

Application Data Sheet

No. 2

Autograph Precision Universal Tester

Material Testing & Inspection

Flexural Testing of Plastics

Standard No. ISO178: 2010 (JIS K 7171: 1994)

Introduction

In recent years, a large variety of synthetic resin (plastic) materials has become available for use in a diversity of products. They are used in applications that take advantage of their respective characteristics. For example, polyethylene (PE) is cheap and easy to mold, and thus used for containers, packaging film, and other everyday applications. In contrast, polycarbonate (PC) is transparent, has a high mechanical strength, and is heat-resistant; consequently, it is used for CDs and DVDs in the electrical and electronics fields, as well as in transportation equipment, optics, and medical fields.

In this Data Sheet, flexural testings are performed on four materials, including polyvinyl chloride (PVC) and polypropylene (PP).

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Measurements and Jigs

In plastic flexural testings, the width of the two supports and central loading edge must be larger than the width of the specimen, and parallelism within ± 0.2 mm is required. The loading edge radius is $5 \text{ mm} \pm 0.1 \text{ mm}$, and the supports radius is specified as $2 \text{ mm} \pm 0.2 \text{ mm}$ for specimens with a thickness of 3 mm or less, and $5 \text{ mm} \pm 0.2 \text{ mm}$ for specimens with a thickness exceeding 3 mm. The span must be adjusted to a value of $16 (\pm 1)$ times the specimen thickness. In this test, since a 4 mm-thick specimen is used, the span is set to 64 mm (specimen thickness of 4 mm $\times$ 16 = 64 mm).

Measurement Results



Fig. 1: Test Status

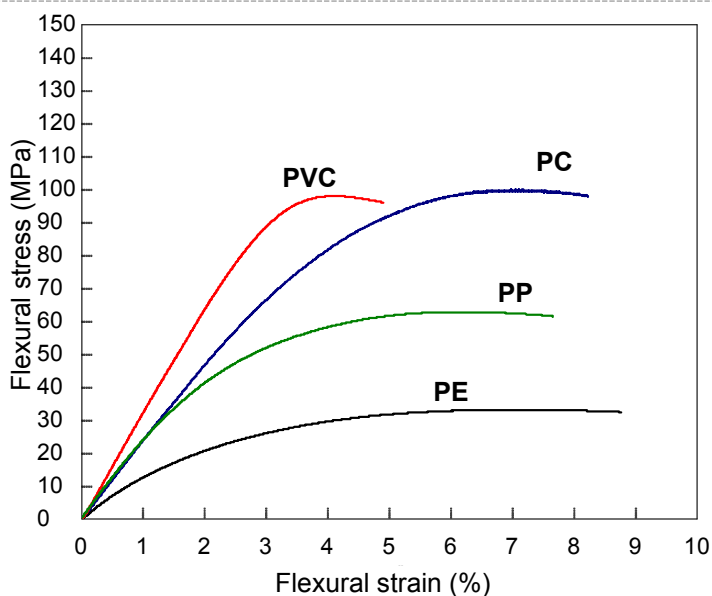


Fig. 2: Relationship Between Flexural Stress and Flexural Strain

Table 1: Test Conditions

Item	Set Value
Test Speed	2 mm/min
Span	64 mm

Table 2: Test Results

Sample	Flexural Modulus (MPa)	Flexural Strength (MPa)
PE (polyethylene)	1527	33.0
PC (polycarbonate)	2378	99.7
PVC (polyvinyl chloride)	3257	97.8
PP (polypropylene)	2559	62.6

Plastic Flexural Testing System

Tester: AGS-X
Load Cell: 1 kN
Test Jig: Three-point bending test jig for plastics (loading edge radius.: 5 mm, supports radius.: 3 mm)
Software: TRAPEZIUM LITE X



AGS-X Table-Top Precision Universal Tester

Features

- A high-precision load cell is adopted. (The high-precision type is class 0.5; the standard-precision type is class 1.) Accuracy is guaranteed over a wide range, from 1/500 to 1/1 of the load cell capacity. This supports highly reliable test evaluations.
- Crosshead speed range
Tests can be performed over a wide range from 0.001 mm/min to 1,000 mm/min.
- High-speed sampling
High-speed sampling, as fast as 1 msec.
- TRAPEZIUMX LITE X operational software
This is simple, highly effective software.
- Jog controller (optional)
This allows hand-held control of the crosshead position. Fine position adjustment is possible using the jog dial.
- Optional Test Devices
A variety of tests can be conducted by switching between an abundance of jigs in the lineup.

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