No. IV-210 1/3/2010-Prov-I
Government of India
Ministry of Home Affairs

26, Man Singh Road, Jaisalmer House,
New Delhi, 23.2.2010

To
The DG: CRPF

Subject:- QRs/Technical Specifications for the Special Equipments for CoBRA Bns.

The QRs/ Technical Specifications in respect of the following Special Equipments for CoBRA Bns as per Appendix, has been accepted by the Competent Authority in MHA.

(1) Foldable Solar Charger-Appendix-A
(2) Compact light weight stainless steel multi utility tool- Appendix-B
(3) Light Weight ballistic protective eyewear against grenade blasts-Appendix-C
(4) Tactical 3 points sling universal- Appendix-D
(5) Waist belt nylon with buckle and rings for facilitating slithering/rappelling-Appendix-E
(6) Jungle Floppy Hat-Appendix-F
(7) Balaclava with convertible properties as Cap Comforter, Facemask and Cold Weather Muffler-Appendix-G
(8) Nylon Life Jacket with expandable Ployethylene Foam, Buckle and Whistle Plastic-Appendix-H

2. Henceforth, CRPF should procure the above equipments required by them strictly as per the laid down Technical Specifications/QRs.

23/2/10
(R.S.Sharma)
Director (Prov)

महानिदेशक सचिव डायरी संख्या
DG's Sectt. Diary No. 378 (Mohan)
महानिदेशक / Director General
अ. महानिदेशक / Add. D.G.
तिथि / Date 05 MAR 2010
म.नि. कार्मिक / परि० / प्रशि. / संभरण / प्रशा. / निर्माण
वि.सं. / निदेशक (चिकित्सा)
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CENTRAL RESERVE POLICE FORCE (CoBRA) STANDARD

SPECIFICATION FOR JUNGLE FLOPPY HAT

Submitted to :

Office of the Inspector General of Police, CoBRA Sector
CRPF, Sector –IV, PUSHP VIHAR,
New Delhi-110017

Prepared by :

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0.0 FORWARD

0.0 This specification has been prepared by Office of the Inspector General of Police, CoBRA sector, CRPF on the authority of The Inspector General of Police, CoBRA sector.

0.1 This specification is for use by the CRPF - CoBRA.

0.2 This specification would be used for manufacture, quality assurance and procurement of the item.

0.3 Quality assurance authority for the item covered in this specification is Office of the Inspector General of Police, CoBRA Sector, CRPF, New Delhi. All enquiries regarding this specification, including those relating to any contractual conditions contained therein shall be addressed to the Quality Assurance authority at the following address:

Office of the Inspector General of Police, CoBRA Sector
CRPF, Sector –IV, PUSHP VIHAR,
New Delhi-110017

0.4 Copies of the specification can be obtained from:

Office of the Inspector General of Police, CoBRA Sector
CRPF, Sector –IV, PUSHP VIHAR,
New Delhi-110017

0.5 This specification holds good only for the supply order for which it is issued.

0.6 The Quality Assurance Authority reserves the right to amend or modify this specification as and when required.

0.7 The Quality Assurance Authority is the competent authority to grant concessions, if any, in respect of any clause contained in this specification

0.8 For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS:2-1960 (Reaffirmed 2006). The number of significant places retained in the rounded off value should be the same as that of the specified value in this specification.

1.0 SCOPE

1.1 The specification prescribes the requirement of two types of “Jungle floppy hat” (dark and light colour disruptive printing) herein referred as “Hat”.

1.2 This specification does not specify the general appearance, lusture, feel of “Hat”.

2.0 MATERIALS AND MANUFACTURE

2.1 The shape, dimensions and design of the “Hat” shall be as shown in Fig 1 to 8. The “Hat” shall be made of a crown, tape, brim, head-band and chin strap. The “Hat” shall be manufactured as described in the following sub classes.

2.1.1 Base fabric: A fabric made out of 50% Nylon and 50% cotton blended yarns shall be used to manufacture the “Hat”. For guidance, 2/40s and 16s yarns may be used in warp and weft directions respectively. The fabric shall have Rip stop weave (IS 13510:2000). The fabric shall be printed with disruptive pattern and water – repellent finished. It shall be singed, heat-set and fully shrunk.

2.1.2 For guidance the disruptive pattern may be obtained by repeats of the design size of 34.25” ± 5% in warp direction and 33.25” ± 5% in weft direction (Fig.1). The color schemes for light and dark disruptive patterns are shown in Fig. 2 and Fig. 3 respectively. The repeat size shall be same for both color schemes. The pattern shall be printed with dyes having fastness properties as given in Table 3. The dyes used for dyeing and printing shall be free from banned amines (Test method IS 15570:2005). The patterns shall be properly registered in relation to each other and shall present definite sharp demarcation with minimum feathering and spew.

2.1.3 Construction of Crown: Three pieces of base fabric shall be used to construct the crown. One of the pieces shall be nearly circular in shape to form the top closure of the crown. Its dimensions shall depend upon the size of the “Hat” (Table 2); the other two pieces form Band 1 and Band 2 of the crown as shown in Fig.4. The height of these two pieces shall be 55±2 mm and 35±2 mm respectively while their length shall be equal to the circumference of the “Hat”.

2.1.4Tape: Two layers of base fabric, each having 20±2 mm width shall be stitched together to form the tape. The length of the tape shall be equal to the circumference of the “Hat”. It shall be attached to the Band 2 using lateral stitch in a way shown in the Fig. 5. The stitches shall be 80±2 mm apart all along the circumference of the “Hat”.

2.1.5 Construction of Brim: The brim shall be made with four layers of base fabric. They are joined together by stitching in the form of eight concentric circles (Fig. 6). The finished brim should be free from puckering, twists and distortions. 20±2 mm wide *base fabric* shall be used for piping the brim’s outer edge (Fig. 4).

2.1.6 Headband: 90±3 mm wide strip of *base fabric* shall be used as head-band. One end of head band shall be stitched to the inner edge of the brim and the other end to the in side of the crown as per Fig. 7.

