



WORLD KARATE FEDERATION

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ANNEXES



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ANNEX I – KARATE MITTS

1. Ergonomics

Contact area adapted to sports competition

In traditional karate, the basic form for the direct punch (tsuki) consists of aligning the longitudinal axis of the first and second metacarpus with the longitudinal axis of the forearm (see figure 1). This form is justified, as the first two metacarpal-phalanx-joints, called kentos in Japanese, are used for impact. This position of the wrist allows good transmission of force during impact.

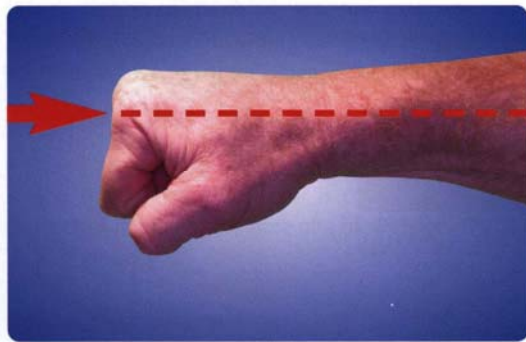


Fig. 1: tsuki form in traditional karate.

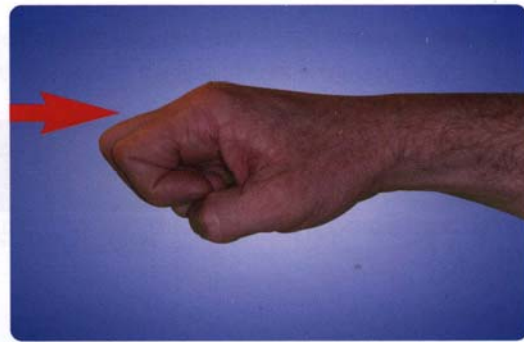


Fig. 2: tsuki form in karate sports.

In competitive sparring karate, to favor release and speed, the wrist is less closed than in the traditional form (see figure 2). The form of the karate mitt has therefore been adapted to best suit this hand form and present a maximum thickness on the main impact surface (see figures 3 and 4).



Fig. 3: karate mitt form adapted to karate sports.



Fig. 4: sectional view of shock absorption layer.



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Maintenance of the contact area during a frontal blow

The protective cuff for the wrist and the thumb protection must be sufficiently solid to prevent the mitt from slipping out of position during a frontal blow. Figure 5 shows an impact with the cuff and the thumb protection correctly used. Figure 6, performed with the cuff not closed and without the thumb protection, shows the effect of a blow if these elements did not succeed in their role of holding the karate mitt in place: the bunching means that the shock absorption layer does not correctly cover the area of the blow.

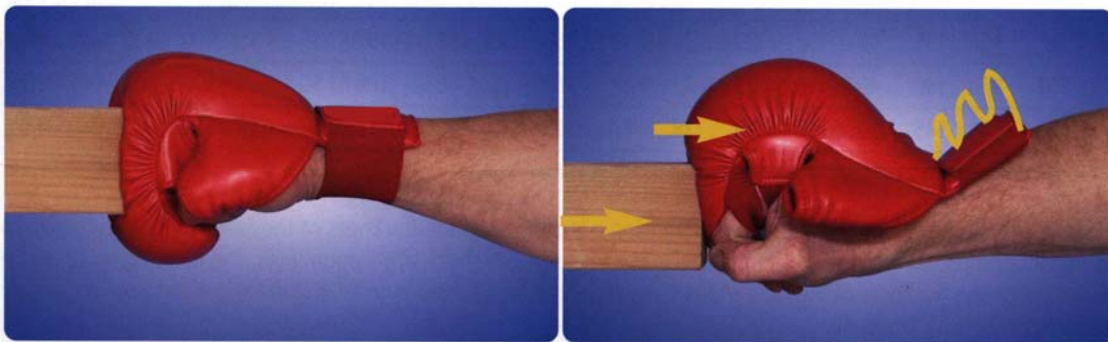


Fig. 5: impact with a good security.

Fig.6: impact with high injury risk.

