MATERIALS
TESTING AND
FORCE GAUGES

- High-quality Force Measurement Instruments
- High-precision Universal Test Machines
- Extensive range of grips, jigs, probes and fixtures
- Application expertise and customized solutions
MEASURING UP TO YOUR STANDARDS – EASY AND ACCURATE SOLUTIONS TO THE CHALLENGES YOU FACE EVERY DAY
About Us

AMETEK Test & Calibration Instruments is one of the world's leading manufacturers and developers of instruments for testing the tensile strength, compressibility, hardness, elasticity, peeling and adhesion ability of a wide range of materials. Our product portfolio spans from handheld Force Gauges up to 150 kN Universal Testing Machines and from Polymer Testers to Food Texture Analyzers.

**Lloyd Instruments** Universal Testing Machines are used to determine the physical and mechanical properties of raw materials and components, as well as for product testing of finished goods.

**Chatillon** is a leading manufacturer and global supplier of Force Measurement Instruments and Testers for use in production, quality and R&D in a host of applications and markets.

**Davenport** Polymer Testers are used in the polymer and plastics industry for quality conformity of incoming polymers and process control, as well as for testing and validating finished products.

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**Contents**

- **5** Benefits
- **6** Markets
- **10** Applications
- **11** Mechanical, Ergonomic & Hydraulic Force Gauges
- **12** Digital Force Gauges
- **13** Mechanical & Motorized Test Stands
- **14** Digital Force Testers
- **15** NEXYGEN® Plus Software
- **16** Single Column Testing Machines
- **18** Twin Column - Bench Testing Machines
- **19** Twin Column - Floor Testing Machines
- **20** Accessories
- **22** Polymer Testers
CUSTOMIZED TEST SOLUTIONS ARE OUR SPECIALTY — NO MATTER YOUR TEST NEED, WE'LL GIVE YOU THE RIGHT SOLUTION.
The Benefits of Materials Testing and Force Measurement

Your customers demand innovation, reliability and consistently high quality. Your company demands shorter product-to-market cycle times, lower manufacturing costs and improved profitability. Basically, you’re expected to do more with less.

Product testing is an integral part of your company’s strategy to ensure customer safety, satisfaction and, ultimately, loyalty. Force measurement and materials testing instruments are important tools in this process. These tools measure your product’s performance, safety, quality and compliance. Ultimately, product testing is key to ensure that your company avoids obstacles that can damage your valuable relationship with your customers.

AMETEK Test & Calibration Instruments Force Gauges and Materials Testing Instruments meet these demands - we help you deliver dependable, reliable and quality products that meet your internal requirements as well as international standards. We offer a comprehensive product line engineered to be easy to set up, easy to operate and even easier to maintain.

Markets

Our product range is very versatile and our universal test machines combined with dedicated grips and fixtures can be used to solve a variety of specific test applications.
Applications

The following section details common applications and key international standards by industry sector.

Our application knowledge and expertise is immense.

If you don’t see your application here, please contact us.
Plastics

The testing of raw materials requires highly accurate and repeatable data to allow preparation of material data sheets. A wide range of grips is available, including pneumatic grips for reducing operator fatigue and constant pressure gripping. Our extensometers enable our customers to accurately measure parameters such as modulus, yield strength and elongation to failure. For flexural and compression tests, our machines can compensate for load frame and fixture deflection ensuring highly accurate data acquisition.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Standard / Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression</td>
<td>ASTM D695, ASTM D6412, ISO 604, BS 2782</td>
</tr>
<tr>
<td>Flexural</td>
<td>ASTM D790, ISO 178, BS 2782</td>
</tr>
<tr>
<td>Shear</td>
<td>ASTM D732</td>
</tr>
<tr>
<td>Friction</td>
<td>ASTM D1894</td>
</tr>
</tbody>
</table>

Products & Components

Testing of products and components often requires test methods that are not based on international standards. NEXYGENPlus software can be configured for any multi-stage test method that is required. Configurable user access rights and audit trails benefit customers working in the medical device or pharmaceutical industries.

