

# TRIBOLOGY

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# FOUR BALL WEAR AND EP



**K93100 Four Ball Tester**

### Shipping Information

Shipping Weight: 1360 lbs (620 kg)  
 Dimensions: 45 Cu. ft.

*\*Pneumatic option required  
 IP300 or CEC-L-45-A-99 units available.  
 Please contact Koehler Customer Service for additional information.*

### Included Accessories

- |                       |                              |
|-----------------------|------------------------------|
| Set of Weights        | Set of Hand Tools            |
| Ball Chucks           | Torque Wrench                |
| Ball Pot              | Electrical Controller        |
| Ball Chuck Remover    | Connecting Cables            |
| Ball Rack             | TriboDATA Software           |
| Ball Clamp Ring       | Calibration and Test Reports |
| Ball Holder Base Disc |                              |

### Ordering Information

Catalog No.		Order Qty
<b>K93100</b>	Four Ball Tester, 220V 60Hz	1
<b>K93100-PN</b>	Four Ball Tester with pneumatic loading, 220V 60Hz	
<b>K93190</b>	Four Ball Tester, 380V 50Hz	1
<b>K93190-PN</b>	Four Ball Tester with pneumatic loading, 380V 50Hz	
Accessories		
<b>K93105</b>	Test Balls (Pack of 100)	
<b>K93111</b>	High Resolution Digital Microscope	

## Tribology (Friction and Wear) Testing of Lubricants Friction and Wear Test Equipment

Koehler Instrument Company is pleased to offer advanced equipment for a variety of friction and wear tests. Several of the standard instruments that we offer are listed here. Please contact us to discuss your requirements for these as well as custom-designed units for tribology analysis methods. Our applications personnel will consult with you on your requirements and work with our design staff to provide solutions for your tribology testing needs.

### Test Method

Determines the Wear Preventative (WP) and Extreme Pressure (EP) characteristics of lubricating oils and greases in sliding steel-on-steel applications. The test consists of rotating a steel ball under load against three stationary steel balls coated with lubricant. Measurements are taken at the rotating speeds, temperatures, and duration as specified by published standards. The load-wear index can be calculated from the weld point in EP tests, and lubricant comparisons can be made based upon scar diameters incurred from wear tests.

### Four Ball Wear and EP Tester

- Conforms to ASTM D2266, D2596, IP 239, and related specifications
- Performs Wear Preventative (WP) and Extreme Pressure (EP) tests
- Displays and records normal load, frictional torque, time, and temperature
- Test speeds and temperatures are electronically controlled
- Data Acquisition Software and Card are included
- Custom configurations are available
- Precise variable loading capability\*

Four Ball Tester performs both Wear Preventative (WP) and Extreme Pressure (EP) analyses for measuring the wear and frictional properties of lubricants under sliding steel-on-steel test conditions. Tests are performed in accordance to the latest ASTM and IP published methods. Normal load on the ball assembly and frictional torque are measured through load cells. Data is processed and stored utilizing TriboDATA, an advanced data acquisition and processing software package. Test results can be plotted and compared, as well as exported to other programs. Wear scars on the steel balls are measured and recorded with a High Resolution Digital Microscope available as recommended accessory for the Four Ball Tester.

### High Resolution Digital Microscope

Koehler's Four Ball Microscope is a versatile device for measuring the wear scar diameter on a steel test ball. This apparatus consists of the "Dinolite" Microscope with "DinoCapture" Software mounted at an angle on an aluminum base. The device is designed to measure the wear scar without removing the test balls from the ball pot allowing for a safer measurement procedure. The wear scar can be viewed through an external PC. The software measures the wear scar using a diameter and line tool. The images can be saved at varied resolutions on a PC.

