

## REICHERT TESTER

### About the Reichert Tester

The Reichert tester is an excellent tool for lubricant and additive manufacturers to evaluate the wear preventive (WP) and extreme pressure (EP) properties of their samples. This test was developed as a quick method to identify the formation of a lubricating film between two test surfaces. The Reichert Tester uses a drop in noise level (screeching) to identify when a lubricating film is successfully formed between the test surfaces.

Traditionally, this tester was shut off when a perceivable reduction in noise was observed. This required trained and an experienced operators to run tests with accuracy. As a result of this operator dependency there was often a variance in the observed test results. This problem was addressed by Ducom by incorporating instrumentation to monitor and log noise level, therefore reducing operator dependency.

The Reichert Tester sees significant utilization by lubricant and additive manufacturers to evaluate and rank their products quickly in their development / product formulation phase. It is also very useful for additive depletion studies and lubricant selection for metallurgy. This tester also sees use as an effective tool to determine lubricant quality while in use in machinery. Its requirement for a small sample volume allows maintenance staff to withdraw small lubricant samples from machinery and run a quick test to determine if it is time to replace the lubricant. This tester is capable of testing both, lubricating oils and greases.



Reichert Tester by Ducom for lubricant performance testing.

## REICHERT TESTER

### Understanding the Reichert Test

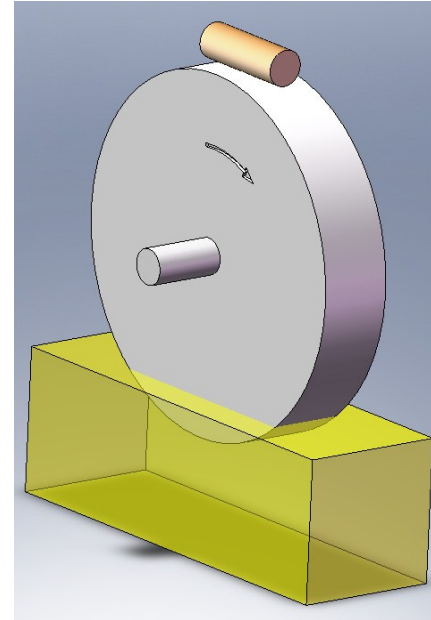
Very important parameters of a tester are its specimen and counter specimen metallurgy, specimen geometry and the resultant contact geometry. The Reichert tester uses a test pin as one specimen and a friction wheel as the other specimen. The surface of the test pin is tangential to the surface of the friction wheel. The axis of the pin is perpendicular to the axis of the friction wheel (see figure 2). This arrangement creates a "cross-cylinder" contact geometry.

The test pin is stationary during the test and is pressed firmly against a rotating friction wheel. The friction wheel is partially dipped in the lubricant under test, therefore carrying sufficient lubricant on its surface to the contact area. The system is instrumented to measure the applied load and frictional force during the test.

At the start of the test, there is no contact wear and the contact is a Hertzian ellipse. As the test progresses, contact wears out giving rise to a relatively larger contact area. As a result of the larger contact area and the constant applied load, the contact stress diminishes. When contact stress reduces below the load carrying stress of the lubricant, a lubricating film is formed across the contact surface area. The formation of this film is indicated by a reduction in the screeching noise from the contact and also from change in the frictional force. At this point is detected and the test is stopped.

Area of wear scar on the test pin is measured and the load carrying capacity of the lubricant is computed. The sliding distance is also noted using the radius of the friction wheel and the number of revolutions made before the test was stopped. The wear preventive property is estimated by measuring development of wear scar with time. Highly concentrated additive can be tested in various dilutions to optimize formulation.

The lubricant reservoir has a heater to control its temperature of the test sample. For testing lubricating greases, a spatula is used to apply grease samples ahead of the contact manually. Radial wear measurement is done using a dial gauge. The change in the vertical position of the pin sample after the test is measured and reported as wear.



Test Area Contact Geometry

## REICHERT TESTER

### Instrumentation

The Ducom Reichert Tester is instrumented to measure a variety of parameters. In conjunction with the Ducom software, users can record and report various test parameters along with results. Some of the instrumented parameters are:

- Contact load measurement
- Frictional force measurement
- Set test speed
- Set and control of lubricant reservoir temperature
- Test duration
- Dial indicator to measure radial wear
- Scar image acquisition on a PC for size measurement (optional)
- Average sound level recording

### Software

The Ducom Reichert Tester is supplied with the WinDucom software for data acquisition and control. This software is compatible with Windows 7 operating system. Its user friendly interface allows users to quickly set up test parameters, enter test details like test specimen information, sample information and other notes that make interpretation and documentation of results easy.

WinDucom test data is displayed online and stored in a PC. The software records frictional force and sound levels during the test. At the end of the test acquired data can be viewed as a function of time or sliding distance. Using the innovative CompariView function on Ducom software, users can compare up to 4 test results simultaneously. This feature is especially helpful during comparative studies as well as a marketing tool to visually and objectively demonstrate performance differentiation between products. Acquired data can be exported in ASCII format to other software for further analysis and reporting.

## REICHERT TESTER

### Standard test instrument specifications

Parameter	Unit	Minimum	Maximum	Remarks
Rotational Speed	RPM	500	1500	
Sliding Speed	m/sec	0.85	2.5	
Test Load	N	100	500	In steps of 100 N
Test Temperature	Deg. C	Ambient	120	
Sample Volume	mL	25		
Power	V/Hz/KVA/Phase	230/50-60/2KVA/1		

\* Specifications subject to change without notice. Consult Ducom for details.