Markets served include: Medical device, automotive, pipes, building materials, electronics, aerospace, packaging, defence and many more.

Packaging

The testing of packaging requires an extremely versatile materials testing system due to the varying requirements within industries such as pharmaceutical, cosmetics, food and beverages. A single system from us will allow you to test in compliance with all standards shown below and many more.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Standard / Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength, elongation, yield strength</td>
<td>ASTM D882, ISO 527</td>
</tr>
<tr>
<td>Static and kinetic coefficients of friction</td>
<td>ASTM D1894, ISO 8295</td>
</tr>
<tr>
<td>Tearing strength</td>
<td>ASTM D1004, ASTM D1938, ISO 6383</td>
</tr>
<tr>
<td>90° and 180° peeling of heat bonded seals</td>
<td>Seal Strength</td>
</tr>
<tr>
<td>Puncture resistance</td>
<td>ASTM D5748, EN 14477</td>
</tr>
<tr>
<td>Cardboard compression, flexural, ECT, BCT, FDT, SCT</td>
<td>ISO 5628, ISO 3007, ISO 12048, EN 23035, ISO 9899</td>
</tr>
</tbody>
</table>
Adhesive Tapes

Our LS Series can be configured to test in accordance with the FINAT methods.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Standard / Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>180° peel</td>
<td>FTM1</td>
</tr>
<tr>
<td>90° peel</td>
<td>FTM2</td>
</tr>
<tr>
<td>Low speed release</td>
<td>FTM3</td>
</tr>
<tr>
<td>Loop tack</td>
<td>FTM9</td>
</tr>
<tr>
<td>Dynamic shear</td>
<td>FTM18</td>
</tr>
</tbody>
</table>

Rubber

Testing of rubber materials commonly requires machines capable of measuring very high strain in addition to testing at temperatures above and below ambient.

We offer extended column machines ideal for rubber applications that are compatible with long travel contacting and non-contacting extensometers.

Thermal chambers for testing between -70°C and +300°C are also available for the study of material properties at temperatures other than ambient.

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Standard / Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile</td>
<td>ISO 37, ASTM D412, ASTM D413, ASTM D429, ASTM D4482</td>
</tr>
<tr>
<td>Tear</td>
<td>ASTM D624</td>
</tr>
</tbody>
</table>

Metals

The key to accurate metals testing to international standards is the ability to measure the stress and strain to a very high degree of accuracy.

For metals testing, we offer a wide range of extensometers to measure such parameters as Young’s modulus and proof stress.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Tensile</td>
<td>EN 10002, EN ISO 8496, ISO 6892, ASTM E8, ASTM A370</td>
</tr>
<tr>
<td>N value</td>
<td>ISO 10275</td>
</tr>
<tr>
<td>Bending</td>
<td>ASTM E290, ASTM E1012, EN 13523, EN ISO 7438, EN ISO 8491</td>
</tr>
<tr>
<td>Erichsen cupping test</td>
<td>DIN 50101</td>
</tr>
</tbody>
</table>

Furnaces for testing metals up to 1200°C are also available. Standard test methods within NEXYGENPlus software allow simple and fast test creation to international standards.
Textiles
The LS Series capability covers the testing of a wide range of textile products including:

- Geo-textiles
- Fibre and yarn
- Coated textiles
- Knitted products
- Thermal insulation
- Non-wovens
- Ropes
- Nets
- Webbing

Test types include:

<table>
<thead>
<tr>
<th>Test Type</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Seam slippage</td>
<td>Tensile strength</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>Puncture resistance</td>
</tr>
<tr>
<td>Tear resistance</td>
<td>Trouser tear</td>
</tr>
</tbody>
</table>

Foams
Several compression/relaxation tests can be performed on foam samples, measuring the forces at various percentages of compression to international standards.

Paper and Board
Tests such as Z direction fibre strength, bending, friction and compressibility can be easily performed using NEXYGENPlus software. Data from all tests can be combined into a single material properties data sheet.

Food
We also supply a dedicated food texture analyser featuring all the benefits of the LS Series and NEXYGENPlus.