Open inner side

To allow the use of open hand parries specific to Karate, the karate mitt is open on the inner side. The system for holding the fingers and the suppleness of the foam must permit comfort in the different degrees of opening or closing the hand (see figure 7a, 7b and 7c). The thumb extremity is not fixed at mitt to allow the hand opening.

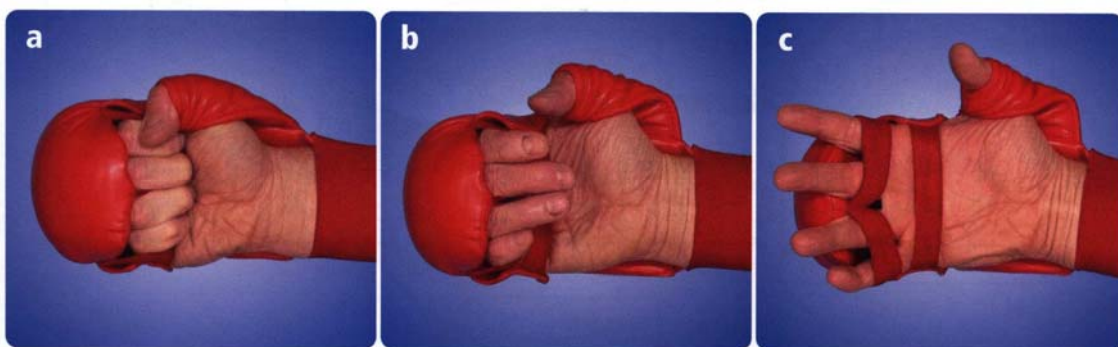


Fig. 7: inside of mitt compatible with the closed hand (a), partially closed hand (b) or open hand (c) position.



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1. Size Shock absorption layer (Foam)

Dimensions (in millimetres) and angles (in degrees)

	a	b	c	c1	c2	c3	c4	c5	d	d1	d2	d3	d4	e	A°	B°
XS	91	86	125	46	48	31	34	12	154	74	80	99	55	55	100°	120°
S	95	88	130	47	50	33	35	12	157	76	81	102	55	55	100°	120°
M	99	90	135	48	52	35	36	12	160	78	82	105	55	55	100°	120°
L	103	92	140	49	54	37	37	12	163	80	83	108	55	55	100°	120°
XL	107	94	145	50	56	39	38	12	166	82	84	111	55	55	100°	120°

(*) Allowable range for dimensions: 3 millimeters more or less.

Details for thickness dimensions: The dimension e is defined as the thickness of the foam at the main area of impact. It must correspond to the maximum thickness of the shock absorption layer. The dimensions c1 and e which define the thickness of the layer of foam are the same for all sizes in order that the shock absorption capacity be identical in XS, S, M, L and XL.

