LAB NEWS

LABORATORY TESTING INC.

2331 Topaz Drive, Hatfield, PA 19440

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A Publication from *Laboratory Testing Inc.*

Stress Rupture & Creep Testing at LTI

The stress rupture test determines the tendencies of materials that may break under an overload. It is used in the selection of materials where dimensional tolerances are not critical, but rupture cannot be tolerated. The constant-load creep test is similar to the stress rupture test, using the same type of specimen and apparatus, however, strain measurements are made during the test. Stress rupture tests provide a measure of the ultimate load-carrying ability of a material as a function of time, whereas creep tests measure the load-carrying ability for limited deformation.

Stress rupture and creep testing have been offered by LTI for years, however, a recent investment in four state-of-the-art machines has placed a new emphasis on the services. The fully-automated machines were manufactured by Applied Test Systems, Inc. and provide state-of-the-art computer control and monitoring. The testing and specification generation complies with ASTM standards E4, E8, E83, E139, E292, and similar requirements. The stress/creep testing systems also comply fully with ISO 9000 compliance and data management.

A wide range of graphing and reporting options are available to meet customer needs. Standard reports contain basic information for test evaluation. Reports and graphs will be available to e-mail or fax to customers.

Testing is performed at temperatures up to 2000° F according to ASTM standards. Smooth, notched, combination smooth & notched and flat specimens machined to ASTM standards can all be used for the testing and can be machined in our Machine Shop.

Our new machines or test stands are designed to apply a static stress to a specimen at a specific temperature for an extended period of time and are calibrated to ASTM standards. The requirements for temperature control of creep and stress rupture tests is ±3° F and are obtained from calibrated thermocouples attached to the test bar.

For more information, contact Glenn Derstine at ext. 118.

Testing Article in TPJ

Our new article titled "Certifying the quality of your tube and pipe" has been published in the October/ November 2004 issue of *The Tube & Pipe Journal* (*TPJ*). It is a step-by-step guide for selecting a laboratory that is well-suited to meeting your specific testing requirements.

Certifying the quality of your tube and pipe

Also, our NDT manager, Mark Tierney, was interviewed for an article in the November issue of *Quality* titled, "Lab services plentiful, but go unused." The discussion covers the value of testing, competition abroad and personnel certification.

If you would like a copy of either article, please call Sharon Bentzley, marketing manager, at ext. 112.

Holiday Hours

We are approaching the busy holiday season and plan to be closed on the following days:

Thanksgiving
Thursday, November 25th
Friday, November 26th

Christmas & New Years
Friday, December 24th
Friday, December 31st

Please give us advance notice if you will have rush orders coming to LTI near the holidays.

Magnetic Particle & Liquid Penetrant Inspection

Front: Rich Goodwin (supervisor), Bob McDonough & Zach Byers (technicians)
Back: Kevin Burton, Rick Stuart & Don Meyers (technicians)

Products of all shapes and sizes are carefully and efficiently inspected in our 5000 sq. ft. Magnetic Particle (MP) and Liquid Penetrant (LP) area. You'll receive excellent turnaround on your orders, usually within 4 business days, and you can count on a competitive price.

Your materials and finished products will receive expert attention from our certified MP and LP technicians. Together, they have over 50 years of experience performing NDT inspections at LTI. Their qualifications include NAS 410/ MIL-STD-410, SNT-TC-1A, Pratt & Whitney PWA-NDTQ and MIL-STD-2132.

Liquid penetrant inspections are performed using fluorescent and visible dye methods. A wide range of parts can be inspected, including tubing, pipe and barstock up to 40 feet long. Wet fluorescent and dry powder methods of magnetic particle inspection are used to detect flaws in raw materials and finished parts. Our three MP units have beds up to 12 feet in length.

For more information on our qualifications and capabilities, please call Mark Tierney, NDT manager, at ext. 125 or Rich Goodwin, NDT supervisor, at ext. 132.