Texture analysers are used to measure properties including:

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>TPA</td>
<td>Consistency, Gumminess</td>
</tr>
<tr>
<td>Adhesiveness</td>
<td>Crispness, Hardness</td>
</tr>
<tr>
<td>Chewiness</td>
<td>Firmness, Springiness</td>
</tr>
<tr>
<td>Cohensiveness</td>
<td>Gel strength, Stickiness</td>
</tr>
</tbody>
</table>
MECHANICAL FORCE GAUGES

LG & DG SERIES

- Economical tensile or compression testing
- Accuracy better than ±0.5% F.S.
- For use in hazardous environments

Ideal for a wide range of force testing applications. With their durable plastic housing and ergonomic shape, these gauges fit naturally in the hand for a comfortable and firm grip, even at maximum loads.

Available in lbf, kgf or N units and have a concentric dial that measures clockwise only and rotates 360-degrees for taring. A peak hold switch captures peak readings and can be easily and quickly returned to zero. A mechanical overload feature protects the gauge from damage.

HYDRAULIC GAUGES

ERICHSEN WUPPERTAL

- Economical force measurement
- For use in hazardous environments
- Range of styles to meet every need

Hydraulic Gauges are a low-cost method for obtaining general force measurements. With a wide range of styles and sizes, these gauges are popular in many industries and particularly popular for use in hazardous environments.

The hydraulic gauges can be used for occasional force checks, continuous loading, or permanent installation. Every model has a robust construction and most are suitable for use in rough operating conditions on machines and in production.

ERGONOMIC GAUGES

MSE & DMG SERIES

- Accuracy better than ±0.5% F.S.
- For use in hazardous environments
- Application kits available

Ideal for functional capacity evaluations and basic muscle strength measurements where economy and ease-of-use are essential. Compact and easy-to-use, these gauges are designed for use in physical, occupational and sports medicine applications and general patient assessment in family, neurological and orthopedic practices.

Simplicity is a key design criterion for these gauges. A large, easy-to-read dial indicator displays peak strength and a variety of testing fixtures are optionally available. These mechanical force gauges are an excellent and economical solution for tensile or compression testing.
DIGITAL FORCE & TORQUE GAUGES
DF II SERIES

A new era in force measurement
– best price performance of any digital force gauge available

Impressive handheld gauges that meet the ever increasing industry demands for rapid data acquisition and shorter test cycles. These powerful, yet user-friendly gauges are designed for either handheld use or test stand mounting and provide accurate measurements that are required in quality testing to determine the strength or functionality of a part or product.

The DF II Series boasts a large, easy-to-read, high resolution LCD display, as well as a varying range of functions, including normal and peak readings. One of the models can be equipped with integral load cells or smart remote sensors for load measurement or torque measurement. Chatillon DF2 Wedge Communication Software is an option if advanced data analysis is needed.
**MECHANICAL TEST STANDS**

**MT SERIES**

- **Tensile, compression, peel & flexural testing**
- **For use with DF II Series Force Gauges**
- **Extended column heights available**

Easy-to-use solutions for force measurement applications. Features an innovative, compact and lightweight design that maximizes working space and simplifies operation and maintenance.

The single column design with a 150mm (6 in) throat is ideal for large specimens and the removable platen is designed to accommodate metric as well as imperial threaded fixtures. The test stand comes with a standard 6-inch stroke (longer strokes available as special order) and it can be bench mounted, wall mounted or even positioned horizontally.

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**MOTORIZED TEST STANDS**

**LTCM SERIES**

- **Tensile, compression, peel & flexural testing**
- **For use with DF II Series Force Gauges**
- **Ideal for busy production environments**

Economical, motorized testers optimized for production floor operation and when combined with a DF II Series digital force gauge, it provides users with an easy-to-use testing system. The series is ruggedly built and the control panel is designed to promote simple operation. The LTCM Series features a large working area and a 5 in (130mm) throat ideal for large sample sizes.

