properties' enumerated below in this Appendix 'E')*	(a) **For Polyester Part** Dope (Solution) dyeing at the time of **FILAMENT** extrusion stage **OR** Disperse dyeing of the **POLYESTER FIBRES , provided** the **defined colour with MELANGE effect and ALL COLOUR FASTNESS as well as OTHER RELATED PROPERTIES as enumerated in this Appendix 'E' are achieved within SPECIFIED LIMITS.** (b) **For Cotton Part** Vatdyeing OR Acid Reactive dyeing of the **COTTON FIBRES, provided** the **defined colour with MELANGE effect and ALL COLOUR FASTNESS as well as OTHER RELATED PROPERTIES as enumerated in this Appendix 'E' are achieved within SPECIFIED LIMITS.**	---	---
Nature of Dye ***(* Note :** The 'quality of the dye' and the 'process quality control' during dyeing will be evaluated by checking the compliance with the achievement of permissible values of Delta E and all colour fastness related properties' enumerated below in this*	(a) **For Polyester Part DOPE (SOLUTION) DYEING** at the time of filament extrusion stage **OR DISPERSE DYEING** of fibres (b) **For Cotton Part VAT OR ACID REACTIVE DYEING** of fibres	---	IS 4472-Part I, II & III : 2021

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
Appendix 'E')			
Colour of the fabric *(* **Note** : - Matching / Variation in Colour will be checked at **BPC** as well as **Bulk Production inspection stages only** and **will not be applicable** at **Technical Evaluation Stage.** - For **details refer Clauses 11.1, 11.3 & 11.4 of the Main Body of this IAFS)*	*** PANTONE 18-4005 TCX (Steel Grey) with MELANGE effect** ***Note**: The variation in Colour i.e **Delta E cmc** at BPC / BPI Lot evaluation stage will be checked by comparing the **LCH values observed in the Lab** during testing of the fabric sample submitted by the firm with the **reference values given below** (which is applicable in case **Methodology-II** is adopted by the firm) OR **with the reference values decided** during Phase-1 of BPC (which is applicable in case **Methodology-I** is adopted by the firm)*	AAT CC	AATCC 173 : 2009 & AATCC Evaluation Procedure 7:2009

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
CIE Lab **L** **C** **h° coordinates**	**L: 47.91** **C: 1.84** **h°: 64.75**	AATCC	AATCC 173 : 2009 & AATCC Evaluation Procedure 7:2009 *(To be measured with single layer of fabric with white background)*
Tristimulus Values **X** **Y** **Z**	**X: 15.993** **Y: 16.725** **Z: 17.146**		
CIE Lab (Star) **L** **a** **b coordinates**	**L: 47.91** **a: 0.78** **b: 1.66**		
Tolerance	**2:1**		
Illuminant	**D 65**		
Standard Observer	**10 Degree**		
Delta E_{cmc} (Permissible variation in colour of the Fabric) *(when compared with Colour Spectrum coordinate / tri-stimulus values obtained with actual fabric, with Illuminant as D65, Standard Observer as*	**≤ 1.0 * ; that too within the same quadrant** *(Delta E_{cmc} ≤ 1.0, would be applicable, If **Methodology –I** is adopted by the firm)* **≤ 1.2 * ; that too within the same quadrant**	AATCC	AATCC 173 : 2009 & AATCC Evaluation Procedure 7:2009

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE BASE FABRIC (To be used in both the sleeves and the main body of the BDU T Shirt)			
10 Degrees and Tolerance as 2 :1. ***Note 1**: For measuring of the L C h° , X Y Z and L a b values , single layer of the fabric against white background (of the instrument cover) are to be used. The values obtained thereafter are then to be used for calculation of the* **Delta E_{cmc}** *)* *(* **Note 2** :* *- Variation in Colour will be checked at **BPC** as well as **Bulk Production inspection stages only** and **will not be applicable** at **Technical Evaluation Stage.** - For **details refer Clauses 11.1, 11.3 & 11.4 of the Main Body of this IAFS)***	*(Delta E_{cmc} ≤ 1.2, would be applicable, If **Methodology –II** is adopted by the firm)* ****Note 3**: The variation in Colour i.e **Delta E cmc** at BPC / BPI Lot evaluation stage will be checked by comparing the **LCH values observed in the Lab** during testing of the fabric sample submitted by the firm with the **reference values given above for PANTONE 18-4005 TCX (Steel Grey) with MELANGE effect** (which is applicable in case **Methodology-II** is adopted by the firm) OR **with the reference values decided** during Phase-1 of BPC (which is applicable in case **Methodology-I** is adopted by the firm)*		

