TOYOSEIKI

Testing machines for plastics

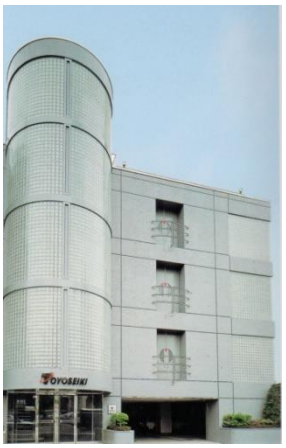
TOYO SEIKI SEISAKU-SHO, LTD.

5-15-4, Takinogawa, Kita-ku, Tokyo 114-8557 JAPAN

About TOYOSEIKI

Founded in 1934 in Tokyo, Japan, TOYOSEIKI has been contributing to the field of material R&D and quality assurance through supplying various kinds of reliable testing machines to the industries. Today, TOYOSEIKI is recognized as one of the leading supplier especially for polymer testing equipment.

Toyo Seiki Seisaku-sho, Ltd. Head Office
5-15-4, Takinogawa, Kita-ku, Tokyo 114-8557, Japan
Tel: +81-3-3916-8183 Fax: +81-3-3916-8173
www.toyoseiki.co.jp



Head office (Takinogawa, Kita-ku, Tokyo)

Tokyo factory (Ukima, Kita-ku, Tokyo)

Funado support center (Funado, Itabashi-ku, Tokyo)

Local Distributors

East Asia

China

Dongyang Jingji Trading (Shanghai) Co., Ltd. (Subsidiary)
Room 27039, 27F, Infinitus Tower, No.168 Hubin Road, Huangpu-dist., Shanghai, P.R. China.
Phone: +86-21-6385-0255
Fax: +86-21-6385-0256

Korea

TOSEI CO., LTD.
#1005/1006 Teheran Office Bldg., 6 Teheran-ro 52-gil, Gangnam-gu, Seoul, Korea 06211
Phone: +82-2-565-3456
Fax: +82-2-565-3459

Taiwan

FRIENDS UNION ENTERPRISES CO., LTD.
7F-2, No.33 Sec. 2, Hsin Yi Road, Taipei
Phone: +886-2-2321-0212
Fax: +886-2-2395-7385

Local Distributors

Southeast Asia

Indonesia

PT. Saga Jaya
Ruko Crystal I No.30, Gading Serpong, Tangerang, Banten 15810, Indonesia
Phone: +62-21-5421-5698
Fax: +62-21-5421-5697

Malaysia

BSL Technologies Sdn. Bhd.
B-6-18, Block B, Ativo Plaza, No 1, Jalan PJU 9/1, Damansara Avenue,
Bandar Sri Damansara, PJU 9, 52200 Kuala Lumpur, Malaysia
Phone: +60-3-6270-0618
Fax: +60-3-6270-9618

Singapore

SAGA Instruments Pte. Ltd.
21 Toh Guan Road East #06-07, Toh Guan Centre, Singapore 608609
Phone: +65-6779-9606
Fax: +65-6779-9609

Thailand

CG ENGINEERING LTD. PARTNERSHIP
7/10 Moo 6 Tambol Ban Pratum Amphure Samkohk Phatumtani 12160 Thailand
Phone: +66-2-1569470
Fax: +66-2-1569472

Vietnam

TECHNO VIETNAM INDUSTRIES CO.,LTD.
5th Floor, 84 Duy Tan Street, Cau Giay District., Hanoi, Vietnam
Phone: +84-24-3795-9933
Fax: +84-24-3795-9944

Local Distributors

South Asia

India

Sams Advanced Climatic Technologies Pvt. Ltd.
Plot No. 8 & 9/29, Mirra Industrial Estate, Phase – 1,
IDA Patancheru, Hyderabad – 502 319. India
Phone: +91-8455-297383/297384

North America

U.S.A.

Testing Machines, Inc.
40 McCullough Drive, New Castle, DE 19720 USA
Phone: +1-302-613-5618
Fax: +1-302-613-5619

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1. Universal Testing Systems

■No.210 Strograph E3

Single column, tabletop universal testing machines, up to 1kN

E3-S E3-L

The TOYOSEIKI **Strograph E3** series are the most cost effective single column tabletop universal tensile machines designed for testing tensile, bend/flexure, compression, peel, friction etc. of various materials, ranging up to 1kN.

Model	E3-S	E3-L
Load cell capacity	Max. 1kN	
Force accuracy	±1.0% of reading (Down to 1/500 of load cell capacity) Conforms to ISO 7500-1 (JIS B 7721) Class 1	
Crosshead speed range	0.05 to 1500mm/min., 22 steps	
Crosshead speed accuracy	±0.5% (0.5 to 1000mm/min)	
Crosshead travel distance (Excluding chucks)	490mm	990mm
Effective stroke	330mm (Using J-3 chuck)	830mm (Using J-3 chuck)
Power requirement	Single-phase, AC100 to 115V or AC200 to 230V, 50/60Hz, 0.3kVA	
Dimensions	W435 x D460 x H900mm	W435 x D460 x H1400mm
Weight	Approx. 47kg	Approx. 62kg

■No.260 Strograph VGS/VG series

Dual column, universal testing machine, up to 5kN (VGS), 20kN (VG)

VGS

VG with optional stand

The TOYOSEIKI **Strograph VGS/VG** series dual column, universal testing machines are designed for testing tensile, bend/flexure, compression, peel, friction etc. of various materials, ranging up to 5kN (VGS), 20kN (VG).

Model	VGS (05F, 1F, 5F)	VG (1F, 5F, 10F, 20F)
Load cell capacity	Max. 5kN	Max. 20kN
Force accuracy	±1.0% of reading (Down to 1/500 of load cell capacity) Conforms to ISO 7500-1 (JIS B 7721) Class 1	
Crosshead speed range	0.0005 to 1000mm/min., 23 steps	
Crosshead speed accuracy	±0.1% (0.5 to 500mm/min)	
Crosshead travel distance (Excluding chucks)	830mm	1100mm
Effective stroke	495mm (Using C-3 chuck) 610mm (Using Box chuck)	595mm (Using C-1 chuck) 670mm (Using C-2 chuck) 750mm (Using C-3 chuck) 785mm (Using C-4 chuck)
Power requirement	Single-phase, AC100V, 50/60Hz, 0.7kVA	Single-phase, AC100V, 50/60Hz, 0.8kVA
Dimensions	W600 x D470 x H1300mm	W720 x D470 x H1600mm
Weight	Approx. 105kg	Approx. 135kg

■No.260 Strograph S series

Dual column, universal testing machine, up to 50kN

S20/S50

S20-F/S50-F

The TOYOSEIKI **Strograph S** series dual column, universal testing machines are designed for testing tensile, bend/flexure, compression, peel, friction etc. of various materials, ranging up to 20kN (S20, S20-F), 50kN (S50, S50-F).

Model	S20 / S50	S20-F / S50-F
Operation	By optional data processing unit (Main unit does not have any operation panel)	Operation panel
Load cell capacity	Max. 50kN	
Force accuracy	±1.0% of reading (Down to 1/500 of load cell capacity) Conforms to ISO 7500-1 (JIS B 7721) Class 1	
Crosshead speed range	0.0005 to 1000mm/min., 23 steps	
Crosshead speed accuracy	±0.1% (0.5 to 500mm/min)	
Crosshead travel distance (Excluding chucks)	940mm	
Effective stroke	620mm (Using model C-1 chuck)	
Power requirement	Three-phase, AC200V, 50/60Hz, 3.5kVA	
Dimensions	W810 (870 incl. emergency switch) x D590 x H1620mm	
Weight	Approx. 175kg	

■No.120 Strograph T

Universal testing machine with environmental chamber (-50 to +200ºC)

The TOYOSEIKI **Strograph T** universal testing machine with environmental chamber is capable of performing tensile, bending and flexural tests at temperatures in the range of -50 to +200ºC, load up to 10kN. Specially designed main unit and thermostatic chamber provides large crosshead stroke.

Load cell capacity	Max. 10kN
Force accuracy	±1.0% of reading
Crosshead speed range	0.5 to 500mm/min., 14 steps
Crosshead speed accuracy	±0.1%
Crosshead travel distance (Excluding chucks)	900mm
Effective stroke	600mm (Using model C-2 chuck)
Temperature range	-50 to 200ºC
Power requirement	■Three-phase, AC200V, 50/60Hz, 3.5kVA (Main unit) ■Three-phase, AC200V, 50/60Hz, 17.3kVA (Thermostatic chamber) ■Single-phase, AC100V, 50/60Hz, 1kVA (PC)
Dimensions	W1270 x D920 x H2200mm
Weight	Approx. 500kg

2. Fully Automated Tensile & Flexure Testing Systems

■No.218 Strograph AP4

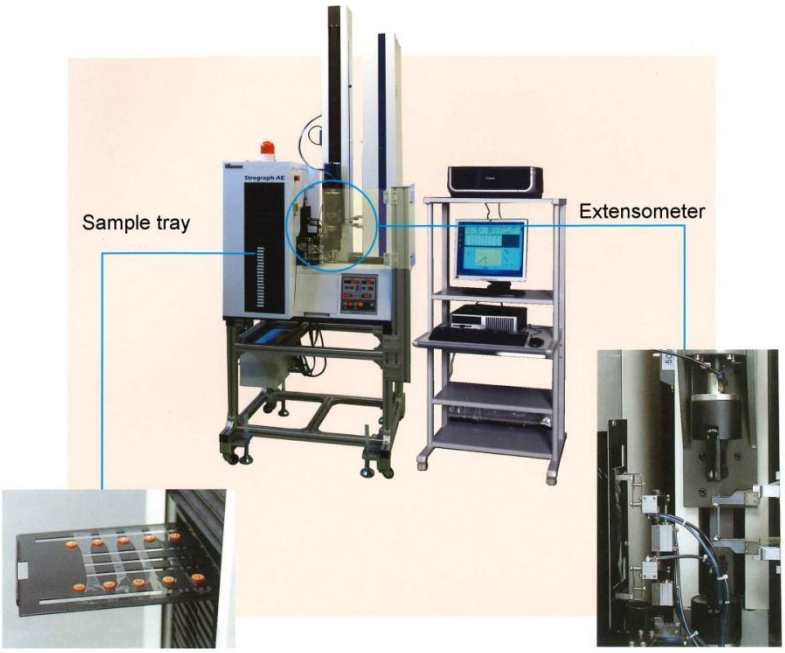
Fully automatic tensile testing machine for plastic specimens

The TOYOSEIKI **Strograph AP4** is a fully automated tensile testing machine which is designed for plastic specimens. The machine operates a sequential operation from dimensions measurement, chucking, tensile testing, and mark-tracing to data processing by simply loading specimens into cartridge.

