DIRECTORATE GENERAL, CRPF
Block No.1 CGO Complex, Lodhi Road, New Delhi-03
(Bharat Sarkar/Grih Mantralaya)
(Tele-011-24360155/FAX-011-24360155)

No.L.VII.08/2015-19-Prov DA 5 (Part I) Dated, the 27 /09/2019

To

The DsG/Directors: AR (Through LOAR), BSF,CISF, ITBP, NSG, SSB, NIA and IB,

Subject: - Revised QRs/Specification and Trial Directive of Full Body Protector for Male.

Sir,

In pursuance of directions issued vide Deputy Secretary (Prov) MHA, PM Division /Prov.I New Delhi letter No.F/No. 11012/02/2009-Fin. I/Prov.I/17 dated 2/1/2018 and MHA UO No. IV.24011/05/2015-Prov. I-474 dated 20/6/2018, DG/CRPF has approved the revision of QRs/Specification and Trial Directive of Full Body Protector for male personnel in place of MHA's earlier approved QRs/Spec. and TDs of subject item, vide his letter No.L.VII.54/2010-12-Prov.R dated 13/11/2013.

2. Henceforth, all the CAPFs/NIA and IB should procure and trial evaluate the subject items, required by them, strictly as per the laid down QRs and TDs and all CAPFs will be accountable for correctness of the QRs and TDs of Full Body Protector for male.

Encl. A/Above.

27/9/19

(R.K.Thakur)
DIG (Prov) Dte

No.L.VII.08/2015-19-Prov DA 5 (Part I) Dated, the /09/2019

Copy to : -

a. The US (Prov.I) Desk, PM Division, 26, Jaisalmer House, Man Singh Road, New Delhi.
b. The SO (IT) MHA- with the request to host the revised QRs/Specifications and TDs of Full body Protector (Male) on official website of MHA (under the page of organizational setup, Police Modernisation Division – Protective Gears Equipments) and soft copy is being sent through email.
c. DG, BPR&D near SSB Building, NH 8 Palam Mahipalpur, New Delhi 110037
d. DDG (Procurement) MHA.

(R.K.Thakur)
DIG (Prov) Dte

N.O.O.

01. DIG (IT) CRPF Dte Genl New Delhi (through mail)a/w soft copy of the approved addendum of the QRs/TDs for hosting the same in CRPF website at appropriate place please. Encl. A/Above.
02. DA GeM for getting it upload on GeM portal.

APPENDIX - "A"

QUALITATIVE REQUIREMENTS (QRs)/ SPECIFICATION OF FULL BODY PROTECTOR(Male)

01. Nomenclature:- Full Body Protector (Male)

It comprises of Chest protector, Shoulder Pad, Upper Arm guard, Elbow & Fore Arm guard, Thigh/ Pelvic guard, Groin guard and Shin guard.

02. Colour

Fabric and shield of required colour and required plain/ disruptive/ camouflage pattern as agreed to between the manufacturer and the user.

03. Weight

The overall weight of full body protector shall be $\leq$ 6.5 kg.

04. Life

06 Years.

05. Size:- Three sizes namely Small, Medium and Large.

5.1 Reference Size: Based on statistical data and based on ergonomics, dimensions for Small, Medium and Large Size of body protector have been arrived to as given in Appendix- B.

5.2 Sizes of components of Body Protector for Male: Medium size of components of body protector is taken as reference size for Male. Small size shall be 10% smaller than the reference size and large size shall be 10% larger than the reference size.

06. Dimensions of Full Body Protector

Components of Full Body Protector for Male should meet to the dimensional requirements of the size of the Full body protector given in Appendix-B. Tolerances for all the measurements shall be ± 5%.

07. Material: .

7.1.1 Type of Fabric – The woven and knitted fabric should be made of cotton fiber. The fiber shall be identified as 'cotton' in accordance with IS 667: 1981.

