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भारतीय मानक मसौदा

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Draft Indian Standard

TEXTILES — CAP FIELD SERVICE KHAKI — SPECIFICATION

ICS : 61.040

Made up textiles (Including Ready-Made Garments) Sectional Committee, TXD 20

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FOREWORD

(*Formal clauses will be added later*)

Cap Field Service is a type of cap typically worn by defence, police personnel during field duties for sun protection and unit identity. This standard has been formulated in consideration of the requirements of police service uniforms in India, with the objective of promoting uniformity under the 'One Nation, One Uniform' initiative. This standard will assist procurement agencies in ensuring uniformity in quality and performance of field caps.

In order to improve ventilation and thermal comfort, two panels of knitted polyester mesh have been incorporated in the body of the field cap. The use of mesh panels facilitates breathability without adversely affecting the structural integrity or performance of the cap.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded of in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard specifies the requirement of cap field service under One Nation One Police Uniform.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 PROCESSING/MANUFACTURING

3.1 Body

The body of the cap shall be made of cotton and polyester (80:20) blended twill weave fabric, water replant having 250 gsm and knitted polyester mesh. The top of the cap shall be made from five triangular panels (3 panels made with fabric twill weave cotton and polyester (80:20) and 2 panels made with knitted polyester mesh). The base of the pieces shall be adjusted to attain the internal circumference of the cap of required size. The panel shall be joined together with plain seam and all the panel joints shall be reinforced with 1.5 cm wide strip of calico cotton khaki by machine stitching at the edges as shown in the Fig. 1.

3.2 Forehead Piece

A forehead piece in the shape of segment of circle of required dimension shall be made from HDPE as given in Table 3, fused with forehead part of fabric twill weave cotton and polyester (80:20), water replant 250 gsm khaki and other side covered with a layer of calico cotton khaki to the shape and dimension shown in Fig. 2. The position of embroidered police logo shall place at the center of the forehead at front.

3.3 Peak

3.3.1 The peak shall be of the shape and dimension illustrated in Fig. 1, size scale given in Table 4, it shall consist of a piece of LDPE sheet moulded encased in a casing of body material as showing in the Fig. 1.

3.3.2 The peak shall be quilted at the periphery with 3 row of machine stitching equidistance from each other.

3.3.3 The peak shall be stitched to the main body by single row of machine stitching as shown in the Fig. 1. Care shall be exercised that the projection of the peak is horizontal and there is not crookedness or unevenness in peak.

3.4 Lining

At the inside of the cap a minimum 3 cm wide band made with calico cotton khaki provided throughout the periphery.

3.5 Adjusting Strap

A adjustable strap of (20 ± 1) mm width made with body material shall be provided at back side of the cap along with a hook loop fasteners having (20 ± 1) mm wide for adjustment.

3.6 Stitching

The cap shall be assembled throughout with lock stitches regulated at 4 to 5 stitches per cm with even tension. The ends of loose threads shall be trimmed off.

4 WORKMANSHIP AND FINISH

The general workmanship and finish of cap field service shall be of a high standard and similar to sealed sample. In order to attained high standard in aesthetic appearance (shade, fitments and texture), general workmanship (alignments, stitching and consistency), finish (softness, comfort and neatness), the cap shall be free from yarn, weaving, wet processing, garmenting defects and any other spots which affects the serviceability of cap. All components of the cap shall also be compatible in fitment, workmanship and finish.

5 REQUIREMENTS

5.1 The fabric used for body and knitted polyester mesh shall confirm to the requirements as specified in Table 1 and Table 2.

5.2 The fabric used for interlining for forehead shall confirm to the requirements as specified in Table 3.

Table 1 Requirements of Fabric used for Body of the Field Cap
(*Clauses* 3.1 and 5.1)