Load cell capacity	Max. 20kN
Crosshead speed range	0.0005 to 500mm/min.
Effective stroke (Including model B-1 chuck)	Approx. 700mm
Thickness gauge for specimen thickness and width measurement	Digital type thickness gauge Resolution:1/100mm, Accuracy:±2/100mm, Measurement point:3 points Anvil: Tip R2.4mm (spherical), Fix side Ø2mm (flat)
Extensometer	Contact type, Gauge length:50mm Accuracy: Fine elongation±1μm (0-100μm), ±1.5μm (150μm), Large elongation±1% Effective stroke: 350mm
Specimen feeder	Max. 200 specimens
Power requirement	Single-phase, AC100V, 50/60Hz, 1kVA (Main unit) Single-phase, AC100V, 50/60Hz, 0.5kVA (PC)
Compressed air requirement	0.5MPa
Dimensions	W1500 x D900 x H2000mm
Weight	Approx. 620kg

■No.211 Strograph AE Film

Fully automated tensile testing machine for plastic films



The Toyoseiki **Strograph AE Film** is a fully automated tensile testing machine which is designed exclusively for plastic films.

Load cell capacity	Max. 500N
Crosshead speed range	5 to 500mm/min., 13 steps
Crosshead speed accuracy	±0.5%
Effective stroke (Including chucks)	Approx. 650mm (Option: approx. 850mm)
Thickness gauge	Resolution: 0.1μm, Accuracy:±1μm, Meas. points:3, Anvil dia.:Ø5mm
Extensometer	Contact type, gauge length: 40mm, 50mm Tracing speed: Max 500mm/min., Effective stroke: approx. 500mm
Specimen feeder	Max. 100 specimens (Option: 250 specimens)
Kind of specimen	■JIS Z 1702 ■ISO 527-3, type 2, type 1B
Power requirement	Single-phase, AC100V, 50/60Hz, 1.5kVA
Compressed air requirement	0.5MPa
Dimensions	■Main unit: W800 x D760 x H2240mm (Stroke extension option H2440mm) ■PC: W800 x D640 x H1260mm
Net weight	Approx. 200kg

■No.509 Bendograph

Fully automated bend/flexure testing machine for plastic specimens

The TOYOSEIKI **Bendograph** is designed exclusively for the automatic flexural testing of plastic specimens. Other than the setting up of specimens, all operations including testing and data processing are performed automatically. This machine's compact design is good for laboratories that have limited space and would otherwise be unable to fit a similar machine.

Load cell capacity	Max. 2kN
Crosshead speed range	0.05 to 100mm/min.
Effective stroke	40mm
Thickness measurement	Twin digital linear gauge (Indenter R50mm & Ø4mm)
Width measurement	Digital linear gauge (Indenter Ø1mm)
Upper loading anvil	■R5mm (ISO/JIS/ASTM) ■R3.2mm (ASTM)
Lower support anvils	■R5mm, Span 64mm (ISO/JIS) ■R5mm or R3.2mm, Span 50.8mm or 101.6mm (ASTM)
Flexural measurement	Standard: Cross-head displacement with compliance correction Option: Non-contact displacement meter
Specimen	■ISO/JIS: L80 x W10 x T4mm ■ASTM: L127 x W12.7 x T6.4 or 3.2mm
Specimen feeder	Max. 140 specimens (In case of 4mm thickness specimen)
Power requirement	Single-phase, AC100V, 50/60Hz, 0.6kVA (Main unit)
Compressed air requirement	0.5MPa
Dimensions	W900 x D500 x H1600mm (Main unit)
Weight	Approx. 200kg (Main unit)
Related standards	ISO 178 (JIS K 7171) ASTM D790

3. Accessories (Options) for Universal Testing Systems

■Chucks (Grips)

Tensile tests

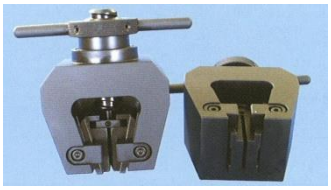
Screw type vise chuck

Model	Max. load	Grip width	Grip length	Clearance	Grip face
A-1	10kN	50mm	54mm	16mm	File teeth
A-2	5kN	50mm	50mm	16mm	File teeth
A-3	1kN	50mm	40mm	16mm	■File teeth ■Rubber sheet
A-4	200N	30mm	30mm	9mm	■File teeth ■Rubber sheet
A-5	100N	30mm	30mm	9mm	■File teeth ■Rubber sheet
A-6	50N	20mm	20mm	9mm	■File teeth ■Rubber sheet

A-2

Non-shift wedge chuck

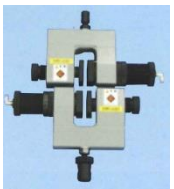
Model	Max. load	Grip width	Grip length	Clearance	Grip face
C-0	50kN	40mm	42mm	6.5mm	File teeth
C-1	20kN	32mm	45mm	7.5mm	File teeth
C-2	10kN	26mm	35mm	7.5mm	File teeth
C-3	5kN	26mm	30mm	7.5mm	File teeth
C-4	1kN	26mm	30mm	7.5mm	File teeth



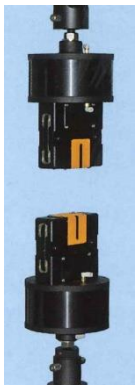
C-1

Pneumatic vise chuck (Application: Plastics etc.)

Model	Max. load	Grip width	Grip length	Clearance	Grip face
BD-20K	20kN	50mm	50mm	8mm	File teeth
B-7	20kN	50mm	50mm	2+5mm	File teeth
BD-10K	10kN	40mm	40mm	8mm	File teeth
B-8	10kN	60mm	50mm	2+5mm	File teeth
B-9	5kN	60mm	50mm	5+5mm	File teeth
B-10	2kN	50mm	50mm	5+5mm	File teeth



B-8



BD-10K

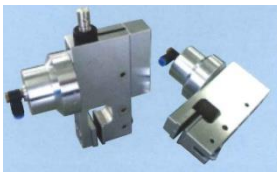
Pneumatic vise chuck (Application: Film etc.)

Model	Max. load	Grip width	Grip length	Clearance	Grip face
B-11	5kN	40mm	30mm	10mm	File teeth
B-12	1kN	30mm	24mm	10mm	■File teeth ■Rubber sheet
B-13	500N	30mm	20mm	10mm	■File teeth ■Rubber sheet

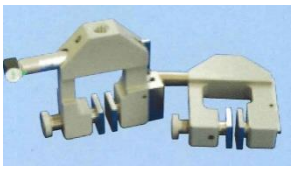
B-13

Pneumatic vise chuck (Application: Thin film etc.)

Model	Max. load	Grip width	Grip length	Clearance	Grip face
B-4	500N	25mm	25mm	3mm	■File teeth ■Rubber sheet
B-5	50N	20mm	20mm	2.5+2.5mm	■File teeth ■Rubber sheet
B-6	20N	18mm	18mm	3+3mm	■File teeth ■Rubber sheet



B-4



B-5

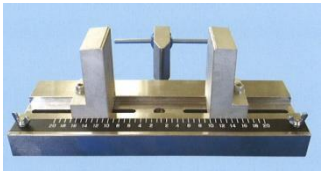
Wide range box chuck (Application: Film etc.)

Model	Max. load	Grip width	Grip length	Clearance	Grip face
J-1	5kN	50mm	30mm	6mm	■Flat ■Rubber sheet ■File teeth
J-2	500N	50mm	30mm	6mmm	■Flat ■Rubber sheet ■File teeth
J-3	100N	50mm	20mm	6mm	■Flat ■Rubber sheet

J-3

Bending (Flexure) tool [Direct type]

Model	Max. load	Upper loading anvil	Lower support anvils	Support span	Related standards
F-0	5kN	R5mm	R5mm	20 to 200mm	ISO 178 (JIS K 7171) Specimen with thickness above 3mm
F-1	5kN	R5mm	R2mm	20 to 200mm	ISO 178 (JIS K 7171) Specimen with thickness 3mm or less
F-2	5kN	R3.2mm	R3.2mm	20 to 200mm	ASTM D790



F-1

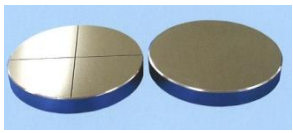
Bending (Flexure) tool [Cage type]

Model	Max. load	Upper loading anvil	Lower support anvils	Support span	Related standards
F-3	5kN	R5mm	R5mm	30 to 100mm	ISO 178 (JIS K 7171) Specimen with thickness above 3mm
F-4	5kN	R3.2mm	R3.2mm	30 to 100mm	ASTM D790
F-5	500N	R5mm	R5mm	20 to 80mm	ISO 178 (JIS K 7171) Specimen with thickness above 3mm
F-6	500N	R3.2mm	R3.2mm	20 to 80mm	ASTM D790

F-3

Compression tool [Direct type]

Model	Max. load	Diameter
G-1	20kN	Ø150mm
G-2	10kN	Ø100mm
G-3	5kN	Ø100mm



G-2

Compression tool [Direct type with ball tip]

Model	Max. load	Diameter
G-4	20kN	Ø150mm
G-5	10kN	Ø100mm
G-6	5kN	Ø100mm

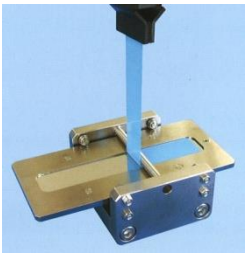
Compression tool [Cage type]

Model	Max. load	Diameter	Support tip	Max. height of specimen
G-7	20kN	Ø140mm	R5mm	90mm
G-8	10kN	Ø120mm	R2mm	80mm
G-9	5kN	Ø100mm	R3.2mm	50mm

G-9

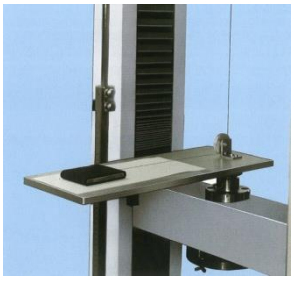
90º peeling test tool (Application: Adhesive tape etc.)