### Specifications

Conforms to the specifications of:  
 ASTM D2266, D2596, D2783, D4172, D5183\*, IP 239  
 Electrical Requirements: **CE**  
 220V, 60Hz, 3 phase  
 440V, 50Hz, 3 phase  
 Drive Motor: 1.5 kW  
 Test Speeds: 1200, 1440, 1760 rpm  
 Optional Test Speeds (min/max): 1000/3000, 300/3000 rpm  
 Maximum Axial Load: 10000 N at 3000 rpm or 12000 N at 1800 rpm  
 Test Duration (min/max): 1/9999 min  
 Test Ball diameter: 12.7 mm

# TRIBOLOGY DATA ACQUISITION SYSTEM

## TriboDATA Data Acquisition System

- Powerful data acquisition system provides analog to digital conversion and data analysis of test results for many tribology instruments available from Koehler as well as **other tribology instrument manufacturers**
- Real-time display of critical test parameters such as normal load, friction force, temperature, and time

The Koehler TriboDATA System is designed to acquire and process analog data from the various tribology test instrumentation offered from Koehler as well as from *other tribology instrument manufacturers*. The analog-to-digital converter card is comprised of four analog inputs, and the test data is recorded and displayed in real-time. Up to four graphs can be displayed simultaneously. The data can be stored to disk for future reference or exported in an ASCII text format to other software packages. Critical test parameters are also saved with the data. With the TriboDATA hardware and software package, data acquisition of crucial test parameters such as normal load, friction load, temperature, and time can be seamlessly performed to ensure that your test results are consistent and repeatable within prescribed test conditions. As an option, a CCD camera package is available to capture wear scar images and store them on a PC for analysis.

### Computer Requirements

Processor: Pentium or higher  
 Processor Speed: 100 MHz or higher  
 Operating System: Windows®95/98/NT  
 Memory (RAM): 16 Mb  
 Required Disk Space: 10 Mb  
 One Free Expansion ISA Slot

### Included Accessories

Software on CD  
 Acquisition Data Card  
 Connection Cable  
 Instruction Manual



**K93900 TriboDATA Data Acquisition System**

### Ordering Information

Catalog No.		Order Qty
K93900	TriboDATA Data Acquisition System	1

# HIGH FREQUENCY RECIPROCATING RIG

## Test Method

A 2-mL test specimen of fuel is placed in the test reservoir and maintained at 25 or 60°C. When the temperature has stabilized, a vibrator arm holding a nonrotating steel ball and loaded with a 200-g mass is lowered until it contacts a test disk completely submerged in the fuel. The ball is caused to rub against the disk with a 1-mm stroke at a frequency of 50 Hz for 75 min. The ball is removed from the vibrator arm and cleaned. The dimensions of the major and minor axes of the wear scar are measured under magnification and recorded.

## High Frequency Reciprocating Rig

The two-station Fuel Lubricity Wear Test Machine incorporates two test positions with heater pads and mounting arrangements for fuel lubricity test specimens. Load is applied manually by means of dead weights directly to the fixed ball specimen carrier by means of a loading yoke. Machine controls are limited to speed control of the drive motor to give the required frequency, temperature control of the specimen bath and test duration. Test data is limited to post test wear scar measurement only and no facilities are provided for friction force measurement.

### Electrical Requirements

115V 60Hz, Single Phase  
 230V 50/60Hz, Single Phase



**K93450 High Frequency Reciprocating Rig (HFRR)**

### Specifications

Test specifications: ASTM D6079; ISO 12156  
 Contact Geometry: Ball on Plate  
 Ball Specimen: 6 or 10 mm diameter  
 Load: 1.95 to 10.00 N ( $\pm 0.01$  N)  
 Stroke: 1 mm ( $\pm 0.02$  mm)  
 Frequency: 2.5 to 50 Hz ( $\pm 1$  Hz)  
 Fluid Volume: 2 mL ( $\pm 0.2$  mL)  
 Test Temperature: 25 or 60°C ( $\pm 2^\circ$ C)  
 Test Duration: 75 min ( $\pm 0.1$  min)  
 Bath Surface Area: 6 cm<sup>2</sup>

### Ordering Information

Catalog No.	
K93450	High Frequency Reciprocating Rig, 115V 60Hz
K93459	High Frequency Reciprocating Rig, 230V 50/60Hz



# PIN-ON-DISC



**K93500 Pin-On-Disc Tester**

## Specifications for Pin-On-Disc with Environmental Chamber & Lubricant Recirculating System

Temperature: 60°C Maximum  
 Discharge Rate: 0-1 L/min  
 Viscosity Range: 90 SAE Maximum  
 Capacity: 3L of Lubricant

### Shipping Information

Shipping Weight: 440 lbs (200 kg)  
 Dimensions: 18 Cu. ft.