Sl No.	Parameters	Requirements	Method of Test, Ref to
(1)	(2)	(3)	(3)
i)	Fibre composition, percent	Cotton – 80 ± 2 Polyester – 20 ± 2	IS 3416
ii)	Mass (g/m^2), percent	250 ± 5	IS 1964
iii)	Width, *Min*	150	IS 1954
iv)	Thread per cm, percent, nominal a) Warp b) Weft	 42 21	IS 1963
v)	Breaking Load in 'N' (5 cm × 20 cm, between grip), *Min* a) Warp b) Weft	 1 200 520	IS 1969 (Part 1)
vi)	Age Relaxation shrinkage, percent, *Max* a) Along warp b) Along weft	 1.5 1.5	IS 2977
vii)	*p*H of aqueous extract	6.0 to 8.5	IS 1390
viii)	Scouring loss, percent, *Max*	2	IS 1383
ix)	Spray Rating	3	IS 390
x)	Colour fastness to: a) Light b) Washing	 5 or better 4 or better	 IS/ISO 105-B02 IS/ISO 105-C10

	c) Perspiration	4 or better	IS/ISO 105-E04
xi)	Weave	2/1 Twill Weave	Visual

Table 2 Requirements of Knitted Polyester Mesh
(*Clauses* 3.1 and 5.1)

Sl No.	Parameters	Requirements	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Material	100 percent polyester	IS 667
ii)	Mass, g/m^2, percent	110 ± 5	IS 1964
iii)	Width, cm	150	IS 1954
iv)	Mesh Density, holes/sq. inch *Min*	45	Visual
v)	Bursting Strength, kgf/sq cm *, Min*	7	IS 1966 (Part 1)
vi)	Colour fastness to: a) Light b) Washing c) Perspiration	 5 or better 4 or better 4 or better	 IS/ISO 105-B02 IS/ISO 105-C10 IS/ISO 105-E04

Table 3 Fabric used for Interlining for Forehead
(*Clauses* 3.2 and 5.2)

Sl No.	Parameters	Requirements	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Material	HDPE	Annex B
ii)	Mass, g/m^2, percent	165 ± 5	IS 1964
iii)	Breaking Load in 'N' (5 cm × 20 cm, between grip), *Min* a) Warp b) Weft	 300 200	IS 1969 (Part 1)
iv)	Shrinkage percentage (*Max*) (in both directions) a) After soaking in boiling soap soda solution. b) After thermal treatment at 100 °C for 1 h.	 1.0 0.5	IS 2977 Annex C Annex D
v)	Loss in mass on boiling in soap soda solution, percent, *Max*	2.0	Annex E
vi)	Adhesion strength, N, *Min*	20	Annex F
vii)	Strike through after boiling in soap soda solution	The resin shall not strike through the laminated polyester/cotton blended fabric	Annex G
viii)	Presence of starch	Nil	IS 199

5.3 Dimensions and Tolerances

The cap shall conform to the dimensions as given in the Table 4 respectively. The Cap shall also conform to the shape, design and dimensions.

Table 4 Dimension Chart of Cap Field Service Khaki
(*Clauses* 3.3.1 and 5.3)

Sl No.	Size	Internal Circumference, mm	Length of Panel, mm	Circumference of Peak Outer Periphery, mm	Circumference of Peak Inner Periphery, mm
(1)	(2)	(3)	(4)	(5)	(6)
i)	Small	540	155	350	200
ii)	Medium	600	170	370	220
iii)	Large	640	180	390	240
iv)	Tolerance, percent	± 5	± 5	± 5	± 5

6 SAMPLING

6.1 The lot size is restricted to 10000 sets.

6.2 The supplier shall offer the store in box (four unit packs in a box), serially numbered and arranged in such a manner that the entire lot is easily accessible to the sampling officer.

6.3 Based on the lot size offered for quality assurance, sample units for visual examination and dimension check at the time of sampling be drawn as per col (2) and for bulk inspection as per col (4) of the Table 5 using technique of random sampling as per IS 4905.

6.4 On being satisfied with the preliminary examination, sample if required for laboratory test/examination shall be drawn as per col (5) and col (7) of the Table 5.

Table 5 Sampling and Permissible Number
(*Clauses* 6.3 and 6.4)

Sl No.	Lot size in sets	Sampling Plan						
		Visual examination / dimension check at the time of sampling (L-1)		Sample Size for detail check at bulk QA Stage (L-II)	Physical parameters (for laboratory tests) (S-4)		Chemical parameters (for laboratory tests) (S-2)	
		Sample Size	Acceptance No.		Sample Size	Acceptance No.	Sample Size	Acceptance No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Up to 280	13	1	32	13	1	5	0
ii)	281 to 500	20	2	50	13	1	5	0
iii)	501 to 1200	32	3	80	20	2	5	0
iv)	1201 to 3200	50	5	125	32	3	5	1

v)	3201 to 10000	80	7	200	32	3	5	1

NOTES —
1. Samples for lab testing will be drawn from the samples drawn and mentioned in col no. (2) only.
2. Samples for chemical test col no. (7) shall be drawn out of physical test samples col no (5).
3. Total Acceptance No. mentioned in col no (6) for physical parameter is inclusive of Acceptance No. mentioned at col no (9) for chemical parameter.