Model	Max. load	Applicable specimen	Exfoliation
R-1	50N	25 x 109mm	19mm
R-2	30N	35 x 109mm	29mm



Slide test tool (For friction test)

Model	Table size	Sled dimensions	Sled contact face	Sled weight	Related Standard
S-1	160 x 380mm	63.5 x 63.5mm	Sponge	200g	ASTM D1894
S-3	160 x 380mm	63 x 63mm	Felt	200g	ISO 8295 (JIS K 7125)



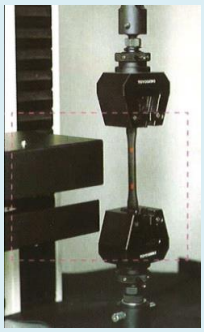
S-1

■Extensometer

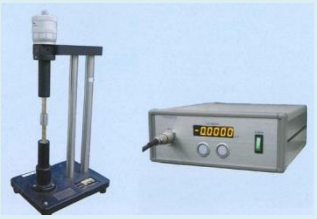
Contact type extensometer

Model	DE-CH (High accuracy model)	DE-C (Standard model)
Measurement range	Max. 350mm (BD-10K chuck)	Max. 1000mm
Measurement principle	Large range: Wire encoder Fine range: Non contact linear encoder	Pulse type encoder
Resolution	Large range: 22.0μm Fine range: 0.4μm	0.01mm
Accuracy	Large range: ±1% Fine range: ±1μm	±0.2mm or 1% of reading, Whichever greater
Gauge length	50mm	20 to 50mm
		

Non-contact type extensometer

Model	DE-SP (Laser Extensometer)	DE-A (Video Extensometer)
Measurement range	-----	Max. approx. 750% (Standard)
Measurement principle	Laser (Class 3B)	Optical (CCD camera)
Resolution	-----	0.1mm
Accuracy	Large range: ±1% Fine range: 1μm	-----
Gauge length	20 to 75mm	20, 25, 50mm
Max. speed	500mm/min.	-----
		

Strain gauge type extensometer (For measurement of elastic modulus)

Model	DE-ME
Measurement range	Fine range only
Measurement principle	Strain gauge
Resolution	-----
Accuracy	±0.5mm or 1μm, whichever greater
Gauge length	50 or 75mm
	 Strain gauge  Calibration device

4. Rheology & Melt Flow Indexers

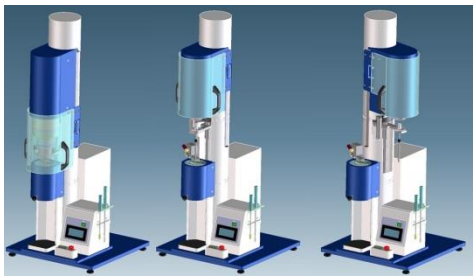
■No.522 Melt Indexer, model G-02

The TOYOSEIKI **Melt Indexer G-02** is designed for measuring of the Melt Flow Rate (MFR) and Melt Volume Rate (MVR) conforms to ISO 1133 (JIS K 7210) and ASTM D1238.

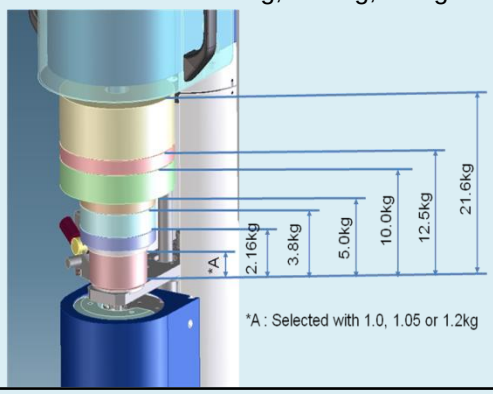
Test types	■Single weight MFR ■Single weight MVR (With optional piston displacement transducer)
Temperature range	100 to 350ºC (Option 400ºC)
Temperature accuracy	±0.2ºC
Temperature resolution	0.1ºC / 0.01ºC (Can be changed from environment setting)
Test loads	■0.325, 2.16kg (Standard) ■1, 1.05, 1.2, 3.8, 5, 10, 12.5, 21.6kg (Optional)
Touch screen	4” LCD touchscreen Language: English, Chinese, Korean and Japanese
Options	■Piston displacement transducer ■Weight lifting device ■Manual cutting device ■Automatic cutting device ■Die plug ■Software ■Safety cover etc.
Power requirement	Single-phase, AC100 to 115V or 200 to 230V, 50/60Hz, 0.3kVA
Dimensions	W400 x D370 x H560mm
Weight	Approx. 40kg
Related standards	ISO 1133 (JIS K 7210) ASTM D1238 Procedure A , B, C *Note: Optional piston displacement transducer is required for procedure B* *Optional half size orifice is required for procedure C*

■No.522 Melt Indexer, model G-02 Multi-weight

Semi-automated model for multiple weights test



The TOYOSEIKI **Melt Indexer G-02 Multi-weight** is designed for ASTM D 1238 procedure D, multiple weights test. Up to 8 different weights can be used with automatic selection. Multi-weight concept (Automatic selection of the test weights) enables the user to perform measurement similar to a capillary rheometer with different test loads.

Test types	■Single weight MFR (And MVR with optional piston displacement transducer) ■Multiple weights MFR (And MVR with optional piston displacement transducer)
Temperature range	100 to 350ºC (Option 400ºC)
Temperature accuracy	±0.2ºC
Temperature resolution	0.1ºC / 0.01ºC (Can be changed from environment setting)
Installed test loads (8 different test loads with automatic selection)	■0.325, 2.16kg, 3.8kg, 5kg, 10kg, 12.5kg, 21.6kg +select 1 kind from 1kg, 1.05kg, 1.2kg 
Multiple weights test	Up to 3 test loads in one test
Piston displacement transducer	Available as option
Weight lifting & residue push	Automatic (Motorized)
Furnace cleaning	Manually
Touch screen	4” LCD touchscreen (Language: English, Chinese, Korean and Japanese)
Power requirement	Single-phase, AC100 to 115V or 200 to 230V, 50/60Hz
Compressed air requirement	0.4MPa
Dimensions	W700 x D730 x H1400mm
Related standards	ISO 1133 (JIS K 7210) ASTM D1238 Procedure A, B, C, D *Note: Optional piston travel transducer is required for procedure B* *Optional half size orifice is required for procedure C*

■No.521 Semi Auto Melt Indexer, model 4A

Semi-automated Melt Indexer

The TOYOSEIKI **Semi Auto Melt Indexer** is designed for measuring of Melt Flow Rate (MFR) and Melt Volume Rate (MVR) conforms to ISO 1133 (JIS K 7210) and ASTM D1238 with semi-automated functions such as assisted weight lifting, residue purging and assisted cleaning to ease the user‘s burden during operation.

Test types	• Single weight MFR • Single weight MVR
Temperature range	100 to 350ºC
Test loads	0.325kg, 2.16kg, 5.0kg (standard)
Piston displacement transducer	Yes
Weight lifting & residue push	Automatic
Furnace cleaning	Automatic *(Except setting & disposal of cleaning gauze)*
Power requirement	Single-phase, AC100V, 50/60Hz, 1.5kVA
Compressed air requirement	0.5-0.7MPa
Dimensions	W740 x D605 x H1100-1180mm
Weight	Approx. 150kg
Related standards	ISO 1133 (JIS K 7210) ASTM D1238

■No.520 Melt Flow Rater, model D-M

Fully Automated Melt Indexer

The TOYOSEIKI **Melt Flow Rater** is designed for measuring of the Melt Flow Rate (MFR) and Melt Volume Rate (MVR) conforms to ISO 1133 (JIS K 7210) and ASTM D1238 in fully automated mode. This machine follows a sequential operation from the loading of materials, testing, data processing to the cleaning of barrel and performing the next test all on its own. This tremendously reduces the workload of the user who can go on to perform other job functions after loading in the samples.

Test types	• Single weight MFR • Single weight MVR
Temperature range	80 to 300ºC
Test loads	0.325, 2.16, 5, 10kg (Standard)
Piston displacement transducer	Yes
Furnace cleaning	Fully-automatic
Piston cleaning	Fully-automatic
Orifice cleaning	Fully-automatic
Sample cups	• 10 pcs. (Standard) • 20 pcs. (Optional dram type piston cleaning gauze should be selected) • 40 pcs. (Optional dram type piston cleaning gauze should be selected)
Power requirement	Single-phase, AC100V, 50/60Hz, 1.5kVA
Compressed air requirement	0.6MPa
Dimensions	W900 x D700 x H1060mm (Main unit)
Weight	Approx. 320kg (Main unit)
Related standards	ISO 1133 (JIS K 7210) ASTM D1238 Procedure A, B *Note: Optional automation unit is required for procedure A*

■No.583 Capilograph

Capillary Rheometer (Single & twin bore barrel)

The TOYOSEIKI **Capilograph** measures melt viscosity of polymers by detecting the shear rate and shear stress of melt polymer when it flows out of the capillary die. Die swell and melt strength can also be measured by equipping it with optional attachments.
The twin bore barrel model (F-2) allows easy Bagley & Weissenberg-Rabinowitsch correction (for determination of true viscosity) or elongational viscosity calculation in a single test run.

Model	F-1	F-2
Temperature range	60 to 400ºC (Option: 500ºC)	
Temperature accuracy	±1ºC (Less than 300ºC) Within ±2ºC (300ºC or more)	
Number of bores	Single	Twin
Bore diameter	Ø9.55mm or Ø15mm	Ø15mm
Barrel length	Length: 350mm, Effective length: 250mm	
Piston speed	0.1 to 1500mm/min.	
Force range (Load cell capacity)	25kN (Bore dia. Ø9.55mm) 50kN (Bore dia. Ø15mm)	25kN (Bore dia. Ø15mm)
Cleaning device for barrel	Included (Pneumatic)	
Safety cover with interlock	Included	
Melt strength measurement	Optional	
Die swell measurement	Optional	
Bagley & weissenberg-Rabinowitsch correction	Optional	
Elongational viscosity calculation	Optional	
Power requirement	Three-phase, AC200V, 50/60Hz, 5.2kVA (For main unit) Single-phase, AC100V, 50/60Hz, 0.3kVA (For PC)	
Compressed air requirement	0.5MPa	
Dimensions	W1060 x D1100 x H1950 to 2360mm (Main unit)	
Weight	Approx. 650kg (Main unit)	
Related standards	ISO 11443 (JIS K 7199) ASTM D3835	

■No.633 P-V-T Test System

The TOYOSEIKI **P-V-T Test System** measures relationship data in the form of Pressure-Volume (Specific)-Temperature of melting polymers required at the time of actual polymer processing just with a small quantity of sample.