7.1.2 a) Mass of Outer and Inner woven fabric shall be 230 ±5% g/ m² when tested in accordance with IS 1964:2001.

b) Mass of cotton knitted neck fabric shall be 150 ±5% g/ m².

7.1.3 Tear Strength – Tear Strength of woven fabric Mass: 230 ± 5% shall be 25 N (minimum) for Warp and 20 N (minimum) for weft when tested in accordance with IS 6489 (Part-1).

7.1.4 Tensile Strength – Tensile Strength of woven fabric Mass: 230 ± 5% shall be 770 N (minimum) for Warp and 450 N (minimum) for weft when tested in accordance with IS 1969 (Part-1).

Bursting strength of knitted fabric of GSM 150 ± 5% shall be minimum 240 KPa.

7.1.5 Flame Retardency – Outer fabric and fabric for neck protection/ collar shall pass the requirements when tested for Flame Retardance by Surface ignition and Edge ignition in accordance with Procedure A and Procedure B of IS 15758 (Part-4) respectively.

Requirements for Surface Ignition

a) No specimen shall give hole formation.

b) No specimen shall give flaming to the top or either side edge.

c) No specimen shall melt or give flaming or molten debris.

d) The mean value of after-flame time shall be ≤ 2 s.

e) The mean value of after-glow time shall be ≤ 2 s.

Requirements for Edge Ignition:

a) No specimen shall give flaming to the top or either side edge.

b) No specimen shall melt or give flaming or molten debris.

c) The mean value of after – flame time shall be ≤ 2 s.

d) The mean value of after – glow time shall be ≤ 2 s.

7.1.6 Flame Retardancy after washing – Both fabrics shall be washed for 30 washes in accordance with IS 15370 and shall be tested for Flame Retardancy as per clause 7.1.5 and meet the requirements as mentioned in clause 7.1.5.

7.1.7 Bacterial Filtration Efficiency – Inner Fabric shall have Bacterial Filtration Efficiency.

7.1.8 Resistance to Chemicals – Outer fabric and neck fabric shall be resistant to chemical when tested in accordance with IS 15758 (Part-3)2007 for

- 10 percent hydrochloric acid solution.

- 10 percent sulfuric acid solution.
- Kerosene, petrol, diesel and Molotov cocktail liquid.

When tested in accordance to IS 15758 (Part-3), the penetration index shall be ≤ 1 and Repellency Index shall be ≥ 95%.

7.2 Thread – Polyester sewing thread should be used.

7.3 Protector Shield – Plastic/ Composites/ Metal/ any other suitable material.

7.4 Full Body protector shall withstand stab and impact requirements given at Para 9.1 Table-1 when tested in accordance with the corresponding test methods prescribed in VPAM KDIW 2004: 18/05/2011.

7.5 Protective & Comfort Padding – Padding may be made of suitable material in single layer or made in combination of layers of foam, rubber, plastic or any other suitable material.

08. Construction

8.1 Number of stitches – Stitches shall be made of double thread. A minimum of 04 stitches per 2.5 cm shall be applied for all components of Full Body Protector.

8.2 Construction of Pads – Single or multilayer.

8.2.1 Multilayer of pads shall be inter- switchable together so as to remain in place and shall not slip. Outer side of pads shall be covered with outer fabric which is flame retardant. Inner side of pads (wearer side) shall be covered with inner fabric which is sweat absorbing and resistant to microbes.

8.2.3 Material coming into contact with the wearer's skin shall not be the type known to cause skin irritation or disease, and shall not undergo significant loss of strength, flexibility, or other physical change as a result of contact with perspiration or body oil.

8.2.4 Any material used in the construction of body protector shall not be adversely affected by ordinary household soap and water, mild household detergent, or cleaners.

09. Mechanical Properties

9.1 Full Body Protector shall meet the requirements give below in Table 1 when tested in accordance with VPAM KDIW 2004 Edition 18/05/2011.

