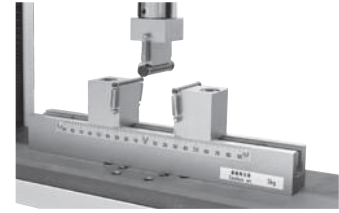


3. Bending Test Jigs

3-1 Material Testing

3-1-1 Three-Point Bending Test Jig for Plastics Plastics

These test jigs are for three-point bending testing of plastic samples based on JIS, ISO and ASTM standards. Samples of different thicknesses stipulated in each standard can be handled by exchanging the support sets.



10 kN

• Types and main specifications

Applicable standards	JIS K6911 JIS K6902 ^{Note2} JIS C6481 JIS C6485 JIS K7171 ASTM D5943 ISO 178 *Sample thickness 3 mm or less	JIS C6485 JIS K7171 ASTM D5943 ASTM D990 ^{Note3} ISO 178 *Sample thickness greater than 3 mm	JIS K6911 JIS K6902 JIS C6481 JIS K7171 ASTM D5943 ISO 178 *All sample thicknesses	ASTM D790 (Test method 1) ^{Note4} *Distance between supports of 0.8 to 20 inches supported.	JIS K6911 JIS K6902 JIS C6481 JIS K7171 ASTM D5943 ISO 178 *Sample thickness 3 mm or less	JIS K7171 ASTM D990 ^{Note3} ISO 178 *Sample thickness greater than 3 mm	ASTM D790 (Test method 1) ^{Note4}	JIS K7221
Kit No. ^{Note1}	346-53887-XX				346-53888-XX			
Max. test force	10 kN				100 kN			
Punch radius × width (mm)	R5 × 34			R1/8" × 72 mm	R5 × 72		R1/8" × 72	R15 × 110
Support radius × width (mm)	R2 × 34	R5 × 34	R2 × 34, R5 × 34	R1/8" × 110 mm	R2 × 110	R5 × 110	R1/8" × 110	R15 × 110
Distance between supports (mm)	20 to 200			0.8 to 8"	50 to 500		2 to 20"	200 to 500
Operational temp. range	0 to 40 °C							

Note 1: Please select the kit No. according to the load cell used.

Note 2: Bending strength test supported. Distance between supports of 20 to 200 mm supported.

Note 3: This is a bending jig with the support and punch radius R5 recommended by ASTM D990.

Note 4: This is a bending jig with the support and punch radius R1/8" prescribed by ASTM D990.

3-1-2 Three/Four-Point Bending Test Jig for Small Samples Plastics Metals

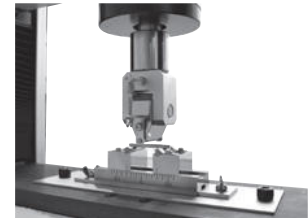
These test jigs are for three/four-point bending testing of small samples of various materials.

• Types and main specifications

Applicable AUTOGRAPH	AG, AGS Series
Kit No.	346-53921-XX ^{Note1}
Max. capacity	5 kN
Punch radius × span (mm)	R2 (4-point bending: R2 × 10)
Support radius × width (mm)	R2.5 × 20
Distance between supports (mm)	10 to 60
Sample size (W × L) (mm)	W15 max. × L15 min.
Operational temp. range	0 to 40 °C

Note 1: This P/N does not include the 4-point bending punch.

If the 4-point bending punch is required, then 343-09106-17 is required.



3-1-3 Three-Point Bending Test Jig for Metal Samples Metals

This test jig is for three-point bending tests of various types of metals.

• Applicable standards: JIS Z2248 (Complies with the push bending method. However, a protective device such as the safety cover is required.)

