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**Adhesives—General testing
methods—Part 1 : General
properties**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal of establishment of Japanese Industrial Standard submitted by Evaluation Committee for Adhesion and Adhesives (ECAA)/the Japan Plastics Industry Federation (JPIF)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

Consequently **JIS K 6833** : 1994 is withdrawn and is replaced with this Standard and **JIS K 6833-2**.

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Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS K 6833 consists of the following 2 parts under the general title “*Adhesives—General testing methods*”:

Part 1: General properties

Part 2: Sampling

Adhesives—General testing methods— Part 1 : General properties

Introduction

This Japanese Industrial Standard comprises Part 1 of the two parts into which **JIS K 6833**, which was established in 1994, has been divided, and specifies the method of determining the general properties of adhesives.

No corresponding International Standard has been established at this point.

Warning

Persons using this Japanese Industrial Standard shall be familiar with normal laboratory practice. This Standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

1 Scope

This Standard specifies the method of obtaining the basic properties of adhesives.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

- JIS B 7410 *Liquid-in-glass thermometers for testing of petroleum product*
- JIS B 7411 *Solid-stem general purpose liquid-in-glass thermometers*
- JIS G 3141 *Cold-reduced carbon steel sheets and strips*
- JIS H 4160 *Aluminium and aluminium alloy foils*
- JIS K 6800 *Glossary of terms used in adhesives and adhesion*
- JIS K 6807 *Test methods for formaldehyde resin liquid adhesives for wood*
- JIS K 6828-1 *Plastics—Polymer dispersions—Determination of non-volatile matter (residue) at specified temperatures*
- JIS K 6828-2 *Plastics—Polymer dispersions—Determination of white point temperature and minimum film-forming temperature*
- JIS K 6833-2 *Adhesives—General testing methods—Part 2: Sampling*
- JIS K 6848-2 *Adhesives—Testing methods of bonding strength of adhesives—Part 2: Guidelines for the surface preparation of metals*
- JIS K 6848-3 *Adhesives—Testing methods of bonding strength of adhesives—Part 3: Guidelines for the surface preparation of plastics*
- JIS K 6848-4 *Adhesives—Testing methods of bonding strength of adhesives—Part 4: Guidelines for the surface preparation of adherends excluded metals and plastics*

- JIS K 6850 *Adhesives—Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies*
- JIS K 6851 *Testing methods for tensile shear strength of wood-to-wood adhesive bonds*
- JIS K 6852 *Testing methods for shear strength of adhesive bonds by compression loading*
- JIS K 6854-3 *Adhesives—Determination of peel strength of bonded assemblies—Part 3: Adhesives—180° peel test for flexible-to-flexible bonded assemblies (T-peel test)*
- JIS K 6861 *Testing methods for α -cyanoacrylate adhesives*
- JIS K 6866 *Adhesives—Designation of main failure patterns*
- JIS K 6900 *Plastics—Vocabulary*
- JIS K 7100 *Plastics—Standard atmospheres for conditioning and testing*
- JIS K 7117-1 *Plastics—Resins in the liquid state or as emulsions or dispersions—Determination of apparent viscosity by the Brookfield Test method*
- JIS K 7117-2 *Plastics—Polymers/resins in the liquid state or as emulsions or dispersions—Determination of viscosity using a rotational viscometer with defined shear rate*
- JIS K 8124 *Calcium chloride (for drying)*
- JIS K 8150 *Sodium chloride*
- JIS K 9006 *Ammonium dihydrogenphosphate*
- JIS P 3801 *Filter paper (for chemical analysis)*
- JIS R 3202 *Float glass and polished plate glass*
- JIS R 3503 *Glass apparatus for chemical analysis*
- JIS Z 8401 *Guide to the rounding of numbers*
- JIS Z 8703 *Standard atmospheric conditions for testing*
- JIS Z 8802 *Methods for determination of pH of aqueous solutions*
- JIS Z 8803 *Viscosity of liquid—Methods of measurement*
- JIS Z 8809 *Standard liquids for calibrating viscometers*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions in **JIS K 6800** and **JIS K 6900** and the following apply.

3.1 shear rate

the change rate of laminar flow rate of right angled direction to the flow in fluid

NOTE : It is also called “rate of shear” or “velocity gradient”.

3.2 shear stress

the force of tangent direction acting to the unit area of shear flow surface in fluid

NOTE : It is also called “shearing stress”.

3.3 Newtonian property

the property that shear stress is proportional to shear rate

3.4 non-Newtonian property

the property that shear stress is not proportional to shear rate

3.5 viscosity curve

the curve indicating the relation of shear rate to viscosity

3.6 thixotropy

the flow characteristic dependant on time in which the apparent viscosity is decreased with time under the condition of a definite shear rate and gradually restored by removing shear stress

3.7 TI value (thixotropy index)

the ratio of apparent viscosity at two different kinds of shear rates (rotation speed), which is obtained from the ratio of respective viscosity by changing the rotation speed at 1 : 10

NOTE : It is the value indicating the degree where viscosity is changed depending on shear rate, and it is also called SVI (Structural Viscosity Index) or STI (Shear Thinning Index).

3.8 expression of adhesion strength

the adhesion strength measured in specified elapses of time, after the adherend is bonded under the condition designated by the manufacturer of adhesive

4 Test methods

4.1 Types of tests

The types of tests for obtaining the general properties shall be shown in table 1.