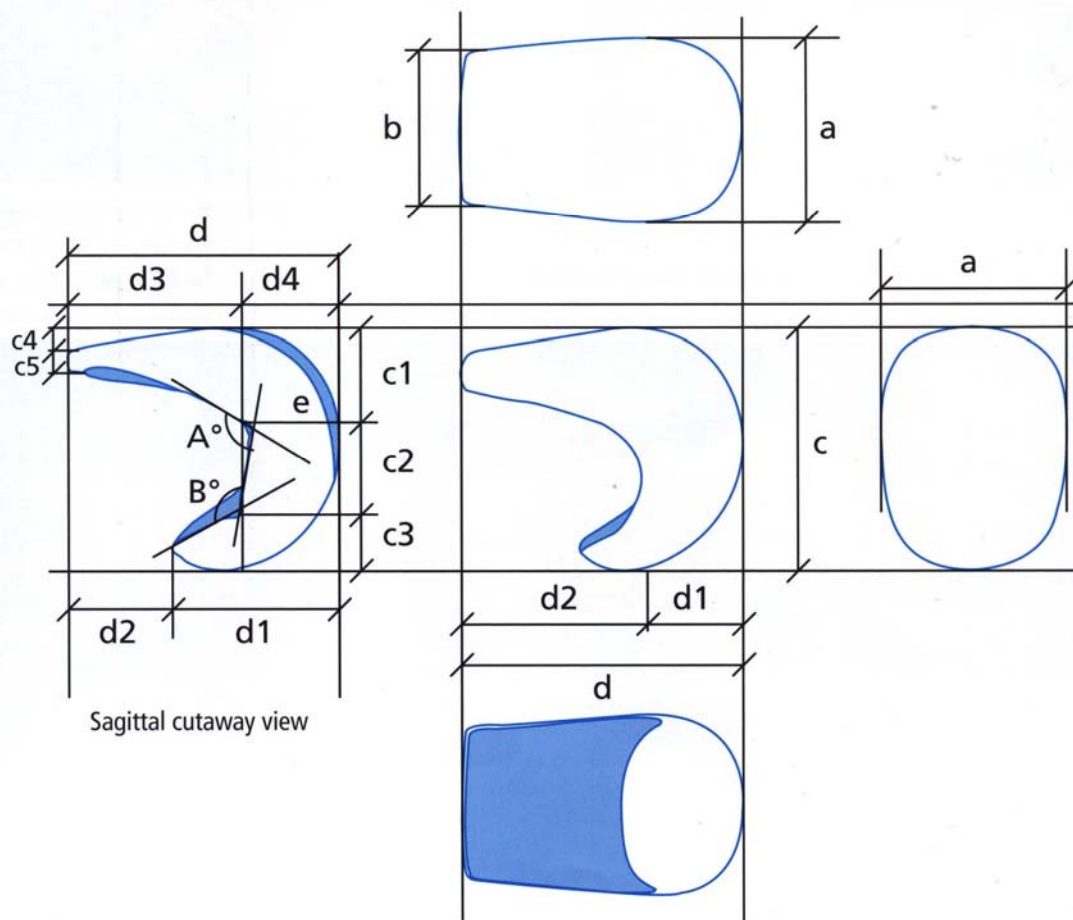


Fig. 8: karate mitt dimensions (foam).

Polyurethane (foam)

Density: (UNE-EN ISO 845:1996) between 94 – 96 kg/m³

Compression load: (UNE-EN ISO 3386-1:1998) between 166 – 168 Newton

Cost due to compression: (UNE-EN ISO 3386-1:1998) between 59 – 61 Kilopascals



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ANNEX II – FOOT PROTECTOR

1. Ergonomics

Protection that does not encounter force and movement

- **Shape adapted to the top of the foot**

Three grooves cut across the block cushioning the top of the foot dividing the block into 4 transversal rectangular chunks (see figure 9).

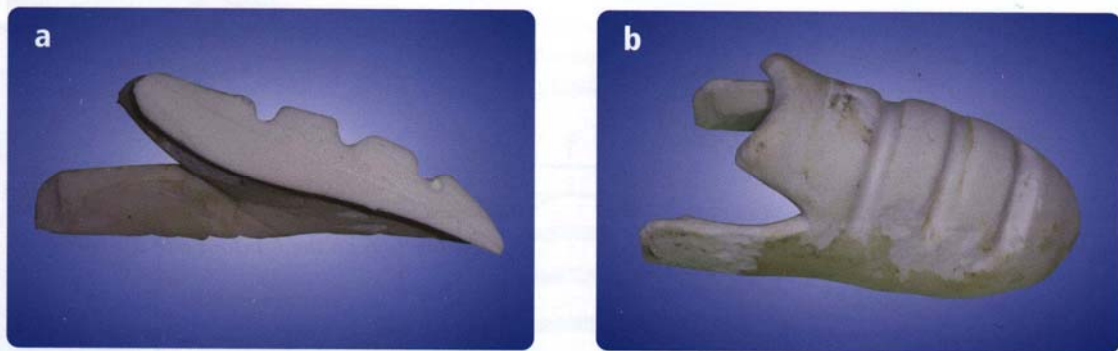


Fig. 9: top foot cushioning block divided into transversal chunks: cross section (a) and view from above (b).

This conformation allows the protection to be distorted without affecting the mid and forefoot during dorsiflexion, which occurs extremely often in sport karate (see figure 10).

