SPECIFICATIONS FOR SPECIFICATION FOR UNDER PANT THERMAL

CONTENTS

1.0SCOPE

1.1 The specification prescribes the requirement of "Under Pant Thermal" (color- as per user requirement).

1.2 This specification does not specify the general appearance, luster, feel, type of finish of "Under Pant Thermal".

2.0 MATERIAL AND MANUFACTURE

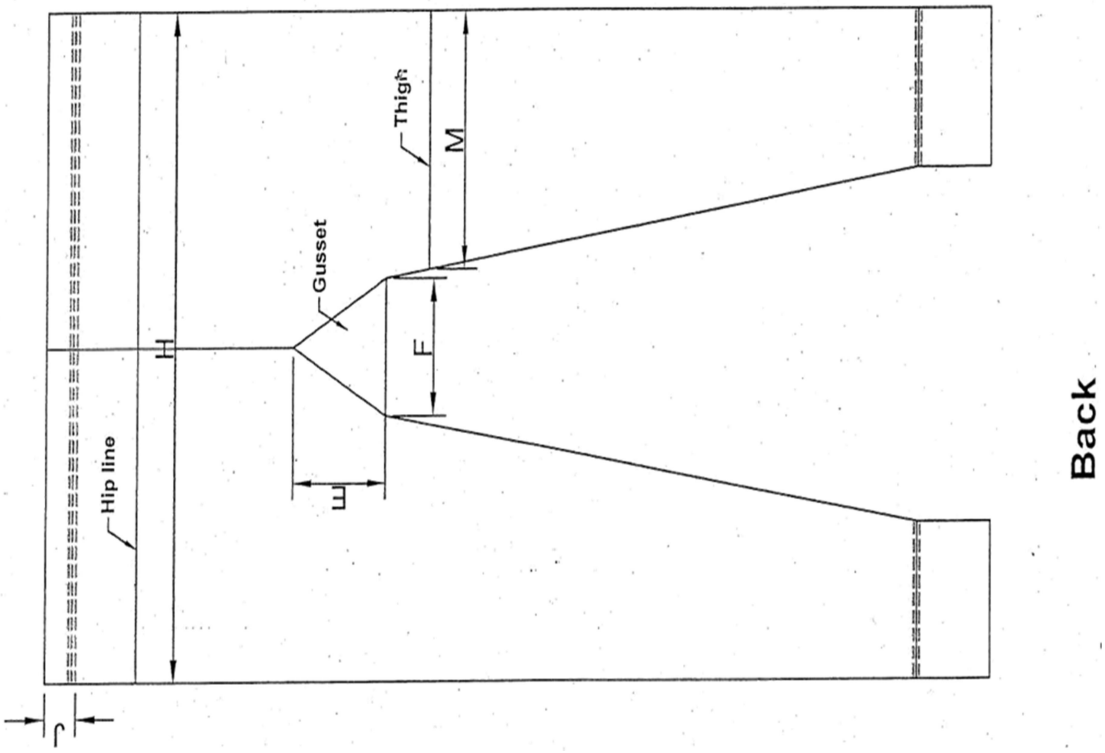
2.1 The style and shape with dimensions of the "Under Pant Thermal" are shown in the Fig. 1.