Model	A2
Measurement system	Direct method by piston-cylinder system Vacuum degassing device included Strain correction by temperature & pressure
Furnace cleaning	Pneumatic
Test mode	■Constant pressure temperature change mode ■Constant temperature pressure change mode ■Thermosetting resin test mode
Temperature range	Room temperature +5ºC to 400ºC
Temperature control	PID control
Length of furnace	115mm
Diameter of furnace	Ø9.55mm
Pressure applying system	Pneumatic cylinder
Maximum pressure	200MPa
Pressure detection	Load cell
Pressure detection accuracy	±1% F.S.
Displacement measurement	Linear scale
Displacement measurement range	10 to 30mm (Resolution 1 micrometer)
Sample insertion	Pneumatic (Vacuum degassing system)
Power requirement	Single-phase, AC100V, 50/60Hz, 1kVA
Compressed air requirement	0.55MPa or more
Dimensions	W670 x D750 x H1050mm (Main unit)
Weight	Approx. 120kg (Main unit)

■No.669 Thermal Conductivity Tester

The TOYOSEIKI **Thermal Conductivity Tester** measures thermal conductivity of plastic materials during the transition from melted state to solid state. The tester is also capable of measuring the conductivity during the change of state from solid state to melted state.

Model	LS-1
Measurement cylinder	■Cylinder diameter: Ø12.5mm ■Electric heater: 400W ■Temperature sensor: Pt100 (Resolution 0.1ºC)
Probe	■Probe diameter: Ø1.2mm ■Probe length: 50mm ■Temperature sensor: Pt100 (Resolution 0.01ºC) ■Heater output: 0 to 16V, 0 to 400mA *However, max output 5W, accuracy 0.1& (at test room 25ºC)*
Pressure system	Ø63mm Pneumatic cylinder system (max 2800N)
Measurement temperature range	Max. 350ºC
Measurement range	0 to 1.5W/m.k
Cleaning	Pneumatic cylinder (max 2800N)
Specimen supply	Manually
Displacement measurement range	10 to 30mm (Resolution 1 micrometer)
Power requirement	Single-phase, AC100V, 50/60Hz, 1kVA
Compressed air requirement	0.5MPa
Dimensions	W310 x D495 x H690mm (Main unit)
Weight	Approx. 30kg (Main unit) Approx. 6kg (Control unit)

5. HDT & VICAT

■No.533 HDT / VICAT Tester

The TOYOSEIKI **HDT / VICAT Tester** uses a 2 steps split loading system to ensure simultaneous application of the load on the specimens, applying a consistent fixed stress to the specimens. Using their patented design of the stirring and circular flow, Toyoseiki is able to ensure the temperature uniformity of the oil bath, achieving a precision of ±0.5ºC throughout in the tank. Equipped with high precision LVDT, and Pt100 temperature sensor at each station, TOYOSEIKI's HDT / VICAT Tester is able to provide consistent, stable results when measuring the temperature as the limiting distortion is reached.

Model	3M-2W2	6M-2W2
Number of stations	3	6
Heat transfer medium	Silicone oil	
Temperature range	Max. 300ºC	
Heating rate	120ºC/h, 50ºC/h	
Bending stress	1.80MPa, 0.45MPa	
LVDT resolution	1/1000mm	
Specimen support span	64mm, 100mm	
Movement of test stations	Motorized	
Application of test weights	Motorized (Simultaneously applied)	
Specimen feeding	Manual	
Power requirement	Single-phase, AC220 to 230V, 50/60Hz, 3.2kVA	Single-phase, AC220 to 230V, 50/60Hz, 5.5kVA
Cooling water requirement	0.1 to 0.7MPa, 5L/min. or more	
Dimensions	W720 x D630 x H1350mm	W1010 x D630 x H1350mm
Weight	Approx. 150kg	Approx. 180kg
Related standards	■DTUL: ISO 75-1, 2 (JIS K 7191-1, 2), ASTM D648 ■VICAT: ISO 306 (JIS K 7206), ASTM D1525	

■No.533 Fully Automated HDT / VICAT Tester

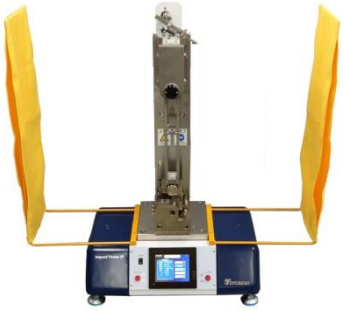
The TOYOSEIKI **Fully Automated HDT / VICAT Tester** has been designed to perform HDT and VICAT tests with fully automated operation.

Model	3A-2W	6A-2W
Number of stations	3	6
Heat transfer medium	Silicone oil	
Temperature range	Max. 300ºC	
Heating rate	120ºC/h, 50ºC/h	
Bending stress	1.80MPa, 0.45MPa	
LVDT resolution	1/1000mm	
Specimen support span	64mm, 100mm	
Movement of test stations	Motorized	
Application of test weights	Motorized (Simultaneously applied)	
Specimen feeding	Automatic	
Specimen holder *Note: In case 4mm height specimen for DTUL*	120 specimens	240 specimens
Power requirement	Single-phase, AC220-230V, 50/60Hz, 3.2kVA	Single-phase, AC220-230V, 50/60Hz, 5.5kVA
Cooling water requirement	0.1 to 0.7MPa, 5L/min. or more	
Dimensions	W780 x D760 x H1540mm	W1080 x D760 x H1590mm
Weight	Approx. 180kg	Approx. 210kg
Related standards	■DTUL: ISO 75-1, 2 (JIS K 7191-1, 2), ASTM D648 ■VICAT: ISO 306 (JIS K 7206), ASTM D1525	

6. Impact Testing Systems & Notcher

■No.556 Impact Tester

Pendulum impact tester, up to 15J (Charpy), 22J (Izod)



With optional safety cover

The TOYOSEIKI **Impact Tester IT** is a pendulum impact tester which measures absorbed impact energy of plastic specimens based on Izod, Charpy and Tensile strength method.

Model	IT
Max. hammer capacity	15J (Charpy, ISO179) 22J (Izod, ISO 180)
Touch screen	5 inch color touchscreen
Test results	■ Lifting angle ■ Absorbed energy ■ Absorbed energy per unit sectional area
Power requirement	Single-phase, AC100 to 240V, 50/60Hz, 0.2kVA
Dimensions	W600 x D360 x H1000mm
Weight	Approx. 80kg
Related standards	■Charpy: ISO 179 (JIS K 7111), ASTM D6110 ■Izod: ISO 180 (JIS K 7110), ASTM D256 ■Tensile-impact: ISO 8256 (JIS K 7160), ASTM D1822

■No.526 Temperature-controlled Impact Tester

Pendulum impact tester with temperature chamber

The TOYOSEIKI **Temperature-controlled Impact Tester** is a pendulum impact tester which measures absorbed impact energy of plastic specimens based on Izod, Charpy and Tensile strength method at low temperature.

Cooling method	Refrigerator
Temperature range	-40 to 40ºC (Model -40C)
Max. hammer capacity	15J (Charpy) 22J (Izod)
Test results	■ Lifting angle ■ Absorbed energy ■ Absorbed energy per unit sectional area
Power requirement	Three-phase, AC200V, 50/60Hz, 8.7kVA
Dimensions	W1300 x D1200 x H1600mm
Weight	Approx. 600kg
Related standards	■Charpy: ISO 179 (JIS K 7111), ASTM D6110 ■Izod: ISO 180 (JIS K 7110), ASTM D256 ■Tensile-impact: ISO 8256 (JIS K 7160), ASTM D1822

■No.628 Notching Tool A-4 / A-4E

Advanced milling type notcher for Izod/Charpy impact test specimen

The TOYOSEIKI **Notching Tool A-4** series are miniature, computerized, numerically controlled milling machine for preparing a variety of notched specimen bars. All operations except mounting and dismounting of the specimens are automatic. It automatically positions and cut according to specimen and notch dimensions. The instrument employs a precision servo motor control system with a touchscren control display. Safety interfaces protect the operator from accidents. The cutter speed and table travel speed can be optimized for the specimen's material. The instrument can store up to 99 (16 for A-4E) user-defined cutting programs. Bars can also be automatically cut from the ISO multipurpose specimens (A-4 only)

Model	A-4	A-4E
Processing items	■Notching ■Specimen's ends slicing	■Notching
Specimen clamp	Length: 63.5 to 200mm Height: 3 to 15mm Thickness: Max. clamp clearance 100mm (=4mm x 25 specimens)	
Notch height motor	Stepper motor with precision ball screw	
Notch height setting	3 to 14.99mm, 0.01mm steps	
Table feed motor	Stepper motor with precision ball screw	
Table feed rate	50 to 1200mm/min.	
Cutter motor	AC servo motor (200 to 900rpm)	Synchronous motor (50Hz: 300rpm, 60Hz: 360rpm)
Standard V notch cutter	Diameter: Ø75mm Angle: 45º Tip-radius: 0.25mm Material: High speed tool steel	
Specimen's ends Slicing length	Standard: 80mm (ISO179, 180, 8256) Option: 63.5mm (ASTM D256)	-----
Safetygurds	Safety cover with interlock, Emergency stop switch	
Power requirement	Single-phase, AC100V, 50/60Hz, 0.8kVA	Single-phase, AC100V, 50/60Hz, 0.3kVA
Dimensions	W300 x D700 x H700mm	
Weight	Approx. 65kg	

■No.451 Du Pont Type Impact Tester
■No.452 Sheet Impact Tester

Impact tester for measurement of impact resistance of coatings or plastic sheets

H-50

H-100

Sheet Impact Tester

The TOYOSEIKI **Du Pont Type Impact Tester** is a impact tester which measures impact resistance of coatings or plastic sheets. **Sheet Impact Tester** is an advanced model which has weight lifting device.