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Blend Composition of the Fabric	**PCL (Polyester, Cotton, Lycra)** (i) Cotton : **55%** ***(minimum)*** (ii) Lycra : **5 % (maximum)** but cannot be less than **3 %** (iii) Polyester : **Remaining %** ***(but not exceeding 42 %)***	IS/ AAT CC	IS 3416 (Part 1) : 1988 (*based upon dry mass)* (RA 2017) , and IS 667 : 1981 or AATCC 20 : 2011, AATCC 20 A : 2012
Type of finish on the fabric	**Antimicrobial**	AAT CC	AATCC - TM100
Type of yarns to be used while knitting of the fabric **(i) Course wise** **(ii) Wales wise**	(i) Course wise: PCL blend *Elastomeric Core Spun yarn* (ii) Wales wise: PCL blend *Elastomeric Core Spun yarn* ** **Note 1** *: Yarn made of only* ***Super Combed Cotton*** *OR* ***Compact cotton*** *(as well as* ***Polyester;*** *since polyester being a part of the blend too) , with* ***Very High Tenacity****, post* ***removal of short fibres*** *after* ***double combing****, ensuring* ***minimal hairiness*** *and* ***negligible tendency*** *to* ***pilling*** *and* ***fuzziness*** *should be used (Average Cotton Fibre length of minimum 5 cm and Polyester Staple Fibre length of 6.5 cm is recommended to be maintained during yarn manufacturing)*		Visual for (i) & (ii) / End point traceability documents during Bulk Production Lot Inspection stage for Note-1

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Approximate value of 'Nominal Count' of Yarns (i.e Yarn size to be used in knitting of the fabric):- **(i) Course direction of the fabric** **(ii) Wales direction of the fabric** *{To be checked from the yarn; taken out from the finished garment i.e BDU T Shirt}*	(i) Course wise : **24_s / 1 Ne + 20 D (** to **22_s/ 1 Ne + 20 D** **of** *Elastomeric Core Spun Yarn of PCL blend* (ii) Wales wise : **24_s / 1 Ne + 20 D** to **22_s/ 1 Ne + 20 D** **of** *Elastomeric Core Spun Yarn of PCL blend*	IS	IS 3442: 2023 Amdt No.1 (RA 2018) & End point traceability documents during Bulk Production Lot Inspection stage (Refer Note1 in the Row above)
Approximate value of 'Twist' of the yarns (to be used in knitting) of fabric: - **(i) Course direction of the fabric** **(ii) Wales direction of the fabric** *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	(i) Course wise: **700 twists/m** *(in **'Z'** direction **for 'Single' Yarn)*** (ii) Wales wise : **700 twists/m** *(in **'Z'** direction **for 'Single' Yarn)*** *(**Note**: These values are for illustration of the format only, and is to be disregarded. The actually observed values in the yarn used in the fabric used in garmenting the T-Shirt are to be reported)*	IS/ ISO	IS 832: 2021 (Part-1) / ISO 2061 : 2015
Type of knit (to be used while knitting of fabric) **(i) Main classification *(Warp or Weft Knit)***	**(i) Main classification : Warp Knit** *(for durability & strength)* **(ii) Sub classification** **1x1 Rib knit** (however, it		SP 45:1988 (Handbook on glossary of terms issued by BIS)

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
(ii) Sub classification	should be **extremely closely fine knit,** with **high knit stitch density**)		
Size of each loop (i.e Loop / Stitch length) in the knitted fabric *{**Note**: Though, **the Lab testing / Manufacturer's authenticated values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**2.5 mm** (Maximum) **at 1300 turns/m** *(**Note:** This value is for illustration of the format only, and is to be disregarded. The actually observed value in the fabric used in the T Shirt is to be reported)*		To be furnished by the NABL Lab
Type of stitch (used while knitting the fabric)	**Alternating rows of knit & purl stitches**		To be furnished by the NABL Lab
Thread count (Knit Stitch density of the loops) of the fabric per dm **(i) Course direction** ***(Courses / dm)*** **(ii) Wales direction** ***(Wales/dm)*** *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	(i) Courses / dm : 290 **(Min.)** (ii) Wales /dm : 210 **(Min.)** *(**Note**: These values are for illustration of the format only, and are to be disregarded and not to be treated even for guidance. The actually observed values of the fabric used in the T-Shirt are to be reported)*	IS	IS1963 : 1981 (RA 2023)

