

KES

Vinyl Leather for Automobiles

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Contents

1. Scope of Application
2. Kind
3. Symbol Composition
4. Quality
5. Physical Appearance
6. Dimension and Tolerance
7. Materials and Processing Method
8. Test Piece Adaption Method
9. Treatment Method of Test Piece
10. Testing Method
11. Inspection
12. Procedure for Establishment and Alteration
13. Marking Explanation

Kia MOTORS

1. Scope of Application

This standard specifies the vinyl leather (hereinafter referred to as "lether") used mainly for the furnishings of automobile interiors and exteriors.

Remark: This standard also applies to those having foam layers, vinyl sheets or other equivalent to this
However, sheets for the clush pad shall be excluded in this standard.

2. Type

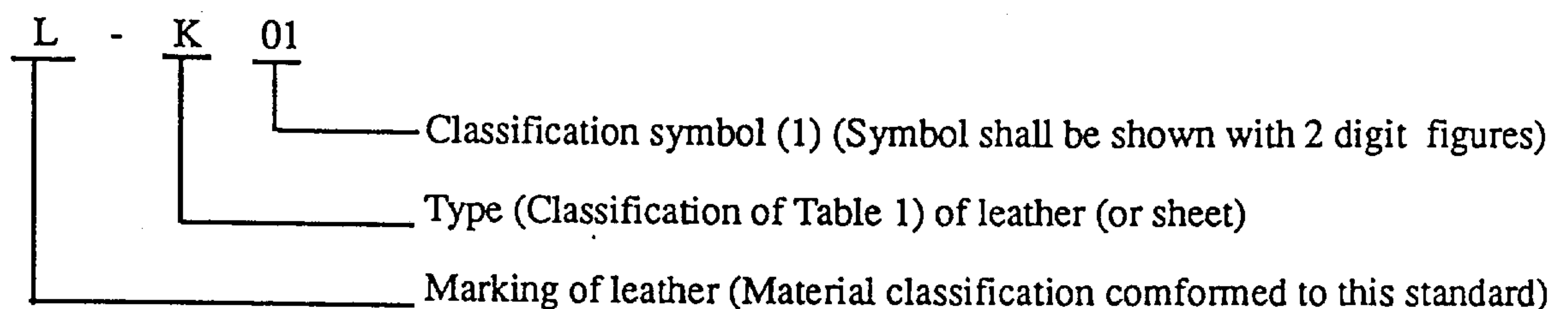
The types of leather are shown in Table 1 according to the foam type of the material being used or to those without foam.

Table 1

Types		Symbol	Remarks
Type 1	Lozenge weave	A	
Type 2	Plain weave	K	Calico
Type 3	Plain weave hosiery	M	
Type 4	Double weave hosiery	W	
Type 5	Other different foam	X	
Type 6	Those without foam	V	Vinyl sheet

3. Symbol composition

The material symbol composition of leather is as follows:



Note (1) Classification symbols shall be numbered according to the characteristics of leather, including foam (structure, thread No.), coat (non-foam, foam), thickness, etc.

4. Quality

Leathers shall be tested according to 10, and its results shall satisfy the requirements of Attached Table 1 to 5. However, alterations of the specified values, and additions and deletions of test items may be indicated depending on the usage classification and required quality of leather.

5. Physical Appearance

Leathers shall not have any harmful defect to use, such as color stain, pollution, foam, alien substance mixture, etc. However, the surface conditions such as pattern shape, colors, print pattern, glossy, etc., shall conform to the agreement made between the parties concerned.

6. Dimension and Tolerance

The coat thickness or the total thickness shall conform to Tables 1-5. However, the width and length shall be determined by otherwise agreement. The tolerances of thickness, width and length shall conform to Table 2.

Table 2

Classification	Tolerance	Remarks
Thickness (mm)	coat thickness $+0.05\text{mm}$ 0	
	Total thickness $+0.1\text{mm}$	
Length (mm)	$+5\%$ of standard length 0	

Remark: The dimensional tolerance of the width shall conform to the agreement made with the concerned section of KIA.

7. Materials and Manufacturing Method

Leather is manufactured by adhering vinyl chloride resin compound to which plasticizers, stabilizers, pigments, etc., are added, to the foam. However, leathers are usually processed with patterns on their surface, and such processes as the pattern shape, colors, glossy, etc., shall be otherwise agreed upon.

8. Sampling Method of Test Sample

Basically, a formal test sample of 1m in length shall be sampled at random from the lot of uniform quality, and shall be left alone, for at least 24 hours in the standard atmospheric conditions for testing which shall be adjusted as necessary.

9. Treatment Method of Test Piece

A portion of the test sample excluding the portions of 50mm from both ends shall be placed in parallel in a lengthwise direction during the length direction test, and in parallel in a breadthwise direction during the breadth direction test. However, in the case of tension test, they may not necessarily be placed in parallel in lengthwise direction.

10. Testing Method

10.1 Standard Condition of Test Room

The standard conditions of the test room, as a rule, shall conform to the standard temperature/humidity condition (Temperature $20 \pm 2^\circ\text{C}$, relative humidity $65 \pm 5\%$) of KS A 0006 (Standard atmospheric condition of testing). However, the date of test, temperature and humidity shall be described in the test result report.

10.2 Numerical Value Rounding Method of Test Results

The numerical value of the test result shall be secured down to the specified value and rounded up according to KS A 0021 (Rules for rounding off numerical values)

10.3 Measurement of Thickness

By means of KS B 5206 (Dial gauges with 0.01mm precision) with a pressure plate of 10mm in diameter inserted (thickness gauge), measurements shall be taken at 5 or more spots chosen at random and the average value shall be calculated.