Crosshead travel is controlled from a simple console or using an optional footswitch controller. The series is very flexible with a crosshead speed of up to 20 in (500mm) per minute and a travel distance of up to 29 in (750mm). When combined with a Chatillon DFS II Series force gauge, you have a force measurement system with load accuracy of better than 0.1% Full Scale.
DIGITAL FORCE TESTERS
CS SERIES

Robust & reliable
– designed specifically for use in production environments

Revolutionary systems optimized for production testing applications, including medical devices, plastics, packaging, textiles, rubber and electronics to name a few. No personal computer is required, no proprietary software is required, and no knowledge of programming languages is required.

The Series provides you with an easy-to-use, intuitive and straight-forward method for tensile testing, compression testing, sheer testing, flexural testing, peel testing or advanced multi-stage testing that conform to ISO or ASTM testing procedures. With its one click operation on a robust and reliable touch screen, the CS Series is an excellent choice for simple testing applications.
MATERIAL TEST AND DATA ANALYSIS SOFTWARE

NEXYGEN PLUS

The easy to use and flexible software allows the operator to control and monitor all aspects of the system from a single intuitive user interface. This ensures fast, reliable and powerful testing in addition to fingertip control of data analysis features.

NEXYGENPlus is supplied as a complete all-inclusive package with no additional modules required.

THE PACKAGE INCLUDES:

- Complete standards library for food, cosmetics and packaging testing
- Comprehensive multi-stage test wizard
- Security and audit trail utility
- SPC trend and histogram charts
- Video and still picture capture system
- Compatible with Windows 7 or XP
- Data export utility for connection to LIMS and SPC packages
- Seamless integration with Microsoft® Office

Test Library

Getting started with NEXYGENPlus could not be simpler thanks to the extensive built-in library of test methods covering food, cosmetics and packaging tests to AACC, ASTM, DIN, EN, ISO and other international standards.

Our philosophy is to offer a complete standards library to every customer, in addition to complete test wizards for tension, compression, tearing, peeling, friction and flexural tests.

The standard user configurable test can be used to create specialist multi-stage tests and is particularly beneficial for texture profile analysis.
Video and Still Picture Capture

Whether for advanced texture analysis or presentation of tests results, video and stills capture is a unique convincing feature. Entire tests can be videoed and synchronised with the stress/strain data and replayed for detailed post-test analysis.

Alternatively, still images can be taken at specific points during the test. These still images are recorded on the graph for easy analysis. These powerful features can be utilised by simply connecting a webcam or analogue video camera to a PC.

Test Data Security and Audit Trails

The security and audit trail feature enables supervisors to manage user access and data traceability. The module can also be configured to assist manufacturers with FDA 21 CFR Part 11 compliance requirements.

Electronic signatures and the ability to restrict user access rights increase security and avoid costly errors. Integrated audit trails covering operator usage and test results guarantee that all changes to test procedures are recorded in a simple retrievable format.

Reporting and Exporting Data

NEXYGENPlus features a simple to use report designer linked to Microsoft Word. Layouts, fonts and images can all be manipulated using the full power of Microsoft Word. Microsoft Office integration allows seamless transfer of data to familiar Windows® packages such as Word and Excel® for further analysis. Data can also be exported to your favourite LIMS, SPC or data management systems by using our versatile data export facility.
**APPLICATION–SPECIFIC TESTING MACHINES**

Specific needs, unique solutions
– experts in designing test solutions that work for you

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**Friction Tester**

The FT1 friction tester is a perfect choice to easily measure static and kinetic coefficients of friction. It conforms to international standards for friction testing including ASTM D1894, ISO 8295 and TAPPI T549.

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**Texture Analyser**

The TA1 texture analyser is a cost effective, easy to use solution for performing rapid, detailed texture analysis tests. An extensive range of jigs, probes and fixtures designed from years of experience is available. In addition, the machine can be fitted with multi-purpose grips for testing the strength and integrity of food packaging.
**SINGLE COLUMN TESTING MACHINES**

**LS SERIES**

**Extraordinary versatility** — the right solution for a multitude of industries and applications

High-precision solutions that, when combined with our extensive range of grips, fixtures, extensometers and software, create a powerful materials testing system. Suitable for a wide range of applications and test types, including medical devices, plastics, packaging, textiles, rubber and electronics to name a few.