Table - 1

Requirements of Mechanical Properties for Chest Protector and Back Protector

Sl. No.	Requirement	Strike energy/ Joules	Angle of Incidence (degrees)	Permitted value, mm	Reference Clause/ Annex/ IS
1	Stab Resistance	65	90 25	<20(Penetration depth)	VPAM KDIW 2004:18/05/2011 Class K-3 Section - 5
2	Impact Resistance	100	90	<20(Deformation depth)	VPAM KDIW 2004:18/05/2011 Class W-5 Section - 8

9.2 **Flame Retardancy** – Full Body Protector shall meet the requirements when tested in accordance with IS 15758 (Part 4) for Surface ignition and Edge ignition and shall meet requirements as mentioned in para 7.1.5. and 7.1.6.

9.3 **Resistance to chemicals** – Full Body Protector shall be resistant to chemicals when tested in accordance with IS- 15758(Part-3) 2007 and shall meet requirements as mentioned in para 7.1.8.

9.4 **Temperature** – Full Body Protector should be able to with stand when exposed to temperature of -20°C for 05 hours and 55° C (± 2° C) for 05 hours separately. There should not be any deformation or cracks after the exposure.

10. Ergonomic Requirements

10.1 All the components of Full Body Protector shall be flexible for optimum movement, fit comfortable and suitable to human body parts shape. Body protector shall be designed for maximum wearing comfort and easy maneuverability.

10.2 Upper Arm Protector Shield shall be flexible for easy to wear. Elbow Protector Shield shall be attached with forearm Protector Shield.

10.3 Groin Protection Padding must be segmented and shall be attached to Chest protector Shield. The protection attachment shall cover groin area from the anticipated projectiles and shall be comfortable when sitting.

10.4 Thigh guard & pelvic guard shall be attached and flexible & easy to wear/ movement. It must be supported by kamarbandh to avoid slippage while running and during movement.

11. Hook & Loop Fasteners

11.1 The components of the fasteners for securing attachments to the Full Body Protector shall not reduce the degree of protection afforded to the wearer by the protective padding or cushioning material of the Full Body Protector.

11.2 Hook and Loop fasteners (Velcro) shall be adjustable, durable and shall be attached to elastic strips.

11.3 Hook and Loop Fasteners shall withstand to 300 cycles of opening and closure operations.

11.4 Shear strength of Hook & Loop Fasteners: Minimum- Lengthwise – 750, Widthwise – 750 as per Annex-E of IS 8156: 1994

11.5 Endurance test of hook and loop fasteners (after 5000 cycles of closing and opening operations). The shear strength shall not decrease by more than 10% of their original value as per Annexure -G of IS 8156: 1994.

Mamta Singh
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Member-II

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V. K. Yadav
DC, CISF
Member-VII

Satish Chandra
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Sci. D, DIPAS
Member-XIII

Dr. M. S. Parmar
Jt. Dir. NITRA
Member-XII

Approved / Not approved

5

DG, CRPF

Appendix-B

Dimensional Requirements for components of Full Body Protector (Male)

Table B-1

Dimension of Chest Protector Shield and padding:-

Sl.No	Description	Male (Medium size)	
		Length (cm)	Width (cm)
i.	Front Protector shield (Ref. Fig.01)	40	39
ii.	Back Protector shield (Ref. Fig. 02)	42	31
iii.	Front padding with Segmented Groin Pad (Ref. Fig.03)	60	43
iv.	Back padding (Ref. Fig. 04)	50	55
v.	Neck Pad	30	92.5

