



Leading Manufacturing In Testing Industry.



EKT-2003SA

Moving Die Rheometer-Auto Sample Loading System



□ EKT-2003SA



□ EKT-2003S/2003SP

EKT-2003SA Moving Die Rheometer – Auto Sample Loading System

EKT-2003SP Moving Die (Foam pressure) Rheometer

EKT-2003S Moving Die Rheometer

The EKT-2003SA/2003SP/2003S series of MOVING DIE RHEOMETER are high precision instruments that offer excellent sensitivity and reliability of measurements for the evaluation of vulcanization properties of rubber compounds.

The instrument is designed in accordance with ASTM D5289 & ISO 6502 standards for evaluating rubber vulcanization characteristics, curing time, cross-linking rate and $\tan \delta$. The rubber test piece is contained in the biconical die capacity and maintained at stable die temperature. Through the oscillating of the lower die at small rotary amplitude, a precise transducer, which is installed upon the upper die, will measure the reaction torque of vulcanizing rubber.

The latest technologies in temperature control and torque measurement are applied to ensure faster temperature response and greater repeatability and reproducibility of test results. Besides the scorch time and cure time, both the viscous and elastic properties of vulcanizing rubber can also be accurately measured and analyzed.

Special Functions and Features

Improved Die Structure & Torque Measurement System Provides Better Sensitivity

- The new designed die structure provides simple and easy loading and removal of samples. Test specimens are held firmly in the die cavity ensuring the vulcanization properties of rubber compounds are measured with high precision.
- The new improved rotorless moving die cavity system ensures the stability of the die cavity pressure during the test and provides the real viscoelastic property of rubber compounds in the vulcanization stage.
- The torque-measuring device is installed upon the upper die so as to eliminate extra resistance forces generated by the oscillating structures.

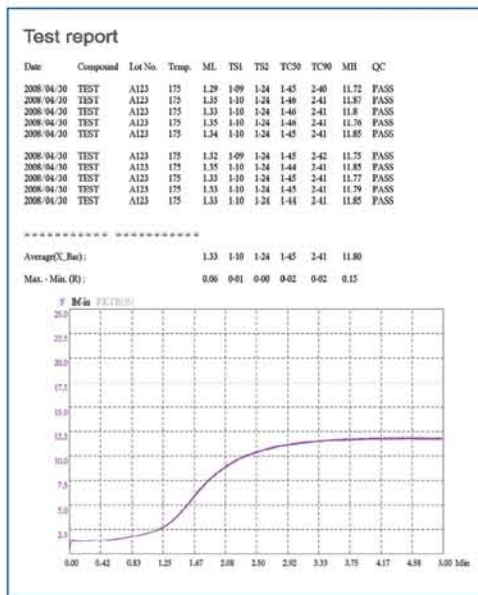
Safe environment

- A safety shield automatically comes down when starting a test, isolating the test chamber and protecting the user. It cannot be opened manually during the test and will go up when the test is over.



Greater Repeatability

Through over 25 years of experience and a constant investment in research and development to improve our products, the newly introduced EKT-2003S Moving Die Rheometer provides higher sensitivity and greater test repeatability.



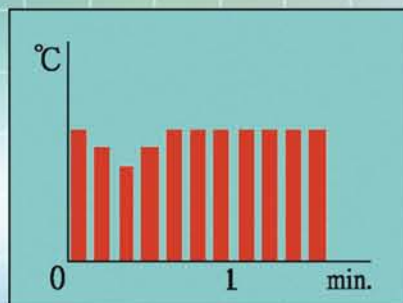
Stable Temperature Control

Rapid thermal recovery

The direct heating of dies and the use of a microprocessor control system minimize the heating time and improve the die temperature recovery time when starting a test.

Increased test capacity

Rapid die temperature recovery and reduced volume sample size minimize the curing time and increase the amount of test pieces analyzed.



Friendly & Simplified Operation

Windows® operation system

Windows® system software offers easy learning and a friendly environment. From the software help manual, the user can easily and quickly review the operation steps.

Easy specimen removal

The new designed die cavity uses HDPE Polyester film to separate the test sample from the dies, preventing direct contact and therefore eliminating any risks of die contamination. It also enables the user to remove the tested sample more easily as it is not sticking to the die.





Automatic Data Processing

The computerized system and auxiliary professional processing software will automatically save all the test results, including data and curves. The professional operation software provides comprehensive functions such as quality control check and statistical analyses.