### Included Accessories

Electrical Controller Unit  
 Connecting Cables  
 Spare Fuses  
 TriboDATA Software  
 Set of Weights  
 Set of Hand Tools  
 Set of Pins  
 Calibration and Test Reports

### Electrical Requirements

115V 60Hz  
 230V 50/60Hz

## Pin-On-Disc Tester

- Conforms to ASTM G99 standard test method
- Analyzes wear and friction characteristics of sliding contacts (dry or lubricated conditions)
- Tests can be performed on a variety of materials: metals, polymers, composites, ceramics, lubricants, cutting fluids, abrasive slurries, coatings, and heat-treated samples
- TriboDATA software package varies and records pin pressure, pin temperature, sliding speed, and lubrication parameters
- Custom configurations available

The Pin-On-Disc machine is a versatile unit designed to evaluate the wear and friction characteristics on a variety of materials exposed to sliding contacts in dry or lubricated environments. The sliding friction test occurs between a stationary pin stylus and a rotating disk. Normal load, rotational speed, and wear track diameter can be varied. Electronic sensors monitor wear and the tangential force of friction as a function of load, speed, lubrication, or environmental condition. These parameters as well as the acoustic emissions at the contact are measured and displayed graphically utilizing the TriboDATA software package.

### Specifications

Conforms to the specifications of: ASTM G99  
 Sliding Speed Range: 0.26-10 m/sec  
 Disc Rotation Speed: 100-2000 rpm  
 Maximum Normal Load: 200 N  
 Frictional Force: 0-200 N  
 Wear Measurement Range: 4 mm  
 Pin Size: 3-12 mm diagonal/diameter  
 Disc Size: 160 mm diameter x 8 mm thick  
 Wear Track Diameter: 10-140 mm

### Ordering Information

Catalog No.		Order Qty
K93500	Pin-On-Disc Machine, 115V 60Hz	1
K93590	Pin-On-Disc Machine, 230V 50Hz	

### Optional Configurations Available

Environmental Chamber  
 Lubricant Recirculating System  
 Environmental Chamber and  
 Lubricant Recirculating System

*High temperature models (up to 700°C) are available. Please contact Koehler Customer Service for additional information.*

# TIMKEN TESTERS


## Timken Mechanical Tester

A steel test cup rotating at 800 RPM is pressed against a steel test block. Sample under test is carried by the test cup into the sliding contact. Test load at the contact is progressively increased, score value and OK value are determined.

### Test Method

This tester is used to measure extreme pressure properties of lubricating grease and lubricating fluids.

### Specifications

Conforms to the specifications of:  
ASTM D 2509 - IP 326 for greases.  
ASTM D 2782 - IP 240 for lubricating fluids.  
Rate of loading : 0.9 to 1.3 Kg/sec.  
Grease feed rate :  $45 \pm 9$  g / min.  
Fluid feeder : 3.8 liter with recirculating pump and heater.  
Motor : 1.5 kW with variable frequency drive.  
Power : 220V 60Hz, 380V 50Hz, 5 KVA max. 

### Included Accessories

- Calibration kit for load and RPM
- Set of tools for operation
- Microscope for scar measurement
- Electronic timer

## Timken Pneumatic Tester

A steel test cup rotating at 800 RPM is pressed against a steel test block. Sample under test is carried by the test cup into the sliding contact. Test load at the contact is progressively increased, score value and OK value are determined.