Model	H-50	H-100/H-200	No.452 Sheet Impact Tester
Application	Coatings	Plastic sheets	Coatings & plastic sheets
Falling height	Max. 500mm	Max. 1000mm (H-100) Max. 2000mm (H-200)	Max. 1000mm
Falling weight	■300g ■500g ■1000g	■1000g ■2000g	Select one out from below ■300g ■500g ■1000g ■2000g
Impact head	■R1.59mm ■R3.18mm ■R4.76mm ■R6.35mm ■R12.7mm	■R7.9mm	Select one out from below ■R1.59mm ■R3.18mm ■R4.76mm ■R6.35mm ■R7.9mm ■R12.7mm
Receive block	■R1.59mm/R3.18mm ■R4.76mm / R6.35mm ■Flat	■R8.1mm / R15.2mm	Select one out from below ■R1.59mm ■R3.18mm ■R4.76mm ■R6.35mm ■R8.1mm ■R15.2mm ■Flat
Power requirement	N/A	N/A	Single-phase, AC100V, 50/60Hz, 0.3kVA
Dimensions	W460 x D300 x H760mm	W450xD300xH1260mm(H-100) W460xD300xH2260mm(H-200)	W550 x D350 x H1500mm
Net weight	20kg	25kg (H-100), 30kg (H-200)	150kg
Related standards	JIS K 5600-5-3	ASTM D2794	JIS K 5600-5-3, ASTM D2794

■No.195 Film Impact Tester
■No.196 Film Impact Tester with Thermostatic Chamber

Puncture Impact tester for measurement of impact resistance of plastic films

FT-M

FT-DG

The TOYOSEIKI **Film Impact Tester** is a puncture impact tester which measures impact resistance of thin materials such as plastic films by puncturing of a hemispherical hammer.

No.196 Film Impact Tester with Thermostatic Chamber

Model	No.195 Film Impact Tester, model FT-M	No.195 Film Impact Tester, model FT-DG	No.196 Film Impact Tester with Thermostatic Chamber
Capacity	■0 to 1.5J ■0 to 3J (2 ranges)		
Impact head	Hemisphere shape (2 kinds) ■Ø12.7mm ■Ø25.4mm		
Display	Analog (Pointer)	Digital (Touch screen)	Digital (Touch screen)
Temperature range	N/A		-35 to 100ºC
Power requirement	N/A	Single-phase, AC100V, 50/60Hz, 0.2kVA	Three-phase, AC200V, 50/60Hz, 6.9kVA
Compressed air requirement	0.3 to 0.5MPa (For pneumatic chuck option)		0.3 to 0.5MPa
Dimensions	W740 x D300 x H750mm		W1300 x D800 x H1750mm
Weight	82kg		350kg
Related standards	N/A		

■No.613 Dart Impact Tester

Falling dart impact tester for plastic films

The TOYOSEIKI **Dart Impact Tester** evaluates impact rupture strength by measuring impact energy applied to plastic films.

Dart	Method A: Ø38mm, 32g Method B: Ø50.8mm, 320g
Dart mass	Method A: Max. 970g Method B: Max. 1290g
Falling height	250 to 1520mm
Compressed air requirement	0.5MPa
Dimensions	W1050 x D500 x H2500mm
Weight	Approx. 97kg
Related standards	ISO 7765-1 (JIS K 7124-1) ASTM D1709

7. COF Testers

■No.557 Friction Tester, model AN2, AN-S2

Inclined plane method friction (slip angle) tester

AN2

AN-S2

The TOYOSEIKI **Friction Tester model AN2, AN-S2** evaluates friction coefficient by placing sample (block) on an inclined plane, gradually increasing the angle of inclination and determining the angle at which the block starts moving.

Model	AN2	AN-S2
Measurement range of coefficient of static friction (tanθ)	0 to 2.747 (Resolution: 0.001)	0 to 1.732 (Resolution: 0.001)
Max. table angle	70º (Resolution: 0.1º)	60º (Resolution: 0.1º)
Table inclination speed	1.0, 1.5, 2.0, 2.7, 3.0º/s	1.5±0.5º/s
Table dimensions	W210 x D300mm	W150 x D120mm
Sled	W60 x 100mm, 1000g	
Power supply	Single-phase, AC100 to 240V, 50/60Hz, 0.3kVA	Single-phase, AC100V, 50/60Hz, 0.2kVA
Dimensions	W360 x D540 x H385mm	W280 x D468 x H235mm
Net weight	26kg	12kg
Related standards	JIS P 8147 ASTM D4521 TAPPI T542	

■No.557 Friction Tester, model HM-3

Horizontal plane method friction tester

The TOYOSEIKI **Friction Tester, model HM-3** measures friction coefficient (μS, μD) of plastic films.

Table speed	5 to 1500mm/min.
Table drive motor	Servo motor
Table stroke	1 to 200mm
Table size	W330 x D225mm
Load cell	To be selected upon order ■10N (For 200g sled) ■20N (For 1000g sled)
Sled	To be selected upon order ■63 x 63mm, 200g…For plastic films & sheets (ISO 8295/JIS K 7125) ■60 x 100mm, 1000g…For paper & cardboard (JIS P 8147)
Power requirement	Single-phase, AC100 to 240V, 50/60Hz, 0.2kVA
Dimensions	W540 (Max.630) x D350 x H280mm W650 x D350 x H330mm (Including optional safety cover)
Weight	Approx. 19kg
Related standards	ISO 8295 (JIS K 7125) JIS P 8147

8. Creep, Fatigue, Scratch Hardness, Folding Endurance

■No.259 Creep Tester

The TOYOSEIKI **Creep Tester** performs tensile creep test by applying a constant tensile load to the specimens in a controlled temperature chamber, subjecting the materials to a high level of stress under load and temperature over time. With high precision sensors to continuously monitor the materials, it is able to measure minute elongation for calculation of strain in the materials. These creep tests are important to the development and characterization of new materials that are used in materials under constant load.

Model C300-6, Data processing unit shown is option

Load	■Model C100-3, C100-5, C100-6: 10-1000N ■Model C200-3, C200-5, C200-6: 20-2000N ■Model C300-3, C300-5, C300-6: 30-3000N ■Model C10003, C10006: 100-10000N
Number of specimens	3 stations: Model C100-3, C200-3, C300-3, C10003 5 stations: Model C100-5, C200-5, C300-5 6 stations: Model C100-6, C200-6, C300-6, C10006
Elongation	■Model C100: 50mm ■Model C200: 30mm ■Model C300: 25mm ■Model C1000: 50mm
Temperature range	Room temp. + 20ºC to 200ºC
Power requirement	Three-phase, AC200V, 50/60Hz, 10.4kVA
Dimensions	W1470 x D1730 x H1860mm (3 stations model)
Weight	800kg (3 stations)
Related standards	ISO 899-1 (JIS K 7115) ASTM D2990

■No.395 Repeated Vibration Fatigue Tester

Fatigue tester for rigid plastics

The TOYOSEIKI **Repeated Vibration Fatigue Tester** evaluates fatigue resistance by applying repeated stress to plastic materials while giving constant load by means of an unbalanced mass rotation.

Vibration load	■Model B20: ±0.2kN ■Model B50: ±0.5kN ■Model B70: ±0.7kN
Number of cycles	1800cpm
Counter	8 digits
Power requirement	Single-phase, AC100V, 50/60Hz, 4kVA
Dimensions	W730 x D650 x H810mm
Weight	Approx. 520kg
Related standards	JIS K 7118, K 7119

■No.430 Rotary Abrasion Tester

The **Rotary Abrasion Tester** is used in a very wide field of applications as an abrasion tester of various kinds of flat materials.

Model	TS-2
Rotation speed	60rpm or 72rpm
Load	250, 500, 1000gf
Counter	6-digits
Standard abrading wheels provided	1 set of CS-10 or CS-17
Power requirement	Single-phase, AC100V, 50/60Hz, 1kVA
Dimensions	W275 x D410 x H500mm
Weight	Approx. 18kg
Related standards	ISO 9352 JIS A 1453, JIS K 5600, JIS K 6264, JIS K 7204

■No.530 MIT type Folding Endurance Tester

Folding endurance tester for plastics, foils etc.

The TOYOSEIKI **MIT type Folding Endurance Tester** evaluates folding endurance of paper, plastics, leather, foil etc. by repeatedly folding specimen on both sides.

Model	S-2	D-2
Loading system	Spring	Dead weight
Load	• 1.0 to 5.0N • 5.0 to 15.0N (to be selected)	• 2.45 to 19.6N (2.45N steps) • 0.98 to 9.8N (0.49N steps) (to be selected)
Folding angle	45º, 90º, 135º (left/right)	
Folding speed	90, 175cpm	
Chuck (Standard)	Radius of edge: R0.38mm Clearance: 0.25mm	
Counter	9999999 times	
Power requirement	Single-phase, AC100 to 230V, 50/60Hz, 0.5kVA	
Dimensions	W280 x D320 x H450mm	
Wight	Approx. 25kg	
Related standards	ISO 5626 JIS P 8115, JIS R 3420, JIS C 5016 ASTM D2176	

9. Tearing Resistance

■No.164 Digital Elmendorf type Tearing Tester

Tearing tester for plastic films

The TOYOSEIKI **Digital Elmendorf Type Tearing Tester** evaluates resistance of plastic film etc. based on Elmendorf method. Tearing resistance is determined from the loss of potential energy of a fan shaped pendulum and the results are automatically calculated displayed on the touchscreen.

Model	SA	SA-W	HD-D
Capacity (Scale)*1 ★Using additional weight	16N	16N 32N★	32N 64N★
Number of samples	1 to 16 pieces		
Chucks (Jaws)	Pneumatic		
Energy indication	Digital		
Interface	RS-232C		
Power requirement	Single-phase, AC100V, 50/60Hz, 0.1kVA (Other voltages upon request)		
Compressed air requirement	0.4MPa or more		
Dimensions (Approx.)	W500 x D420 x H700mm		W630 x D250 x H660mm (Main unit) W260 x D350 x H200mm (Measuring unit)
Weight (Approx.)	33kg	36kg	36kg (Main unit), 5kg (Measuring unit)
Related standards (Plastic films)	ISO 6383-2 (JIS K 7128-2)		

■No.193 Light Tearing Tester, model D

Tearing tester for plastic film

The TOYOSEIKI **Light Tearing Tester** is able to evaluate low tearing resistance of light materials (Not necessary to lap the specimens)

Measurement range	196, 490, 980, 1960, 4900, 9800mN
Specimen dimensions	63.5 x 50mm
Number of specimen	1 pieces
Chucks (Jaws)	Screw clamp
Display items	Tearing strength, Average, Minimum value, Maximum value, Standard deviation
Interface	RS-232C
Power requirement	Single-phase, AC100V, 50/60Hz, 0.2kVA (Other voltages upon request)
Dimensions	W400 x D420 x H590mm
Weight	30kg

10. Stiffness

■No.581 Loop Stiffness Tester

The TOYOSEIKI **Loop Stiffness Tester** evaluates stiffness of thin-film materials by measuring resistance when collapse in loop shape occurs.