The thickness of the coat is the thickness of the compound sheet before it is adhered on the foam and the total thickness is the thickness of the leather foam including the pattern.

10.4 Measurement of Mass

Using 3 sheets of the test pieces of 100mm in length and 100mm in width each weighing up to 1mg, mass shall be calculated and the result converted to g/m^3 values. This shall be the average value of the 3 sheets of the test pieces.

10.5 Tensile Strength and Elongation

(1) For materials with foam (Type 1- Type 5), adapt 3 test pieces with a 30mm in width, 250mm in length, in a widthwire and lengthwire, respectively, and draw a mark line 100mm long in the mid portion. Install them on the tension tester and at the chuck interval of 150mm, pull them at the speed of 200mm/min, thereafter secure the load and the standard distance when showing the maximum load. The tensile strength shall be the maximum load (when resin layer or foam layer is damaged) and it shall be shown in terms of $\text{kgf}/30\text{mm}$ ($\text{N}/30\text{mm}$) and the elongation shall be calculated by the following equation.

$$\text{Elongation (\%)} = \frac{l_1 - l_0}{l_0} \times 100$$

l_0 : Marked line distance before test (mm)

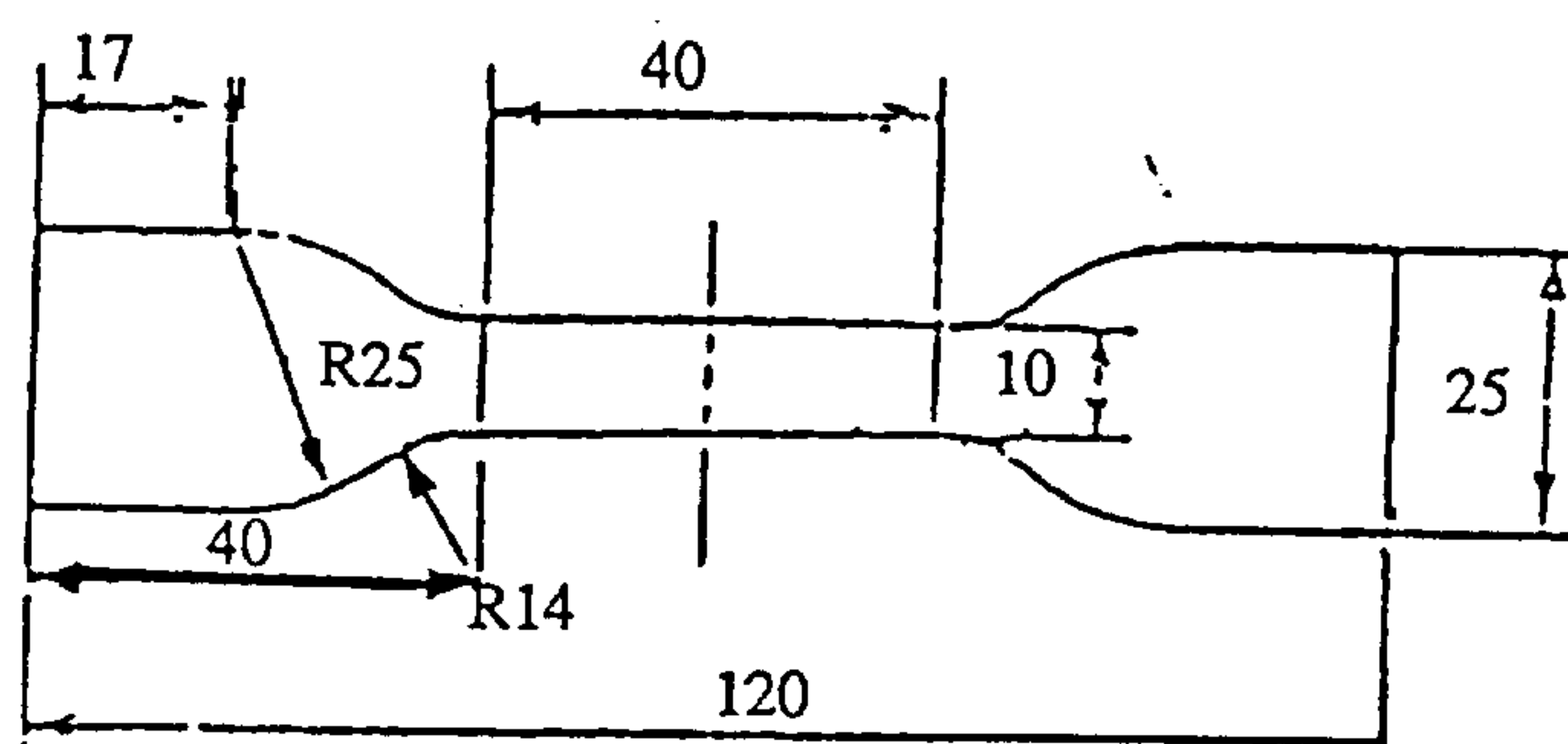
l_1 : Marked line distance when showing maximum load (mm)

This test result shall be the average value of 3 sheets of the test pieces in breadth and length respectively, and an electro-magnet type tension tester shall be used. In case an other type is used, it shall be described. However, when the test piece has been severed on the outside of the marked line, a new test shall be performed.