### Standard test specimen specifications

Specimen	Details
Friction wheel	31.4 mm (dia) X 10 mm (length)
Test roller	12 mm (dia) X 15 mm (length)

### Scar Measurement

#### Optical Microscope

Reporting results from the Reichert Tester requires users to calculate the wear scar area. This is done by measuring the major axis and the minor axis of the scar and further calculating the scar area. The test scar obtained on the Ducom Reichert Tester can be evaluated using an optical microscope. The specifications of the microscope are below:

Parameter	Remarks
Sample stage	X and Y axis - manual movement
X-axis travel	25 mm
Y-axis travel	25 mm
Least Count	10 $\mu$ m
Magnification	5X and 10X

While the optical microscope is an excellent tool to observe and report test results, documentation of results may vary from user to user and the wear scar area must be calculate manually each time. To address this concern and to aid better reporting standards, Ducom also offers an optional Image Acquisition System which is supplied in lieu of the optical microscope if ordered.

## REICHERT TESTER

### Options

#### Image Acquisition System

The Ducom Image Acquisition System for the Reichert Tester is a CCD based instrumented system designed to help users observe and capture test scars. The accompanying software allows users to view test scars on their PC, make measurements and add test data as remarks for documentation and reporting. This can also be used as an effective tool to showcase sample performance for a visual comparison by customers and off-site team members.

The software has tools to mark scar boundary. It is done either by superimposing an ellipse or by identifying its major and minor axes. With this, scar area is computed for estimation of load bearing capacity of lubricant film.

Parameter	Remarks
Measurement range	4 mm maximum
Least Count	10 $\mu$ m

#### Ordering information

Order our products without hassle by using our ordering code. If you need assistance with making a decision or would like to learn more about any item, please contact us or our regional representative.

Item	Ordering Code	Remarks
Reichert Tester	LUB/0005/BA/0001	
<b>Options</b>		
Image acquisition system	LUB/0005/OP/1001	
Dial gauge (radial displacement)	LUB/0005/OP/1002	
<b>Consumables</b>		
Test roll (Brass) - pack of 25	LUB/0005/CO/2001	
Test roll (Copper) - pack of 25	LUB/0005/CO/2002	
Test roll (Aluminum) - pack of 25	LUB/0005/CO/2003	
Test roll (Steel) - pack of 25	LUB/0005/CO/2004	
Friction Wheel (Steel) - pack of 25	LUB/0005/CO/2005	
<b>Spares</b>		
Oil cup	LUB/0005/SP/3001	
Temperature sensor	LUB/0005/SP/3002	

## REICHERT TESTER

### Scope of Supply

#### Reichert Tester

(Ordering Code: LUB/0005/BA/0001)

Supply consists of:

- Basic test instrument consisting of:
  - Rigid instrument frame.
  - Motor with variable frequency drive.
  - Spindle to mount friction wheel.
  - Loading lever with load cells, pin holder and dead weights.
  - Counter specimen holding arrangement.
  - Heated oil cup.
- Power cables.
- Software CD
- Optical microscope
- Operating and maintenance manual (2 copies).
- Calibration reports.
- Tool Kit.

#### Image acquisition system

(Ordering code: LUB/0005/OP/1001)

Supply consists of:

- Image acquisition hardware consisting of:
  - CCD frame and camera
  - Electronics
  - Illumination
  - Software CD
  - Cables
  - Calibration kit
- Operating and maintenance manual (2 copies)
- Software CD

#### Dial gauge

(Ordering code: LUB/0005/OP/1002)

Supply consists of:

- Dial gauge
  - 10 micrometer least count
  - 10mm range for radial wear

#### Test rolls - Brass

(Ordering code: LUB/0005/CO/2001)

Supply consists of:

- Pack of 25 test rolls

#### Test rolls - Copper

(Ordering code: LUB/0005/CO/2002)

Supply consists of:

- Pack of 25 test rolls

#### Test rolls – Aluminum

(Ordering code: LUB/0005/CO/2003)

Supply consists of:

- Pack of 25 test rolls

#### Test rolls - Steel

(Ordering code: LUB/0005/CO/2004)

Supply consists of:

- Pack of 25 test rolls

#### Friction wheel – Steel

(Ordering code: LUB/0005/CO/2005)

Supply consists of:

- Pack of 25 friction wheels

## Other facilities and services by Ducom

### CONTRACT TEST LAB:

Ducom is a preferred partner for tribological tests for several Fortune 500 companies as well as small industries and research labs. Our facilities include a variety of Tribometers, Mechanical Testers and Petro Testers at two locations: Bangalore (India) and Evanston, IL (USA). Contract testing on custom development testers are also offered. Ducom also offers the facility to video-witness tests—saving on costs involved with physically witnessing critical tests.

Ducom Test Facility has been in service since 1999, providing tribological testing facilities to academics and industries. Ducom ensures that customers get great value by offering these services on advanced tribometers that are regularly calibrated and checked for repeatability of their results. The test facility is run by experienced staff with more than five decades of cumulative testing experience in the field of tribological testing alone. Advantages of choosing Ducom Test Facility as your testing service provider:

- No capital investment on a tester
- No additional man-power requirement
- No maintenance and AMC costs
- No training requirement
- Excellent security - limited access facility and strongly enforced non-disclosure agreement
- Excellent reporting - test reported in accordance with applicable test standards

## About Ducom Instruments

Ducom is a multi-faceted test instrument manufacturer. Instruments capabilities span macro, micro and nano scale characterization with installations in over 2000 labs worldwide. Ducom test instruments are trusted for their excellent repeatability, high technology and robust design.

A dedicated in-house Research & Development group works on development of new technologies and test methods to bring state-of-the-art characterization techniques to research labs and industries.

- Since 1978
- ISO 9001: 2008 Certified
- CE certified testers
- State-of-the-art R&D
- In-house CNC manufacturing
- In-house design, electronics & software

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