Dimensions of sample	Length: 90 to 180mm Width: 6 to 25.4mm Thickness: 100 to 250μm
Loop length (Effective length)	50 to 120mm
Load range	5000mN (x1) 500mN (x10) 50mN (x100)
Compression rate	3.3mm/s
Output	RS-232C Recorder output (Option)
Power requirement	Single-phase, AC100V, 50/60Hz, 0.3kVA
Dimensions	W360 x D490 x H310mm
Weight	Approx. 25kg

■No.826 Digital Gurley Stiffness Tester

The TOYOSEIKI **Digital Gurley Stiffness Tester** evaluates stiffness of comparatively weak materials such as woven cloth, paper, film, etc. by bending the vertically mounted specimen to the left and right.

Measuring range	0.01 to 5000mN (Pendulum angle 0.3° to 55°)
Length of sample	25.4, 38.1, 63.5, 88.9, 114.3mm
Width of sample	12.7, 25.4, 50.8mm
Test loads	5, 25, 50, 200g
Weight installation distance	25.4, 50.8, 101.6mm
Driving motor	Stepper motor
Arm speed	2 rpm
Angle measurement	Unloaded type encoder (Resolution 0.1°)
Interface	RS-232C x 1
Operating panel	4 inch LCD touch screen
Power requirement	Single-phase, AC100 to 240V, 0.2kVA
Dimensions	W300 x D300 x H550mm
Weight	Approx. 15kg
Related standards	JIS L 1085, JIS L 1096, JIS L 1913

11. Thickness

■No.132 Digital Thickness Meter, model B-1

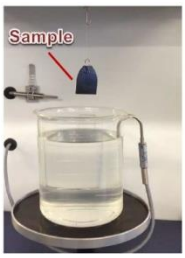
The TOYOSEIKI **Digital Thickness Meter** measures thickness of materials in sheet form such as film etc. Measuring pressure and presser are material specific as per required in accordance with JIS standards.

Measurable items	■Ethylene vinyl acetate resin film for agriculture ■Polyethylene film for packaging ■Contraction packaging film
Anvil dia. (mm)	5
Load (gf)	125
Resolution (mm)	0.001
Option	Mini Printer
Electrical	Battery SR44 x 1
Dimensions	W100 x D170 x H240mm
Weight	Approx. 3.4kg
Related standards	JIS K 6783, Z 1702, Z 1709

12. Density

■No.265 Automatic Densimeter, model DSG-2

The TOYOSEIKI **Automatic Densimeter** measures density of materials such as polymers or rubber in various forms including films or light materials. The weighing operation is fully automatic and the density of the sample is automatically calculated and displayed on the screen at the end of the test. By using the optional attachments, it can also be used to determine density of liquids and rate of change of volume etc. An optional temperature sensor can also be added to allow direct measurement and input of air and liquid temperatures.

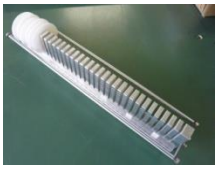


Automatic lifting

Balance unit capacity	100g
Balance unit resolution	0.0001g (0.1mg)
Balance unit repeatability	0.1mg (Standard) 0.07mg (Optional high repeatability balance unit)
Beaker lifting mechanism	Motorized direct-drive actuator Lifting speed: 10, 20, 30mm/sec. (Selectable) Beaker stop position: Lower side: 0, 10, 20mm (Selectable) Upper side: 80, 90, 100mm (Selectable)
Data storage	200 lots, 1000 sets of data (Up to 100 sets of data per lot can be saved)
Immersion liquid	Water, ethanol, acetone (to be used in the range of 10 to 30ºC)
Immersion liquid temperature control (Option)	Possible to control immersion liquid temperature with optional refrigerated circulator and double-wall beaker
Immersion time range	1 to 999 sec.
Table of immersion liquid density	Table of water density is installed as standard Possible to save up to 2 kinds of table (Such as ethanol or acetone)
Power requirement	Single-phase, AC100 to 240V, 50/60Hz, 0.1kVA
Dimensions	W290 x D443 x H900mm
Weight	Approx. 35kg
Related standard	ISO 1183 (JIS K 7112), ISO 2781 (JIS K 6268) JIS Z 8807 ASTM D792

■No.265 Automatic Densimeter, model DSG-A2

Fully Automated Density Tester



Sample holder

The TOYOSEIKI **Automatic Densimeter, DSG-A** measures the density of plastics with fully automated operation.

Measurement unit	
Max. capacity	100g
Minimum readout	0.0001g (0.1mg)
Operation panel	4 inch LCD touch screen
Measurement item	Solid density
Measurement units	■g/cm^3 ■kg/m^3 (Selectable)
Density display resolution	0.000001g/cm^3
Beaker lifting mechanism	Motorized direct-drive actuator
Data saving capacity	200 lot (100data/lot; provided max. 1000 data can be saved)
Interface	RS-232 x 1
Power requirement	Single-phase, AC100 to 240V, 50/60Hz, 0.1kVA
Dimensions	W290 x D443 x H915mm
Weight	Approx. 35kg
Automated sample feeder	
Sample dimensions	40 x 40 x 2mm or Ø40 x 2mm (On request basis. Need confirmation for other dimensions)
Number of samples	Max. 64 (Vary depending on sample dimensions)
Measurement time	Approx. 2 minutes / test (Depends on sample)
Sample feeding	Pick-up hand, Feeding arm (Pneumatic cylinder, Motorized actuator)
Operation panel	4 inch LCD touch screen
Compressed air requirement	0.3MPa
Power requirement	Single-phase, AC100 to 240V, 50/60Hz, 2kVA
Dimensions	W300 x D600 x H850mm
Weight	Approx. 40kg

6. Heat Aging

■No.272 Geer Oven

Stacking option

The TOYOSEIKI **Geer type Oven** evaluates aging of materials in hot air atmosphere with a fixed air change rate. Air change rate is measured by methods of electric power consumption.

Models	A45A2S, A60A2S	A45S, A60S	S45, S60
Air change meter (Air change rate measuring device)	Built-in type equipped	Built-in type equipped	Not equipped (Portable air change meter is available as option)
Damper setting	Automatic	Manual	Manual

Inside dimensions	■Model 45 series: W450 x D450 x H500mm ■Model 60 series: W600 x D600 x H600mm
Temperature range	Max. 300ºC
Temperature control accuracy	±1ºC (40ºC to 100ºC) ±2ºC (125ºC to 300ºC)
Inside oven wind speed	0.5±0.1m/s (Average of 18 points)
Air change rate	2 to 20* times/h (*Up to 50 times/h (Model 60) or 60 times/h (Model 45) is possible)
Sample rotating rack rotation speed	8 to 10rpm
Options	Paper-less type recorder etc.
Power requirement	■Model 45 series: Three-phase, AC200V, 50/60Hz, 3.8kVA ■Model 60 series: Three-phase, AC200V, 50/60Hz, 4.8kVA
Dimensions	■Model 45 series: W1090 x D800 x H1430mm ■Model 60 series: W1240 x D950 x H1540mm
Weight	■Model 45 series: Approx. 200kg ■Model 60 series: Approx. 290kg
Related standards	ISO 188 (JIS K 6257) JIS B 7757, K 7212, K 6723, A 5756, C 3005

14. Lab-scale Biaxial Film Stretcher

■No.586 Film Stretching Tester, model EX10B1

The TOYOSEIKI **Film Stretching Tester** experimentally evaluates suitable processing conditions and product value of biaxially stretching films in laboratory.

Dimensions of sample	90 x 90mm
Number of grips	36
Grips driving method	N2 gas
Max. stretching ratio	10 x 10
Stretching speed	0.003 to 26m/min.
Stretching mechanism	Pantograph mechanism (Center stretching)
Stretching mode	■Simultaneous biaxial stretching ■Sequential biaxial stretching ■Constant-width uniaxial stretching ■Manual stretching ■Manual uniaxial stretching ■Stress relaxation after stretching ■Programmed multistage stretching
Driving system	AC servo motor
Temperature range	70 to 230ºC
Power requirement	Three-phase, AC200V, 50/60Hz, 35kVA
Compressed air requirement	0.7MPa
Dimensions	Main unit: W2000 x D2200 x H2200mm Temperature control panel: W700 x D630 x H1800mm

15. Lab-scale Extrusion & Compounding Systems (Torque Rheometer)

■No.655 Labo Plastomill (Base unit)

Laboratory mixer & extruder system

The TOYOSEIKI **Labo Plastomill** is torque rheometer for process parameters optimization or laboratory-scale simulation of polymer materials.

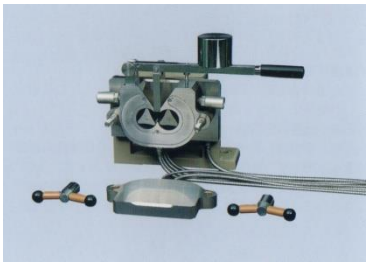
Base unit + Extruder

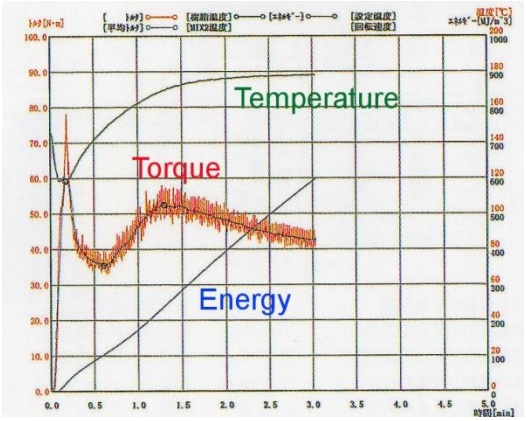
Base unit + Mixer

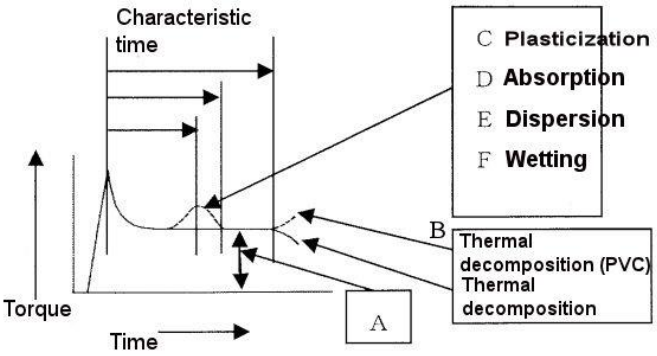
Model	3S150	10S100	3S500
Max. torque	300N.m	1000N.m	300N.m
Speed range	0.1 to 150rpm	0.1 to 100rpm	0.1 to 500rpm
Motor power	3.5kW	5.5kW	15kW
Torque detection	Load cell		Torque meter
Torque accuracy	±0.1% within FS		
Resin pressure measurement	4 channels (Note: Pressure sensor is option)		
Temperature controller	6 channels (Note: Temperature sensor is option)		
Power requirement	Three-phase, AC200V, 21kVA		Three-phase, AC200V, 35kVA
Compressed air requirement	0.5MPa, 40L/min.		
Dimensions	W525 x D660 x H950mm (Main unit)		
Weight	Approx. 215kg	Approx. 235kg	Approx. 285kg