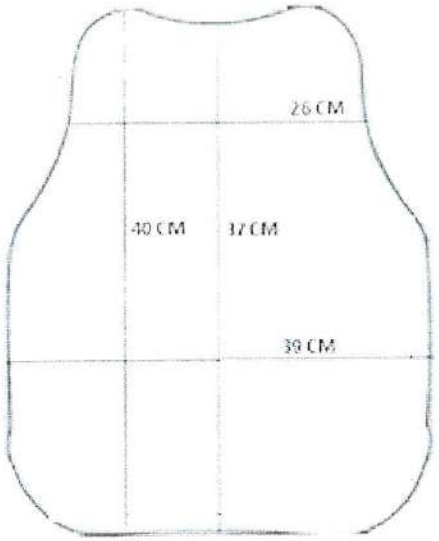

Fig.1– FRONT PROTECTOR SHIELD

Fig.2– BACK PROTECTOR SHIELD

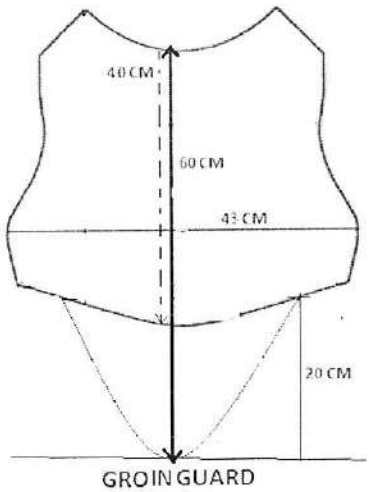

Fig.3– FRONT PADDING WITH SEGMENTED GROIN PAD

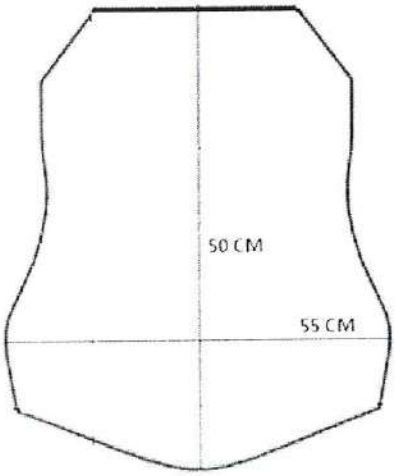

Fig.4– BACK PADDING

Table B-2

Dimensions of Elbow and Fore Arm Protector Shield and Padding:

Sl.No	Description	Male (Medium size)	
		Length (cm)	Width (cm)
i.	Elbow shield(Ref. Fig. 05)	13	18
ii.	Forearm guard shield outer (Ref. Fig.06)	17	16
iii.	Forearm guard shield Inner (Ref. Fig.07)	17	9.5
iv.	Elbow & Fore Arm shield Padding (Ref. Fig.08)	37 (overall)	27 (overall)

