

The Committee for Conformity Assessment of Accreditation and Certification  
on Functional and Technical Textiles  
Specified Requirements of Protective Gloves against Mechanical Risks  
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### 1.Scope :

This standard specifies requirements, test methods and marking for protective gloves against the mechanical risks of abrasion, blade cut, tear and puncture.

### 2.Terminology :

The protective glove against mechanical risks glove that provides protection against at least on of the following mechanical risks: abrasion, blade cut and puncture

### 3.Performance specification :

Table 1 – Levels of performance

Test	Level 1	Level 2	Level 3	Level 4	Level 5
6.1 Abrasion resistance (number of cycles)	100	500	2000	8000	-
6.2 Blade cut resistance(index)	1,2	2,5	5,0	10,0	20,0
6.3 Tear resistance(N)	10	25	50	75	-
6.4 Puncture resistance(N)	20	60	100	150	-

### 4. Conditioning of samples

- Temperature  $(23\pm 2)^{\circ}\text{C}$ ;
- Relative Humidity  $(50\pm 5)\%$ .

The period of conditioning is 24 h. Tests shall preferably be performed in the above mentioned environment. If the test is performed in a different environment, it shall be started within 5 min after removal from the conditioning.

### 5. Testing Items

- 5.1 Abrasion resistance
- 5.2 Blade cut resistance
- 5.3 Tear resistance
- 5.4 Puncture resistance

## 6. Test method ( Summary ) :

### 6.1 Abrasion resistance

6.1.1 Apparatus: Refer to CNS 12915 L3233 section 6.17.5

6.1.2 Abradant: Glass Paper, Grade F2 , Grit 100(or familiar material)

#### 6.1.3 Test specimen preparing

Four test specimens shall be taken from four individual gloves of the same glove series. The diameter of each specimen is 38.0-38.5 mm.

#### 6.1.4 Test procedure

- (1) Place the ring of the specimen holder in position on the mounting plate provided on the base of the testing apparatus. Secure without tension carefully.
- (2) Ensure that the ring containing the specimen and metal insert is held firmly in the mounting plate.
- (3) Mount the test specimen holders on the top plate under a pressure of  $(9\pm 0, 2)$  kPa.
- (4) Switch on the testing machine. Begin the test and check the test specimens after 100 cycles. If there is no breakthrough continue the test until reaching 500 cycles (performance level 2). If there is no breakthrough,
- (5) If a breakthrough is found when examining the test specimens at a given performance level, the classification shall be at the preceding inferior performance level. When breakthrough occurs at less than 2 mm of the edge of one test specimen or when tearing occurs, this test specimen has to be discarded and the entire test has to be repeated.
- (6) Where the test specimen is made of several un-bonded layers, the test is performed on each layer, and the classification is based on the sum of the number of cycles.

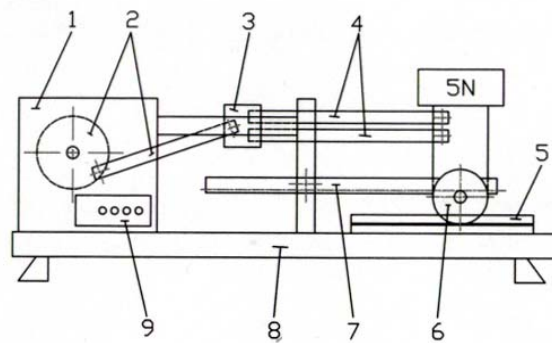
#### 6.1.5 Results and Report

Where the test specimen is made of several unbounded layers, the test is performed on each layer, and the classification is based on the worst of the number of cycles.

