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JIS K 7128-2 : 1998

(ISO 6383-2 : 1983)

**Plastics—Film and sheeting—
Determination of tear resistance—
Part 2 : Elmendorf method**

ICS 83.140.10

Descriptors : plastics, materials by form, sheet materials, films (states of matter),
film properties testing, tear tests

Reference number : JIS K 7128-2 : 1998 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

Determination of tear resistance consists of the following three parts.

Part 1 : Trouser tear method

Part 2 : Elmendorf method

Part 3 : Right angled tear method

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In the event of any doubts arising as to the contents,
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Plastics—Film and sheeting—Determination of tear resistance— Part 2 : Elmendorf method

Introduction This Japanese Industrial Standard has been prepared based on ISO 6383-2, *Plastics—Film and sheeting—Determination of tear resistance—Part 2: Elmendorf method* issued in 1983, without changing the technical contents.

The portions underlined with dots in this Standard show the matters not specified in the original International Standard.

1 Scope and field of application

1.1 This part of JIS K 7128 specifies a method of determining the force required to propagate a tear through a specified distance and from a specified slit, cut in a test specimen of thin flexible plastic sheeting or film, under specified conditions of loading.

The upper limit of thickness that can be tested depends on the tearing force of the material in relation to the capacity of the testing machine.

Materials that can be tested according to this method include flexible poly (vinyl chloride) (PVC) and polyolefin films, but variable elongation and oblique tearing effects on the more extensible films may cause poor reproducibility of test results. This method may not be suitable for testing more rigid materials such as rigid PVC, nylon and polyester films.

1.2 The tear resistance test specified by this method is applied to specimens cut from semi-finished and finished products. The test is suitable for the control of production and manufactured products as well as for acceptance or rejection testing under specifications for semi-finished and finished products, provided that it has been demonstrated that the data for a particular material are acceptably reproducible.

1.3 There is no direct linear relationship between tearing force and specimen thickness. Data from this method are expressed as tearing force in newtons, with specimen thickness also reported. Only data obtained at the same thickness should be compared because sets of data from specimens of dissimilar thickness are generally not comparable.

2 References

ISO 291, 1977 *Plastics—Standard atmospheres for conditioning and testing.*

ISO 4591, 1992 *Plastics—Film and sheeting—Determination of average thickness of a sample and average thickness and yield of a roll by gravimetric techniques (gravimetric thickness).*

ISO 4593, 1993 *Plastics—Film and sheeting—Determination of thickness by mechanical scanning.*

3 Definition For the purpose of this Standard, the following definition applies.

tear resistance : The force, in newtons, required to tear a test specimen by the specified method.

4 Principle A test specimen having a specified precut slit is subjected to a tearing force generated by the energy stored in a pendulum of specified dimensions. The energy expended in tearing the specimen is used to calculate the tear resistance of the specimen.

5 Apparatus The test machine shall be of the Elmendorf type (an example of a suitable test machine is shown diagrammatically in Fig. 1), comprising the following.

5.1 Stationary jaw Accurately aligned with a movable jaw carried on a pendulum, preferably formed by a sector of a circle, free to swing on ball bearings or other substantially frictionless bearings. Each jaw shall have a clamping surface of not less than 25 mm in the horizontal direction [dimension *b* (see Fig. 1)] and not less than 15 mm in the vertical direction (dimension *c*). The thickness of the fixed portion of each jaw shall be between 9 mm and 13 mm (dimension *a*). When the pendulum is in the initial position, ready for the test, the jaws shall be separated by a distance of $2.8 \text{ mm} \pm 0.3 \text{ mm}$ and so aligned that the test specimen clamped in them lies in a plane perpendicular to the plane of oscillation of the pendulum, with the edges of the jaws gripping the test specimen in a horizontal line, a perpendicular to which through the axis of suspension of the pendulum (i.e. the distance between the axis and the top edges of the clamping jaws) is $104 \text{ mm} \pm 2 \text{ mm}$ long and makes an angle of $27.5^\circ \pm 0.5^\circ$ with the plane of the test specimen.

5.2 Means for holding the pendulum In a raised position and for releasing it without imparting shock.

5.3 Means for determining the energy expended by the pendulum In tearing a specimen. This usually consists of a circumferential scale on the pendulum which indicates against a pointer. The machine shall be accurately calibrated (allowing for friction and windage losses) to enable the scale reading to be used to give the force required to tear the standard test specimen in newtons, with an accuracy to within 1 %. This calibration shall be periodically checked. Annexes A and B give instructions for the adjustment and calibration of the apparatus.

5.4 Incremental masses To add to the pendulum to increase the tearing force capacity of the machine.

5.5 Suitable measuring equipment To measure the thickness of the material being tested by the methods specified in ISO 4591 and ISO 4593.