7 CRITERIA FOR CONFORMITY

The lot shall be considered to be in conformity with the required standard if the samples drawn for lab test as above are found satisfactory and the lot is also found otherwise satisfactory with regard to visual parameters.

8 MARKING

8.1 Each pair of cap field service khaki shall be marked with the following:

a) Size of cap field service khaki;
b) Manufacturer's name and country of origin label;
c) Batch number, month and year of manufacture; and
d) Any other information required by law in force.

8.2 BIS Certification Marking

The Product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the bureau of Indian Standards Act, 2016, and the Rules and Regulations framed thereunder, and the product (s) may be marked with the Standard Mark.

9 PACKING

The cap field service khaki shall be delivered/packed in new, dry, clean and sound condition. Each cap shall be pressed wrinkle free before packing. Then cap shall be suitably folded and put into a self- sealing polythene bag.

FIG. 1 BODY OF THE CAP

FIG. 2 FOREHEAD PIECE OF THE CAP

ANNEX A
(*Clause* 2)

LIST OF REFERED STANDARDS

IS No.	*Title*
105-B02 : 2014	Textiles — Tests for colour fastness — Part B02 Colour fastness to artificial light: Xenon arc fading lamp test
105-C10 : 2006	Textiles — Tests for colour fastness Part C10 Colour fastness to washing with soap or soap and soda
105-E04 : 2013	Textiles — Tests for colour fastness Part E04 Colour fastness to perspiration (*first revision*)
IS 199 : 1989	Textiles — Estimation of moisture, total size or finish, ash and fatty matter in grey and finished cotton textile materials (*third revision*)
IS 667 : 1981	Method for identification of textile fibres (*first revision*)
IS 390:2024 ISO 4920 : 2012	Textile fabrics Determination of resistance to surface wetting (spray test) (*second revision*)
IS 1383 : 2023	Methods for determination of scouring loss in grey and finished cotton textile materials (*second revision*)
IS 1390 : 2022 ISO 3071 : 2020	Textiles — Determination of pH of aqueous extract (*third revision*)
IS 1954 : 2024 ISO 22198 : 2006	Textiles — Fabrics — Determination of width and length (*third revision*)
IS 1963 : 1981	Methods for determination of threads per unit length in woven fabrics (*second revision*)
IS 1964 : 2001	Textiles — Methods for determination of mass per unit length and mass per unit area of fabrics (*second revision*)
IS 1966 (Part 1) : 2022 ISO 13938-1 : 2019	Textiles — Bursting properties of fabrics Part 1: Hydraulic method for determination of bursting strength and bursting distension (*third revision*)
IS 1969 (Part 1) : 2018	Textiles — Tensile properties of fabrics — Part 1 Determination of maximum force and elongation at maximum force using the strip method (*fourth revision*)
IS 2977 : 1989	Fabrics (other than wool) — Method for determination of dimensional changes on soaking in water (*first revision*)
IS 3416 : 2024 ISO 1833-11 : 2017	Textiles — Quantitative chemical analysis — Mixtures of certain cellulose fibres with certain other fibres (method using sulphuric acid) (*third revision*)
IS 4905 : 2015 ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)

ANNEX B

(*Table* 3, *Sl No*. i)

METHOD OF DETERMINING NATURE OF POLYMER

B-1 APPARATUS

B-1.1 Measuring Tape

B-1.2 Glass Plate

B-1.3 Air Oven

B-2 REAGENT

B-2.1 Solvent — m-xylene

B-3 PROCEDURE

B-3.1 The test specimens of the same sample measuring approximately 3 cm x 3 cm are placed together keeping the coated side face to face in between two glass plates having thickness of about 2 mm. The size of the glass plate shall be approximately of the same size as that of the size of the test specimen.

B-3.2 Place a weight of 100 g over the glass plate and the whole assembly shall be put in an air oven maintained at 145 °C ± 2 °C temperature for 5 min.