- (2) For materials without foam (Type 6), adapt 3 test pieces as in Figure 1, breadthwise and lengthwise, respectively, and draw a marking line with an accurate interval of 20mm to both directions, from the center of mid portion. Pulling conditions and others shall be performed according to the method of (1), and the severing tension load and the marked line distance measured when test piece has been served. The test results shall be secured in the form of an average value of the 3 sheets in the breadth and length direction, respectively, and the maximum load shall be shown in terms of kgf/10mm (N/10mm). Elongation shall be calculated by the equation of (1).

Remark: Test method shall conform to 7.4 of KS M 3505 (Polyvinyl chloride film for agriculture)

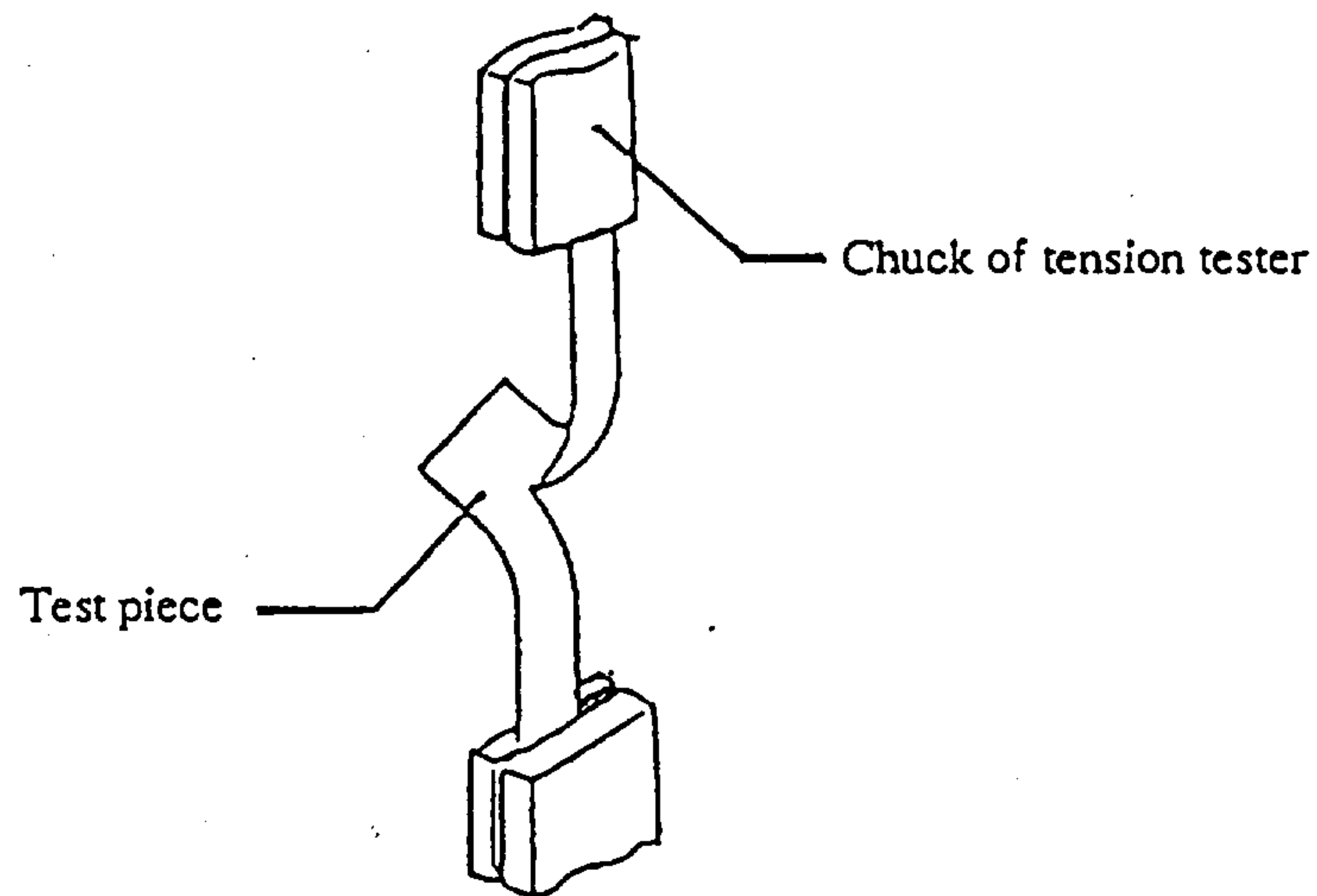
Figure 1



10.6 Tear Strength

- (1) For those with foam (Type 1 - Type 5), adapt 3 sheets of 40mm in breadth, 15mm in length, breadthwise and lengthwise, respectively, and sever the center edge of the shorter side of the test piece, 75mm long parallel with the longer edge. Install the severed ends of the test piece to the inside and outside of each other, and as shown in Figure 2, tear it to the parallel direction with the severed edge at a pulling speed of 20mm/min. The test result shall be the average value in terms of kgf(N) of 3 sheets of the test pieces, breadthwise and lengthwise, respectively, and the type of tester used in the test shall be described.