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Mass of the fabric per unit area (i.e. in GSM or g/m²)	***260 - 280 g/m²***	IS	IS 1964: 2001 (RA 2017)
Usable width in cm *of the fabric* ***(Note** : *This is for **guidance only**. To be **considered for evaluation**, in case **only fabric** is being procured)*	**160 cm (Min.)***	ISO/ IS	ISO 22198:2006 IS 1954:1990
Bursting Strength of the Fabric	**600 kN/m² (Min)**	ISO / AST M	ISO : 13938-1 / ASTM D 3786 / ASTM
Pilling resistance / Pilling rate of the fabric *(tumble pilling for 2 hours)* ***using tumble type pilling tester***	**Average rating of 4-5** or better	IS	IS 10971: 2011 (RA 2022) OR ASTM D 3512
Pilling resistance / Pilling rate of the fabric *(after **5000 revolutions as well as after 2 hours of test) using Martindale tester***	**Average rating of 3.5** or better	ISO	ISO 12945-2:2020
Fuzziness rating of the fabric	**Average rating of 4** or better	IS	IS 10971: 2011 (RA 2022)
Fabric's Colour fastness to light (Blue Wool rating)	**5 or better**	IS/ ISO	IS 2454 : 1985 / ISO 105 B 02 : 2014

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Fabric's Colour fastness to washing *(after 5 repeated washing / drying cycles at 38 °C to 44 °C)*	(a) **Change in Shade : 4-5** (b) **Staining on** *(i)Acetate :* ***4-5*** *(ii) Cotton* ***: 4-5*** *(iii) Nylon* ***: 4-5*** *(iv) Polyester* ***: 4-5*** *(v) Acrylic:* ***4-5*** *(vi) Wool* ***: 4-5***	IS/ ISO	IS/ISO 105 C 10 : 2006 Test A1 (RA 2021)
Fabric's Colour fastness to perspiration *(to be checked both in* ***acidic*** *and* ***alkaline*** *simulated conditions)*	**ACIDIC** (a) **Change in Shade : 4-5** (b) **Staining on** *(i)Acetate :* ***4-5*** *(ii) Cotton* ***: 4-5*** *(iii) Nylon* ***: 4-5*** *(iv) Polyester* ***: 4-5*** *(v) Acrylic:* ***4-5*** *(vi) Wool* ***: 4-5*** **ALKALINE** (a) **Change in Shade : 4-5** (b) **Staining on** *(i)Acetate :* ***4-5*** *(ii) Cotton* ***: 4-5*** *(iii) Nylon* ***: 4-5*** *(iv) Polyester* ***: 4-5*** *(v) Acrylic:* ***4-5*** *(vi) Wool* ***: 4-5***	ISO	ISO 105 E 04 : 2008 (RA 2019) **(Note :** *This standard has replaced IS 971 : 1983)*

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Fabric's Colour fastness to perspiration & light *(both to be **checked simultaneously**)*	**4**	ISO	ISO 105 B 07 : 2009
Fabric's Colour fastness to rubbing	(i) Dry **: 4-5** (ii) Wet :**4-5**	IS/ ISO	IS 766 : 1988 / ISO 105 X12 : 2016
Fabric's Colour fastness to hot pressing at 110° C ± 2°C, maintaining a pressure of 4 ± 1 kPa	(i) Immediately after **Dry pressing** *for 15 s* **: 4** (ii) Immediately after **Damp pressing** *for 15 s* **: 4** (iii) Immediately after **Wet pressing** *for 15 s* **: 4** (iv) After conditioning of all three test specimens for 4 hours**: 4** (v) Staining on the cotton (adjacent) fabric**: 4**	IS/ ISO	(RA 2009) / ISO 105 X11: 1994 ***(Note:** This standard has replaced IS 689: 1988)*
Fabric's Dimensional Change / stability (i.e *Relaxation residual shrinkage / expansion)* upon SOAKING in water (along with Wetting agent) for 3 hours and flat drying; as per the procedure mentioned in the specified test method; in **(i) Course direction** **(ii) Wales direction** ***(Note:** This is to be checked after single soaking & drying cycle only)*	**In case checked with the garmented T-Shirt *(in which the fabric has been pre-treated / washed before garmenting to cater for the dimensional variation)*** (i) Lengthwise : **± 3.0 %** *(i.e Max. Range is 3% inclusive of Shrinkage + Expansion)* (ii) Widthwise : **± 3.0 %** *(i.e Max. Range is 3 % inclusive of Shrinkage +*	IS	IS 2977 :1989 (RA 2020)