2.1.7 Chin strap: The chin strap shall be made from a tape whose finished dimensions should be 8±1 mm wide and 850±5 mm long (Fig 7). The tape shall be of two layers of *base fabric,* stitched together. Both the free ends of the chin strap shall be attached to the brim. It shall have a plastic stopper to adjust the strap length (Fig. 7). For more details of plastic stopper, the sealed sample may be referred.

3.0 STITCHING:

3.1 Lock stitch having 3 to 4 stitches per cm shall be employed wherever stitching has to be carried out. The stitching shall be done with even tension and all loose ends shall be securely fastened off.

3.2 Nylon sewing threads conforming to the variety no. L2 of IS: 4229: 1992 RA 2003) shall be used. The colour of the sewing thread shall match the dark green colour of *base fabric*.

4.0 WORKMANSHIP AND FINISH

The *base fabric* used shall be free from defects such as yarn, fabric and dyeing defects.

The workmanship to stitch the “Hat” should be free from defects due to stitching and handling.

5.0 REQUIREMENTS

5.1 The dimensions and mass of the various sizes of “Hat” shall conform to Table 2.

5.2 The “Hat” shall conform to the requirement given in Tables 3 to 5.

6.0 SEALED SAMPLE

For appearance, shape, general workmanship, finish and for other aspects, not defined in this specification, “Hat” shall conform to the sealed sample held in the custody of the Indian navy headquarters. The custody of sealed sample shall be a matter of prior agreement between the buyer and the seller.

7.0 DIMENSIONS

7.1 The “Hat” shall conform to the dimensions given in the Table 2. To measure dimensions of the “Hat”, take the “Hat” to be tested and lay it flat on a horizontal surface. Remove all creases and wrinkles without distorting it.

7.2 To determine mass, take a set of 10 “Hat” from the test samples. Condition them to moisture equilibrium (IS 6359:1971, RA 2004) for 24 hours and weigh. The “Hat” shall conform to the mass given in the Table 2

8.0 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Manufacturers must satisfy themselves that the stores are in accordance with the requirements of the buyer and fully conform to the required specification by carrying out a through pre-inspection of each lot before actually tendering the same for inspection to the inspecting officer nominated by the CRPF-CoBRA. A declaration by the manufacturer that necessary pre-inspection has been carried out on the store tendered, will be submitted along with the *CHALLAN*. The declaration will also indicate the method followed in carrying out pre-inspection showing the feature checked/tested and will have the test certificate attached to the *challan*/declaration.

8.2 The sampling procedure given below shall give desired protection to the buyer and the seller provided the lot submitted for inspection is homogeneous. To achieve this, manufacturer shall maintain a system of process control at all stages of manufacture and shall ensure that the caps tendered by him for inspection comply with the requirements of this standard in all respects.

8.3 In any consignment, all the “Hats” of same size and colour delivered to a buyer against a dispatch note shall constitute a lot.

8.3.1 The conformity of the lot to the requirements of this specification shall be determined on the basis of the tests carried out on the samples selected from it.

8.4 Unless otherwise agreed to between the buyer and the seller, the number of "Hat", depending upon the size of the lot, shall be selected at random in accordance with the col 2 of Table 1 for non-destructive testing and col 4 of Table 1 for destructive testing.

Table-1: Number of "Hat" to be selected from a lot and permissible number of non-conforming "Hat"

No. of caps in the lot	**Non – Destructive Testing**		**Destructive Testing (Chemical Testing)**	
	No. of "Hat" to be selected	**Permissible number of non-conforming "Hat"**	**No. of "Hat" to be selected**	**Permissible number of non-conforming "Hat"**
(1)	**(2)**	**(3)**	**(4)**	**(5)**
Up to 200	20	1	3	0
201 – 400	30	1	4	0
401-800	50	2	5	0
801 – 1500	70	3	8	0
1501 - 2500	100	4	12	1
2501 and above	150	5	16	2

8.5 The sample size and the criteria for conformity for various characteristics shall be as follows:

Characteristics	**Number of test samples**	**Criteria for conformity**
Dimensions and freedom from defects	All the “Hat” selected according to the column 2 of Table 1	Non-conforming “Hat” not to exceed the corresponding number given in column 3 of Table 1
Dimensional change, pH value, weight, colour fastness to various agencies except light	All the “Hat” selected according to the column 2 of Table 1	Non-conforming “Hat” not to exceed the corresponding number given in column 5 of Table 1
Colour fastness to light	One up to 500 “Hat” and two above 500 “Hat”	Each observed value satisfies the specified requirement.

9 MARKING

A suitable cloth label marked with the following information shall be securely attached adjacent to the chin strap of each “Hat”.

a) Size;
b) Manufacturer’s name or trade-mark, if any; and
c) Year of manufacture, if required.

10. PACKAGING & PACKING

10.1 The “Hat” shall be packed in clean and dry condition.

10.2 Each “Hat” shall be wrapped in a polythene bag of suitable size.

10.3 Ten “Hat” of same size packed as mentioned in 10.2 and shall be arranged suitably and tied together with twine jute 3 ply (IS 1912:1984 RA 2007) to form a bundle.

10.4 The bundles shall be wrapped with layer of polyethylene film of minimum 40 microns thickness (See IS : 2508:1984, RA 2003). A suitable number of such bundles shall be packed in wooden cases lined with water proof packing paper (See IS 1398:1982, RA 2004) or polyethylene film of 40 microns.