Figure 2

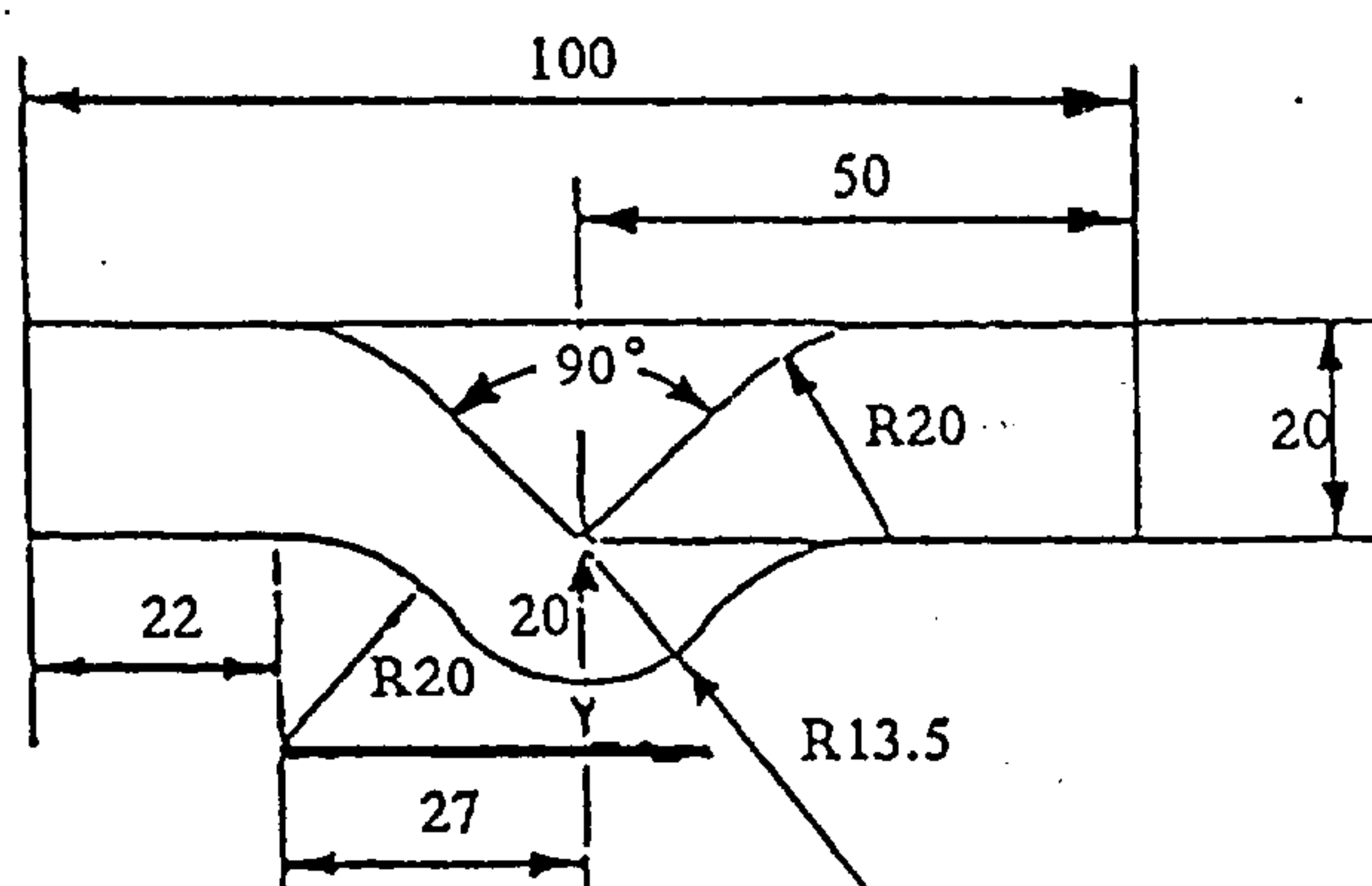


In case a pendulum type tension tester is used in securing the test result of the lengthwise (breadthwise) value, take the load when it shows a maximum load, when the constant speed elongation tension tester with a magnet recording equipment is used, secure the average value of the maximum values.

- (2) For those without foam (Type 6), adapt 3 sheets each of the test pieces of Figure 3, lengthwise and breadthwise, respectively. The test piece shall be installed accurately, as to correspond the axis direction with the direction of the tester. Tear at a pulling speed of 200mm/min, then measure the load when the test piece is being severed. The test result shall be secured in the form of the average value of 3 sheets, lengthwise and breadthwise, and shall be classified into a rectangular type tear load.

Remark: Test method shall conform to 7.4 of KS M 3505 (Polyvinyl chloride films for agriculture)

Figure 3



10.7 Stripping Strength

Adapt 3 sheets of the test pieces of 30mm in breadth, and 120mm in length, breadthwise and lengthwise, respectively, and strip off parallel, with the shorter side edge as long as 50mm.⁽²⁾

Install the separated film and the foam on the tension tester and pull at a speed of 200mm/min. Then, secure the stripping strength from the maximum load or the average of the maximum load in accordance with 10.6. It shall be shown in terms of kgf/30mm(N/30mm).

In case the required load for stripping can not be loaded uniformly on the backside of the stripped surface, disregard the load and perform the test anew, then the test result shall be shown with the average value of 3 sheets of the test piece, breadthwise and lengthwise. Then describe the type of tester used.

Note (2): When stripping is difficult, apply a solution such as methyl ethyl ketone and after letting the stripped test piece alone as is, for 6 hours or more in standard conditions the test shall be performed.