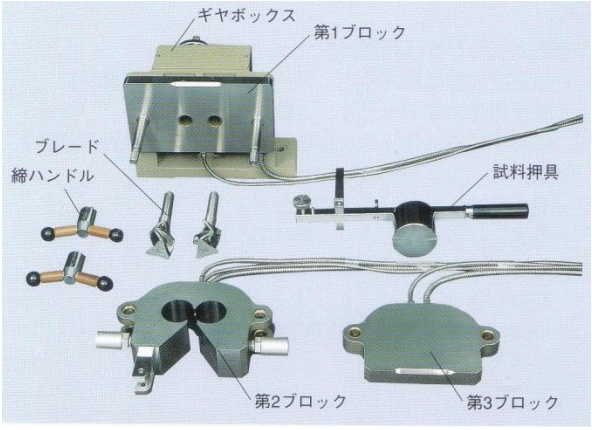
■No.655 Labo Plastomill (Mixer)

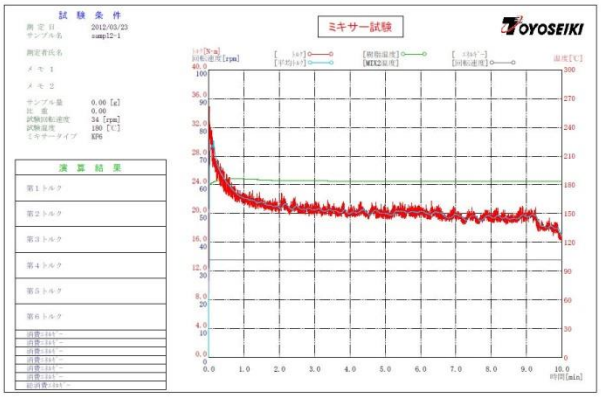
Model	R30	D30	R60	R100	R500
Chamber	30cm^3		60cm^3	100cm^3	500cm^3
Blade	Roller	Delta	Roller		
Application	Thermosetting resins		Thermoplastics		
Gear ratio	2 : 3				
Heating system	Electric				
Max. temperature	250ºC (Option: 400ºC)				
Max. torque	200Nm			300Nm	1000Nm



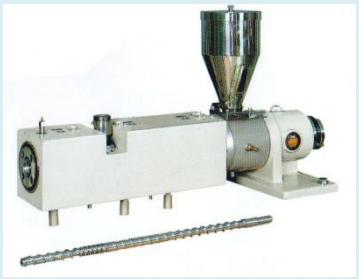




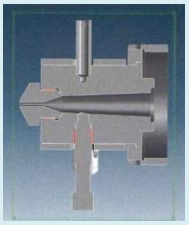




■No.655 Labo Plastomill (Single-screw Extruder)

Model	D2020	D2025
Screw diameter	20mm	
L/D	20	25
Max. temperature	350ºC	
Heating system	Electric	
Heating zones	3	
Cooling (Cylinder)	Air	
Cooling (Feeding zone)	Water	
Vent port	N/A	1
Sensor ports	4	
Max. torque	200Nm	
Die (Standard)	Strand die (Ø3mm x 1)	
Screw (Standard)	Full flight Comp. rate: 2.0	Vent screw Comp. rate: No.1=2.5, No.2= 3.0 (Option: Full flight screw)
		

■No.655 Labo Plastomill (Measuring dies for extruder)

Name	Model	Specifications	
Strand die	ST1	Ø3mm x 1 (Standard) Ø1.5, 2, 4, 5, 6, 2.095mm (Option)	 
T die	T25F	W=25, t=0 to 1.5mm	  *T150C*
	T60F	W=60, t=0 to 1.5mm	
	T120C	W=120, t=0 to 1.5mm	
	T150C	W=150, t=0 to 1.5mm	
Inflation die	I25C	Ø25mm, slit 0.7mm (Cross type)…for PVC	
	I25S	Ø25mm, slit 0.7mm (Spiral type)	

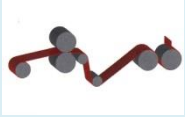
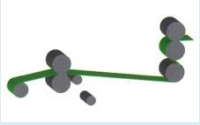
■No.655 Labo Plastomill (Pelletizer & conveyor for extruder)

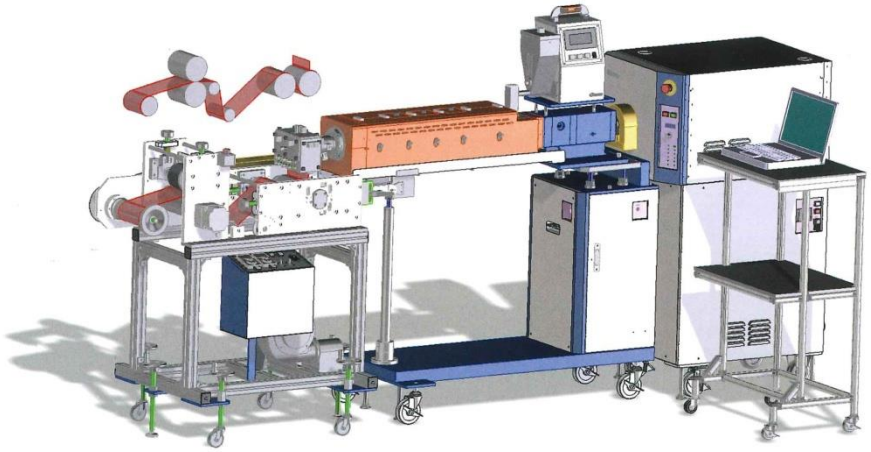
Model	PETEC3 (Cold cut pelletizer)
Number of strands	Max. 3
Pellet size	3mm fixed
Take up speed	2.5 to 25m/min.
Water bath	L660 x W100 x D70mm
Power requirement	Three-phase, AC200V, 50/60Hz, 1.4kVA
Water requirement	0.2MPa, 4L/min.
Dimensions	W460 x D1030 x H1230mm
Weight	Approx. 75kg

Model	CON (Conveyor)
Belt size	L1500 x W150mm
Speed	0.5 to 6m/min.
Option	Cooling roll (Model R-1)
Power requirement	Single-phase, AC100V, 50/60Hz, 0.1kVA
Dimensions	W550 x D1540 x H900 to 1100mm

Base unit + Extruder + Strand die + Pelletizer

■No.655 Labo Plastomill (Film take-up device for extruder)

Model	FT2W20	FT3W20	
Take-up speed	0.5 to 10m/min.		
Cooling roll	Ø100 x 200mm x 2	Ø100 x 200mm x 3	
Cooling roll temperature	Max. 100ºC		
Cooling roll configuration		 Horizontal (Standard)	 Vertical (Option)
Take-up roll	Ø100 x 200mm		
Pressure roll	Ø100 x 800mm, Rubber lining		
Take-up system	Bobbin take-up system, Ø75 x 200mm		
Air knife	Equipped		
Power requirement	Single-phase, AC100V, 50/60Hz, 0.3kVA		
Dimensions	W1200 x D720 x H1200mm		
			



Base unit + Extruder + T die + Film take-up device

■No.666 Labo Plastomill Micro

Bench-top laboratory mixer & extruder system

The TOYOSEIKI **Labo Plastomill Micro** evaluate kneading and extrusion characteristics of very small quantities of materials.

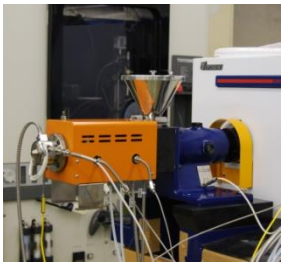
Labo Plastomill Micro (Base unit)

Speed range	0 to 100rpm (±1% / FULL)
Max. torque	40Nm
Temperature range	0 to 400ºC
Motor power	0.4kW
Torque detection	Electric current conversion
Torque measurement accuracy	±10% (In range of 10% or more against max. torque)
Pressure & temperature amplifier	1 channel each
Temperature controller	3 channels
Power requirement	Single-phase, AC100V, 50/60Hz, 0.5kVA (Main unit)
Compressed air requirement	0.5MPa or more
Dimensions	W400 x D600 x H630mm (Main unit)
Weight	Approx. 50kg (Main unit)

Labo Plastomill Micro (Segment mixer, model KF6 / KF6V)

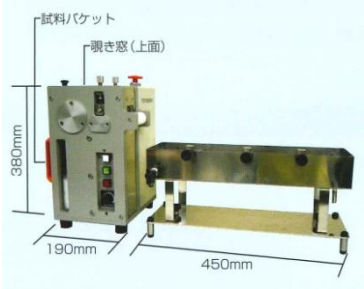
Chamber capacity	Disk I: Approx. 6cm^3, Disk II: Approx. 5cm3
Rotation speed	Triple speed (x3 against motor rotation speed)
Blade revolution ratio	1:1
Heating system	Electric
Max. temperature	350ºC
Max. permissible torque	40N.m
Cooling device	■Compressed air ■Water (Possible under 100ºC)
Power requirement	Single-phase, AC100V, 50/60Hz, 1.5kVA

Labo Plastomill Micro (Single screw extruder, model D1220)



Screw diameter	Ø12mm
L/D	20
Max. temperature	350ºC
Heating system	Electric
Heating zone (Cylinder)	2
Air cooling (Cylinder)	Possible
Vent port	N/A
Pressure meas. hole	1
Standard die head	Strand die (Ø2.5mm x 1) T die (W=60, t=0.3 to 0.8mm) optional
Standard screw	Full flight (CR=2.5)
Power requirement	Single-phase, AC100V, 50/60Hz, 1.2kVA

Labo Plastomill Micro (Small pelletizer, model MPETC1)



Pellet length	3mm fixed
Take up speed	2 to 8m/min.

Labo Plastomill Micro (Small film take-up device, model FT2B8)

Cooling roll	Ø80 x 80mm
Take up speed	0.3 to 5m/min.
Air knife	Included (Compressed air required)

16. Gas & Water Vapor, Air Permeability

■No.571 Gas Transmission Rate Tester

Gas Permeability Tester

The TOYOSEIKI **Gas Transmission Rate Tester** measures gas transmission rate (protection from gas leakage) of packaging films, and any protective layers. It can be used for various gases such as oxygen, nitrogen, carbon dioxide and air, providing the gas transmission rate, gas transmission coefficient and the diffusion coefficient as a standard, and dissolution coefficient measurement as an option.