2.2 The "Und

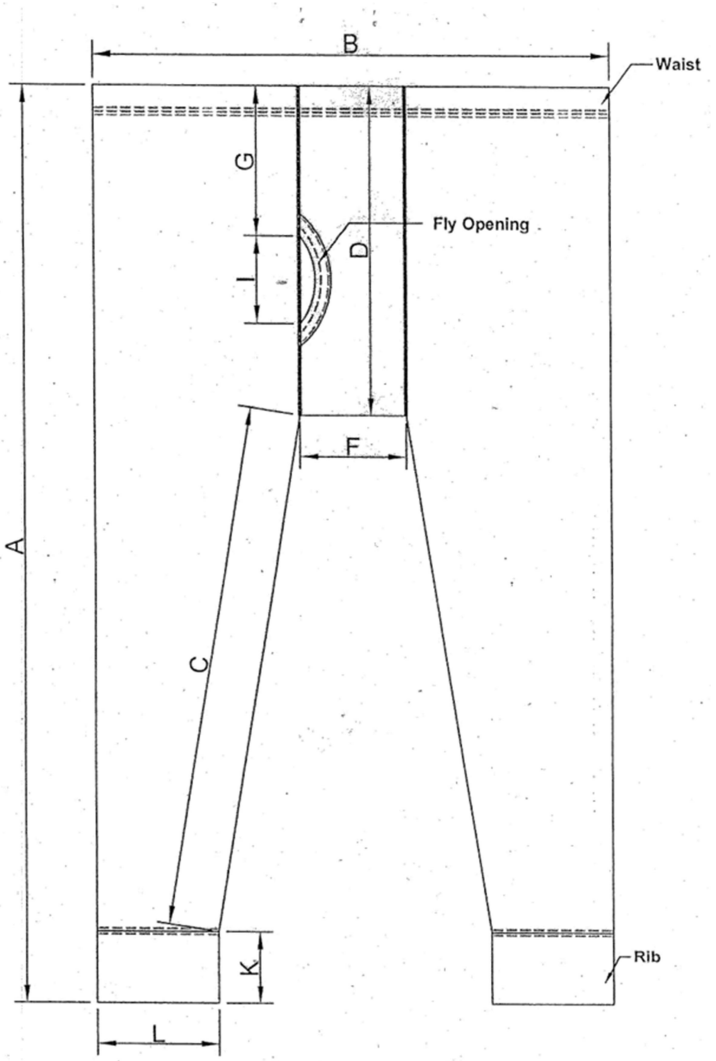
2.3 The "Under Pant Thermal" shall be tailored out of well and evenly knitted **tubular interlock** fabric made from circular knitting machine. The arrangement of needles in dial and cylinder of knitting machine are shown in the Fig. 2. The finish of the "Under Pant Thermal" shall match the specification.

2.4 At waist of the "Under Pant Thermal", the raw edge of the fabric shall be turned into of 2.5cm throughout and stitched with elastic tape (2.0± 0.1) cm through the waist band.

2.5 The rib (1X1) attached to the sleeves opening of the "Under Pant Thermal"



shall be manufacture using polyester yarn along with 5% elastane filament yarn.



Front

Fig 1: Under Pant Thermal

3.0 STITCHING

3.1 The type of stitch and seams (refer ISO 4915:1991 Textiles -Stitch types- classification and terminology and ISO 4916:1991 Textiles —Seam types- classification and terminology) and count of sewing thread (white colour) for seams and stitches at various portions of "Under Pant Thermal" shall be as given in Table 1. All the stitches shall be of even tension throughout with all loose ends fastened.

Table-1 Seams and Stitches

Sl. No **1**	**Portion to be stitched** **2**	**Type of stitch** **3**	**Nos. of stitches per cm, Min.** **4**	**Type of Seam** **5**	**Recommended Thread in the Needle/Looper(s)** **6**
1	Waistband elastic	Multithread Chain stitch(407)	8	EFa	i) 100Tex Polyester sewing thread (two ply)- in needle ii) 60 Tex Polyester (two ply)- in Looper
2	Center panel	Cover stitch(605)	4	SSa	
3	Binding at upper fly opening	Multithread chain stitch(406)	4	BSb	
4	Binding at under fly opening	Multithread chain stitch(406)	4	BSb	
5	Inseam leg joining	3 thread overlock(504)	3	SSa	
6	Gusset end joining	3-thread overlock (504)	3	SSa	
7	Rib attach	3-thread overlock(504)	3	SSa	

8	Rib cover stitch	Multithread chain stitch(406)	8	LSb	

Efa=Edge Finishing (Sub Class-a), SSa= Super imposed Seam (Sub class-a), BSb=Bound Seam (Sub class-b), LSb=Lapped Seam (Sub class-b)

4.0 WORKMANSHIP AND FINISH

The "Under Pant Thermal" shall be free from workmanship defects i.e. texture, knitting flaws etc. The "Under Pant Thermal" shall not have missed stitches, hole, cut, oil stains or any other defect which may significantly affect the appearance or serviceability of "Under Pant Thermal".

6.0 REQUIREMENTS

6.1 Dimensions

The dimensions of "Under Pant Thermal" when measured by the method prescribed in Annex- A shall conform to the requirements given in Table 2.

6.2 The width of the elastic tape (used in waist band) shall be (2.5±0.1) cm
(measured in accordance with IS 1954: 1990, (RA 2007). The other properties of the elastic tape, when tested shall meet the requirement laid down in specification IS 9686: 1980, (RA 2002). For this purpose, the seller has to submit at least 5 meters of elastic tape along with the "Under Pant Thermal".

6.3 Other Requirements:

i) The "Under Pant Thermal" shall conform to the parameters as given in Table 3 A.

ii) The rib attached with the sleeve opening of the "Under Pant Thermal" shall confirm to the parameters given in Table 3B.