### Test Method

This tester is used to measure extreme pressure properties of lubricating grease and lubricating fluids.

### Features & Benefits

- Loading is pneumatic. Frictional torque is measured with a torque cell.

### Specifications

Conforms to the specifications of:  
ASTM D 2509 - IP 326 for greases.  
ASTM D 2782 - IP 240 for lubricating fluids.  
Rate of loading : 0.9 to 1.3 Kg/sec.  
Grease feed rate :  $45 \pm 9$  g / min.  
Fluid feeder : 3.8 liter with recirculating pump and heater.  
Motor : 1.5 kW with variable frequency drive.  
Power : 220V 60Hz, 380V 50Hz, 5 KVA max. 

### Included Accessories

- Calibration kit for load and RPM
- Vibration sensor
- Microscope for scar measurement
- Set of tools for operation
- Electronic timer

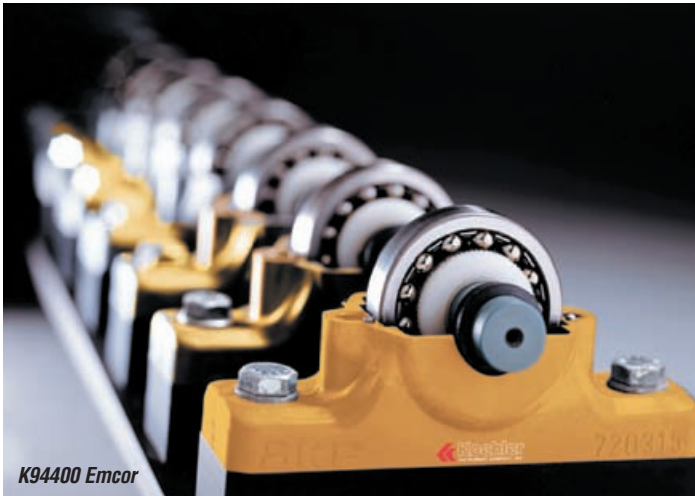


K92000 Timkin Tester

### Ordering Information

Catalog No.	
K92000	Timken Tester, 220V 60Hz
K92000-PN	Timken Tester with pneumatic loading, 220V 60Hz
K92090	Timken Tester, 380V 50Hz
K92090-PN	Timken Tester with pneumatic loading, 380V 50Hz

## CORROSION INHIBITION PROPERTIES OF GREASES



### Test Method

Measures the ability of a grease to protect a bearing against corrosion in the presence of water. Two sets of grease-coated bearings per station are partially immersed in water and rotated at a speed of 80 rpm in a sequence of running and resting periods. At the end of the test, the raceways of the bearing outer rings are inspected for rust.

### Emcor Grease Testing Machine

- Evaluates the rust preventive properties of greases and oils
- Performs both standing and dynamic testing

The Emcor Grease Testing Machine evaluates the rust preventive properties of greases on bearing components, measuring the ability of a grease to protect a bearing against corrosion in the presence of water. As bearings are normally used in environments exposed to humidity and temperature variations, condensation may form on the bearing thus promoting the onset of rust. Rust is detrimental to proper bearing operation and will compromise the longevity of the bearing. A good quality grease should be designed to protect the bearing from rust and corrosion under these conditions.

The Emcor system features test method versatility, since both greases and oils can be tested as well as variations can be made with regard to the test medium (e.g., brine instead of water). The costs for running these tests are minimal. The two test bearings are the only machined parts that have to be renewed for each test, and the polyamide material for the housing is rigid and strong and rarely ever needs replacement.