Table- 2 : Dimensions and mass of the "Hat"

Size	**Internal circumference of the brim in cm**	**Width of the brim in cm**	**Circumference of circular crown in cm**	**Mass of 10 caps (minimum) in gram**
Small	56	6.0	50.5	990
Medium	60	6.0	51.5	1000
Large	64	6.0	52.5	1160
Tolerance	±0.5	±0.2	±0.5	-

Table-3: Requirements of "Hat" (*Base Fabric*)

S. No.	Parameters	Requirements	Method of Testing
1	Composition ,% - Nylon 6 6 - Cotton	 50±5 Remainder	AATCC Test method 20 and 20A
2	Dimensional Change (due to relaxation), percentage, Maximum	2.0	As per guidance of IS 2977:1989 (See Annexure 1)
3	Ends/dm (minimum)	400	IS 1963:1981
4	Picks/dm (minimum)	180	IS 1963:1981
5	Weight in g/m^2	220 ±10	IS 1964 : 1970
6	Tearing Strength, Newton (Minimum) - Warp-wise - Weft-wise	 35 35	IS 6489:1993
7	Colour Fastness to a). Light (on blue wool Standards) b). Washing - Change in shade - Staining on cotton c). Perspiration (Acid & Alkaline) - Change in shade - Staining on cotton d) Crocking - Dry - Wet	 5 or better 4 or better 4 or better 4 or better 4 or better 4 or better 4 or better	 IS 2454:1985 IS 687:1979 IS 971:1983 IS 766:1988
8	pH Value of aqueous extract	6.0 – 8.0	IS 1390:1983 (Cold method)
9	Spray rating, (minimum)	80	As per guidance of IS 390: 1975 (See Annexure 2)
10	Colour specification	≤ 3.0	See Table 4 and 5

Table-4A: Specification of colour of Disruptive Pattern Uniform (DARK)- Dark Green

(AATCC Test method 173 : 2005 & AATCC Evaluation Procedure 7 : 2003)

Colour	:	**Dark Green**		
System	:	**CIE LCH**		
Illuminant Observer	:	**D 65**		
Standard Observer	:	**10 Degree**		
Tristimulus Values	:	**X**	**Y**	**Z**
		5.234	**5.964**	**4.813**
L C H	:	**L**	**C**	**H**
		29.321	**8.650**	**124.923**
CMC (l:c)	:	**2:1**		
Colour difference, ΔE_{cmc}	:	**≤ 3.0**		

Interpretation of Results :

i) If ΔE_{cmc} is less than or equal to 3, then sample is acceptable.

ii) If ΔE_{cmc} is greater than 3, then sample is unacceptable.

Note-1 : Absorbance/reflectance/ transmittance are affected by surface characteristic features of the substrate. Therefore comparison should be made between samples of same type i.e., identical fabric construction parameters and filament/ fibre composition.

Note-2 : Test should be carried out after proper conditioning as per AATCC 173.

Table 4B: Specification of colour of Disruptive Pattern Uniform (DARK)-Light Green

(AATCC Test method 173 : 2005 & AATCC Evaluation Procedure 7 : 2003)

Colour	:	**Light Green**
System	:	**CIE LCH**
Illuminant Observer	:	**D 65**
Standard Observer	:	**10 Degree**

Tristimulus Values :

X	Y	Z
13.838	14.418	11.139

L C H :

L	C	H
44.827	10.951	84.217

CMC (l:c)	:	**2:1**
Colour difference, ΔE_{cmc}	:	**≤ 3.0**

Interpretation of Results :

iii) If ΔE_{cmc} is less than or equal to 3, then sample is acceptable.

iv) If ΔE_{cmc} is greater than 3, then sample is unacceptable.

Note-1 : Absorbance/reflectance/ transmittance are affected by surface characteristic features of the substrate. Therefore comparison should be made between samples of same type i.e., identical fabric construction parameters and filament/ fibre composition.

Note-2 : Test should be carried out after proper conditioning as per AATCC 173.

Table-4C: Specification of colour of Disruptive Pattern Uniform (DARK)-Khaki

(AATCC Test method 173 : 2005 & AATCC Evaluation Procedure 7 : 2003)

Colour	:	**Khaki**
System	:	**CIE LCH**
Illuminant Observer	:	**D 65**
Standard Observer	:	**10 Degree**

Tristimulus Values :

X	Y	Z
10.410	**10.217**	**6.302**

L C H :

L	C	H
38.229	**16.771**	**70.096**

CMC (l:c)	:	**2:1**
Colour difference, ΔE_{cmc}	:	**≤ 3.0**

Interpretation of Results :

v) If ΔE_{cmc} is less than or equal to 3, then sample is acceptable.

vi) If ΔE_{cmc} is greater than 3, then sample is unacceptable.

Note-1 : Absorbance/reflectance/ transmittance are affected by surface characteristic features of the substrate. Therefore comparison should be made between samples of same type i.e., identical fabric construction parameters and filament/ fibre composition.

Note-2 : Test should be carried out after proper conditioning as per AATCC 173.

Table-4D: Specification of colour of Disruptive Pattern Uniform (DARK)-Black

(AATCC Test method 173 : 2005 & AATCC Evaluation Procedure 7 : 2003)

Colour	:	**Black**
System	:	**CIE LCH**
Illuminant Observer	:	**D 65**
Standard Observer	:	**10 Degree**

Tristimulus Values :

X	Y	Z
2.294	**2.393**	**2.994**

L C H :

L	C	H
17.428	**3.064**	**280.297**

CMC (l:c)	:	**2:1**
Colour difference, ΔE_{cmc}	:	**≤ 3.0**

Interpretation of Results :

vii) If ΔE_{cmc} is less than or equal to 3, then sample is acceptable.

viii) If ΔE_{cmc} is greater than 3, then sample is unacceptable.

Note-1 : Absorbance/reflectance/ transmittance are affected by surface characteristic features of the substrate. Therefore comparison should be made between samples of same type i.e., identical fabric construction parameters and filament/ fibre composition.

Note-2 : Test should be carried out after proper conditioning as per AATCC 173.

Table-5A: Specification of colour of Disruptive Pattern Uniform (LIGHT) - Dark Green

(AATCC Test method 173 : 2005 & AATCC Evaluation Procedure 7 : 2003)

Colour	:	**Dark Green**
System	:	**CIE LCH**
Illuminant Observer	:	**D 65**
Standard Observer	:	**10 Degree**

Tristimulus Values :

X	Y	Z
12.113	13.044	12.675

L C H :

L	C	H
42.829	3.739	117.481

CMC (l:c)	:	**2:1**
Colour difference, ΔE_{cmc}	:	**≤ 3.0**

Interpretation of Results :

ix) If ΔE_{cmc} is less than or equal to 3, then sample is acceptable.

x) If ΔE_{cmc} is greater than 3, then sample is unacceptable.

Note-1 : Absorbance/reflectance/ transmittance are affected by surface characteristic features of the substrate. Therefore comparison should be made between samples of same type i.e., identical fabric construction parameters and filament/ fibre composition.