10.8 Static Load Elongation and Residual Strain Rate

Adapt 3 sheets of the test pieces of 50mm wide and 250mm long, breadthwise and lengthwise, respectively and draw a marking line of 100mm on the mid portion. Install them on a Moldens fatigue tester of which the chuck interval is adjusted to be 150mm and the load (including load of lower clamp) of 8kgf (78.4N) shall be added without moving them. However, the load to be added for types 5,6 and M12 of type 3 shall be 5kgf (49N). Let it be alone as is, with the added load, for 10 minutes, and thereafter secure the marked line distance. Next, remove the load and dismount the test piece from the clamp, and after letting it alone for 10 minutes on flat plate, secure the marked line distance. Static load elongation and residual strain rate shall be calculated by the following equations.

$$\text{Static load elongation (\%)} = \frac{L_1}{L_2} - 100$$

$$\text{Residual strain rate (\%)} = \frac{L_2}{L_1} - 100$$

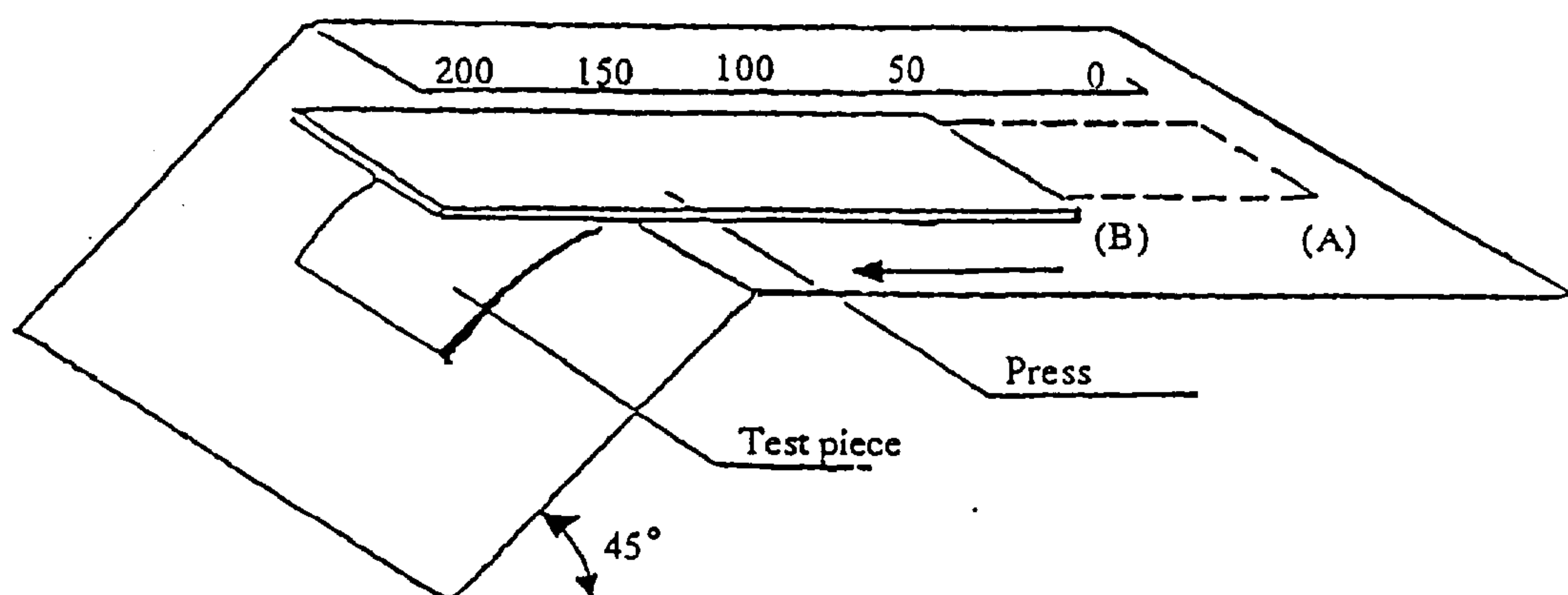
Where, L_1 : Marked line distance (mm) after 10 min of loading

L_2 : Marked line distance (mm) after 10 min of removing the load

10.9 Flexibility Strength

Adapt 5 sheets of the test pieces of 25mm wide, and 200mm long, lengthwise and breadthwise, respectively, and place the test piece on a parallel table of which the surface is smooth and have a part of the surface sloped 45°, as shown in Figure 4, so as to correspond the shorter side edge with the base line (A). Pressing the test piece with a pressing plate of the same size to the direction of the sloped surface, push along at a speed of about 10mm/sec and when one edge of the test piece comes in contact with the sloped surface, the position of the other edge shall be read by the scale. the flexibility strength shall be shown with the moved distance (Reading of B point) (mm), and the distance shall be measured against the surface and backside of each 3 sheets then shown with the average value (an integral number).