### Ordering Information

Catalog No.		Order Qty
K94400	Emcor Grease Testing Machine, 115V 60Hz	1
K94490	Emcor Grease Testing Machine, 230V 50Hz	

### Accessories

K94401	Test Bearing	8
K94402	Mounting Sleeve	8
K94403	Mounting Nut	8
K94408	Mounting Tool	1
K94410	Filling Device for Test Bearings	1
K94490-1	Emcor Washout Test Option	1

*Includes: Peristaltic Pump, Overflow Container, Inlet and Outlet Tubing and Pipe Fittings*

### Specifications

Conforms to the specifications of:  
 ASTM D6138; IP 220; ISO 11007;  
 DIN 51802; NFT 60-135;  
 SIS 155130  
 Electrical Requirements: **CE**  
 115V, 60Hz, 1 phase  
 230V, 50Hz, 1 phase

### Dimensions

l x w x h, in. (cm)  
 48½ x 15 x 11 (123 x 38 x 28)  
 Net Weight: 88 lbs (40kg)

### Shipping Information

Shipping Weight: 121 lbs (55 kg)  
 Dimensions: 8 Cu. ft.

## SCRATCH TESTER

### Specifications

Normal load control range: 2 - 20N  
 Normal load accuracy: 1% or 10mN  
 Tangential force measurement range: 2 - 20N  
 Tangential force accuracy: 1% or 10mN  
 Stroke (X): 0.1 - 50mm  
 Speed: 0.1 - 5mm/s  
 Pitch (Y): 0.2 - 50mm  
 Loading Rate: 0 - 20N/s. In steps of 0,2,5,10,15,20N/s  
 Sample Size (LxWxT): 60x60x10mm  
 Operating Temperature: 15 - 40°C. RH: 25 - 85%  
 Storage Temperature: -10 - 40°C, RH: 0 - 90%  
 Electrical Requirements: **CE**  
 115V 60Hz  
 220V 50Hz

### Included Accessories

Control Box	Diamond Indenter
Reference Sample (2)	Data Acquisition Software
Tool Kit	Operating and Instruction Manual

**Dimensions** l x w x h, in. (cm)  
 11.81 x 10.83 x 21.65 (30 x 27.5 x 55)  
 Net Weight: 44.1 lbs (20kg)

### Scratch Tester

The Scratch Tester is a versatile instrument capable of quantifying scratch resistance, critical load, adhesion and bond strength for a wide range of surfaces. The tester evaluates scratch resistance of a sliding surface in relative motion (X movement) to a stylus. The stylus is pressed against the moving surface with controlled force which is normal to the surface. Tangential force at the contact is measured. The ratio of tangential and normal forces is merely the co-efficient of friction till the threshold of surface damage. Energy required to damage the surface contributes an additional component to the tangential force, which increase this ratio. Force ratio is not the only sign of damage - acoustic emission level also increases corroborating the occurrence of surface damage. Image of the entire scratch may be captured and the view at any given load can be seen to study nature of failure.

### Ordering Information

Catalog No.	
K93000	Scratch Tester, 115V 60Hz
K93090	Scratch Tester, 220V 50Hz

### Accessories

K93004	CCD Based Image Acquisition System
K93016	Acoustic Emission Sensor

# PIN AND VEE BLOCK TESTER

## Test Method

To evaluate wear preventative and load carrying properties of fluid lubricants, and endurance (wear) life of film lubricants.

## Pin and Vee Block Tester

- Automatic Start of Test at Set Temperature
- Over-Temperature and Over-Torque Protection
- Maintenance of Test Speed within Specified Limits over entire Load Range
- Calibration kit for Load, Torque, and Wear
- High Performance Sensor to cover entire test load range with single load cell with adequate resolution.

The Pin and Vee Block Tester consists of a rotating pin pressed between two stationary steel Vee blocks. Load is applied to the Vee blocks by a ratchet mechanism. Ramping of load during extreme pressure testing is made possible by auto advancement mechanism of ratchet. Pin and Vee blocks are immersed in lubricant fluid under test in heated test cup. Wear, torque and endurance life is evaluated accordingly. The Pin and Vee Block tester comes with data acquisition software. Test torque, load, temperature and wear are measured and recorded. The software permits users to view, compare and report various test results.