Note-2 : Test should be carried out after proper conditioning as per AATCC 173.

Table 5B: Specification of colour of Disruptive Pattern Uniform (LIGHT)- Light Green

(AATCC Test method 173 : 2005 & AATCC Evaluation Procedure 7 : 2003)

Colour	:	**Light Green**
System	:	**CIE LCH**
Illuminant Observer	:	**D 65**
Standard Observer	:	**10 Degree**

Tristimulus Values :

X	Y	Z
19.319	**20.577**	**18.966**

L C H :

L	C	H
52.483	**5.930**	**99.085**

CMC (l:c)	:	**2:1**
Colour difference, ΔE_{cmc}	:	**≤ 3.0**

Interpretation of Results :

xi) If ΔE_{cmc} is less than or equal to 3, then sample is acceptable.

xii) If ΔE_{cmc} is greater than 3, then sample is unacceptable.

Note-1 : Absorbance/reflectance/ transmittance are affected by surface characteristic features of the substrate. Therefore comparison should be made between samples of same type i.e., identical fabric construction parameters and filament/ fibre composition.

Note-2 : Test should be carried out after proper conditioning as per AATCC 173.

Table-5C: Specification of colour of Disruptive Pattern Uniform (LIGHT)-Khaki

(AATCC Test method 173 : 2005 & AATCC Evaluation Procedure 7 : 2003)

Colour	:	**Khaki**
System	:	**CIE LCH**
Illuminant Observer	:	**D 65**
Standard Observer	:	**10 Degree**

Tristimulus Values :

X	Y	Z
31.643	**32.716**	**28.306**

L C H :

L	C	H
63.930	**9.848**	**76.272**

CMC (l:c)	:	**2:1**
Colour difference, ΔE_{cmc}	:	**≤ 3.0**

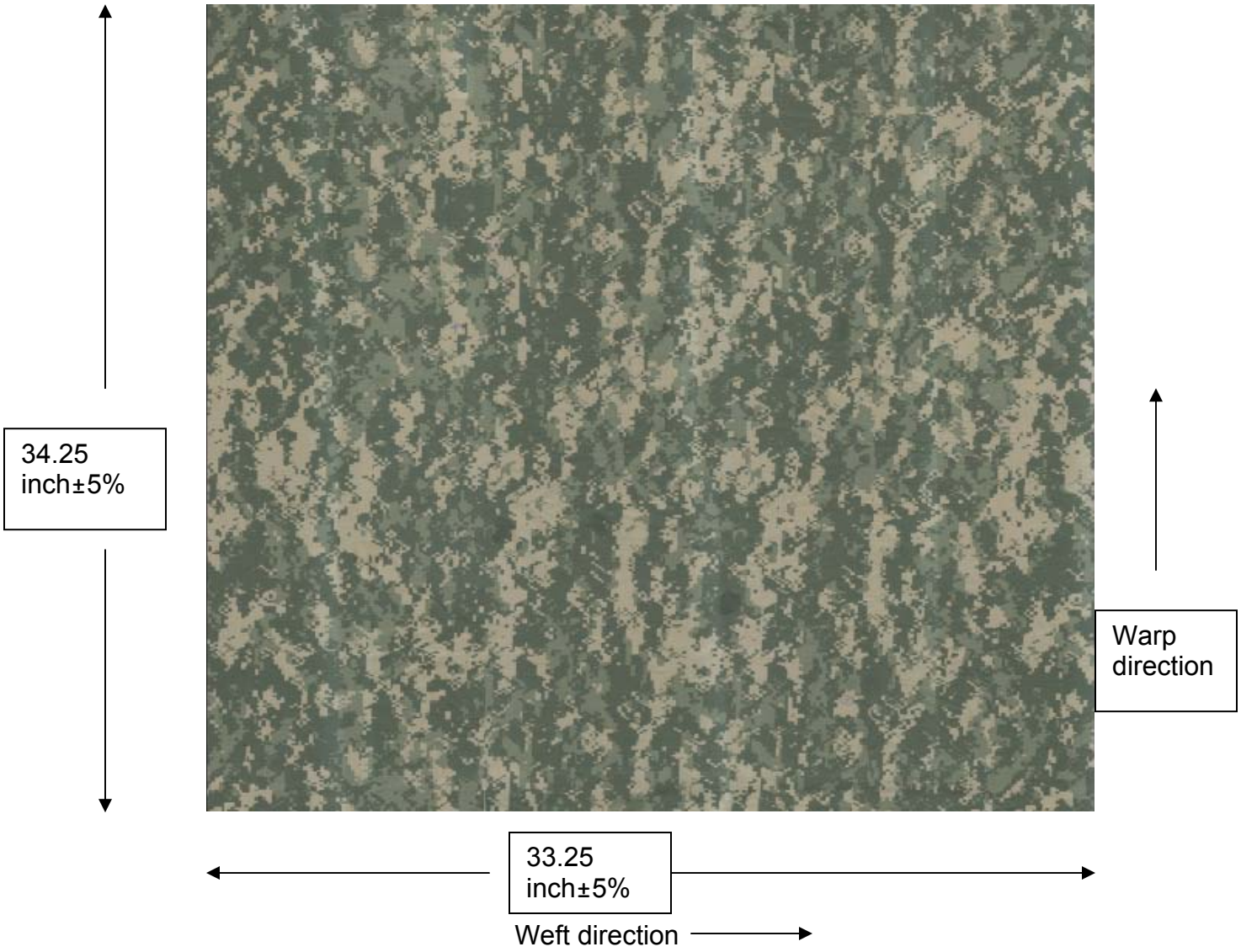
Interpretation of Results :

xiii) If ΔE_{cmc} is less than or equal to 3, then sample is acceptable.

xiv) If ΔE_{cmc} is greater than 3, then sample is unacceptable.

Note-1 : Absorbance/reflectance/ transmittance are affected by surface characteristic features of the substrate. Therefore comparison should be made between samples of same type i.e., identical fabric construction parameters and filament/ fibre composition.