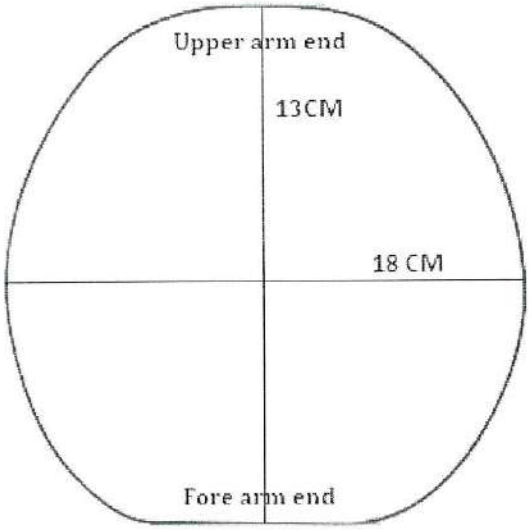

Fig.5 ELBOW SHIELD

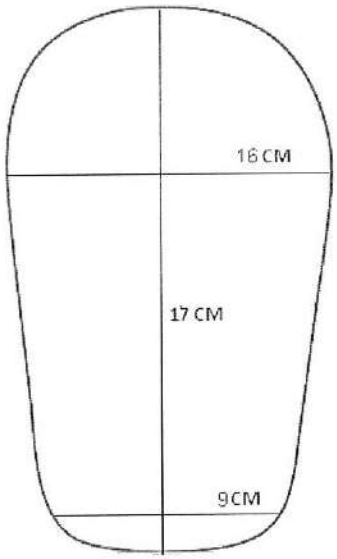

Fig. 6 FOREARM GUARD SHIELD OUTER

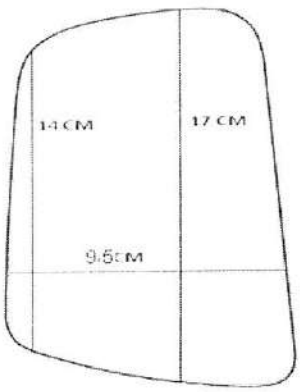

Fig.7 FOREARM GUARD SHIELD INNER

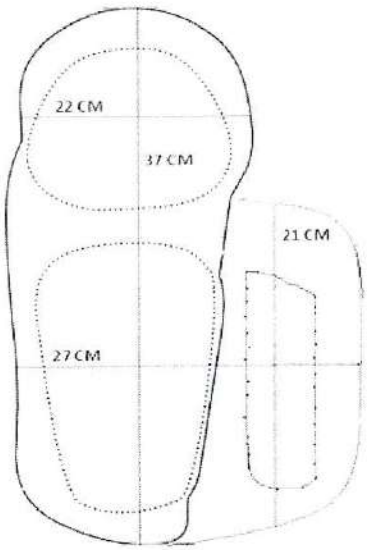

Fig.8 ELBOW AND FORE ARM GUARD INNER PADDING

Table B-3

Dimensions of Shoulder Protector Shield and padding:

Sl.No	Description	Male (Medium size)	
		Length (cm)	Width (cm)
i.	Shoulder Protector Shield (Ref. Fig.09)	11	19
ii.	Shoulder Protector Shield Padding(Ref. Fig.10)	13	23

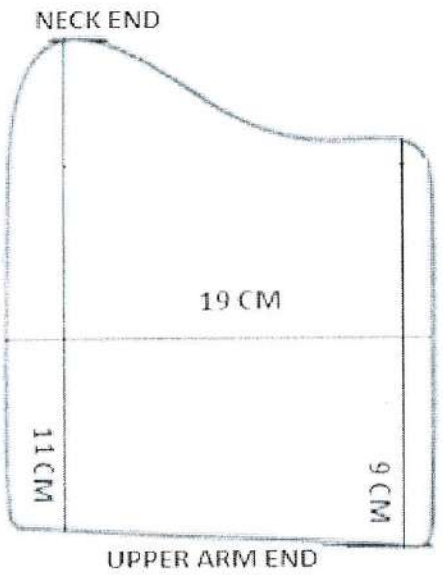

Fig.9 SHOULDER PROTECTOR SHIELD

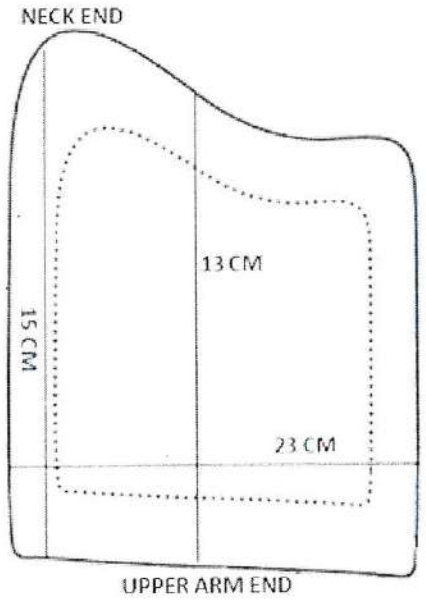

Fig.10 SHOULDER PROTECTOR SHIELD PADDING

Table B-4

Dimensions of upper Arm Protector Shield and padding:

Sl.No	Description	Male (Medium size)	
		Length (cm)	Width (cm)
i.	Upper Arm Protector Shield(Ref. Fig.11)	17	22
ii.	Upper Arm Protector Shield Padding (Ref. Fig.12)	23	24