Windows® is a registered trademark of Microsoft Corporation.

Easy torque calibration

The instrument is delivered with a torque calibrator. By using the auxiliary of calibration software, the user can easily run the torque calibration periodically.

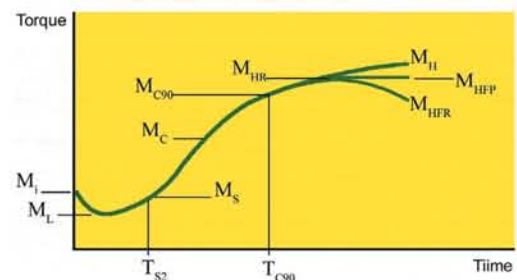
ILLUSTRATIONS

M_i	Initial torque	M_{HFR}	Final torque of reverting curve
M_L	Minimum torque	T_{S2}	Scorch time 2, time at M_L+2
M_{HR}	Maximum torque of reverting curve	T_{C90}	Time at which 90% of cure has taken place (optimum cure time)
M_H	Maximum torque at specified time of marching curve	M_{S2}	Torque at scorch time 2, equal to M_L+2
M_{HFP}	Maximum torque of plateau curve	M_{C90}	Torque value of 90% cured rubber

Cure curves types

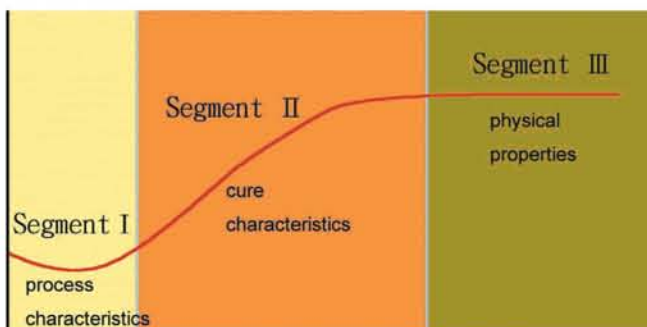
As shown in the following picture, according to the differences in rubber compounds, the cure curves are classified in three types depending on the behavior of the rubber in its vulcanized stage:

1. Vulcanization to equilibrium torque (MHFP).
2. Vulcanization to a maximum torque with reversion (MHFR).
3. Vulcanization with continuously increasing torque (MH).



Curve Segments

The cure curve produced by this instrument enables you to analyze not only the stability of rubber compounds but also its processing properties. Typically, the cure curve (as displayed hereafter) can be divided into three segments. Segment I gives information related to the processing characteristics such as viscosity and fluidness. Segment II shows the characteristics of curing rate. And segment III indicates the physical properties of the cured rubber such as stiffness, hardness and strength.



Test curves

After each test, there are a total of 7 (9 for EKT-2003SP) types of curves that can be measured. The user can select one or more to be displayed on the monitor or printed out.

1. Elastic torque curve
2. Viscous torque curve
3. Viscoelastic complex curve
4. Loss angle curve
5. Cure rate curve
6. Tan δ curve
7. Upper and lower die temperature curves (2 curves)
8. Foam pressure curve (for EKT-2003SP model)
9. Pressure rate curve (for EKT-2003SP model)



ILLUSTRATIONS

TS: Scorch times	Min. S': Minimum elastic torque Max. S': Maximum elastic torque
TC: Curing times	Min. Tan δ : Minimum Viscous/Elastic ratio Max. Tan δ : Maximum Viscous/Elastic ratio
MS: Torque related to scorch times	PC2%: [(Max. P - Min. P) x 2% + Min. P] PC95%: [(Max. P - Min. P) x 95% + Min. P]
MC: Torque related to curing times	T@PC2%: Time at Pressure 2% T@PC95%: Time at Pressure 95%
ML: Minimum complex torque	MPR: Maximum Pressure Rate
MH: Maximum complex torque	T@MPR: Time at MPR
Min. P: Minimum foam pressure	CRI: Cure rate index
Max. P: Maximum foam pressure	
Min. S'': Minimum viscous torque	
Max. S'': Maximum viscous torque	

More Test Results

Advanced structure and measurement provides more test results. The flexibly designed software also provides more possibility of data increment.