## Specifications

Conforms to the Specifications of:

ASTM D2625, D2670, D3233, D5620;  
FTM 791C-3807.1, FTM 791C-3812.1

Test Load: 0 to 4500 lbf

Torque: 0 to 100 in-lb

Speed: 100 to 500 RPM

Temperature: Ambient to 200°C

Duration: 0 to 999.9 minutes

Electrical Requirements: **CE**

230V, 50/60Hz, 2 KVA, 1 Phase



K95190 Pin and Vee Block Tester

## Included Accessories

Calibration Kit	Measuring Microscope
Data Acquisition Software	Steel Ruler, 6"
Brinell Ball Attachment	Dust Cover
Test Pin (50)	Shear Pin (50)
Vee Block (100)	

## Ordering Information

<b>Catalog No.</b> K95190	Pin and Vee Block Tester, 230V 50/60Hz
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# MEASUREMENT OF LUBRICITY OF AVIATION TURBINE FUELS BY THE BALL-ON-CYLINDER LUBRICITY EVALUATOR (BOCLE)

## Test Method

Covers the Assessment of the wear aspects of the boundary lubrication properties of aviation turbine fuels on rubbing steel surfaces.

## Data Acquisition

Test parameters such as speed, test duration, fuel temperature, air temperature and humidity are acquired, displayed and recorded. The acquired data can be viewed in graphs. The data acquisition system provides the users with the facility to super impose up to four test graphs for comparative viewing.

## Specifications

Conforms to the Specifications of: ASTM D5001

Motor Speed: 240 ± 0.5 RPM

Fuel Temperature Control: 25±1.0 max, 0.1°C typical

Flow Rate: 3.8 ± 0.1 L/min

Relative Humidity: 10.0 ± 0.2% indicated

Temperature: 25±1.0 max, 0.1°C typical

Fuel Conditioning: 15 min ± 0.1s

Test Duration: 30 min ± 0.1s

Ambient Temperature: 15 to 22°C

Electrical Requirements: 230V, 50Hz, 2 KVA, 1 Phase, 1.5 KVA Max. **CE**

## ATF Lubricity Test Rig (BOCLE)

The instrument consists of a rotating test ring against which a fixed test ball is pressed with the required force. A fuel bath containing the fuel under test is placed on – movable stage under the test ring. The temperature is controlled and the air is conditioned.

Fuel under test is conditioned by maintaining the fuel temperature at 25°C maintained at 25°C with 10% Relative Humidity is passed through the test area which is enclosed.

After conditioning of the fuel, a test ball of 12.7 mm diameter is pressed against the outer surface of the test ring. The lower part of the test ring is immersed in the test fuel bath.

The test ball is pressed with a force of 10 N against the test ring. The test ring is made to rotate at 240 RPM for a period of 30 minutes after which the test stops.

The wear scar on the test ball is studied and the scar diameters of the wear scar (major and minor axis) are measured.

## Ordering Information

<b>Catalog No.</b> K94190	ATF Lubricity Test Rig (BOCLE), 230V 50Hz
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# MULTISPECIMEN

## Multispecimen Tester

- Multiple test configuration for wear and friction monitoring in one unit
- Speeds variable to 2000 rpm and loads to 1000 N
- Data acquisition system records speed of rotation, normal load, sample temperature, and frictional torque

Measures and displays a variety of friction and wear characteristics on various geometric test samples with different compositions and forms. Test configurations are easy to change on the instrument: single or multiple, sliding or rolling, point, line or area contacts are available. A wide range of materials including coatings, lubricants, plastics, metals, polymers, ceramics, and composites can be readily analyzed. The test is performed by mounting a test sample into the spindle and rotating it against a stationary counter-face test specimen. The spindle rotation speed, normal load, and interface temperature can be user-adjusted in accordance with published ASTM standards. Specimen holders are designed for standard test configurations; optional custom designed holders for customer specific applications are also available. This unit has a temperature range to 120°C, load to 1000 N and speed up to 2000 rpm. Windows®-based TriboDATA data acquisition software is included, and some of the possible configurations are shown in the table to the right.