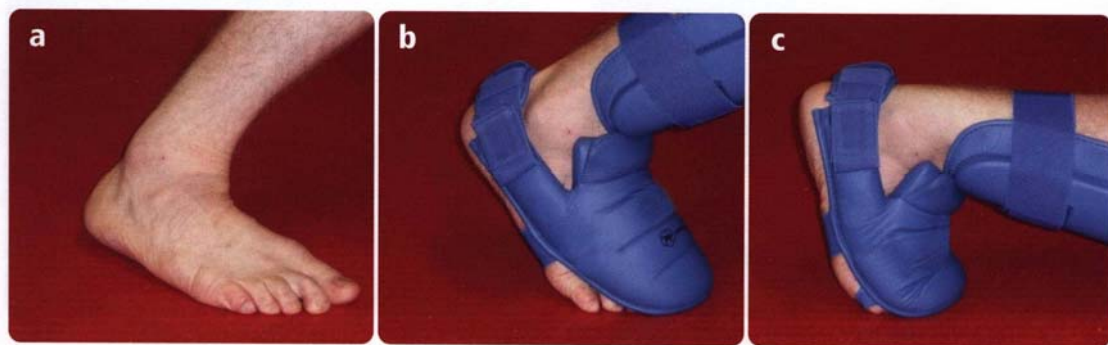


Fig. 10: “traditional” heel pressure on ground (a) and lifted heel pressure (b and c): the top of the protection bends without getting in the way of the foot during dorsiflexion, whether slight (b) or significant (c).



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- **Shape adapted to the underside of the foot**

The underside of the foot protector is designed so that most of the sole of the foot touches the ground directly (see figure 11). The elastic band, which might come into contact with the ground, must be made out of a non-slip material. The undersurface of the toes is not covered; they are therefore in direct contact with the ground when pressure is applied.

- **Shape adapted to the front tip of the foot**

The length of the protection underside must be designed to protect toes, but must not be too long to prevent the front tip of the protection coming into excessive contact with the ground when pressing on the tip of the foot (see figure 12).



Fig. 11: seen from below.



Fig.12: pressing on the forefoot and the toes.

Wear resistance

Sliding movements (Yori Ashi type) occur frequently in sport karate: this causes regular rubbing between the foot protection and the tatami mat, which can cause premature wear on protection. It has been observed that the most worn part is that surrounding the big toe, due to friction resulting from forward propulsion in particular (see figure 13). This area therefore needs to be reinforced with more resistant material (see figure 14).



Fig. 13: rubbing on the ground during forward propulsion.



Figure 14: close-up of the reinforced area.



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2. Size Cushioning block (foam)

Dimensions (in millimetres)

	a	a1	a2	b	c	d	e	f	g	h	h1	h2	A	B	C
S	203	164	39	35	20	44	15	119	79	80	46	34	15	25	10
M	223	180	43	45	22	46	15	123	83	85	49	36	15	25	10
L	233	188	45	47	24	48	15	127	87	90	52	38	15	35	10
XL	256	195	61	48	26	50	15	131	91	95	55	40	15	35	10

(*) Allowable range for dimensions: 3 millimeters more or less.

Further information on thickness dimensions: Dimensions A, B, and C, which define the thickness of the foam block, are the same for all sizes so that the cushioning capacity is identical for S, M, L and XL. Shaded part: the thin layer of foam glued on the cushioning block enhances the finishing by preventing that the envelopment of the entire protection collapses at the grooves.