Table 2: Dimension of "Under Pant Thermal"
(AII dimensions are in centimeter)

Sizes	**Length (A)**	**Waist Elastic (B)**	**Leg Inside Length (C)**	**Crotch (D)**	**Gusset length (E)**	**Gusset Width (F)**	**Waist to Fly Opening (G)**	**Hip (H)**	**Front Opening (I)**	**Elastic Width (J)**	**Rib (Length) (K)**	**Rib (Width) (L)**	**Thigh (M)**
80	81.3	52.1	55.5	27.9	7.5	8.8	11.9	45.7	8.9	2.5	6.4	8.9	21.6
85	86.4	57.2	58.0	29.2	7.5	8.8	12.5	47.0	10.2	2.5	7.0	9.5	22.2
90	91.4	61.0	60.8	30.5	7.5	8.8	13.1	49.5	10.2	2.5	7.0	9.5	22.9
95	96.5	63.5	63.6	31.8	7.5	8.8	13.7	52.1	10.2	2.5	7.6	10.2	24.1
100	99.1	68.6	66.6	33.0	7.5	8.8	14.3	54.6	10.2	2.5	7.6	10.2	25.4
105	101.6	73.7	69.8	34.3	7.5	8.8	15	57.2	10.2	2.5	7.6	10.2	26.7
Tolerance	±1.5	±1.0	±1.0	±1.0	±0.5	±0.5	±0.5	±0.5	±0.5	±0.1	±0.5	±0.5	±0.5

Table 3A: Requirements of "Under Pant Thermal"

Sl. No.	Parameters	Requirements	Method of Testing
	Type of Knitting	Single Jersey Box fleece with anti peeling treatment.	
1	Composition (excluding of Rib), Percentage	--Polyester 97% +/- 5% --Elastane Min 3%	IS 667:1981 and IS 3416 (Part-1): 1988 (Based on dry mass) AATCC 201A:2020
2	Wales/inch, Minimum	32-36	B-3, IS:14759-2000
3	Courses/inch, Minimum	48	B-3, IS:14759-2000
4	Weight, g/m2	200 +- 5%	IS 1964-2001 RA 2022 (Method A)
5	Dimensional Change, (Machine wash at room temperature percentage, Maximum - Wales direction - Courses direction	 5.0 5.0	Washing wash after 3 wash & ISO 6330 : 2021
6	pH Value of aqueous extract	6.0 to 8.0	IS:1390(Latest)
7	Colour fastness to Light	4 or better	IS/ISO 105302 B2 Method
8	Colour	As per user	Visual
	Additional Parameters		
9	Anti fungal	No fungal growth; Effectiveness to be shown against at least 5 fungal strains	AATCC 30 (Part III) - 2017

10	Anti bacterial	Effectiveness to be shown against at least 5 bacteria	AATCC 100
11	Breathability / RET factor	4 m^2Pa/W or less	ISO 11092 - 2014
12	Fabric absorbency rate	10 sec (Max)	AATCC-79
13	Wicking (time taken to reach 22mm)	10 sec (Max)	AATCC-197
14	Fabric drying rate	1.0 ml/hr or more	AATCC 201
15	Anti UV / UV Protection	UPF 50 plus or more	AATCC 183
16	Banned Azo Colorants	None	IS 15570: 2005(Latest)
17	Pilling resistance	4 or better	IS 10971 (Part 1) 2011 RA 2017
18	Colour fastness to Water	4 or better	IS / ISO 105 E01 2010 RA 2017
19	Colour fastness to Rubbing	Dry & Wet: 4 or better	IS/ISO 105-X12: 2001 RA 2016
20	Colour fastness to Laundering at 40C	Change in colour: 4 or better	IS/ISO 105 C 10: 2006 RA 2017 Test A (1)
21	Colour fastness to Perspiration	4 or better	IS/ISO 105 E04: 2008 RA 2019

Table 3B: Requirements of "Under Pant Thermal" – Rib/Cuff

SI. No.	Parameters	Requirements	Method of Testing
1.	Composition, Percentage -Elastane, Minimum -Polyester	 5% min Remainder	AATCC 20A (Dry mass basis)
2.	Wales/inch, Minimum	32-36	B-3, IS:14759-2000

3.	Courses /inch, Minimum (Including elastane yarn)	48	B-3, IS:14759-2000
4.	Colour	Match with the Under Pant thermal fabric	Visual

Table-4: Number of "Under Pant Thermal" to be selected from a lot and permissible number of non-conforming "Under Pant Thermal"

Number of "Under Pant Thermal" in the Lot (1)	Physical Characteristics		Other Requirements - Number of "Under Pant Thermal" to be tested (4)
	No. of "Under Pant Thermal" to be Inspected (2)	Permissible number of non-conforming "Under Pant Thermal" (3)	
Up to 300	13	1	3
301 — 500	20	2	5
501-1000	32	3	5
1001 and above	50	5	8

Note: Sampling officer will select sampling unit randomly and select ultimate items from each sampling unit as per the above table.