### Specifications

Conforms to the specifications of:

ASTM D2266, D3702, D4172	Non-Rotating Sample
Normal Load: 5-1000 N	Diameter/Diagonal: up to 80 mm
Frictional Torque Measurement	Pin Sample Diameter: up to 8 mm
Range: 0-10 Nm	Ball Diameter: 12.7 mm
Shaft Speed: 200-2000 rpm	Non-rotating Sample Temperature:
Wear Measurement: 0-2000 µm	Ambient to 100°C

Configurations Table	
<b>Ball on flat</b> Sliding point contact	1, 2, 3 balls can be used Dry or lubricated contact
<b>Cylinder on flat</b> Sliding line contact	1 or 2 pins. Dry or lubricated
<b>Pin on flat</b> Sliding area contact	1, 2 or 3 pins. Dry or lubricated
<b>Four ball wear</b> Wear preventative properties of lubricants	ASTM D2266 ASTM D4172
<b>Thrust washer</b> Rotating washer against fixed washed with axial load	ASTM D3702

Ordering Information	
<b>Catalog No.</b>	<b>Order Qty</b>
<b>K93600</b> Multispecimen Tester, 220V 60Hz 3 Phase	1
<b>K93690</b> Multispecimen Tester, 380V 50Hz 3 Phase	

### Included Accessories

Electrical Controller  
Electrical Cables  
TriboDATA Software  
Set of Hand Tools  
Calibration and Test Reports

### Electrical Requirements $\text{C}\ \text{E}$

220V 60Hz 3 Phase  
380V 50Hz 3 Phase

### Included Adapters

Ball on Flat  
Cylinder on Flat  
Pin on Flat  
Four Ball Wear Preventative  
Thrust Washer

### Shipping Information

Shipping Weight: 880 lbs (400 kg)  
Dimensions: 32 Cu. ft.

## TRIBOLOGY TEST SPECIMENS AND OTHER TRIBOLOGY EQUIPMENT

### Slurry Abrasion Tester

Measures the slurry abrasive resistance of solid materials as prescribed by ASTM G105 specifications. Performs tests on metals, minerals, polymers, composites, ceramics, coatings, and heat-processed materials. A rectangular test sample is rotated in a slurry cup with the temperature maintained using a water bath. The test speed, temperature, duration, sample size, and slurry composition can be varied. The differential mass of the sample before and after the test is converted to volume loss (abrasion index) for direct comparison of the tested materials.

### Tapping Torque Tester

Evaluates metal working fluids and various machining operations according to ASTM D5619 for the torque requirements of tapping operations in pre-drilled samples. Software package acquires cutting torque and rotational speed and displays them as a function of test duration or angle of tool rotation.

### Air Jet Erosion Tester

Performs air jet erosion test according to ASTM G76 specifications. A test sample is bombarded by a gas containing particulates with a known velocity and concentration of particles. Comparison can be made by varying test sample composition, size, particle velocity, angle of incidence, and temperature.

### Dry Abrasion Tester

Measures index of abrasive resistance to dry sand according to ASTM G65 test specifications. Test specimen is held against a rotating wheel and abraded with a grit of controlled size, composition, and flow with the proper test duration and applied force as prescribed by the ASTM test method. The differential mass of the specimen before and after the test is recorded and converted to volume loss (abrasion index) for direct comparison of tested materials.

### Custom-Built Tribology Test Equipment and Test Specimens

Test specimens are available for all of the tribology instrumentation offered from Koehler. Please inquire with customer service about other custom-built tribology test equipment and test specimens. Custom-designed equipment is readily available for the following tribology test methods:

**Universal Wear (ASTM G77, G99)**

**Vane Pump Wear (ASTM D2882)**

**Shear Stability (ASTM D6278)**

**Slurry Erosion Tester**

**Reichert Tester**

**Grease Life Tester (D3336)**

**Grease Noise Tester**

**V2F Grease Testing Machine**

**ROF Grease Testing Machine (DIN 51806)**

**R2F Grease Testing Machine**



*High Temperature  
Air Jet Erosion  
Tester*