

VPA

Versatile Peel Analyzer



High-throughput measurements of peel tests under any angle from 0 to 180° using Kyowa's proprietary method and self-developed analysis software

■ What is a peel or adhesion test?

Pressure-sensitive adhesive tapes (PSA) are not merely known as articles of daily use but play a significant role in various forefront industries, for example, as constitutive and integral parts in the production process of smartphones, flat panel displays, semiconductors, and solar batteries. Peel adhesion, shear resistance, and tack tests characterize the performance of PSA. Among them, peel adhesion tests are conducted widely for an objective appraisal with quantitative evaluation following ISO 8510-1 and 2, the 90° and 180° peel tests, respectively. However, the 180° peel test tends to be slightly affected by the thickness and elasticity of the PSA tape. On the other hand, the 90° peel test may experience elongation and sagging of the tape due to the somewhat complicated structure of the jigs.

Therefore, demands on peel adhesion, peel angle, and peel rate for the optimization of adhesive tapes used in production processes vary widely depending on the applications.

■ Concept of peel testing with Kyowa's Versatile Peel Analyzers

With their unique Flat Plate Cross Stage method (Patent No. 4717156), the computer-controlled Versatile Peel Analyzers can efficiently perform peel tests at any angle from 0 to 180° under a specific peel rate with only simple settings. The most remarkable part of the VPA is its flat specimen stage, which sits on a rotary table. With the help of this rotary table, the peel angle can be quickly and swiftly adjusted from 0 to 180° without using jigs or tools.

The synchronized actuator mechanism maintains the peel angle C by moving the rotary table in direction A and the flat plate cross-stage in direction B at an equal distance. The horizontal versatile peel analyzer VPA series is the only device that enables peel tests at any peel angle from 0 to 180° while assuring that the peel rate always equals the test speed (pull rate). No complex adjustments or calculations are required.

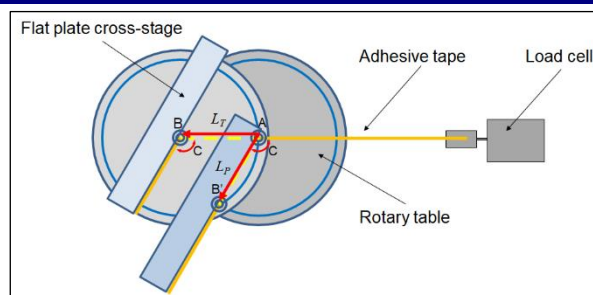
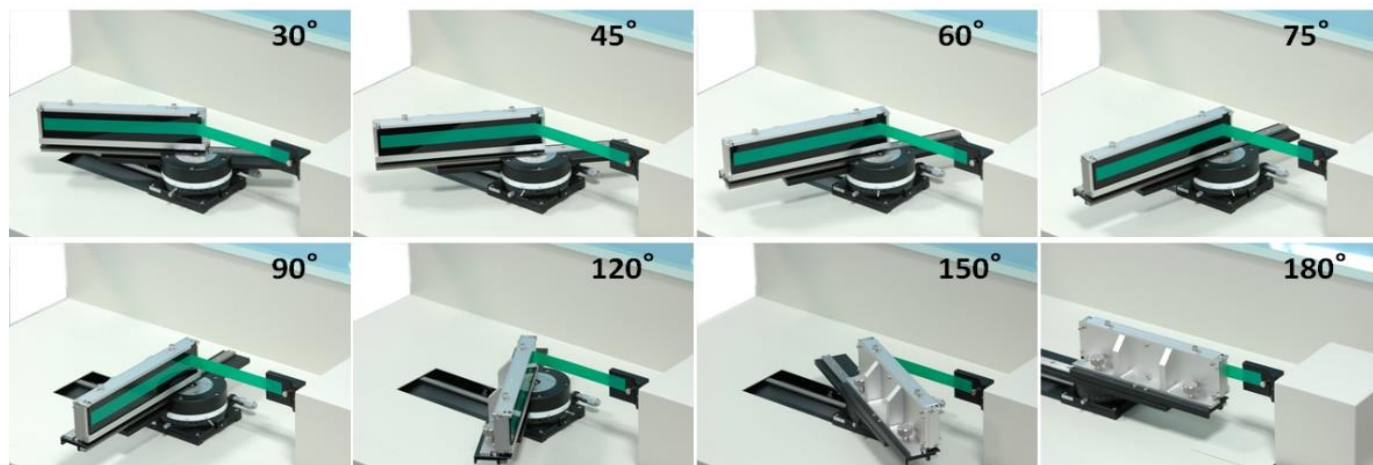