Figure 4



10.10 Dimension Variation by Heat

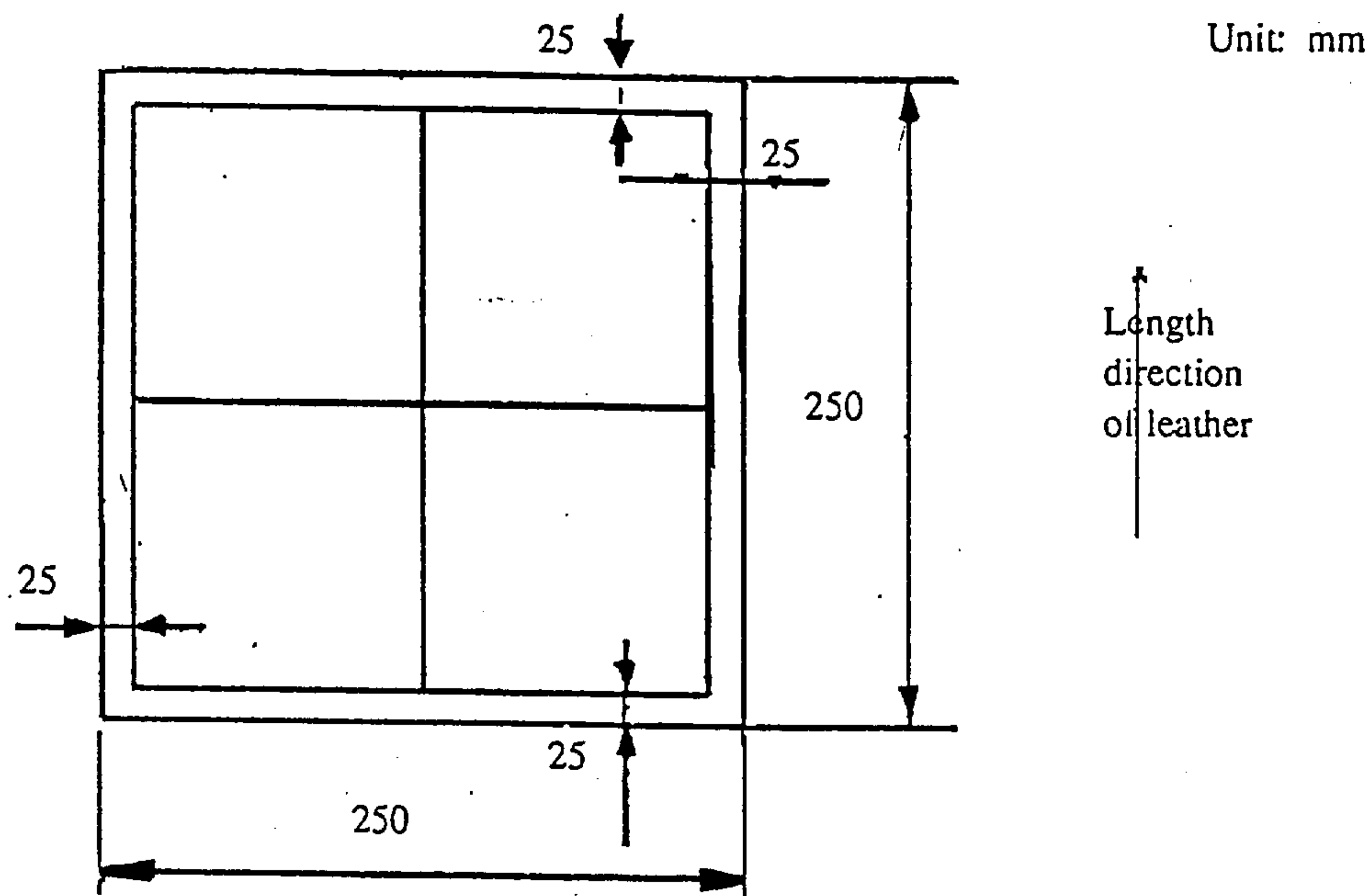
Adapt 3 sheets of the test piece in the size of 250mm wide, and 250mm long and draw the marking lines along 25mm inside of the respective edges and the mid portion shall be parallel with the edges, as shown in Figure 5. Measuring the lengths, and secure the average values of the length and breadth and these values shall be regarded as the original length. The test pieces shall be placed, parallel (3) in a gear type air insulation container adjusted to $100 \pm 2^\circ\text{C}$ and heated for 1 hour to 240 hours, thereafter take them out and let them cooled off at room temperature. Then measure the dimensions again, in accordance with the above method and secure the average values of the length and breadth, respectively. These values shall be regarded as the dimensions, after heating. The dimension variation rate of heating shall be calculated by the following equation, and the result shall be shown with the average values of 3 sheets of the test pieces, lengthwise and breadthwise, respectively.

$$\text{Dimension variation rate by heating (\%)} = \frac{l_1 - l_0}{l_0} \times 100$$

Where, l_0 : original length (mm)

l_1 : dimension after heating (min)

Figure 5



Note (3) Place asbestos on the parallel table of the insulation container, and put the test piece there to be overlaid with the film side upward.

Remark Heating time shall be indicated in quality (Attached Table).

10.11 Heating Lose

Adapt 3 sheets of the test pieces of 100mm wide and 100mm long, and keep them for 30 minutes in a gear type air insulation container⁽⁴⁾ with an air circulation equipment of which the temperature is adjusted to $100 \pm 2^\circ\text{C}$, and immediately after taking them out, let them dry in a disiccator (without dryer) for 1 hour at room temperature, then measure the mass of each testpiece. Let each test piece be alone in the gear type air insulation container at $100 \pm 2^\circ\text{C}$, for 48 hours to 240 hours and immediately after taking them out, keep them in a desiccator at room temperature for 1 hour, thereafter measure the masses. The heat loss shall be calculated by either of the following equations and the result shall be shown with the average value for 3 sheets of the test pieces.

$$\text{Heat loss (g/m}^2\text{)} = (W_0 - W_1) \times 100 \text{ ---- 48 hrs heating}$$

$$\text{Heat loss (\%)} = \frac{W_0 - W_1}{W_0} \times 100 \text{ ---- 240 hrs heating}$$

Where, W_0 : Mass before heating (After treatment of $100 \pm 2^\circ\text{C} \times 30 \text{ min.}$) (g)

W_1 : Mass after heating and cooled (After treatment of $100 \pm 2^\circ\text{C} \times 48 \text{ hrs or } 240 \text{ hrs}$) (g)

Note (4) The standard type of gear type temperature insulation container with air circulation equipment shall be as follows.

Size (Inside): Length 450mm, breadth 450mm, height 500mm

Quantity of air circulation: 100 ℓ /min

Test sample in-put hole: 2 stepped concentric circles with diameters of 100mm, 200mm, 300mm

Revolution speed: 6rpm

Remark: Testing time shall be indicated in quality (Attached Table).