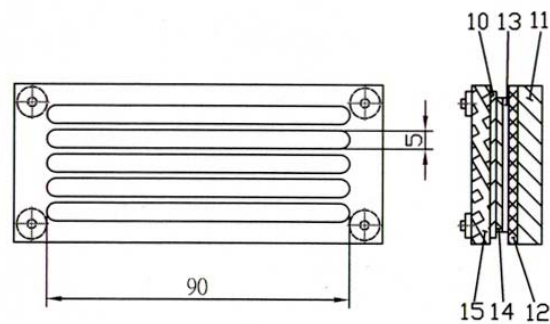
## 6.2 Blade cut resistance

### 6.2.1 Apparatus

Unit: mm



(a) Body of Mechanisms



(b) Specimen holder

Fig1. Apparatus for testing blade cut resistance of protective gloves

#### Key

1. Compartment of motor and electronic detection
2. Wheel and driving rod
3. Sliding system
4. Rods
5. Test piece device
6. Circular blade
7. Toothed rack
8. Support plate
9. Counter
10. Specimen
11. Insulated support
12. Conductive rubber
13. Aluminum foil
14. Filter paper
15. Upper part

a Alternating motion of the blade

### 6.2.2 Accessories of Apparatus

- (1) a circular blade <sup>2)</sup> with a diameter of  $(45 \pm 0, 5)$  mm, a thickness of  $(3 \pm 0, 3)$  mm and a total cutting angle of  $30^\circ$  to  $35^\circ$  (see figure 3). The blade shall be in tungsten steel with a hardness of 740 HV to 800 HV;

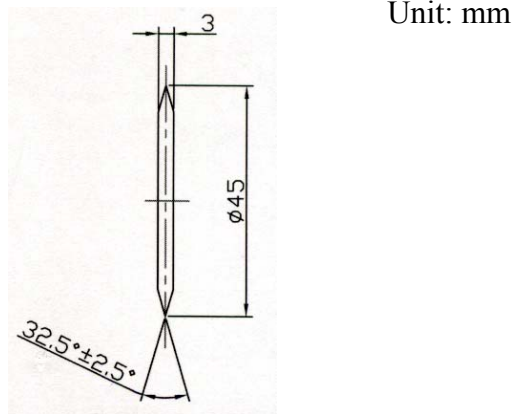


Fig2. Circular blade specifications

- (2) a support of conductive rubber (hardness  $(80 \pm 3)$  1HRD)  
 (3) Control specimen (or familiar material)

Table2. The specifications of Control specimen

Canvas	cotton spun from open end fibers
Linear mass warp and weft (tax)	161
Twist warp (t/m)	double twist S 280
Single yarn (t/m)	Z 500
Twist weft (t/m)	double twist S 280
Warp (threads per cm)	18
Weft (threads per cm)	11
Crimp warp (%)	29
Crimp weft (%)	4
Tensile strength in warp (N)	1400
Tensile strength in weft (N)	1000
Mass per unit area ( $\text{g/m}^2$ )	540
Thickness (mm)	1.2

### 6.2.3 Test specimen and Control specimen preparing

Each consists of a strip  $(60 \pm 6)$  mm wide and  $(100 \pm 10)$  mm long cut on the bias. In the case of a specimen made of several unbounded layers; the complete

specimen shall be tested with all layers together. For each glove series two test specimens shall be taken.

A strip (60±6) mm wide and (100±10) mm long of the control specimen is cut on the bias to the warp.

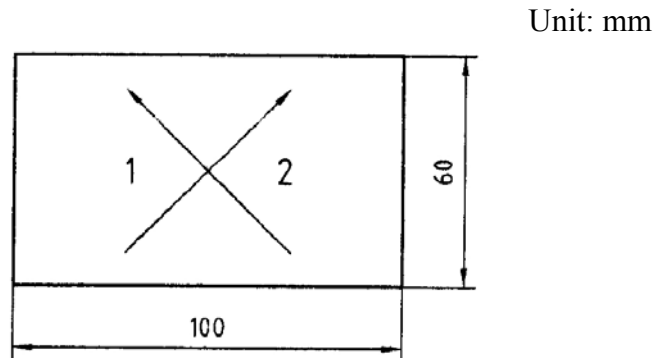


Fig3. Test specimen and Control specimen sampling

Key

- 1 Warp or longitudinal direction
- 2 Weft or transversal direction

#### 6.2.4 Test procedure

- (1) On the rubber support, place an aluminum foil of about 0.01 mm covered with a filter paper sheet of (65±5) g/m<sup>2</sup> and less than 0, 1 mm thick.
- (2) The clamping frame is positioned on the table. The arm holding the blade is lowered onto the control specimen.
- (3) Start the machine; at cut-through with the control specimen, the number of cycles (C) is recorded.
- (4) The test specimen is subjected to the same test and the number of cycles (T) is recorded.
- (5) Five tests shall be made on each test specimen according to the following sequence for each test:
  - a. Test on control specimen;
  - b. Test on test specimen;
  - c. Test on control specimen.