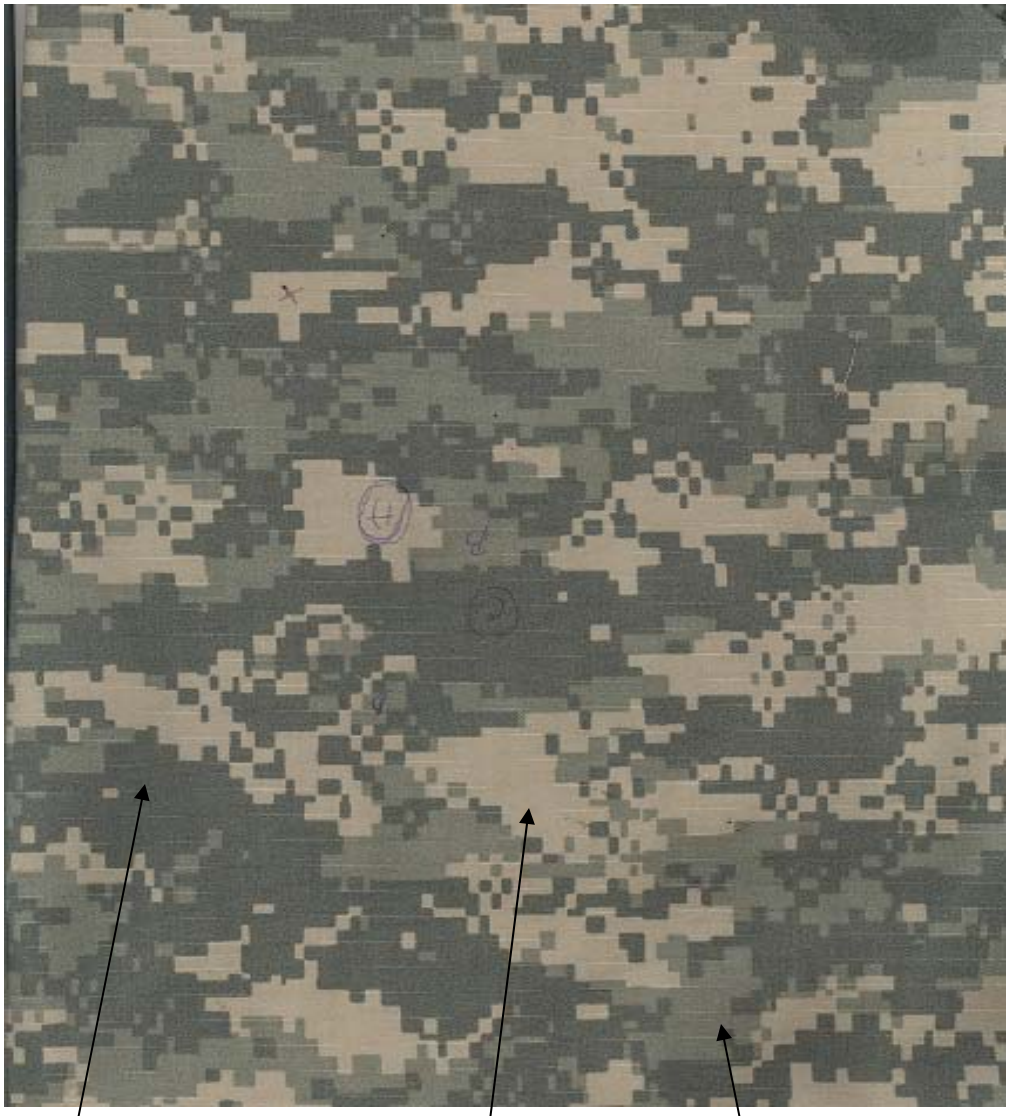
Note-2 : Test should be carried out after proper conditioning as per AATCC 173.



Scale:

Warpwise: 1cm=approx. 2.36 inch
Weftwise: 1 cm-approx 2.30 inch

Fig.1 : Disruptive Print –One repeat of the design
(For true colours refer sealed fabric sample)



Dark Green **Khaki** **Light Green**

Fig. 2 : Disruptive Print –LIGHT COLOUR (For colour identification only)

(For true colours refer sealed fabric sample)