• Types and main specifications

Applicable AUTOGRAPH	AG table-top type, AGS Series	AG floor type
Max. capacity	10 kN	100 kN
Kit No.	346-53891-XX	346-53890-XX
Punch radius × width (mm)	R5 × 72	
Support roller radius × width (mm)	R15 × 110	
Distance between supports (mm)	Max. 200	Max. 500
Operational temp. range	0 to 40 °C	



100 kN

3-1-4 Three/Four-Point Bending Test Jig for Ceramics Ceramics

This test jig is for the bending test of ceramic samples. It is constructed with sample positioning grooves to ensure that a uniform load is applied to the sample. Also, samples are enclosed in a compact capsule to facilitate observation after breakage.

- Applicable standards: JIS R1601
- Types and main specifications

Kit No.	346-53886-XX	
Applicable AUTOGRAPH	AG, AGS Series	
Max. capacity	5 kN	
Bending method	3-Point Bending	4-Point Bending
Punch radius (mm) / material	R2.5 Bearing steel	
Punch span (mm)	—	10 (fixed)
Support radius (mm) / material	R2.5 Bearing steel	
Distance between supports (mm)	30 (fixed)	
Upper compression plate (mm)	ø35	
Sample size (W × L × T) (mm)	W4 × L36 × T3	
Weight (upper kg)		
Operational temp. range	0 to 40 °C	



3-Point Bending

4-Point Bending

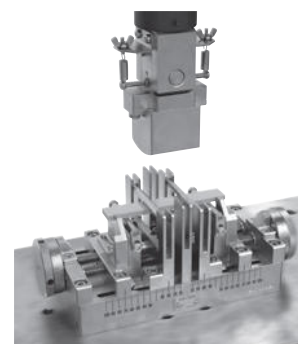
3-1-5 Three-/Four-Point Bending Test Jig for Composite Materials Plastics Ceramics

This highly functional three-/four-point bending test jig is for fiber-reinforced plastics and other composite materials. It can be applied to bending testing of hard plastics and ceramics.

- The dial-operated screw slide mechanism allows easy and precise adjustment of punch and support spacing.
- Punch and support rollers are always kept parallel to ensure the application of correct force on the sample.
- Punch and support rollers that comply with the test standards can be exchanged to handle various materials.
- Applicable standards: JIS K7074, JIS K6911, JIS R1601 K7017
JIS R1602 (Deflection must be compensated using the software.)

- Types and main specifications

Applicable AUTOGRAPH	AG, AGS Series
Kit No.	346-53889-XX
Max. capacity	5 kN
Punch radius × width (mm)	R2×50, R3×50, R5×50 (3 types)
Punch span (mm)	10 to 35 (four-point bending)
Support roller radius × width (mm)	R2×50, R3×50, R5×50 (3 types)
Distance between supports (mm)	30 to 100
Sample size (W × L × T) (mm)	Min. W4 × L36 × T1
Operational temp. range	0 to 40 °C

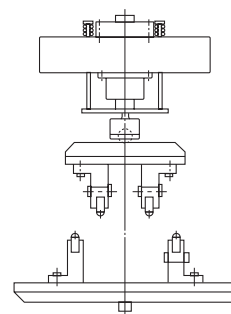


3-1-6 Four-Point Bending Test Jig for Concrete (for AG Series) Concrete

This test jig is for concrete bending tests based on JIS standards.

- Applicable standards: JIS A1106 (ISO 1920)
- Types and main specifications

Applicable AUTOGRAPH	For AG-100kN	For AG-250kN
Kit No.	346-53920-XX	
Max. capacity	100 kN	
Punch radius × width × span (mm)	R15×170×(50 to 180)	
Support roller radius × width (mm)	R15 × 170	
Distance between supports (mm)	50 to 500	
Sample size (W × L × T) (mm)	100 × 380 min. × 100 / 150 × 530 min. × 150	
Operational temp. range	0 to 40 °C	



OPTIONAL ACCESSORIES FOR AUTOGRAPH

Accessories for Universal Tester Instruments

3-1-7 Bending Test Jig for Silicon Chips Electric/Electronics

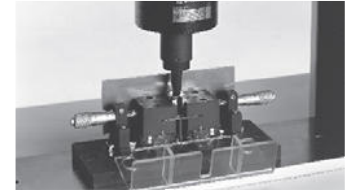
This jig is for three-point bending testing of silicon chips.