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
	Expansion) **In case checked with the fabric used in the garmented T-Shirt** (i) Course : **± 5.0 %** *(i.e Max. Range is 5% inclusive of Shrinkage + Expansion)* (ii) Wales : **± 5.0 %** *(i.e Max. Range is 5 % inclusive of Shrinkage + Expansion)*		
Fabric's Fabric's Dimensional Change / stability (i.e *Relaxation residual shrinkage / expansion)* to repeated Domestic LAUNDRY i.e repeated washing & drying **(i) Course direction** **(ii) Wales direction** ***(Note**: This is to be checked after five repeated home laundering cycles i.e washing & drying)*	**In case checked with the garmented T-Shirt *(in which the fabric has been pre-treated / washed before garmenting to cater for the dimensional variation)*** (i) Lengthwise : **± 3.0 %** *(i.e Max. Range is 3% inclusive of Shrinkage + Expansion)* (ii) Widthwise : **± 3.0 %** *(i.e Max. Range is 3 % inclusive of Shrinkage + Expansion)*	IS	IS 15370 : 2020 (at 41 ± 3°C, using Type B washer) for domestic washing & drying *(i.e domestic laundry)* and IS 2977 :1989 (RA 2020) for calculation of the percentage

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
	In case checked with the fabric used in the garmented T-Shirt (i) Course : **± 5.0 %** *(i.e Max. Range is 5% inclusive of Shrinkage + Expansion)* (ii) Wales : **± 5.0 %** *(i.e Max. Range is 5 % inclusive of Shrinkage + Expansion)*		shrinkage /expansion OR AATCC 150
Initial Bowness and skewness in the woven fabric *(in the initial , original unlaundered state)* *(**Note**: The manufacturer is to provide **2 m X 1.6 m** i.e **two metres of running length of the fabric , from the fabric roll, for this test along with a stitched garment, during stitching of which the fabric from the roll was not washed / treated to)*	**Fabric Skewness in unwashed state**: **2.5% (max.)**	AST M	ASTM D 3882:2008 (2020) , in case the fabric roll is used for testing OR ASTM D7811-13 (2017) using Bow Skew Tool with open slots (in case the garmented fabric is to be used for testing)

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Dimensional stability w.r.t Spirality i.e change in skewness from the initial skew *(due to **skew movement / torqueing** in the garment)* **after home laundering** *(after 03 laundering cycles) of the T-shirt **as per ISO 6330-5A at 40 ° C followed by flat drying***	**Fabric skewness after 3rd laundering cycle : 3.0 % (max.)**	AAT CC	AATCC-179:2004) OR IS/ISO 16322-1: 2005 (*washing as per ISO 6330-5A at 40 ° C followed by flat dry)* AATCC TM 179 -2023
Stretch and recovery	15 % stretch (minimum) 90% recovery after 30 minutes	AST M	ASTM D 2594 (knitted fabric)
Fabric's Dimensional stability to Dry Heat, when tested for contact with heated plane metal plate at 120° ± 2° C **(i) Course direction** **(ii) Wales direction**	(i) Course : **± 1.5 %** *(i.e Max. Range is 1% inclusive of Shrinkage + Expansion)* (ii) Wales : **± 1.5 %** *(i.e Max. Range is 1% inclusive of Shrinkage + Expansion)*	IS	IS 12170 : 1987 (RA 2020)
pH value of the aqueous extract of the Fabric *(using Hot method)*	**5.0 – 7.5**	IS/ ISO	IS 1390 : 1983 (RA 2009) / ISO 3071: 2020
Percentage (by mass) of Water soluble matter in the fabric	**1% by mass (Max)**	IS	IS 3456 : 1966

