FALEX Four-Ball Wear Test Machine

The Falex Four Ball Wear Test Machine is used to determine the relative wear-preventing properties of lubricating fluids and greases in sliding and rolling applications.

Three ½ inch diameter steel balls are clamped together and covered with the test lubricant. A fourth ½ inch diameter steel ball is pressed into the cavity formed by the three clamped balls for three point contact, and rotated for a set duration. Lubricants are compared using the average size of the scar diameters worn on the three lower clamped balls.

The Standard Falex Four Ball Wear Test Machine is supplied with a 1/2 HP motor to drive the rotating ball at 1200 rpm. A mechanical lever arm applies loads up to 50 kilograms on the ball specimen. A digital temperature system controls the initial temperature set point (ambient to 200° C) and displays the lubricant temperature during the test. A digital timer system controls the test duration (1 second to 999 hours).

The Falex Four-Ball Variable Drive Wear Test Machine is supplied with a 1 HP variable speed motor with a standard operating range of 60 to 3600 rpm. Optional systems are available for rotational speeds up to 10,000 rpm. A pneumatic load system applies loads up to 180 kilograms on the ball specimen. A digital friction measurement system displays the test friction force (0 to 1000 grams). A digital temperature system controls the initial temperature set point (ambient to 200° C) and displays the lubricant temperature during the test. A digital timer system controls the test duration (1 second to 999 hours). An optional system is available for controlling the atmosphere in the test cup.

The Falex Four-Ball Wear Test Machine is designed to provide the precision loading required for performing accurate wear tests. It is the only test machine that has proven through cooperative inter-laboratory testing to meet the requirements of the precision as stated in the ASTM Standard Test Methods D2266 and D4172. Insist on the Falex Four-Ball Wear Test Machine to meet your ASTM testing requirements.

Tribology and Petroleum Testing Equipment for More Than 80 Years

FOUR-BALL WEAR SPECIFICATIONS

LOAD:
Variable Drive Four Ball Wear Tester: Pneumatic loading, 180 kg max.
Standard Four Ball Wear Tester: Dead weight and mechanical lever, 50 kg max.

SPEED:
Variable Drive Four Ball Wear Tester: 60 to 3600 rpm continuously variable. 1 to 10,000 rpm with speed conversion options.
Standard Four Ball Wear Tester: 1200 rpm

TEMPERATURE CONTROL:
Digital control from ambient to 200°C
Auto start-up upon reaching test temperature

TEST DURATION:
Digital Programmable Timer (1 second to 999 hours)

FRICTION MEASUREMENT:
Variable Drive Four Ball Wear Tester: Load Cell Assembly and Digital Display of Test Friction Force
Standard Four Ball Wear Tester: Not Available

ENVIRONMENTS:
Dry or lubricated (fluids, greases, dry film)

SPACE REQUIREMENTS:
66 in (H) x 36 in (D) x 32 in (W) (168 cm x 91 cm x 81 cm)

UTILITY REQUIREMENTS:
220V, 60Cycles (50 Cycle optional), Single Phase, 10 Amps
80 psig clean dry air (Model F-1519)

SHIPPING INFORMATION:
750 lb. (341 kg); 43 in x 36 in x 75 in (109 cm x 91 cm x 191 cm)

TEST PROCEDURES

ASTM D 2266	Standard Test Method for War Preventative Characteristics of Lubricating Grease (Four-Ball Method)
ASTM D4172	Standard Test Method for Wear Preventative Characteristics of Lubricity Fluids (Four-Ball Method)
ASTM D5183	Standard Test Method for Determination of the Coefficient of Friction of Lubricants using the Four-Ball Wear Test Machine
IP 300:	Rolling Contact Fatigue Test for Fluids in a Modified Four-Ball Machine

FOUR-BALL EP COMPONENTS AND OPTIONS

F-1519 VARIABLE DRIVE FOUR-BALL WEAR TEST MACHINE

Includes the following:

- 1 HP Variable Speed Motor
  - 60 to 3600 rpm
  - Speed Indicator and Controller
- Digital Test Duration Timer
- Friction Measurement System
  - Load Cell Assembly
  - Air Bearing Assembly
- Pneumatic Loading System
  - 180 Kg max load
  - Load Regulator and Display
- Temperature Controller System
  - Heater Assembly (200° C max)
  - Automatic Test Start
- Ball Cup Assembly and Fixtures
  - Ball Cup with Thermocouple
  - Ball Chuck
  - Ball Cup Tightening Base
  - Ball Cup Disk Adapter
  - 0-25 lb-in Torque Wrench
- Emergency Stop Switch

F-1520 STANDARD FOUR-BALL WEAR TEST MACHINE

Includes the following:

- ½ HP Single Speed Motor, 1200 rpm
- Mechanical Loading System
  - Lever Arm and Weight Hager
  - 50 Kg max load
- Digital Test Duration Timer
- Temperature Controller System
  - Heater Assembly (200° C max)
  - Automatic Test Start
- Ball Cup Assembly and Fixtures
  - Ball Cup with Thermocouple
  - Ball Chuck
  - Ball Cup Tightening Base
  - Ball Cup Disk Adapter
  - 0-25 lb-in Torque Wrench
- Emergency Stop Switch

Four-Ball EP Accessories

F-1519-D1 VIBRATION DETECTION SENSOR
For use with F-1519-D FALEX SoftWEAR™ Data Acquisition System. Sensor, Display and Cutoff System used for determining onset of fatigue when testing materials under rolling conditions.