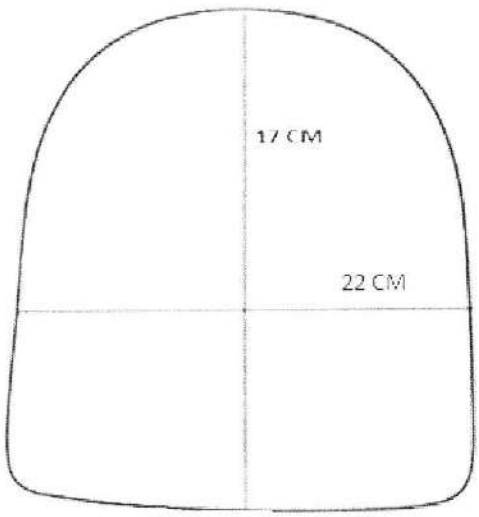

Fig.11 UPPER ARM PROTECTOR SHIELD

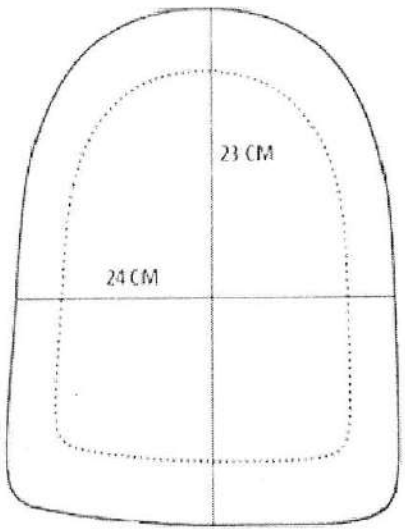

Fig.12 UPPER ARM PROTECTOR SHIELD PADDING

Table B-5

Dimensions of Thigh and Pelvic Protector Shield and Padding:

Sl.No	Description	Male (Medium)	
		Length (cm)	Width (cm)
i.	Thigh and Pelvic Protector Shield(Ref. Fig. 13)	25	31
ii.	Thigh and Pelvic Protector Shield Padding (Ref. Fig.14)	50	85 to 110

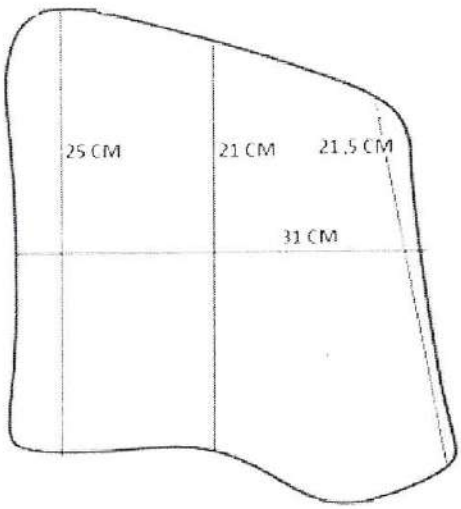

Fig.13 THIGH AND PELVIC PROTECTOR SHIED

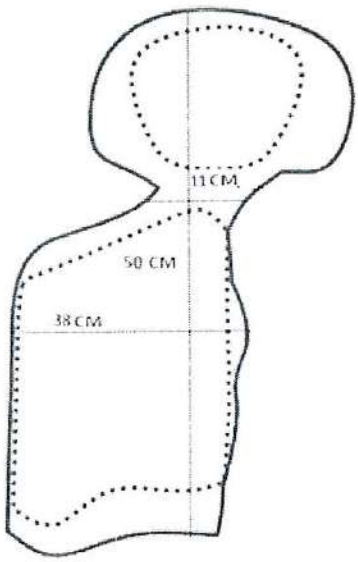

Fig.14 THIGH AND PELVIC PROTECTOR SHIELD PADDING

Table B-6

Dimensions of Shin Protector Shield and Padding:

Sl.No	Description	Male (Medium size)	
		Length (cm)	Width (cm)
i.	Knee Protector Shield (from outside)(Ref. Fig.15)	14	25
ii.	Shin Protector Shield (from outside)(Ref. Fig.16)	26	27
iii.	Shin Protector Padding (Ref. Fig.17)	55	27