This jig complies with SEMI (Semiconductor Equipment and Materials International) standards.

- Applicable standards: SEMI G86-0303, JIS C60068-2-77

- Types and main specifications

Type	Variable support span type		Fixed span
Kit No.	346-53947-XX		
Max. capacity	500 N		
Punch radius × width (mm)	R0.5 × 22 (JIS)	R0.3 × 22 (SEMI)	R0.3 × 22 (SEMI)
Support radius × width (mm)	R0.1 × 22 (JIS)	R0.3 × 22 (SEMI)	R0.3 × 22 (SEMI)
Distance between supports (mm)	1 to 20		5



Variable support span type

3-1-8 Ring Bending Jig for Glass Glass

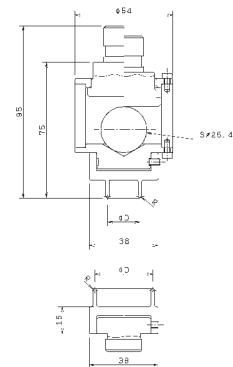
There are two representative strengths for glass, and each is measured by a different method. One is the edge strength obtained from a 3-point (or 4-point) bending test. When glass fractures, very fine damage (microcracking) is formed on the fracture surface. The strength is determined by fracture from this damage in the 3-point (or 4-point) bending test. In other words, the edge strength is an index that indicates the state of damage on the fracture surface. The other is the surface strength obtained from a ring bending test. With this method the fracture commences from near the center of the glass, so the results are not affected by the fracture surface. In other words, the surface strength is an index that indicates the strength of the glass surface itself. This section introduces the ring bending test jig in accordance with the ASTM standard.

- Type

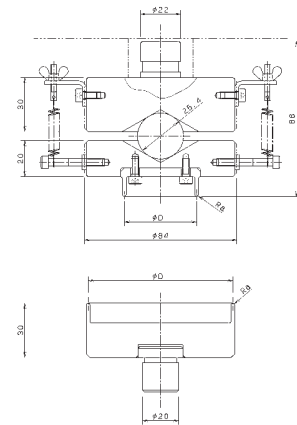
Part No.	Max. test force	Ring diameter ϕD Ring tip radius R	Applicable standards	Mechanism
346-58435-01	5 kN	Upper: $\phi 12.5/R0.75$ Lower: $\phi 25/R0.75$	ASTM C1499-01	This has a spherical seat mechanism. The upper ring punch is suspended on the load cell side by a spring, so the initial load is not applied due to grounding of the ring punch to the sample.
346-58435-02	500 N	Upper: $\phi 5/R0.75$ Lower: $\phi 15/R0.75$	ASTM C1499-01	
346-58435-03	1 kN	Upper: $\phi 40/R0.3$ Upper: $\phi 40/R1$ Lower: $\phi 80/R0.3$ Lower: $\phi 80/R1$	ASTM C1499-01	
346-58716	10 kN	Upper and lower: Can be selected as desired from the following 6 types (1) $\phi 6/R0.5$ (2) $\phi 12.5/R0.5$ (3) $\phi 12.7/R1$ (4) $\phi 18/R1$ (5) $\phi 25.4/R1$ (6) $\phi 32/R1$	ASTM C1499-01	This has a spherical seat mechanism. The upper ring punch is independent of the load cell, so an initial load of about 15 N is applied due to grounding of the ring punch to the sample.
346-58716-01	5 kN	Upper: $\phi 100/R5$ Lower: $\phi 200/R5$	—	

Note: A tensile and compression loading jig is required for the test.

Note: There is a possibility of dispersion of the sample after the test, so using a safety cover is recommended.



346-58716



346-58435-03