Models	CR1	CR3	CT1	CT3
Number of specimens	1	3	1	3
Temperature range	Room temperature		10ºC to 90ºC (Hot water circulation)	
Specimen size	50 x 50mm (Measuring cell: Ø30mm, transmission area: 707mm^2) 90 x 90mm (Measuring cell: Ø70mm, transmission area: 3848mm^2)			
GTR measuring range ***To be selected Type A or B upon order***	■Type A: 0.1 to 100fm/Pa.s ■Type B: 1 to 1000fm/Pa.s (Vacuum pressure gauge: Accuracy 0.25% of reading)			
Test gas	O^2, N^2, Co^2, Air, H2 (Optional) etc.			
Test gas pressure	0 to 200kPa			
Measuring items	Gas transmission rate, Gas transmission coefficient, Diffusion coefficient, Dissolution coefficient (Optional)			
Power requirement	■Main unit: Single-phase, AC100V, 50Hz or 60Hz, 0.5kVA ■Vacuum pump: Single-phase, AC100V, 50Hz or 60Hz, 0.6kVA ■Warm water circulation bath (CT1, CT3): Single-phase, AC100V, 50Hz or 60Hz, 1.5kVA			
Compressed air requirement	0.4MPa			
Dimensions	Main unit (CR1, CT1): W550 x D560 x H470mm Main unit (CR3, CT3): W800 x D560 x H470mm			
Weight	Main unit (CR1, CT1): Approx. 50kg Main unit (CR3, CT3): Approx. 70kg			
Related standards	ISO 15105-1, ISO 2556 JIS K 7126-1, JIS K 6275-1, JIS K 6404-10 ASTM D 1434			

■No.572 Water Vapour Transmission Rate Tester

The **Water Vapor Transmission Rate Tester** measures the water vapour permeability or water vapour permeability coefficient of packaging materials such as plastic film.

Model	CT1W	CT3W
Number of specimen	1	3
Measurement range	20ºC to 85ºC, 80% to 90% RH (depends on the combination)	
Specimen dimensions	• 50 x 50mm (meas. section Ø30mm, through area 707mm^2) • 90 x 90mm (meas. section Ø70mm, through area 3848mm^2)	
Water vapour transmission measurement range	• Type A: 0.001 to 1.000 [g/(m^2・24h)] • Type B: 0.01 to 100.00 [g/(m^2・24h)] *Note: Vacuum pressure gauge: accuracy 0.25% of reading*	
Measurement item	• Water vapour transmission rate [g/(m^2・24h)] • Water vapour permeability coefficient [g・mm/(m^2・24h)]	
Power requirement	• Single-phase, AC100V, 50/60Hz, 5A (Main unit) • Single-phase, AC100V, 50/60Hz, 3A (PC) • Single-phase, AC100V, 50/60Hz, 6A (Vacuum pump) • Single-phase, AC100V, 50/60Hz, 15A (Chiller)	
Compressed air	0.4MPa	
Dimensions	W550 x D560 x H470mm	W800 x D560 x H470mm
Weight (approx.)	50kg	70kg
Related standards	ISO 15106-5 JIS K 7129-5	

■No.158 Gurley type Densometer

The TOYOSEIKI **Gurley type Densometer** measures the porosity of paper and other materials by forcing air through it. Transit time (air permeability resistance) of 100cc and ISO air permermeability can be displayed by automatically detecting the falling rate of the pressure cylinder.

Sample clamping system	Constant load system using lever operation [Sample: 0 to 1mm, approx. 200N (20kgf)]
Outer cylinder	Internal dia. 82.6mm, Height 254mm
Inner cylinder	Internal dia. 74mm, External dia. 76.2mm, Height 254mm Mass 567±0.5g
Gasket	Internal dia. 28.6mm, External dia. 34.9mm
Air permeation volume	Max. 350ml Scale 0, 25, 50, 75, 100, 150, 200, 250, 300, 350ml
Air transmission hole diameter	Ø28.6±0.1mm
Oil used	Machine oil, ISO VG10
Air permeation counter	■Scale detection sensor: Reflection type optical fiber sensor ■Permeation time range: 1.0 to 9999.9sec. ■Measuring mode: Cumulative time(s) ■*Indication mode: Air resistance(s/100ml), ISO air permeability(μm/Pa･s) **Note: Possible to change after measurement.* *It displays cumulative time during measurement.* ■Air permeation volume ranges: 25, 50, 100, 200, 300ml (5 ranges) ■Interface: RS-232C
Power requirement	Single-phase, AC100 to 240V, 0.5A
Dimensions	W220 x D225 x H560mm
Weight	Approx. 22kg
Related standards	ISO 5636-5 (JIS P 8117) JIS L 1913

17. Heat Seal

■No.884 Heat Gradient Tester

The TOYOSEIKI **Heat Gradient Tester** evaluates critical temperature for sealing by producing temperature gradient across 5 heating platens and pressing under the same conditions.

Temperature range	50 to 250ºC
Temperature accuracy	±0.3%
Max. temperature gradient	50.0ºC (Temperature difference of 5 heating plates above 150ºC)
Applied pressure	0.08 to 0.4MPa (Gauge pressure)
Pressure applying duration	0.5 to 99.9sec. In 0.1sec. steps
Heating plate stroke	Approx. 20mm
Seal size	10 x 25mm (5 heating plates)
Power requirement	Single-phase, AC100V, 50/60Hz, 1kVA
Compressed air requirement	0.5MPa
Dimensions	W500 x D380 x H500mm
Weight	Approx. 70kg

18. Others

■No.519 Mini Test Press

MP-WNL

MP-2F
(With swivel type cooling plates)

The compact, bench-top TOYOSEIKI **Mini Test Press** is used as a plastic compression machine. The press is equipped with a two-speed manual hydraulic cylinder pressure system. An optional water-cooled, insulated plate sandwich to cold press samples without cooling down platens is also available.

Dimensions of heating plate	■200 x 200mm ■250 x 250mm
Platen separation	Max. 100mm (75mm with water cooling plate)
Pressure system	Hydraulic cylinder
Compression load	100kN at 30MPa
Pressure indicator	Analog pressure gauge, max. scale: 35MPa
Manual hydraulic pump	2-speed type (automatic switching)
Temperature range	Room temperature+10 to 300ºC or 400ºC
Heaters	Cartridge type balanced heaters
Temperature control	Dual PID controllers, with auto tuning function, digital readouts
Safety devices	Overheat prevention circuit Electrical leakage and overcurrent breaker
Power requirement	Single-phase, AC200V, 50/60Hz, 4kVA
Cooling water requirement	0.15MPa, 20L/min. maximum
Dimensions	W520 x D390 x H680mm (Handle is not included)
Weight	Approx. 90kg

List of contents (In numerical order)

List of contents (In numerical order)

Test standards

Standard	Description	Related instruments	
ISO 75	Plastics -- Determination of temperature of deflection under load	■No.533 HDT / VICAT Tester ■No.533 Fully Automated HDT / VICAT Tester	30 31
ISO 178	Plastics -- Determination of flexural properties	■No.210 Strograph E ■No.260 Strograph VGS/VG ■No.260 Strograph S ■No.120 Strogaph T ■No.120 Strograph AP ■No.509 Bendograph	10 11 12 13 14 16
ISO 179	Plastics -- Determination of Charpy impact properties	■No.556 Impact Tester ■No.526 Temperature-controlled Impact Tester	32 33
ISO 180	Plastics -- Determination of Izod impact strength	■No.556 Impact Tester ■No.526 Temperature-controlled Impact Tester	32 33
ISO 188	Rubber, vulcanized or thermoplastic -- Accelerated ageing and heat resistance tests	■No.272 Geer Oven	51
ISO 306	Plastics -- Thermoplastic materials -- Determination of Vicat softening temperature (VST)	■No.533 HDT / VICAT Tester ■No.533 Fully Automated HDT / VICAT Tester	30 31
ISO 527	Plastics -- Determination of tensile properties	■No.210 Strograph E ■No.260 Strograph VGS/VG ■No.260 Strograph S ■No.120 Strogaph T ■No.120 Strograph AP ■No.211 Strograph AE Film	10 11 12 13 14 15
ISO 899	Plastics -- Determination of creep behaviour	■No.259 Creep Tester	40

Test standards

Standard	Description	Related instruments	
ISO 1133	Plastics -- Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics	■No.522 Melt Indexer ■No.522 Melt Indexer, Multi-weight ■No.521 Semi Auto Melt Indexer ■No.520 Melt Flow Rater	23 24 25 26
ISO 1183	Plastics -- Methods for determining the density of non-cellular plastics	■No.265 Automatic Densimeter ■No.265 Automatic Densimeter (Fully-automated)	49 50
ISO 2556	Plastics -- Determination of the gas transmission rate of films and thin sheets under atmospheric pressure -- Manometric method	■No.571 Gas Transmission Rate Tester	61
ISO 2781	Rubber, vulcanized or thermoplastic -- Determination of density	■No.265 Automatic Densimeter ■No.265 Automatic Densimeter (Fully-automated)	49 50
ISO 5626	Paper -- Determination of folding endurance	■No.530 MIT type Folding Endurance Tester	43
ISO 6383	Plastics -- Film and sheeting -- Determination of tear resistance	■No.164 Digital Elmendorf type Tearing Tester	44
ISO 7765	Plastics film and sheeting -- Determination of impact resistance by the free-falling dart method	■No.613 Dart Impact Tester	37
ISO 8256	Plastics -- Determination of tensile-impact strength	■No.556 Impact Tester ■No.526 Temperature-controlled Impact Tester	32 33
ISO 8295	Plastics -- Film and sheeting -- Determination of the coefficients of friction	■No.557 Friction Tester (HM-3)	39
ISO 9352	Plastics — Determination of resistance to wear by abrasive wheels	■No.430 Rotary Abrasion Tester	
ISO 15105	Plastics -- Film and sheeting -- Determination of gas-transmission rate	■No.571 Gas Transmission Rate Tester	61
ISO 15106-5	Plastics -- Film and sheeting -- Determination of water vapour transmission rate – Part 5: Pressure sensor method	■No.572 Water Vapour Transmission Rate Tester	62

TOYO SEIKI SEISAKU-SHO, LTD.
5-15-4, Takinogawa Kita-ku, Tokyo 114-8557, Japan
Tel: +81-3-3916-8183 Fax: +81-3-3916-8173
www.toyoseiki.co.jp

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