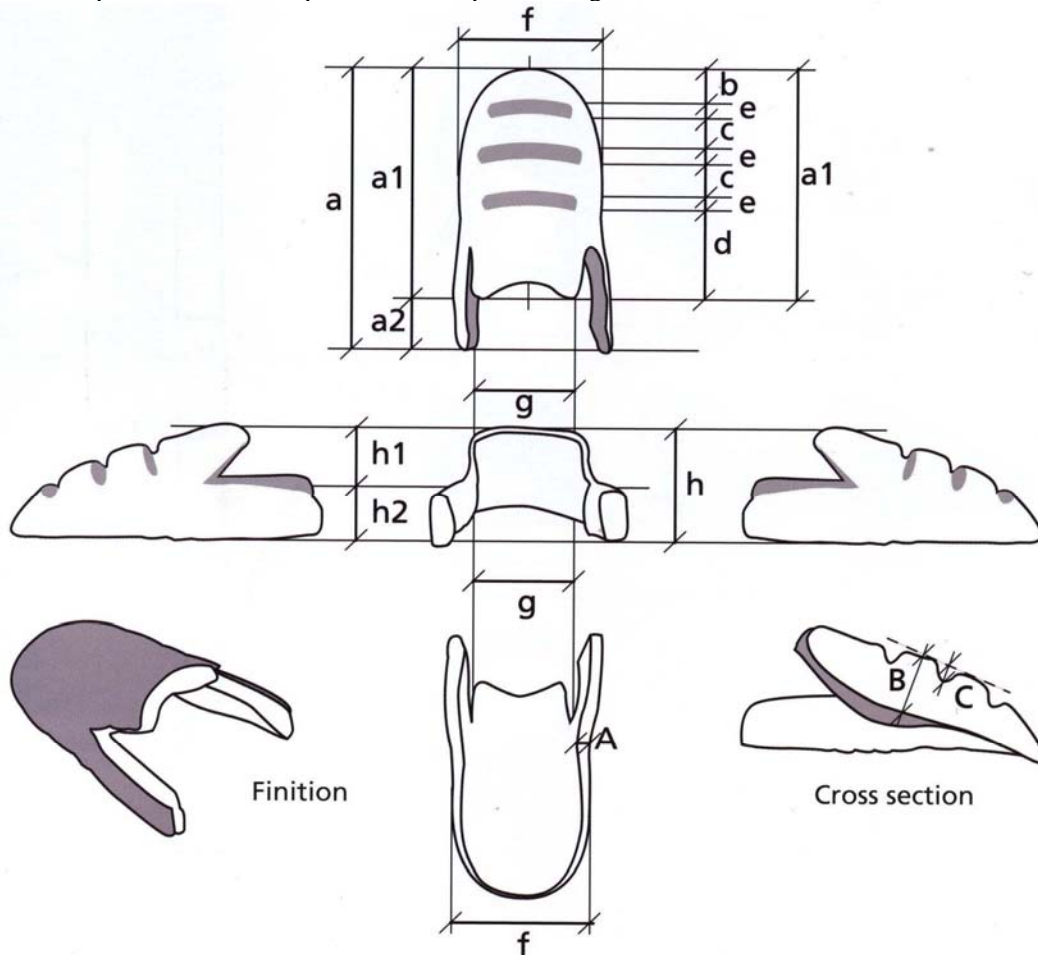


Fig. 15: foot protector dimensions.

Polyurethane (foam)

Density: (UNE-EN ISO 845:1996) between 91 – 93 kg/m³

Compression load: (UNE-EN ISO 3386-1:1998) between 160 – 170 Newton

Cost due to compression: (UNE-EN ISO 3386-1:1998) between 32 – 34 Kilopascals



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ANNEX III– SHIN-PAD

1. Ergonomics

Shape adapted to the leg

The cushioning block is trough shaped (see figure 17) to cover the front and two sides (inside and outside) of the shin. This trough shape must also be wider at the top and narrower at the base to suit the leg's tapered shape.

Connection with the foot protector

It must be possible to fit the shin protector and the foot protector together at the front of the ankle. This is achieved using a Velcro strap with a double tongue, which must be solid but not get in the way of ankle joint (see figure 18).



Fig. 16 cushioning block.



Figure 17: connecting the shin and foot protector.



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2. Size Cushioning block (foam)

Dimensions (in millimetres)

	a	b	c	d	e	f	k	n	o	p
S	270	165	125	30	15	50	295	35	20	50
M	295	180	140	30	15	50	320	35	20	50
L	310	180	140	30	15	50	335	35	20	50
XL	320	190	150	30	15	50	340	35	20	50

About the size of the thickness: e and d dimensions, which define the thickness of the cushioning block, are the same for all sizes for an identical cushioning capacity for S, M, L and XL size. V = Sticking surface Velcro[®] surface.