Figure 1 – Schematic of the movement of the rotary stage and sample stage (flat plate cross-stage)

Quick and easy change of peel angles without any extra jigs or tools, just by turning the sample stage



■ Examples of data

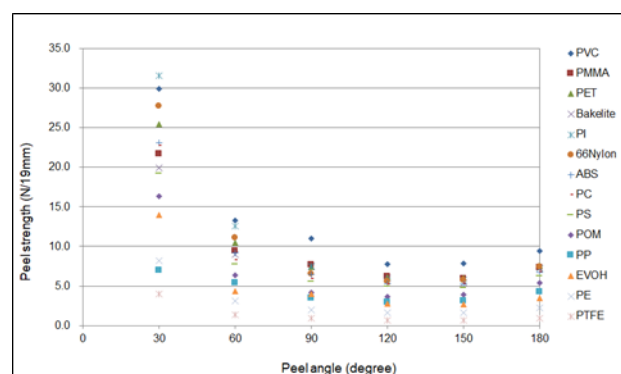


Figure 2 – Peel strength dependence on peel angles of various polymer adherends/polyester adhesive tape combinations

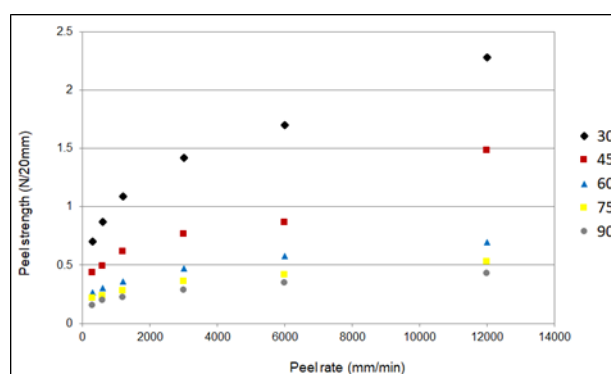


Figure 3 – Peel strength dependence of label and release paper on the peel angle and peel rate

■ *Product lineup*

Standard model - VPA-H200F

The standard model is a high-speed peel tester that applies to larger sample sizes due to its specimen stage and long stage travel distance.



Features of the VPA-H200F

- Available load cell units ranging from 0.1N to 100 N rated capacity (full scale)
- Measurements of peel strength as low as 0.001 N are possible
- Peel area of max. 40 x 200 mm
- Stage travel distance of 200 mm
- Analysis of peel strength dependent on peel angle and peel speed
- Peel angles between 0 and 180°
- Peel rates from 3 to 30000mm/min
- Dimension of the instrument (WxDxH): 910 x 550 x 270mm

Compact model - VPA-H100F

The compact model can accommodate the same unit cell units and features and provides the same functions as the standard model but is limited in terms of maximum peel rate, stage travel distance, and suitable sample size.