10.12 Adhesiveness

2 sheets of the test pieces in the size of 60mm wide and 90mm long shall be duplicated with it's over laid surfaces faced to each other and place on a flat and square glass plate of 60mm² so to duplicate the breadth of the test piece with one of the edges. Then put on a weight of 3kg, of which the bottom dimension is 60mm and keep it in an air insulation container at $80 \pm 2^{\circ}\text{C}$, for 24 hrs, thereafter taking out, remove the weight and let it alone at room temperature for 1 hour, after this, 2 sheets of the test pieces shall be stripped off slowly and checked whether any irregularities such as damages, etc., took place upon the over laid surface and a judgement shall be made according to the judgement standard of Table 3.

Table 3

Class	Judgement standard
1	Adhesiveness definitely occurs and when stripped off remarkable damage shall take place.
2	Adhesiveness definitely occurs and when stripped off damage shall take place
3	Adhesiveness clearly occurs, however it may be stripped off without damage.
4	Adhesiveness occurs, however it can easily be stripped off.
5	Adhesiveness does not occur.

10.13 Cold Resistance

10.13.1 A Method

Adapt 3 sheets of the test pieces in the lengthwise and breadthwise direction with the size of 20mm wide and 100mm long. Adjust the interval of the Anvil and the weight bottom of the equipment (refer to Figure 6) as shown in 7.7 of KS K 6772 (Vinyl leather cross) by pushing up the weight, at 50mm. Also adjust the low temperature container to indicated the temperature, in advance, thereafter duplicate the lengthwise cross section by folding the test piece on the over laid surface, outward. A 5mm portion of that cross section shall be clamped to the test piece holding chuck. The holding tool shall be installed on the cold resistance test equipment so to make the bent portion of the test piece in the center of the anvil. 5 minutes after the installation of the test piece, push the button and release the holding tool of the supporting table, and drop the weight. Push up the weight and take out the test piece holding tool and release the test piece then check whether any cracks, etc.,

– occurred.

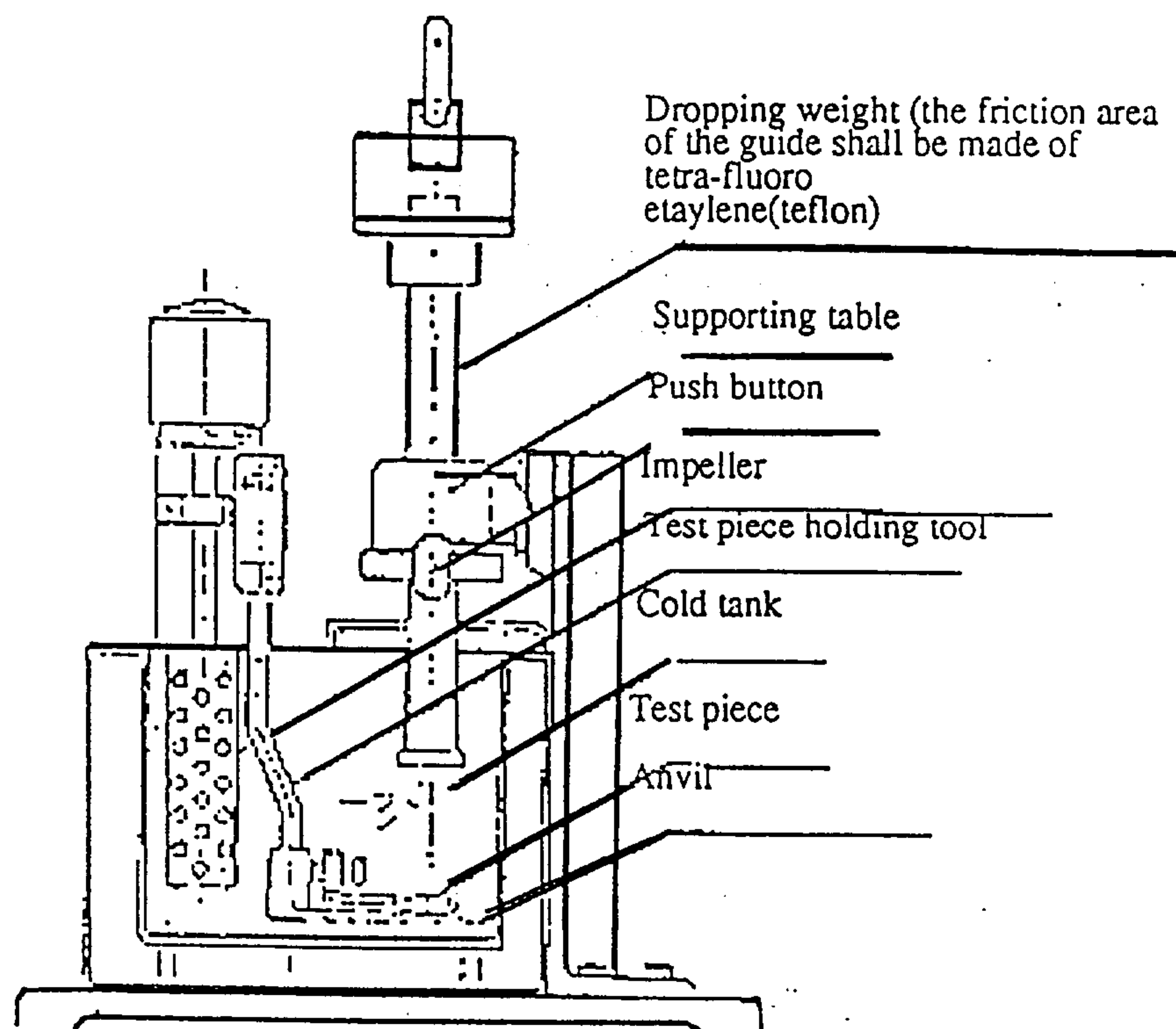
Remarks 1. Total load (including weight) shall be 2.5kg.