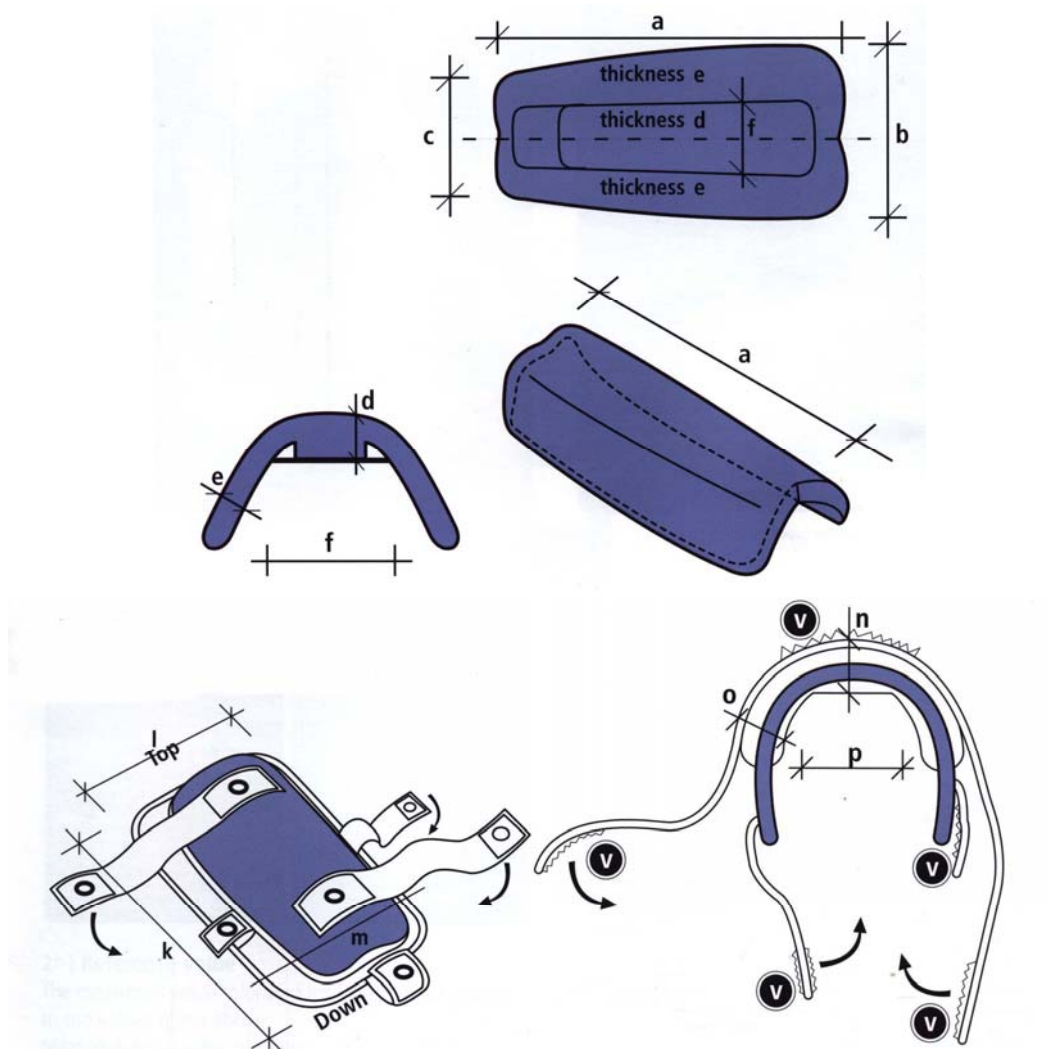


Fig. 18: shin pad dimensions.

Polyurethane (foam)

Density: (UNE-EN ISO 845:1996) between 78 – 80 kg/m³

Compression load: (UNE-EN ISO 3386-1:1998) between 550 – 580 Newton

Cost due to compression: (UNE-EN ISO 3386-1:1998) between 220 – 240 Kilopascals