B-3.3 Check the solubility of the coating material in m-xylene (100 % concentration) maintained at 139 °C ± 2 °C for 5 minutes

B-3.4 If the samples fuse together under heat at 145 °C ± 2 °C for 5 minutes and the coating material is also found to be soluble in hot m-xylene as per B-3.3, the material shall be HDPE.

ANNEX C

(*Table* 3, *Sl No*. ii)

SHIRANKAGE TEST — METHOD OF SOAKING IN SOAP SODA SOLUTION

C-1 PRINCIPLE

Shrinkage test by soaking in soap-soda solution is to assess the dimensional stability of a fabric when exposed to typical washing conditions. In this method, a marked fabric sample is

immersed in a standardized soap and soda solution at a specified temperature for a set duration. After drying, the change in dimensions is measured to determine shrinkage.

C-2 REAGENTS

C-2.1 Soap-Soda

C-2.2 Distilled Water

C-3 PROCEDURE

Test specimen (size 60 cm x 60 cm) shall be prepared and laid as per IS 2977. Soap soda (0.5 percent soap and 0.2 percent soda) solution shall be boiled and poured over the fabric, the fabric shall be left immersed for hours at room temperature. This specimen shall thereafter be taken out, washed thoroughly-with distilled water, dried completely at 27 °C ± 1 °C and 65 percent ± 2 percent R.H. and shrinkage determined as per IS 2977.

C-4 CALCULATION

The formula for calculating shrinkage in the shrinkage test (soaking in soap-soda solution method) is:

$$\text{Shrinkage (\%)} = \frac{A-B}{A} X\ 100$$

Where,

A = Original length or width of the fabric before washing.
B = Length or width of the fabric after washing and drying.

C-5 TEST REPORT

The test report shall include the following information:

a) Whether the specimens were from wide or narrow fabrics and the number of specimens tested from each piece in the test sample;
b) The mean dimensional change, percent in the lengthways and widthways direction for wide fabrics, and in the lengthways direction for narrow fabrics; and
c) Indicate a decrease in dimension by a minus sign and an increase by a plus sign.

ANNEX D
(*Table* 3, *Sl No*. ii)

SHRINKAGE TEST— METHOD OF THERMAL TREATMENT

D-1 PRINCIPLE

Shrinkage test by thermal treatment is to evaluate the dimensional stability of a textile material when exposed to dry heat or steam. The fabric sample is first marked and then subjected to a

specified temperature and duration in a controlled environment (such as an oven or heat press). After cooling, the change in dimensions is measured.

D-2 APPARATUS

D-2.1 Glass Plate

D-2.2 Air Oven

D-2.3 Measuring Scale

D-2.4 Fabric Marker

D-3 PROCEDURE

A test specimen measuring 30 cm x 30 cm shall be cut from the sample and accurate markings of 25 cm x 25 cm shall be made in both the directions. The test piece shall be laid flat on a clean glass plate in an air oven at 100 °C ± 2 °C temperature for 1 h. The sample thereafter shall be removed and conditioned at 27 °C ± 1 °C temperature and 65 percent ± 2 percent relative humidity for 24 h. The fabric shall then again be measured accurately and percentage shall then be determined as per IS 2977.

D-4 CALCULATION

The formula for calculating shrinkage in the thermal treatment method is:

$$\text{Shrinkage (\%)} = \frac{A-B}{A} X\ 100$$

Where,

A = Original length or width of the fabric before washing.
B = Length or width of the fabric after washing and drying.

D-5 TEST REPORT

The test report shall include the following information:

a) Whether the specimens were from wide or narrow fabrics and the number of specimens tested from each piece in the test sample;
b) The mean dimensional change, percent in the lengthways and widthways direction for wide fabrics, and in the lengthways direction for narrow fabrics; and
c) Indicate a decrease in dimension by a minus sign and an increase by a plus sign.

ANNEX E

(*Table* 3, *Sl No*. v)

METHOD OF TEST FOR DETERMINING LOSS IN MASS ON BOILING IN SOAP SODA SOLUTION

E-1 PRINCIPLE

Method for determining loss in mass on boiling in soap-soda solution is to assess the removal of natural or added impurities from a textile material during a simulated scouring process. A known mass of the fabric is boiled in a standardized soap-soda solution for a fixed time to mimic industrial washing. After thorough rinsing and drying, the final mass is measured.