2. The indicated temperature of the cold tank shall be maintained by means of a mixed solution of KS M 1658 (Methyl alcohol) and the water cooled by dry ice.
3. Test piece shall be adapted from the test sample of a larger size than 100mm wide and 100mm long which has been processed for 48 hours of wear adjustment in a gear type air insulation container of $100 \pm 2^{\circ}\text{C}$, excluding both edge portion.

10.13.2 B Method

Adapt 1 sheet of the test sample in a size of 100mm wide, 100mm long, and a heat treatment for 240 hours shall be done in an air insulation container at $100 \pm 2^{\circ}\text{C}$, then the test piece of Figure 7 shall be adhered to. Set the impact strain tester as shown in KS M 5000 (Test method of paints and related raw material) in a cold tank, and push up the weight, 300mm above. Maintain in advance, the indicated temperature of the cold tank and then install it upwards on the tester making overlaid film surface.

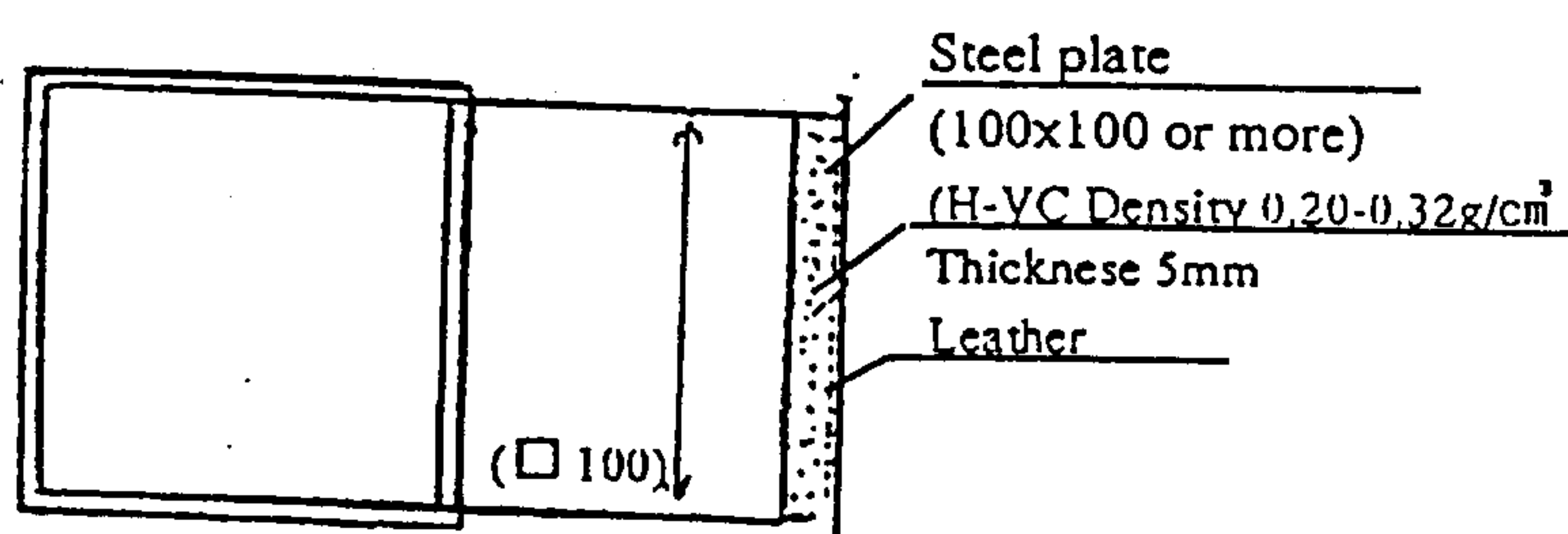
Figure 6



30 minutes after installation, drop the weight and while pushing the weight up take out the test piece, then check whether any cracks occurred. The test shall be performed against 3 places of different test pieces, and the temperature and crack conditions shall be recorded. Remark: The dropping weight of the tester shall be a 100g weight, 12.7mm in diameter and spherical shape.

Figure 7

Unit: mm



10.14 Weather Resistance

10.14.1 Fade test

(1) A Method

Take one sheet of the test piece in the size of 60mm wide and 200mm long and install it in the way described in Figure 8, on the tester specified in KS B 7751 (Ultra violet ray carbon arc type light resistance tester). Select the classification No. corresponding to the usage to which the test piece is applicable, and the test shall be performed under the conditions shown in Table 5 (Test condition). After the test, take it out and put it in a paper bag of which the inside is painted black, then let it alone, for 12 hours or more, at room temperature. And their test piece shall be compared with an unlighted product by eye for the degree of color change and fading, and judgement shall be made according to Table 6 (Color change and fading judgement standard utilizing) KS K 0911 (Standard gray color scale for color change and fading). However, as for the hardening degree, the test piece shall be bent under the condition of $20 \pm 2^\circ\text{C}$ (Standard conditions specified in 10.1) with the utilization of a cold resistance test equipment specified in 10.13.1. Then judgement shall be made whether any cracks took place.