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Glaze and Fading property *(property to withstand frequent abrasive launderings at 100° F ± 5° F)* **after 05 washing cycles – Accelerated laundering test**	**3 - 4 or better** *(After 05th wash)*	AATCC / ISO	AATCC 61- Method 2A *(as per ASTM F 1506)* / ISO 105 - C06:2010
Initial - Anti bacterial (microbial) activity Value after incubation period of 18 - 24 hrs *(To tested with **absorption method**. The washing is to be carried out as per procedure 5 A and reference detergent specified in 4.1.2 of IS 15370:2005 and followed by drying as per 8.5 of IS 15370)* *(a)* ***Staphylococcus aureus Strain no. ATCC 6358 (Gram Positive Bacteria)*** *(b)* ***Klebsiella pneumoniase aureus Strain no. ATCC 4352 (Gram Negative Bacteria)***	***Initial*** *(a) Staphylococcus aureus Strain no. ATCC 6358* ***(Gram Positive Bacteria) - 3.0 (minimum)*** *(b) Klebsiella pneumoniase aureus Strain no. ATCC 4352* ***(Gram Negative Bacteria) - 3.0 (minimum)***	ISO	20743 : 2021
After 30 washes - Anti bacterial (microbial) activity Value after incubation period of 18 - 24 hrs *(To tested with **absorption method**. The washing is to be carried out as per procedure 5 A and reference detergent specified in 4.1.2 of IS 15370:2005 and followed by drying as per 8.5 of IS 15370)* *(a)* ***Staphylococcus aureus Strain no. ATCC 6358***	***After 30 washes*** *(a) Staphylococcus aureus Strain no. ATCC 6358* ***(Gram Positive Bacteria) - 2.0 (minimum)*** *(b) Klebsiella pneumoniase aureus Strain no. ATCC 4352* ***(Gram Negative Bacteria) –***	ISO	20743 : 2021

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
(Gram Positive Bacteria) *(b)* ***Klebsiella pneumoniase aureus Strain no. ATCC 4352 (Gram Negative Bacteria)***	***2.0 (minimum)***		
Oily soil stain release efficiency after home laundering *(after creating the stain on the fabric by using Maize corn oil as per IS 4055 , under weight of 2.26 kg for 55s-65s seconds, and washing thereafter as per procedure 5A and reference detergent specified in 4.1.2of is15370 and followed by drying as per 8.5 of IS 15370)* *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**(a) Initial (after staining the fabric with corn oil)……..** Observed grading – to be reported **(b) After 10 washings …….** Observed grading- to be reported	AAT CC	AATCC TM 130-2018t 130 *(by comparison with standard replicas)* & Annexure C of IS 15853 : 2009 & IS 4055 (for Maize Corn Oil)
Absorbency **(a) Initial (in original fabric without laundering)** **(b) After 05 washes** *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**(a) Initial :** *Observed values are to be reported* **(b) After 05 washes :** *Observed values are to be reported*	AAT CC	AATCC TM 79

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Vertical wicking **(a) Initial (in original fabric without laundering)** **(b) After 05 washes**	**(a) Initial : *Must wick 10 cm in 30 minutes*** **(b) After 05 washes : *Must wick 10 cm in 30 minutes***	AATCC	AATCC TM 197
Horizontal wicking **(a) Initial (in original fabric without laundering)** **(b) After 05 washes**	**(a) Initial : *Must wick 10 cm in 30 minutes*** **(b) After 05 washes : *Must wick 10 cm in 30 minutes***	AATCC	AATCC TM 198
Antistatic properties **(a) Electrostatic clinging** **(b)Electric surface resistivity** *{**Note**: Though, **the Lab testing values** of this parameter are **also mandatory** to be **submitted along with Technical Bids, however,** this **will not be considered for evaluation**}*	**(a) Electrostatic clinging:** Observed values are to be reported **(b) Electric surface resistivity:** Observed values are to be reported	AATCC	AATCC TM 115 & AATCC TM 76
Type of Dye (Filament Dope/ Fiber/ Yarn/ Fabric) ***(* Note :** The 'quality of the dye' and the 'process quality control' during dyeing will be evaluated by checking the compliance with the achievement of permissible values of Delta E and all colour fastness related properties'*	(a) **For Polyester Part** Dope (Solution) dyeing at the time of **FILAMENT** extrusion stage **OR** Disperse dyeing of the **POLYESTER FIBRES , provided** the **defined colour with MELANGE effect and ALL COLOUR FASTNESS as well as OTHER RELATED PROPERTIES as**	---	---