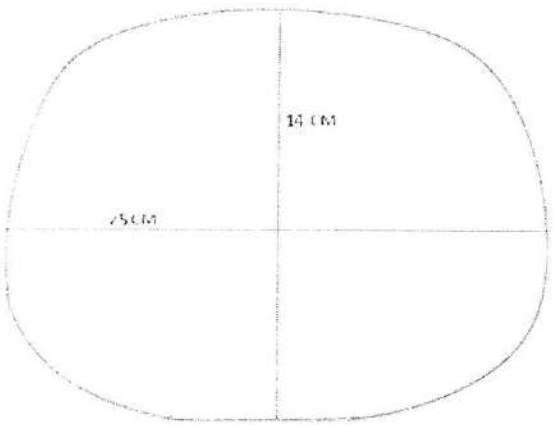

Fig.15 KNEE PROTECTOR SHIELD (FROM OUTSIDE)

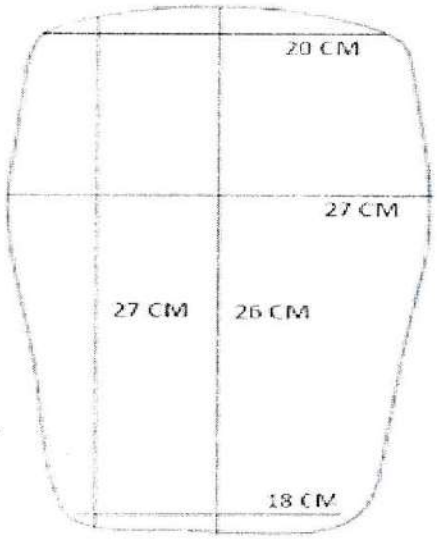

Fig.16 SHIN PROTECTOR SHIELD (FROM OUTSIDE)

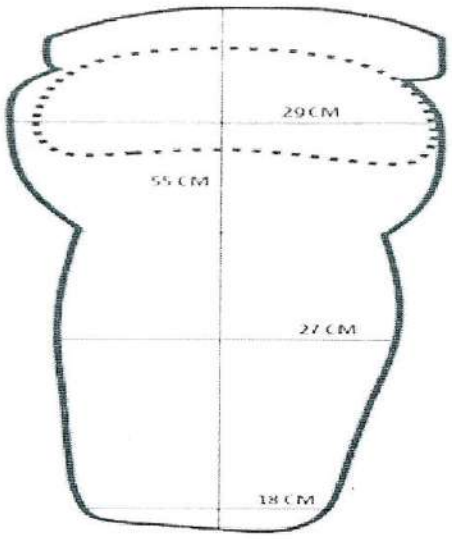

Fig.17 SHIN PROTECTOR PADDING

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V. K. Yadav
DC, CISF
Member-VII

Satish Chandra
DC, BSF
Member-VI

T. A. Singh
DC, ITBP
Member-V

Neeraj Shahi,AC Mod
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Member-IV

Namrata Kohli
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AC, SSB
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Dr. M. S. Parmar
Jt. Dir. NITRA
Member-XII

APPENDIX –'C'

TRIAL DIRECTIVES (TDs) OF FULL BODY PROTECTOR(Male)

TRIAL PHILOSOPHY

The purpose of the Full body protector is to protect the wearer from the various types of missiles that are thrown at him by the rioters most commonly. Such missiles range from stones or similar pieces of bricks/concrete, pieces of glass and glass bottles, acid bulbs/bottles containing sulphuric acid used in storage batteries and hydrochloric acid used for toilet cleaning purposes and burning rags/ bicycle tyres and Molotov Cocktails/ firebombs made basically by petrol/ diesel/ kerosene. The rioters may also attack with various types of wooden/ bamboo sticks and bicycle chains that would not be thrown but would be wielded by hands on coming close to the policemen. Therefore, the Full body protector must be able to provide him adequate protection from all above threats.