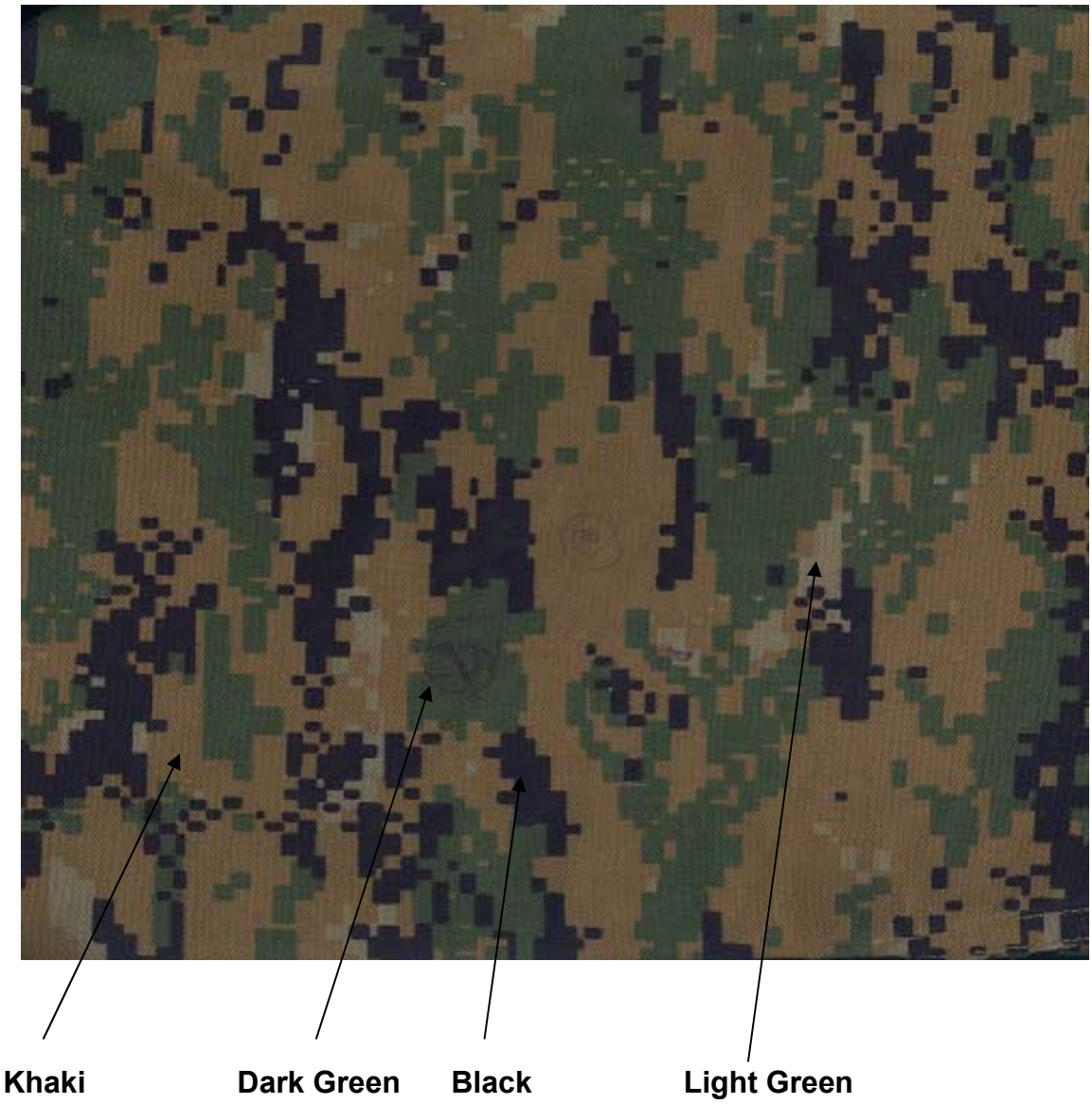
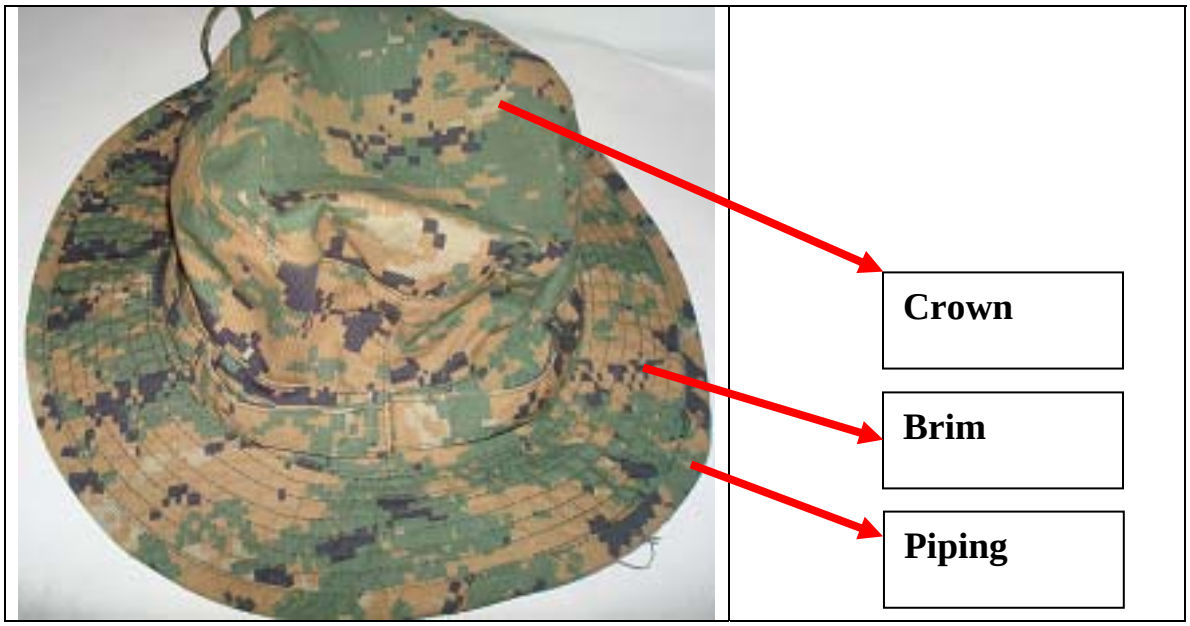


Fig. 3 Disruptive Print –DARK COLOUR (For colour identification only)

(For true colours refer sealed fabric sample)



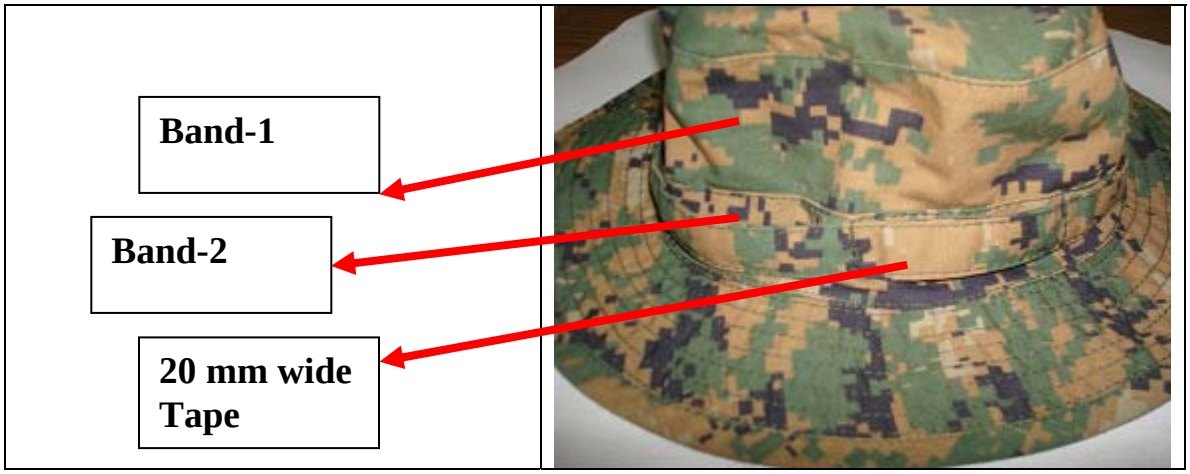


Fig. 4 Side View of "Hat"