#### 6.2.5 Results and Report

If a result is on the limit between two performance levels, the test is repeated with a new blade. The lowest mean value is recorded. Calculation of the index is made according to Table 3. the final index value (I) is the minimum value of the

two specimen tests.

Table3. The specifications of Control specimen

Sequence	(C <sub>n</sub> ) Control specimen	(T <sub>n</sub> ) Test specimen	(C <sub>n+1</sub> ) Control specimen	(i <sub>n</sub> ) Index
1	C <sub>1</sub>	T <sub>1</sub>	C <sub>2</sub>	i <sub>1</sub>
2	C <sub>2</sub>	T <sub>2</sub>	C <sub>3</sub>	i <sub>2</sub>
3	C <sub>3</sub>	T <sub>3</sub>	C <sub>4</sub>	i <sub>3</sub>
4	C <sub>4</sub>	T <sub>4</sub>	C <sub>5</sub>	i <sub>4</sub>
5	C <sub>5</sub>	T <sub>5</sub>	C <sub>6</sub>	i <sub>5</sub>

$$\bar{C}_n = \frac{C_n + C_{n+1}}{2} \quad \text{----- (1)}$$

$$i_n = \frac{\bar{C}_n + T_n}{\bar{C}_n} \quad \text{----- (2)}$$

$$I = \frac{1}{5} \sum_{n=1}^5 i_n \quad \text{----- (3)}$$

### 6.3 Tear resistance

6.3.1 Apparatus : Refer to CNS 12915 L3233 section 6.15.1

6.3.2 Test specimen preparing

The test specimen dimensions are defined in figure 4. Dimensions of the specimen is (100 ± 10) mm x (50 ± 5) mm incision is made in the longitudinal direction of the sample,(25 ± 2.5)mm from the edge.

The last millimeter of the incision is to be made with a sharp unused blade straight and perpendicular to the specimen surface. The 50 mm of each pre-cut defined strip (see figure 4) .

The test shall be performed on one specimen cut from each of four different gloves of the same glove series in case .Two specimens shall be tested in the direction of the glove from cuff to finger tips, and two specimens shall be tested across the palm width (see Figure 5).

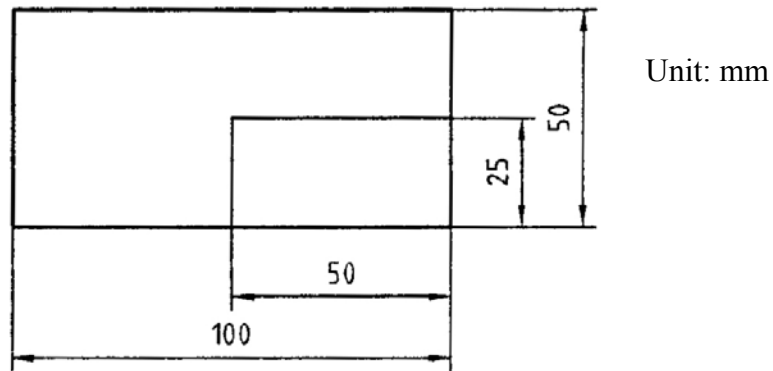


Fig4. Dimension of test specimen

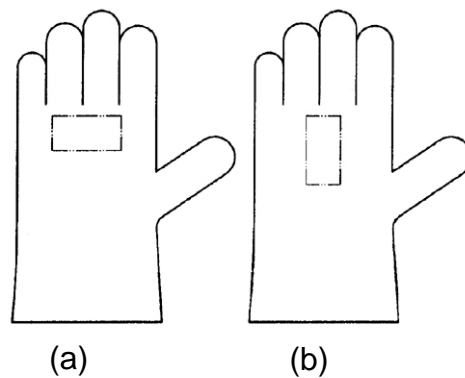


Fig5. The way of sampling

Key

- a) in the direction of the glove
- b) across the palm width of the glove

### 6.3.3 Test procedure

- (1) Clamping the specimen into machine.
- (2) The tearing force is recorded on computer at a tensile test speed of  $(100 \pm 10)$  mm/min. The specimen shall be torn totally apart.
- (3) the test specimen is made of several unbounded layers, the test is performed on each layer, and the classification is based on the highest value obtained.