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
enumerated below in this Appendix 'E')	**enumerated in this Appendix 'E' are achieved within SPECIFIED LIMITS.** (b) **For Cotton Part** Vat dyeing OR Acid Reactive dyeing of the **COTTON FIBRES, provided** the **defined colour with MELANGE effect and ALL COLOUR FASTNESS as well as OTHER RELATED PROPERTIES as enumerated in this Appendix 'E' are achieved within SPECIFIED LIMITS.**		
Nature of Dye ***(* Note :** The 'quality of the dye' and the 'process quality control' during dyeing will be evaluated by checking the compliance with the achievement of permissible values of Delta E and all colour fastness related properties' enumerated below in this Appendix 'E')*	(a) **For Polyester Part DOPE (SOLUTION) DYEING** at the time of filament extrusion stage **OR DISPERSE DYEING** of fibres (b) **For Cotton Part VAT OR ACID REACTIVE** dyeing of fibres	---	IS 4472-Part I, II & III : 2021

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Colour of the fabric *(* **Note** :* *- Matching / Variation in Colour will be checked at **BPC** as well as **Bulk Production inspection stages only** and **will not be applicable** at **Technical Evaluation Stage.** - For **details refer Clauses 11.1, 11.3 & 11.4 of the Main Body of this IAFS)*	*** PANTONE 18-4005 TCX (Steel Grey) with MELANGE effect** ***Note**: The variation in Colour i.e **Delta E cmc** at BPC / BPI Lot evaluation stage will be checked by comparing the **LCH values observed in the Lab** during testing of the fabric sample submitted by the firm with the **reference values given below** (which is applicable in case **Methodology-II** is adopted by the firm) OR **with the reference values decided** during Phase-1 of BPC (which is applicable in case **Methodology-I** is adopted by the firm)*	AAT CC	AATCC 173 : 2009 & AATCC Evaluation Procedure 7:2009

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
CIE Lab **L** **C** **h° coordinates**	**L: 47.91** **C: 1.84** **h°: 64.75**	AAT CC	AATCC 173 : 2009 & AATCC Evaluation Procedure 7:2009 *(To be measured with single layer of fabric with white background)*
Tristimulus Values **X** **Y** **Z**	**X: 15.993** **Y: 16.725** **Z: 17.146**		
CIE Lab (Star) **L** **a** **b coordinates**	**L: 47.91** **a: 0.78** **b: 1.66**		
Tolerance	**2:1**		
Illuminant	**D 65**		
Standard Observer	**10 Degree**		
Delta E_{cmc} (Permissible variation in colour of the Fabric) *(when compared with Colour Spectrum coordinate / tri-stimulus values obtained with actual fabric, with Illuminant as D65, Standard Observer as 10 Degrees and Tolerance as 2 :1.*	**≤ 1.0 * ; that too within the same quadrant** *(Delta E_{cmc} ≤ 1.0, would be applicable, If **Methodology –I** is adopted by the firm)* **≤ 1.2 ** ; that too within the same quadrant** *(Delta E_{cmc} ≤ 1.2, would be*	AAT CC	AATCC 173 : 2009 & AATCC Evaluation Procedure 7:2009

PROPERTY / PARAMETER	REQUIRED VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS FOR THE RIBBED COLLAR FABRIC (To be used in the Crew Neck collar of BDU T Shirt)			
Note 1**: For measuring of the L C h° , X Y Z and L a b values , single layer of the fabric against white background (of the instrument cover) are to be used. The values obtained thereafter are then to be used for calculation of the* **Delta E_{cmc}** *)* *(* **Note 2** :* *- Variation in Colour will be checked at **BPC** as well as **Bulk Production inspection stages only** and **will not be applicable** at **Technical Evaluation Stage.** - For **details refer Clauses 11.1, 11.3 & 11.4 of the Main Body of this IAFS)	*applicable, If **Methodology –II** is adopted by the firm)* ***Note 3**: The variation in Colour i.e **Delta E cmc** at BPC / BPI Lot evaluation stage will be checked by comparing the **LCH values observed in the Lab** during testing of the fabric sample submitted by the firm with the **reference values given above for** **PANTONE 18-4005 TCX (Steel Grey) with MELANGE effect** (which is applicable in case **Methodology-II** is adopted by the firm) OR **with the reference values decided** during Phase-1 of BPC (which is applicable in case **Methodology-I** is adopted by the firm)*		

PROPERTY	MINIMUM VALUE	TEST METHOD	
		GOV STD	STD NO
REQUIREMENTS OF THE BINDING TAPE FABRIC (used in the crew neck collar of the BDU T Shirt)			
The **fabric for the BINDING Tape used in the crew neck collar of the BDU T Shirt)** should be **EXACTLY same (Quality & Colour both)** as that of details enumerated in **Appendix 'E'** above for the **RIBBED COLLAR FABRIC.**			