1. Elastic torque, such as ML, MH, MS1, MS2, MS50 and MC90.
2. Scorch and cure time, such as TS1, TS2, TC50, TC90, and TC95.
3. Cure rate, such as CRI (Cure Rate Index) and MCR (Maximum Cure Rate).
4. Max. & min. values of each curve, such as Tan δ max, δ max and S'' max.
5. Time related to specified points, such as T@Tan δ max and T@MCR.

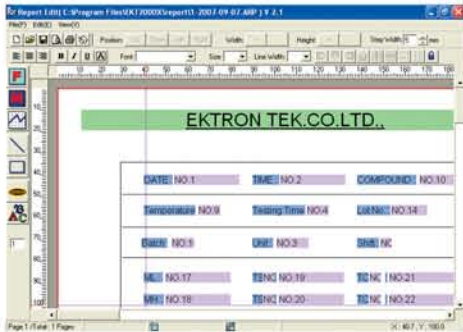
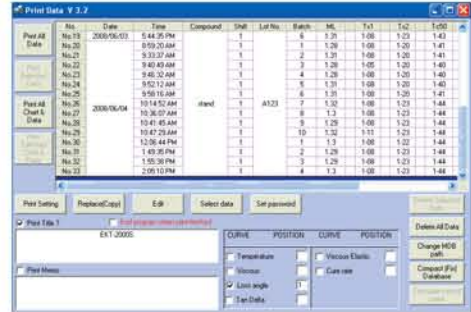
Function Comparison of Different Models

MODEL	EKT-2003SP	EKT-2003SA	EKT-2003SA
Elastic torque curve	V	V	V
Viscous torque curve	V	V	V
Viscoelastic complex torque curve	V	V	V
Loss angle curve	V	V	V
Cure rate curve	V	V	V
Upper/lower die temperature curve	V	V	V
Tan δ curve	V	V	V
Foam pressure curve	V		
Pressure rate curve	V		
Auto-feeding machine			V

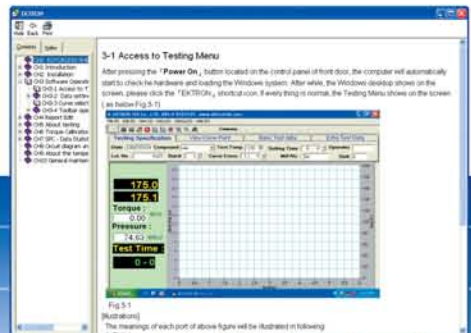


Software Features

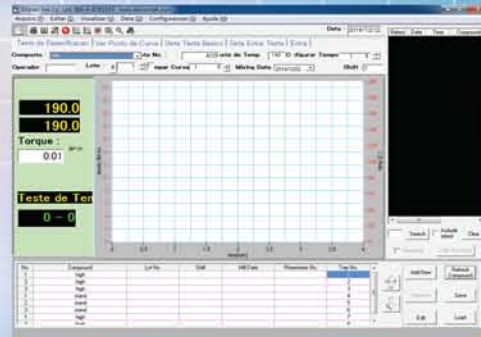
1. Windows® operation system offers an easy and friendly operation interface.
2. Automatic data processing – data collection, processing and storage are carried out automatically by professional software.
3. Test results and curves can be saved and retrieved for review or analysis.



4. Reports are created easily and can be customized to meet the needs of the user, selecting for example specific data or curves.
5. EKTRON software includes a manual to help the user to learn easily how to operate in details the software and hardware.



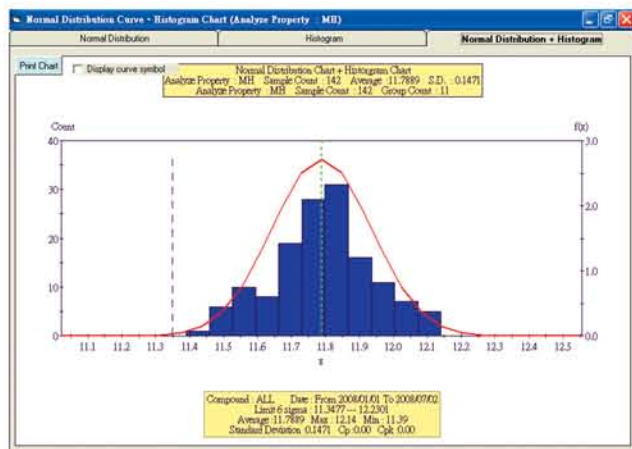
6. EKTRON auto system.