### 6.3.5 Results and Report

The tear resistance for each specimen is taken as the highest peak recorded, and the classification is determined by taking the lowest of the four values.

## 6.4 Puncture resistance

### 6.4.1 Apparatus :

Key

1. Steel 60 HRC Rockwell
2. Ra: Average Roughness of centre-line
3. rcc: radiation cure coating

Unit: mm

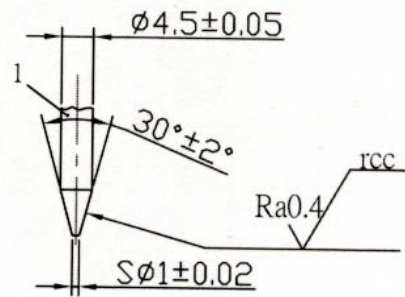
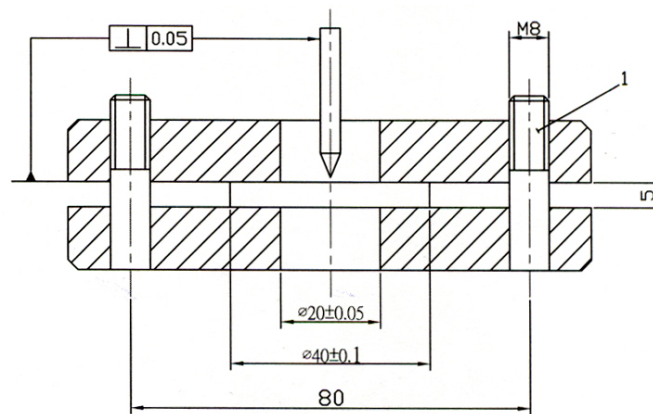


Fig6. Steel stylus



Unit: mm

Fig7. Retaining device

Key

1. Tightening stud

### 6.4.2 Test specimen preparing

The test shall be performed on four specimens cut from four different gloves of the same glove series. A circular specimen with a minimum diameter of 40.0-40.5 mm is taken in such a way that seams, reinforcements or extra thicknesses are

located outside the clamping area and the point of perforation.

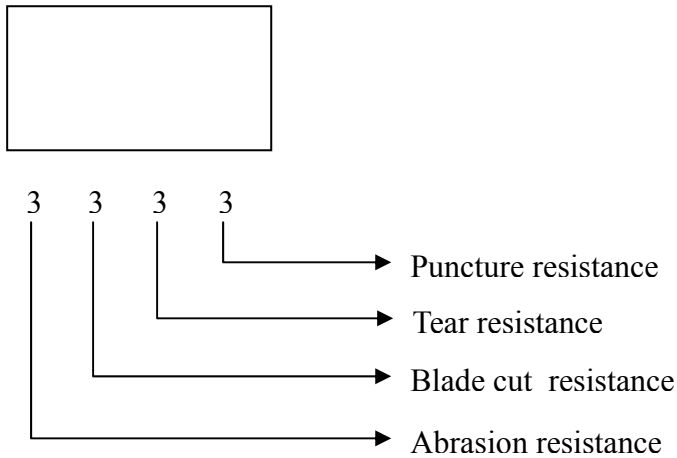
#### 6.4.3 Test procedure

- (1) To set gauge about 50.0-50.5mm. Then clamp the specimen into machine and start the machine at a tensile test speed of  $(100 \pm 10)$  mm/min. After testing record the highest value.
- (2) In the case of several unbounded layers, these layers are tested together.

#### 6.4.5 Results and Report

The classification is determined by the lowest value recorded.

### 7. Marking



### 8. Reference standard :

- BS EN 388 : 2003 Protective gloves against mechanical risks
- BS EN 420 : 2003 Protective gloves-General requirements and test methods
- CNS 12915 L3233-1991 Method of test for fabrics