Features of the VPA-H100F

- Available load cell units ranging from 0.1 N to 100 N rated capacity (full scale)
- Measurements of peel strength as low as 0.001 N are possible
- Peel area of max. 40 x 100 mm
- Stage travel distance of 100 mm
- Analysis of peel strength dependent on peel angle and peel speed
- Peel angles between 0 and 180 °
- Peel rates from 3 to 12000 mm/min
- Dimension of the instrument (WxDxH): 620 x 400 x 270mm

■ *Applications*

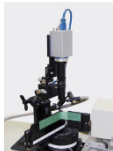
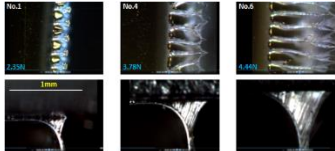
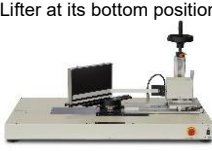
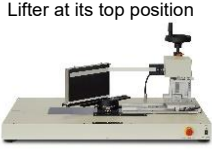
- Effects of peel angles and peel rates on peel behavior of PSA tapes, packaging films, labels, release papers/films
- Peeling properties between carbon fiber prepregs and release papers
- Releasing strength between protective films and critical surfaces such as phone displays, glasses, metals, and carpets
- Peel/bond strength between laminated film layers, coating films on glass or metal, adhesive tapes on wafers and frames
- Adhesive strength between thin-film electrodes and current collectors in lithium-ion batteries
- Adhesive strength between ceramic green sheets and carrier films for laminated ceramic capacitors
- Visualization/observation of the peeling process from above and behind the adherend
- Low force tensile strength tests of various films

■ Specifications1

		VPA-H100F	VPA-H200F
Measurement method		Flat Plate Cross Stage Method	
Rated capacity (full scale) load cell units		0.1 N, 1 N, 5 N, 10 N, 50 N, 100 N	
Maximum measuring load		90 % of the load cell's rated capacity	
Display resolution of load cell units	0.1 N, 1 N, 5 N, 10 N 50 N, 100 N	0.001 N 0.01 N	
Adherend sample shape and dimensions (WxL)		Flat sheet, plate, or strip 50 x 130mm, maximum thickness: 3 mm	Flat sheet, plate, or strip 50 x 230mm, maximum thickness: 3 mm
Max. peel area (WxL)		40 x 100 mm	40 x 200 mm
Stage travel speed range (V_s)		3 to 12000 mm/min	3 to 30000 mm/min
Max. stage travel distance (D_s)		100 mm	200 mm
Default sampling rate ¹⁾		Every 0.20 mm	Every 0.25 mm
Peel rate (V_p)		$V_p = V_s$ (Peel rate=Stage travel speed) The peel rate is independent of the peel angle.	
Peel rate dependency		Measurement of one peel rate or gradually changed peel rates within one measurement cycle.	
Peel angle dependency		Measurement of any peel angle between 0 and 180 °	
Analysis contents		Peel force versus peel distance, peel force versus peel rate, peel force versus peel angle	
Instrument dimensions (WxDxH)		620 x 400 x 270 mm	910 x 550 x 270 mm
Instrument weight		25 kg	41 kg
Power supply		AC100 to 240 V, 50/60 Hz, 25 W, 65 VA	
Operating environment		Temperature: +15 to +35 °C, humidity: 30 to 80 %RH (non-condensing) Positioned away from sources of electrical noise and vibration	

¹⁾ For both models, the sampling rate can be set to 0.10 mm for peel rates up to 6000 mm/min and 0.05 mm for peel rates up to 3000 mm/min.

■ Optional accessories

Heater-type temperature-controlled peel stage set	Safety covers
 Ambient to +180 °C for use with VPA-H200	 Safety cover Shutter-type safety cover
Manual hand roller for preparing PSA tapes, load: 2.0kg	Available load cell units: 0.1 N, 1 N, 5 N, 10 N, 50 N, 100 N
	 0.1 N, 1 N 5 N, 10 N 50 N, 100 N
Peel behavior observation by a special camera/lens assembly	Load cell unit lifter with customized sample stage
  Observation of adhesives' stringiness from the rear and top	  Lifter at its bottom position Lifter at its top position For the use of wide-width adherends and tapes

For detailed information, please get in touch with our sales partner or us directly at +81-48-483-2629 or overseas-sales@face-kyowa.co.jp.

The specifications and designs are subject to change without notice.

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