- **Accuracy +/- 0.5% down to 1% of load cell**
- **For quality control, education and R&D**
- **Modern linear guide technology**

The series features an integral control console with a multi-function keypad and an easy-to-read backlit LCD to display load and extension information. The control console displays prompts and menus, which guide you through machine operations. It can work as a standalone system but when used in collaboration with NEXYGENPlus software it allows the operator to control and monitor all aspects of the system from a single front end.

**www.lloyd-instruments.com**

Extraordinary versatility — the right solution for a multitude of industries and applications
Extraordinary versatility
the right solution for a multitude of industries and applications

Data sampling rate
1000Hz

For simple to complex multi-stage tests

Extended models available

Designed to measure medium or high force ranges and excellent for tension and compression testing where high precision is required. The series can carry out tensile, compression, flexural, friction, insertion/extraction, peeling, tearing or cyclic tests on a wide variety of materials or components.

Combines high performance and flexibility with exceptional ease of use. Equally designed for routine quality control testing and for performing complex multi-stage tests. A comprehensive range of grips and fixtures is available to accommodate specific test specimens. The series can work as a standalone system but when used in collaboration with NEXYGENPlus software, the operator can control and monitor all aspects of the system from a single front end.
**TWIN COLUMN FLOOR STANDING**

From routine to complex – flexibility and high performance testing on the largest samples

Incorporates an extensive range of features making these units ideal for performing complex, as well as routine, testing applications on very large materials. The LR Series machines are floor standing models and they feature a twin-column design with a crosshead travel range of 1150 mm (45.3 in).

- **Data sampling rate**: 1000Hz
- **Extended models available**
- **High accuracy load measurement**

The high stiffness frame incorporates a crosshead guidance system to prevent side loading of the sample under test. The twin-column floor-standing machines can work as a standalone system but when used in collaboration with NEXYGENPlus software, the operator can control and monitor all aspects of the system from a single front end.

www.lloyd-instruments.com
Throughout our years in business, we have designed many solutions to meet our customers’ specific needs. We supply an extensive variety of accessories for our entire product range, including adapters used for tensile and compression testing, cables and force gauge adapter kits designed to ensure proper centerline alignment. We also feature a large selection of grips, fixtures, jigs and probes.

If we don’t have it, we can probably make it, so you are welcome to ask our applications experts for guidance on your specific application.

**EXTENSOMETERS**

We provide a wide variety of general purpose Contacting Extensometers, in just the size you need. These extensometers are designed for accurate strain and extension measurement of a wide range of materials such as semi-rigid plastics, rubbers, wire, cable, textiles and more, up to a maximum sample thickness of 25 mm. These contacting extensometers are also available as Long Travel Extensometers, ideal for use when testing high-elongation materials.

A wide range of Deflection Gauge Extensometers, which measure deformation in three and four point bend tests and in compression testing applications, is also available.

The non-contacting Video Extensometer is suitable for both the measurement of material constants as well as “long travel” applications. The equipment is mounted on an adjustable frame which is attached to the tensile testing machine. It is thus possible to adjust the video extensometer to the optimal position within the chosen work area. The video extensometer is available with eight different lenses to ensure optimal focus.
POGOS & SPLINTER SHIELDS

POGO Test Frames are unique to AMETEK TCI. By fitting the POGO frame below the machine base it becomes possible to test very large samples – up to 2 x 2 m (78.7 x 78.7 in) in size.

There is also an added benefit of optional elevated and low temperature testing capability. POGO test frames are available for all single-column and twin-column bench-mounted test machines.

Splinter Shields are available to protect the user when testing brittle samples which are liable to fragment. These shields help prevent sample splinters from leaving the test area when performing a test. Sliding shields are lowered onto the test area once the sample is mounted. Hinged shields can be easily opened, allowing full access to the test area from the front or back of the machine. Splinter Shields are available for single-column and twin-column (both bench and floor models) test machines.

