

KS

KOREAN INDUSTRIAL STANDARD

Tensile Testing Machines

KS B 5521-1992

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Tensile Testing Machines

1. Scope

This Korean Industrial Standard specifies the tensile testing machines (hereafter referred to as "testers") used for evaluating characteristics of mechanical strength for various materials.

The tester which serves both as a compression testing machine shall be subjected to the application of KS B 5533 in addition to this standard.

Remark The applicable standards of this standard are given as follows :

- KS A 3009** Glossary of Terms Used in Instrumentation
- KS B 5528** Load Calibration Devices for Verifying Material Testing Machines
- KS B 5533** Compression Testing Machines
- ISO 7500/1** Metallic Materials—Verification of Static Uniaxial Testing Machines
— Part 1 : Tensile Testing Machines

2. Definitions and Symbols

2.1 Definitions

The principal terms used in this standard are as follows in addition to those given in KS A 3009.

(1) weighing capacity

Nominal maximum load of a tester which can be measured under the same condition. For the tester of which weighing capacity is variable, its maximum measurable amount is called the maximum weighing capacity and the minimum measurable amount the minimum weighing capacity.

(2) load indicator

A device to indicate the load applied to the test piece which includes devices for indication of load on the scale plate with a load pointer, for indication of load on the recording paper and for showing load by digital scale.

Remark The load indicator is also referred to as the "device to indicate the load."

(3) readability

The fineness of readable indication which is clearly distinguished on the load indicator.

(4) resolution

The load which is equivalent to the readability of the load indicator.

2.2 Symbols

The symbols used in this standard are given as follows :

- F_N is the maximum capacity of load for each weighing capacity of the tester.
- F_i is the reading on the load indicator of the tester at respective measuring points with increasing load.
- F'_i is the reading on the load indicator of the tester at respective measuring points with decreasing load.
- F is the reading on the load-proving instrument at respective measuring points with increasing load.
- F' is the reading on the load-proving instrument at respective measuring points with decreasing load.
- $\bar{F}_i$ is the arithmetic mean of several measurements of F_i at the same measuring point.
- $\bar{F}$ is the arithmetic mean of several measurements of F at the same measuring point.
- $F_{i\max}$ is the highest value of F_i at the same measuring point.
- $F_{i\min}$ is the lowest value of F_i at the same measuring point.
- $F_{\max}$ is the highest value of F at the same measuring point.
- $F_{\min}$ is the lowest value of F at the same measuring point.
- F_{i0} is the residual value on the load indicator of the tester after removal of load.
- r is the resolution on the load indicator of the tester.
- a is the relative resolution of the load indicator of the tester.
- b is the relative repeatability error of the load indicator of the tester.
- f_0 is the relative zero error of the load indicator of the tester.
- q is the relative accuracy error of the load indicator of the tester.
- u is the relative error in reversibility of the load indicator of the tester.

3. Unit of Load

The load shall, as a rule, be expressed in Newton (N).

4. Construction

4.1 Composition and Function

- 4.1.1 The tester shall be composed of a load applying device, a gripping device of the test piece, and a device to indicate the applied load. The tester shall be so constructed as to withstand sufficiently the maximum weighing capacity up to which the test is continued.
- 4.1.2 The tester shall be so constructed as to be capable of making the load calibration with a suitable load-proving instrument to be equipped to the tester.

4.2 Load Applying Device

- 4.2.1 The load applying device shall be such that is capable of applying the load smoothly to a test piece up to the maximum weighing capacity. When applying the load, other force than the tensile force shall not be applied.
- 4.2.2 The load applying device shall be equipped with a safety device to take measures against the load exceeding the maximum weighing capacity.

4.3 Gripping Device of Test Piece

- 4.3.1 The tester shall be equipped with the gripping device which is suitable for the

test piece to be tested by that tester.

- 4.3.2 The gripping device of test piece shall be capable of holding the test piece in alignment with the tension center line of the tester during the test, without subjecting the test piece to other force than the tensile force.
- 4.3.3 The gripping device of test piece shall be so constructed that any breakage resulted from this device (for example the breakage and the like within the gripping device) will not bring forth in the test piece.

4.4 Load Indicator

- 4.4.1 If the tester has two or more load-measuring systems, each system shall be regarded as a separate tester.
- 4.4.2 The load indicator shall be such that is capable to read out with ease the reading of the load applied, and shall be capable of indicating the increase and decrease of the load without remarkable lead or lag. Furthermore, it shall be readable the maximum load which has been applied to the test piece even after the completion of the test.
The device shall be prevented its function from the shock caused by the breakage of the test piece.
- 4.4.3 The load indicator shall be a device which does not exceed the allowable limits for each class as specified in Table 1, as far as its operating conditions are within the permissible range given in 9.3.
- 4.4.4 The load indicator should preferably have a zero adjusting mechanism which is capable of compensating, the mass of the test piece and that of mechanism such as moving parts and others.
- 4.4.5 The device to indicate the load on the scale plate by means of the load pointer shall be as given in the following :
 - (1) The scale shall generally be uniform.
On the tester having the mechanism by which the scale can not be equally divided, the scale shall be divided equally according to load on the basis of that mechanism. However, the scale intervals (magnitude of quantity to be measured corresponding to scale spacing) may be changed according to portions.
 - (2) For any weighing capacity, the scale spacing (interval between centers of adjacent graduation lines) of the scale plate shall be not less than 1mm.
 - (3) All graduation lines on a scale plate shall have the same width not exceeding 1/5 the scale spacing.
 - (4) The graduation lines on a scale plate shall be distinguished by two lengths, long and short, to facilitate reading and shall have numerals to indicate the values of load at appropriate positions for the convenience of direct reading of the values.
 - (5) Width of the extreme end of the load pointer shall approximately be equal to that