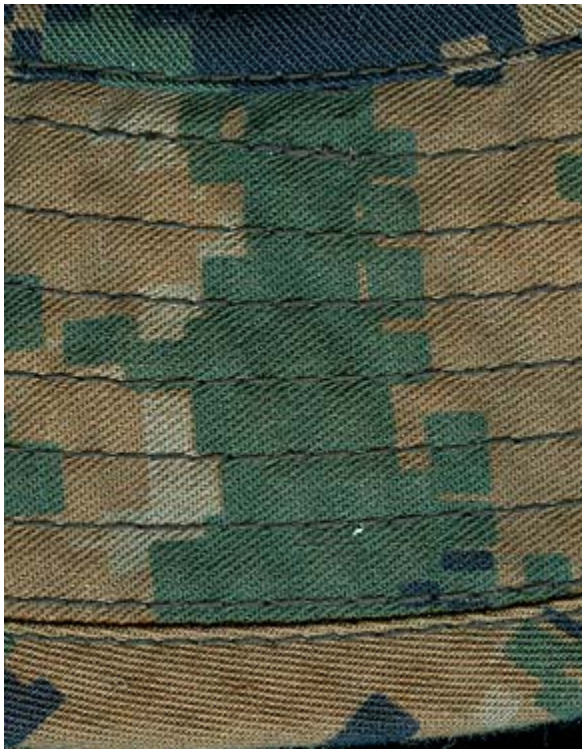


Fig. 6 Type of seams on brim of “Hat”

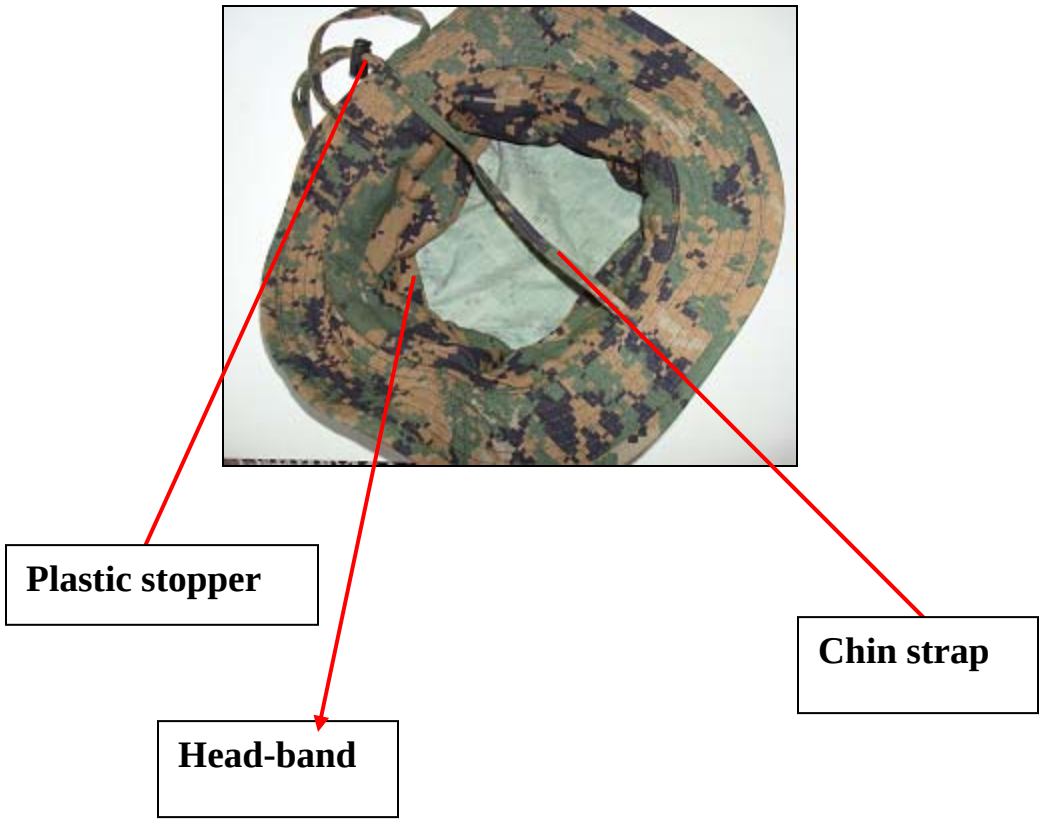


Fig. 7 Inner view of "Hat"