FURNACES & THERMAL CABINETS

Our high temperature vertical split Furnace with a temperature range from 50 to 950°C can be used with all of our twin-column test machines. The electrical heating elements are wound in three zones, which may be independently balanced to linearize the temperature over the full length of the unit. The Furnace is controlled by a sophisticated temperature control unit that is housed in a separate control console.

Designed for testing samples under predefined temperature conditions, we offer a range of Thermal Cabinets, providing a temperature range from -70 to 300°C within a large general purpose test area.

The cabinets have a glass observation panel in the front door that allows the specimen to be inspected during test. The cabinets are mounted on wheels on an independent base unit. Normal ambient tests are possible, when the cabinet is moved in rear position, clear of the test machine crosshead.

Thermal cabinets can be used with all of our twin-column test machines (both bench and floor models).
POLYMER TESTER

PETPLUS

The preferred IV measurement method
– Save costs, save time, focus on safety

A unique test instrument designed for fast and safe solvent-free intrinsic viscosity (IV) measurement of moisture-sensitive polyethylene terephthalate (PET). Existing solvent methods for determining IV involve the need to handle and dispose of toxic solvents.

The PETPlus method is both kinder to the environment and saves on the high costs of purchase and disposal of solvents.

Ideal for QC and R&D
Simple set-up
Small footprint

Unlike other IV measurement instruments, the PETPlus can test polymers at virtually all stages of the process: from incoming resin, powder, dry granules, molten polymer, preforms, PET bottles, films and even re-ground material, thereby eliminating scrap.
**POLYMER TESTER**

**MFI SERIES**

- Test according to international standards
- Manual or fully automatic testing
- Extended column heights available

Used to determine the melt flow rate of a polymer by extruding it in a molten state through a calibrated die using a reference weight.

The MFI-9 is a competitively-priced product, which achieves high accuracy, repeatability and reproducibility of results. The MFI-9 Indexer is ideal for low volume users who require high quality.

The MFI-10 is an intelligent, modular system, which offers flexibility of testing and increased automation. The main base unit can be configured for either manual or fully automatic testing.

**POLYMER TESTER**

**DENSITY COLUMN**

- Simple set-up, operation and maintenance
- Complies with international standards
- Accepts mains water

Davenport Density Measuring Columns are designed to measure the density of solid materials, notably plastics, according to the most commonly used international standards.

It can also be used to make a quick comparative test, ideal for discerning density differences between similar materials.

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ABOUT AMETEK

AMETEK Test & Calibration Instruments
A business unit of AMETEK Measurement & Calibration Technologies offering the following industry leading brands for test and calibration instrumentation.

LLOYD Materials Testing
Materials Testing Solutions
Materials testing machines and software from Lloyd guarantee the highest level of performance and capability for production testing, quality control, laboratory testing, research and education to provide expert materials testing solutions.

Davenport Polymer Test Equipment
Allows critical polymer parameters to be determined, including melt flow index and melt flow rate, intrinsic viscosity (IV) measurement of moisture-sensitive PET polymers and polymer density measurement.

Chatillon Force Measurement
Chatillon has been a hallmark in the industry since 1835. The handheld gauges and motorized testers have earned their reputation for quality, reliability and accuracy and they represent the de facto standard for force measurement.

Newage Hardness Testing
Newage offers a comprehensive range of hardness testers, durometers, optical systems and software for measurement, data acquisition and analysis.

Jofra Calibration
The inventor of the portable high precision dry-block temperature calibrators. The calibration instruments program also covers precision thermometers and temperature baths, temperature sensors, handheld instruments for pressure calibration and process signal calibrators for easy control loop calibration, measurements and simulation.

Crystal Pressure
Digital pressure gauges and calibrators that are accurate, easy-to-use and reliable. Designed for use in the harshest environments; most products carry an IS, IP67 and DNV rating.

M&G Calibration
Pneumatic floating-ball or hydraulic piston dead weight testers with accuracies to 0.015% of reading.

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