7.3 Lot: For the purpose of conformance inspection and test sampling, a lot is defined as all the completed "Under Pant Thermal" of the same size and type, with same assemblies, produced in one facility, using the same production processes and materials, and being offered for delivery at one time to buyer against a dispatch note.

7.4 The CRPF reserves the right to carry out inspection of bigger lot sizes, even to the extent of 100% inspection, if considered necessary.

7.5 The sample size and the criterion for conformity for various characteristics shall be as follows:

Characteristics	Sample size	Criteria for conformity
Freedom from defects, manufacture and dimensions	All the "Under Pant Thermal" shall be inspected according to the column 2 of table 4	Non-conforming "Under Pant Thermal" not to exceed the corresponding number given in col. 3 of table 4
Nature of fibre, Construction, Dimensional change, Scouring loss, pH value, colour	All the "Under Pant Thermal" shall be inspected according to the column 4 of table 4	All the "Under Pant Thermal" to satisfy the relevant requirements.
Colour fastness to light	One each for lot size up to 500 "Under Pant Thermal" and two if lot size is 501 and above	All the "Under Pant Thermal" to satisfy the relevant requirements.

8.0 MARKING

A woven cloth label marked with the following information (Colour from the label shall not bleed on to the "Under Pant Thermal" during storage or use) shall be fastened to each "Under Pant Thermal" at the inside of the hip portion (inner side of the waist band).

a) Size in cm
b) Name of manufacturer or trade mark, if any
c) Any other information required by the buyer.

9.0 PACKAGING & PACKING

9.1 Each "Under Pant Thermal" shall be placed in polyethylene bag. The vendor shall supply a sticker for each "Under Pant Thermal" for inspection and signature. 50 such "Under Pant Thermal" shall be placed in mill Grey board (3 ply corrugated fibre board telescopic Box) to form a unit pack and such four unit shall be packed in 7 ply corrugated fibre board slotted Box and further wrapped into water proof hessian/HDPE sheet (as per buyer requirement) and stitched with not less than 6 stitches/ 6 cm. and strip bound. However, on each box the following shall be indicated:

a) Name of material;
b) Count of yarn and type (carded or combed);
c) Designation of fabric;
d) "Under Pant Thermal" style and size in cm;
e) Blend composition, if required by buyer;
f) Quantity per box;
g) Indication of the source of manufacturer;
h) Any other information as required by the buye

Dial	Needle no.	Structure		
	2	K	M	T
	1	K	M	M

Cylinder	Needle no.	Structure		
	1	M	K	M
	2	M	K	K

K=Knit, M=Miss, T=Tuck

Fig. 2 : Arrangement of needles in dial and cylinder of knitting machine

10. 0 **REFERENCES**

Sl. No.	SPEC. /TEST METHOD No.	DESCRIPTION
(a)	IS 667: 1981	Method for identification of textile fibres
(b)	IS 1390: 1983, RA 2004	Methods of testing of pH value of aqueous extract
(c)	IS 2454: 1985, RA 2006	Methods for determining of colour fastness of textile materials to artificial light (xenon lamp)
(d)	IS 6359:1971, RA 2004	Method for Conditioning of Textiles
(e)	IS 14759 : 2000,	Textiles-Fabric, cotton, rib-knitted-specification
(f)	IS: 9543: 1980	Spun polyester sewing threads
(g)	IS: 834: 1993	Textiles-Ring spun grey polyester yarn for hosiery-Specification
(h)	AATCC 20A	Fibre analysis: Quantitative

ANNEX A

A-1 Conditioning of test specimens and atmospheric conditions for testing: The test specimen shall be tested in prevailing atmospheric conditions. In case of dispute, the sample shall be conditioned and tested in the standard atmosphere as given in IS 6359.

A-2 Dimensions:
Take each "Under Pant Thermal" constituting the test specimen. Lay it flat on a table. Removed by hand all crease and wrinkles without distorting the specimen.
Measure nearest to 0.1 cm, the dimensions given in Table-2.