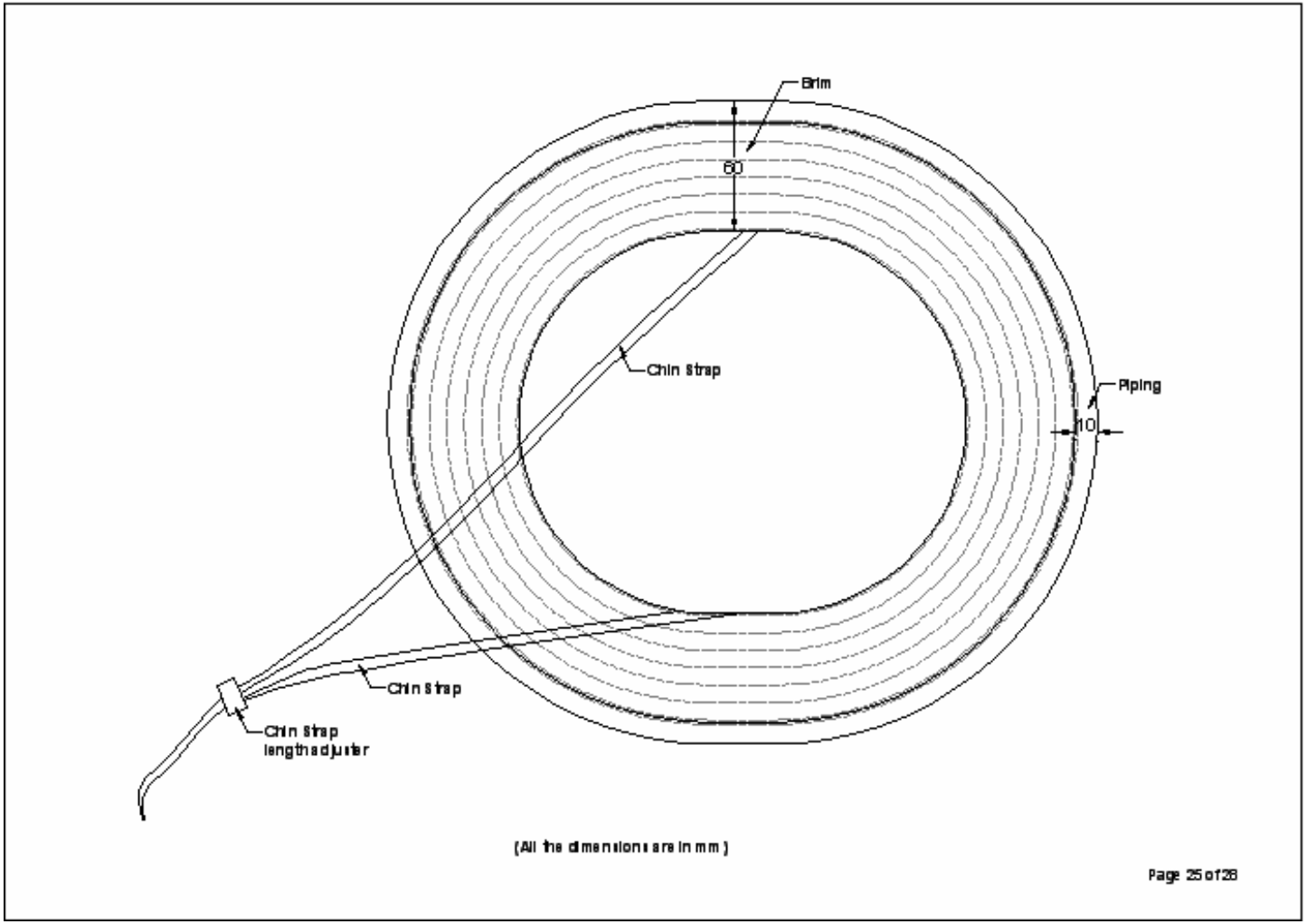


Fig. 8 Brim fabrication (Plan)

11. REFERENCES

Sl. No.	SPEC. /TEST METHOD No.	DESCRIPTION
(a)	AATCC 20 : 2007	Fibre analysis: Qualitative
(b)	AATCC 20A: 2008	Fibre analysis: Quantitative
(c)	IS 971: 1983, RA 2004	Method for determination of colour fastness of textile material to perspiration
(d)	IS 1390: 1983, RA 2004	Methods of testing of pH value of aqueous extract
(e)	IS 2454: 1985, RA 2006	Methods for determining of colour fastness of textile materials to artificial light (xenon lamp)
(f)	IS 2500 (Part 2): 1965, RA 2006	Sampling inspection tables
(g)	IS 687: 1979, RA 2004	Method for determination of colour fastness of textile material to washing
(h)	IS 4905: 1968, RA 2006	Method of random Sampling
(i)	IS 766: 1988 RA 2004	Method for determination of colour fastness of textile material to Rubbing (dry & wet)
(j)	IS 690:1988, RA 2004	Method for determination of colour fastness of textile material to sea water
(k)	IS : 2977:1989, RA 2005	Method for determination of dimensional changes on soaking in water
(l)	IS 6359:1971, RA 2004	Method for Conditioning of Textiles
(m)	IS: 3416:1988, RA 2008	Method of quantitative analysis of binary mixture of polyester fibre with cotton
(n)	AATCC Test method 173 : 2005	CMC: Calculation of small colour differences for acceptability
(n)	AATCC Evaluation Procedure 7 : 2003	Instrumental assessment of the change in colour of a test specimen

Annex -1

DIMENSIONAL CHANGE AFTER WASHING

Dimensional change shall be tested as per the guidance of IS 2977 with the following change in procedure:

For determination of change in dimensions of “Hat”, first, take a “Hat” (fully conditioned), to be tested. Lay it flat on a horizontal surface. Remove all creases and wrinkles without distorting it. Measure to the nearest millimeter (dimension are given in the Table 2). Treat the “Hat” as per IS 2977:1989, dry and condition. After conditioning, again measure all the dimensions as above and compare with the untreated Hat’s dimensions.

Annex -2

SPRAY RATING TEST

Spray test shall be carried out as per the guidance of IS 390 with the following change in procedure:

For spray test, place the “Hat” (after proper conditioning as per the requirement of the test method) under the spray nozzle on a flat surface. Pour 250 ml of distilled water from the sides quickly into the funnel of spray tester at 27±2°C and allow it to spray on the crown. After completing the test, remove the “Hat” from the flat surface and tap it 3 times in succession against a horizontal surface. Immediately after the tapping, under reflect light compare the wetting of the face of the “Hat” with the photographic standard spray test ratings and assign the rating.

SPECIFICATION FOR “JUNGLE FLOPPY HAT”

RECORD OF AMENDMENTS

Amendment No. and Date	Amendment pertains to Sl.No./Para No./Column No.	Authority	Amended by Name and Appointment (in block letter)	Signature and Date

PREAMBLE

The Inspector General of Police (CoBRA Sector), CRPF, has asked NITRA to prepare technical specifications for specification for “Jungle floppy hat”. The specification describes the performance requirements and material properties – ends/dm, pick/dm, weave, weight, yarn count, fibre composition, dimensions, color fastness to light, washing, and perspiration; pH, dimensional change due to washing, etc. Bureau of Indian Standards (BIS) and American Association of Textile Chemists and Colorists (AATCC) test methods are considered to draw this specification.

This report contains 29 pages which describe the technical specifications of “Jungle floppy hat” for CRPF (CoBRA).

Whenever a reference to any other standard occurs in this specification, it shall be taken as reference to the latest version of that standard existing at the time of finalization of a contract.

This technical specification will enable the CRPF (CoBRA) to prepare tender documents (technical details) at the time of placing orders for ““Jungle floppy hat”” and final inspection as well.

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