Statistical analysis

The Statistical Process Control (SPC) software provides the tools for the user to analyze the test results such as the minimum torque (ML), maximum torque (MH), scorch times (TS) and cure times (TC) more easily.

This SPC software can also be used to draw charts including the X-MR, X-R and normal distribution. The software can determine values related to process control such as CP, CPK, standard deviation and 6-sigma from selected data.



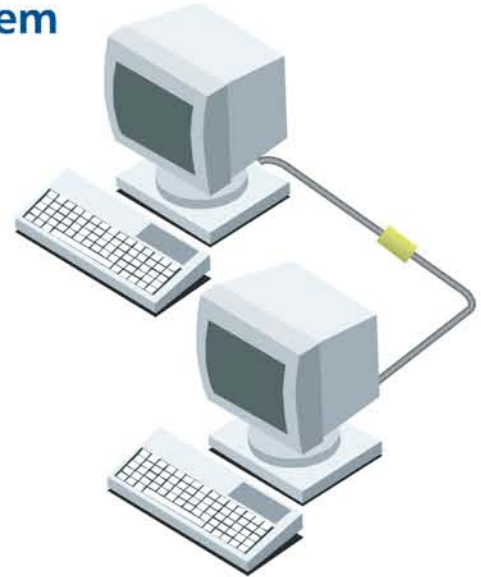
➔ Data export and Data Network System

Data export

After a test, the collected data can be saved as text or PDF files or exported to Excel for further analysis.

Data network system

A data network system can provide the user with a connection between the EKTRON Rheometer, Mooney Viscometer, and Tensile Tester so as to collect all test data from these instruments into one host computer. The built-in network interface was created to help the user to link the instruments to the internal network easily.



Optional Accessories

Volumetric cutter for sample preparation

Using a sample preparation cutter provides not only a quicker sample preparation but also gives more reliable and reproducible testing results due to the improved control over the sample volume.



EKT-2003EKVC

Specifications

01. Testing standards	ASTM D5289, ISO6502
02. Languages	Mandarin Chinese (simplified and traditional), English, Japanese, Vietnamese, Portuguese
03. Oscillating frequency	100 cycles/min. (1.66Hz)
04. Oscillating amplitude	±0.5°, ±3.0°, ±1.0°
05. Temperature	Range 30°C~ 200°C (High temperatures are available on customer's order.)
06. Torque	Range: 0-200 lbf-in
07. Measurement units	Torque: kgf-m, lbf-in, dN-m Pressure: kgf/cm ² , lbf/in ² (psi), kPa, dN/cm ² Temperature: °C
08. Sample volume	≈ 4.5 cm ³
09. Air pressure	4.5 ~ 5.0 kg/cm ²
10. Electrical	220±10% VAC, 50/60±3Hz, 7 Amp single phases.
11. Accessory	Torque standard
12. Weight	Main machinery: 300kg
13. Dimensions	Main machinery: 770(L)×625(W)×1380(H) mm

* All specifications, dimensions and design characteristics are subject to change without notice.



Automation

The new EKT-2003SA is delivered with an automatic feeding machine, providing a way of analyzing samples over a long period of time without human intervention, increasing productivity and decreasing labor cost. The safety of the operator is also improved as the samples are put into the auto-sampler instead of directly between the dies and the safety shield of the dies' chamber can be closed at all time.



EKT-2003SA

Auto-sampler

The auto-sampler can hold up to 120 samples or more, adapting to every customer needs. Within 15s the tested sample is removed and a new one is set between the dies, ready for the next test.

Enable to test in different samples

On the sample delivery plate, there is no. indicated so the operator can place in different sample.

QC control light

Quality control lights have been added to the machine upper front door panel, displaying whether a sample meets (green light) or not (red light) the quality control parameters set for the test. The light will help the operator to quickly notice and check failed analyses.

Main product :

- RHEOMETER
 - Dynamic Processing Rheometer
 - Moving Die (Foam Pressure) Rheometer
 - Moving Die Rheometer
 - Oscillating Disc Rheometer
- Tensile Tester
- Mooney Viscometer
- Plunger Tester
- Mixing Grader
- Vibration Simulator
- Flexometer
- Automatic Ozone Test Chamber
- Fatigue Failure Tester
- Demattia Flexing Fatigue Tester
- Low Temperature Retraction Tester
- Gas Permeability Tester



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