TRIAL METHODOLOGY

01. PHYSICAL TEST

The dimensions of Full Body Protector will be measured physically by board of officers as per figures mentioned in Appendix –B in QRs.

02. TESTS AS MENTIONED IN QRs FOR EACH TYPE OF RESISTANCE

To withstand various threats enumerated in trial philosophy, following tests will be Conducted:

2.1. **Anti Stab** – Full Body Protector shall meet the requirements given below in Table I when tested in accordance with VPAM KDIW 2004 Edition 18/05/2011, level K-3 Section 5.

2.2. **Anti Impact** – Full Body Protector shall meet the requirements given below in Table I when tested in accordance with VPAM KDIW 2004 Edition 18/05/2011 Class W-5 section-8.

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Table – 1

Requirements of Mechanical Properties for Chest Protector and Back Protector

Sl. No.	Requirement	Strike energy/ Joules	Angle of Incidence (degrees)	Permitted value, mm	Reference Clause/ Annex/ IS
1	Stab Resistance	65	90 25	<20 (Penetration depth)	VPAM KDIW 2004:18/05/2011 Class K-3 Section - 5
2	Impact Resistance	100	90	<20 (Deformation depth)	VPAM KDIW 2004:18/05/2011 Class W-5 Section - 8

2.3. Flame Retardancey test - Full Body Protector shall meet the requirements of Flame Retardancy test for Outer fabric and fabric for neck protection/ collar when tested for 'flame retardance' by Surface ignition and Edge ignition in accordance with Procedure A and Procedure B of IS 15758 (Part-4) respectively.

Requirements for Surface Ignition

a) No specimen shall give hole formation.

b) No specimen shall give flaming to the top or either side edge.

c) No specimen shall melt or give flaming or molten debris

d) The mean value of after-flame time shall be ≤ 2 s.

e) The mean value of after-glow time shall be ≤ 2 s.

Requirements for Edge Ignition:

a) No specimen shall give flaming to the top or either side edge.

b) No specimen shall melt or give flaming or molten debris

c) The mean value of after – flame time shall be ≤ 2 s.

d) The mean value of after – glow time shall be ≤ 2 s.

2.4. Resistance to Chemicals -.

Full Body Protector shall be resistant to chemicals for Outer fabric and neck fabric when tested in accordance with IS 15758 (Part-3)2007 for

- 10 percent hydrochloric acid solution.
- 10 percent sulfuric acid solution.
- Kerosene, petrol, diesel and Molotov cocktail liquid.

When tested in accordance to IS 15758 (Part-3), the penetration index shall be ≤ 1 and Repellency Index shall be $\geq 95\%$.

Note:- Vendor shall provide 2 meter of each type of extra fabric (Woven and Knitted) used in the body protector for testing purposes.

2.5 Hook & Loop Fasteners test-

2.5.1 Strength of hook & Loop fasteners: Shear strength of hook & Loop fasteners minimum lengthwise-750, widthwise-750 as per Annx.-E of IS 8156:1994

2.5.2 Endurance test of hook and loop fasteners: Endurance test of hook and loop fasteners (after 5000 cycles of closing and opening operations). The shear strength shall not decrease by more than 10% of their original value as per Annx.-G of IS 8156:1994.

Note:- Vendor shall provide 5 meter of same Hook and Loop fastener which is used in the body protector sample for testing purposes.

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03. Certification

a) Self certification by the manufacturer that all parts of FBP are made of same material.

b) Various tests mentioned in the trial directives can be conducted at one of the following laboratories.

i. NITRA, Ghaziabad(UP)
ii. ATIRA, Ahmadabad(Gujarat)
iii. DMSRDE/DRDO, Kanpur(UP)
iv. GFSU, Gujarat
v. CFSL, Labs
vi. CIPET Labs
vii. Any other NABL approved laboratory having scope for Parameters mentioned in QRs.

Mamta Singh
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D. K. Choudhary
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Member-II

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Member-XII

Approved / Not approved

DG, CRPF 3/4