E-2 APPARATU

E-2.1 Oven

E-3 REAGENTS

E-3.1 Soda Ash

E-3.2 Distilled Water

E-4 PROCEDURE

A specimen sample approximately 5 g shall be taken and weighed accurately in a weighing bottle after oven drying at 100 °C ± 2 °C temperature for 1 h. It shall then be boiled in a solution containing 0.5 percent soap (confirming to IS 285) and 0.2 percent soda ash for 2 h. The level and the strength of the solution shall be maintained throughout the boiling. The specimen shall then be taken out of the solution and washed thoroughly, with distilled water without rubbing. The washed sample shall again be dried at 100 °C ± 2 °C for 1 h and weighed accurately after cooling in desiccator.

E-5 CALCULATION

The percentage loss the mass shall be calculated as under:

$$\%\ Loss = \frac{(m_1 - m_2)}{m_1}$$

Where,

m_1 is mass (g) of the specimen before boiling; and
m_2 is mass (g) of the-specimen after boiling in soap soda solution.

ANNEX F
(*Table* 3, *Sl No*. vi)

METHOD OF TEST FOR DETERMINATING — ADHESION PROPERTY

F-1 PRINCIPLE

Method of test for determining adhesion property is to measure the force required to separate two bonded surfaces, typically a coating, film, or adhesive layer from a substrate. A test specimen is prepared with a defined bonded area, and a tensile or peel force is applied under controlled conditions. The maximum force needed to break the bond is recorded as the adhesion strength.

F-2 APPARATUS

F-2.1 Iron

F-2.2 Air Oven

F-3 PROCEDURE

F-3.1 Cut 10 strips 5 inch from two perpendicular directions in size 10 cm x 20 cm from the interlining fabric and polyester cotton blended fabric. Bond the polyester cotton fabric strip by pressing with heavy iron (weighting approximately 8Kg) already heated to a temperature of 160 °C to 170 °C keeping the coated surface in contact with polyester-cotton fabric and iron with polyester-cotton fabric. The iron may be bought to required temperature by keeping the same for about 10 min in an air oven maintained at 180 °C ± 2 °C. Care shall be exercised to ensure that the proper fusion has been affected.

F-3.2 Allow the bonded strip to cool down to room temperature and condition them at 27 °C ± 1 °C temperature and 65 percent ± 2 percent relative humidity. Thereafter 5 strips each in the two directions in size 5 cm x 15 cm shall be prepared from the laminated strips by trimming off 2.5 cm from all the four sides of the laminated strips. Separate by hand the two bonded layers at one of the two ends up to 5 cm. Determine the peel adhesion strength on a suitable machine having rate of travers of 5 cm per minute.

F-5 CALCULATION

The formula for calculating adhesion strength is:

$$\text{Adhesion Strength} = \frac{F}{W}$$

Where,

F = Force required to separate the bonded surfaces (in Newtons, N).
W = Width of the bonded area (in millimeters or centimeters).

ANNEX G
(*Table* 3, *Sl No*. vii)

METHOD OF TEST FOR 'STRIKE THROUGH' AFTER BOILING IN SOAP SODA SOLUTION

G-1 PRINCIPLE

Method of test for 'Strike Through' after boiling in soap-soda solution is to assess the penetration or migration of residual impurities (like oils, waxes, or finishes) to the fabric surface after simulated scouring. The fabric is first boiled in a standardized soap-soda solution, then dried and placed on a white blotting paper or absorbent surface. If any residues strike through and stain the blotting paper, it indicates incomplete removal of impurities. This test helps evaluate the effectiveness of scouring and the fabric's cleanliness.

G-2 REAGENTS

G-2.1 Soap-Soda

G-2.2 Distilled Water

G-3 PROCEDURE

The interlining fabric measuring 15 cm x 15 cm shall be laminated with polyester-cotton blended fabric in the manner described in Annex F and shall be boiled for 1 h in 0.5 percent soap and 0.2 percent soda solution. The fabric shall then be washed thoroughly with distilled water and dried at room temperature. The specimen shall then be examined for any "Strike through" of polyethylene resin on the polyester-cotton blended fabric at the outer surface.