Table 1 Types of tests

Classification of tests	Test method	Applicable subclause
Test related to general properties	Appearance	5.1
	Density	5.2
	pH	5.3
	Viscosity	5.4
	Non-volatile matter	5.5
Test related to service conditions	Water compatibility	6.1
	Spread	6.2
	Whitening temperature and minimum film-forming temperature	6.3
	Expression of adhesion strength	6.4
	Storage stability	6.5
Test related to performance of adhesive layer	Blocking property	7.1
	Softening temperature	7.2

4.2 Common conditions of test

The common conditions of test in clause 5 to clause 7 shall be as follows.

- a) **Standard atmosphere of laboratory** The laboratory shall be $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ in temperature and $(50 \pm 10)\%$ in relative humidity as specified in **JIS K 7100**.

Moreover, temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and relative humidity of $(65 \pm 20)\%$ as specified in **JIS Z 8703** may be applied in accordance with the agreement between the parties concerned with delivery. In such a case, the applied temperature and humidity in laboratory shall be recorded in the test report.

- b) **Conditioning of sample** The sample shall be that for which 12 h or longer has elapsed after manufacture, and be placed in the standard atmosphere of laboratory in a) for 1 h or longer before test.
- c) **Rounding test results** The test results shall be obtained to one place lower than the numerical value specified for each test item and be rounded in accordance with **JIS Z 8401**.
- d) **Sampling** The sampling shall be in accordance with **JIS K 6833-2**.

5 Test related to general properties

5.1 Appearance

For the sampled sample, the colour shall be marked visually, the condition (high viscosity, low viscosity, etc.) be marked by viscosity and the shape be marked for solid product respectively.

5.2 Density

For the density, the specific gravity shall be measured and obtained from the value of it by calculation.

5.2.1 Specific gravity cup method

5.2.1.1 Equipment

The equipment shall be as follows.

- a) **Specific gravity cup** The specific gravity cup shall have the shape and dimensions as shown in figure 1 and 100 ml in internal volume. The material shall be that made of chromium-plating finished brass or of stainless steel, and the mass of cup shall be not more than 200 g. For the blowing-off hole, an adequate size shall be selected in accordance with the fluidity of sample and the like.
- b) **Thermometer** The thermometer shall be TAG closed type thermometer for low flash point (TAG-50) specified in **JIS B 7410**, or the thermometer equivalent to this in precision.
- c) **Thermostatic bath** The thermostatic bath shall be provided with an agitator and be capable of maintaining at a definite temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.
- d) **Balance** The balance shall be not less than 100 g in weighing capacity and not more than 100 mg in reciprocal sensitivity.

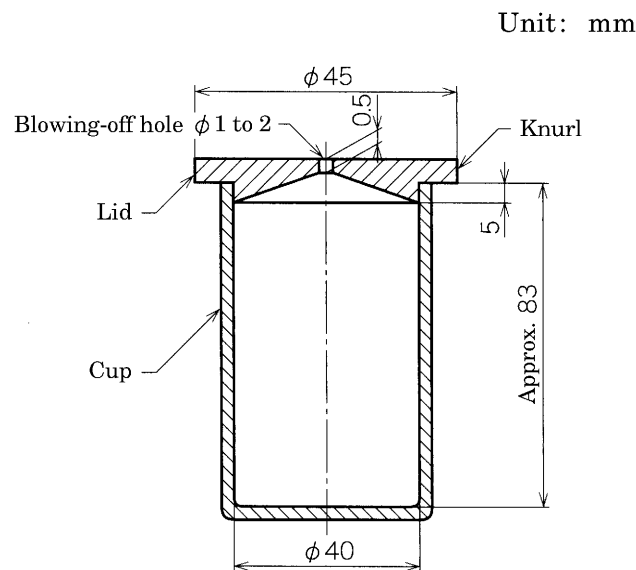


Figure 1 Shape and dimensions of specific gravity cup

5.2.1.2 Procedures

The procedures shall be as follows.

- a) Wash and dry sufficiently the specific gravity cup [see 5.2.1.1 a)].
- b) After leaving it to cool to room temperature, weigh its mass (W_1) together with the lid.
- c) Pour the overflow of water, which has been adjusted to the approximate measuring temperature, from the overflowing holes on the lid into a specific gravity cup while taking care that the bubbles are not included, and put on a lid. Place it in a thermostatic bath maintained at the measuring temperature and leave it to stand for 1 h.
- d) Take out the specific gravity cup from the thermostatic bath. Remove the overflowing water and wipe off water drops on the outer surface with clean cloth or other similar means. Weigh the mass of this specific gravity cut (W_2). The water and the gravity cup shall have been maintained beforehand at the temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.
- e) After drying the specific gravity cup, use the sample instead of water, and perform the procedures in **c)** and **d)** and weigh the mass (W_3) of the sample-filled specific gravity cup.
- f) Perform the measurement three times with the same sample and record the measuring temperature.

5.2.1.3 Expression of test results

The calculation shall be carried out as follows.

- a) The specific gravity (S_G) shall be calculated in accordance with formula (1).

$$S_G = \frac{W_3 - W_1}{W_2 - W_1} \dots\dots\dots (1)$$