F-1519-5 STANDARD BALL CUP ASSEMBLY
Standard Test Cup, Disk, Clamp Ring, Lock Nut and Thermocouple

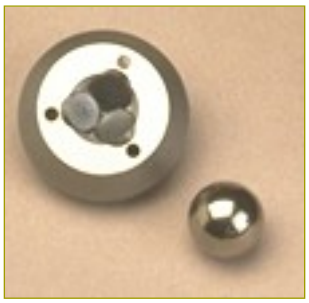
019-108-004 ROLLING FOUR-BALL CUP ASSEMBLY
Rolling Ball Cup, Lock Nut and Thermocouple

006-500-101 ROLLING FOUR-BALL SPECIMEN RACE
Rolling Test Specimen evaluating materials under rolling conditions. Requires F-1519-5A.

F-1519-6 DISK FIXTURE
For punching ¼ inch diameter disk from 1/16 inch sheet stock (must be used with arbor press).

020-005-028 BALL CHUCK
Holds Fourth ½ inch diameter rotating ball during testing.

F-1519-8 THERMOCOUPLE
Ball Cup Thermocouple



F-1519-9 DISK ADAPTER
Permits use of three ¼ inch diameter by 1/16 inch thick disk specimens (F-1519-56) in place of lower balls for alternate material combinations.

F-1519-9A B.O.T.D. CONVERSION KIT
Includes anti-vibration ball clamp ring, anti-vibration cup disk, light load kit (F-1519-13A), calibration weight, 6:1 low speed drive.

F-1519-11 LOW SPEED CONVERSION
Allows 1/2 to 25 rpm. For use with F-1519 model only.

F-1519-12 HIGH SPEED CONVERSION
Allows 200 to 10,000 rpm. For use with F-1519 model only.

F-1519-15 FOUR-BALL WEAR LOAD CALIBRATOR

Calibration Load Cell and Meter for the pneumatic load system on Variable Drive Four-Ball Wear Test Machine, model F-1519.

Falex Scar Measurement Systems

F-1519-31A **HIGH PRECISION SCAR MEASUREMENT SYSTEM**
Includes binocular microscope with X-Y base and digital display of measurement accurate to 0.001 mm. System includes ball cup stand with single ball holder. Allows reading of ball scar without removal from ball cup.

F-1519-31B **DIGITAL SCAR MEASUREMENT SYSTEM with CCD CAMERA**
Includes a CCD camera and digital display of ball scar and capability of measurement on screen to 0.001 mm. System includes ball cup stand with single ball holder and CCD camera with USB port for recording scar diameters to Falex computerized data acquisition system or host computer. Allows for reading ball scar without removal from ball cup.

Falex Test Specimens

006-500-161 **FALEX TEST SPECIMEN BALLS**
AISI E 52100 steel. 500/box
Balls conform to ASTM D2596 and, D2783.

F-1519-9B **ROLLING FOUR-BALL SPECIMEN RACE**
Replacement lower specimen race for evaluating materials under rolling conditions

F-1519-56 **BOTD TEST SPECIMEN SET**

Test balls and disks are available in a wide range of materials, surface finishes and hardnesses. Please contact Falex Corporation or a Technical Sales Representative for pricing and availability.

For All of Your Lubricant and Materials Testing

Lubricants

- Pin and Vee Block
- Block-on-Ring
- Timken EP
- Tapping Torque
- Panel Coker
- High Temperature/High Speed Bearing
- Four Ball Wear
- Four Ball EP
- High Temperature Wheel Bearing
- Thermal Oxidation Stability (L60-1)
- Fretting Wear
- Hydrolytic Stability
- Grease Corrosion Test
- Isothermal Oxidation
- Hydraulic Fluid Pump Stand (Vickers and Conestoga)

Fuels and Solvents

- Ball on Three Disk Fuel Lubricity
- Thin Film Evaporator
- Fuel Deposit Simulator

Materials

- Journal Bearing
- Multi-Specimen
- Crossed Cylinders
- Low Velocity Friction Apparatus
- Pin on Disk
- Coefficient of Stoption
- Magnetic Media and Paper Wear
- Life Performance Face Clutch System
- Thin Coating Wear (Electrical Contacts)
- Dual Drive Rolling Contact Fatigue
- High Speed Bearing/Mechanical Clutch

Abrasion and Erosion

- Dry Sand/Rubber Wheel
- Air Jet Erosion
- Miller Number Slurry