Our Next Show

Power-Gen International

Booth #3570

Nov. 30 - Dec. 2, 2004
Orlando, Florida

Show Sponsored by:
Power Engineering

Rick Heist, (sales manager) and Lee Dilks, (head chemist) with LTI's display at an earlier tradeshow.

Mechanical Testing Terminology

At times, we hear the terms mechanical testing and physical testing used interchangeably, yet they are very different from one another. Mechanical properties of a metal or material relate to its behavior when subjected to a force or load. In contrast, physical properties are determined without the application of force to the test sample.

In mechanical testing of metal, the behavior of the metal is either elastic or inelastic. Elastic behavior occurs with no permanent damage to the test sample. Proof load testing of a fastener is related to elastic behavior because the fastener should not be damaged or fail as a result of the test. In contrast, inelastic behavior is observed when a material is permanently deformed by the applied force, and therefore, does not return to its original shape. Many mechanical tests performed at LTI relate to inelastic behavior of material, including hardness, yield strength, tensile strength, elongation, reduction of area, and Charpy V-notch impact tests.

Physical properties are usually insensitive to the internal or atomic structure of the material and include density, thermal and electrical conductivity, the coefficient of thermal expansion, magnetic permeability, melting temperature and freezing temperature of materials. LTI performs few physical property tests because they usually are not required by most specifications that deal with the use of metals. These tests are more frequently performed by research and educational facilities performing basic studies of materials. Most specifications do require testing to determine mechanical properties and to assure that the material will perform adequately in the intended application.

We continue our section on testing terminology from our last issue of *LabNews* with some terms commonly referred to in **mechanical testing**.

Elastic Limit is maximum stress that a material can sustain without any permanent deformation remaining after complete release of the stress.

Hardness is the resistance of a material to deformation, particularly permanent deformation, indentation or scratching.

Elongation at Break or Total Elongation is the amount of permanent deformation determined after fracture by realigning and fitting together the broken ends of the specimen.

Elongation at Fracture or Maximum Elongation is measured at the time of fracture and includes both permanent and elastic deformation of the tensile specimen. This is usually determined by keeping an extensometer on the specimen through the final fracture.

Reduction of Area is the difference between the original cross sectional area of the tension test sample and the area of its smallest cross section after fracture. Reduction of area is expressed as a percentage of the original cross section.

Ultimate Tensile Strength is the maximum tensile stress that a material is capable of sustaining and is calculated as the maximum load during a tension test carried to rupture, divided by the original cross sectional area of the sample.

Yield Strength is the engineering stress at which the permanent elongation of the sample has begun.

Yield by Extension under Load is the engineering stress at which the permanent elongation of the sample has begun as determined by constructing a line perpendicular to the strain axis of a stress strain curve at a strain that is specified as a percentage of the gage length.

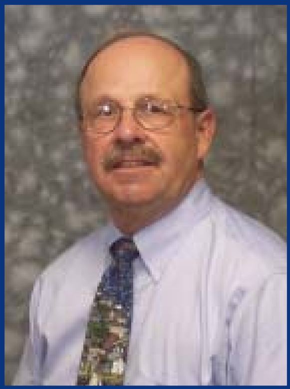
Gage Length is the original length of that portion of the specimen over which the strain or the change of length is determined.

Young's Modulus of Elasticity is the ratio of the stress to the corresponding strain below the proportional limit and the greatest stress that the sample can sustain without deviation from a linear relationship of stress to strain.

Ductility is the ability of a metal to deform to a permanent position before it fractures.

Strain Hardening Exponent "n" is a measure of the increase in hardness and strength caused by the permanent deformation of a tensile sample. "n" is the calculated exponent of the power curve obtained by mathematically approximating the shape of the stress strain curve between yield and ultimate stress.

Q. A. Specialist Joins LTI



LTI welcomes new employee, Frank Peszka. Frank has joined our Quality Assurance Department as a Q. A. Specialist. He brings over 30 years of experience in quality engineering and management to the position as a former employee of Yarway Corporation, Tyco Valves & Controls Division.

Contact LTI

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