SDL ATLAS
TEXTILE TESTING SOLUTIONS

UPDATE

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The world's largest, most complete global source of textile testing, quality control and laboratory equipment.

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IN THIS ISSUE:

Performance Fabric Testing Critical for Quality End-Product

More textiles today are engineered systems than ever before. They contain natural fibers, man-made fibers, combinations, chemical additives, non-textile layers, and more. They are all designed to give better performance under a specific set of conditions. These conditions can vary as much as the content of the fabrics do. Many people relate performance fabrics to exercise clothing. While this is a very good example, these specialized fabrics extend far beyond athletic wear. Performance fabrics include outdoor clothing that is meant to keep you dry in wet conditions, warm in windy conditions, and protected from UV rays when it is sunny. Performance fabrics are used in important professions such as fire fighting and medicine.

Testing these fabrics requires looking beyond the more common tests such as shrinkage, colorfastness, and seam strength. Some technical features are more difficult to test, measure, and quantify. Sometimes several individual tests must be done on different portions of a fabric's primary feature in order to try to categorize the capability. For example, Moisture Management textiles are often tested for wicking, then drying rate, then absorbency, and so on. It is preferable to measure these multiple criteria at the same time during a single test.

SDL Atlas has recognized the need to continue developing testing techniques to keep pace with the advancement of textile technologies. To this end, we have developed a strong group of products focused on testing performance fabrics. They are led by the Moisture Management Tester (MMT) and Sweating Guarded

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MMT STANDARD APPROVED BY AATCC

SEE PAGE 4 »

Pilling Testing: A Problem with Many Solutions

Pilling of woolen knitted fabrics has been a problem for a long time. The development and wide use of man-made fibers in apparel has made it a more serious issue. This defect, which can develop and become worse as a consumer wears and launders a garment, is one that the industry has been trying to solve in a number of ways.

Starting at the fiber and yarn level, it is reported that high test yarns may have a lower pilling propensity. Ring spun cotton yarns often produce less pilling than open spinning. Enzymes are added to some laundry detergents to remove the fibrils before they become entangled with other lint and form an unsightly pill in the laundry process. Some synthetic fibers are engineered with a special profile to have lower pilling. Pills are formed when fibers on a fabric surface "tease out" and become entangled during wear. Such surface deterioration is generally undesirable, but the degree of consumer tolerance for a given level of pilling depends on the garment type and fabric end use. The well-known EN ISO 12945-1 standard tells us, *Generally the level of pilling which develops is determined by the rates of the following parallel processes:*

ICI/M&S Pilling and Snagging Tester

- a) *fibre entanglement leading to pill formation;*
- b) *development of more surface fibre;*
- c) *fibre and pill wear-off.*

The rates of these processes depend on the fiber, yarn, and fabric properties. Examples of extreme situations are found in fabrics containing strong fibers versus fabric containing weak fibers. A consequence of the strong fiber is a rate of pill formation that exceeds the rate of wear-off. This results in an increase of pilling with an increase of wear. With a weak fiber, the rate of pill formation competes with the rate of wear-off. This results in a fluctuation of pilling with an increase of wear. In other constructions, surface fiber wear-off occurs before pill formation. Each of these examples demonstrates the complexity of evaluating the surface change on different types of fabric.

The ideal laboratory test would accelerate wear processes a), b), and c) by exactly the same factor and would be universally applicable to all fiber, yarn, and fabric types. No such test has been developed.

However, test procedures have been established in which fabrics can be ranked in the same order of fuzzing and pilling propensity as is likely to occur in end-use wear.

Regardless of the approach taken to improve fabrics by reducing pilling, a standard and objective laboratory test is needed to determine whether a proposed change in the fiber, yarn, or fabric is truly a positive change.

Pilling Testers

SDL Atlas provides a wide variety of industry standard and innovative instruments to predict and grade a fabric's propensity to pill or fuzz.

M227A&B ICI/M&S Pilling and Snagging Tester is a universal pilling and snagging tester drive system available with 2 (M227A) or 4 (M227B) positions. This system allows a user to rapidly predict pilling or snagging of fabrics in a fraction of the time that it would occur in normal use. The controller allows the user to input test cycle and rotational speeds of 20, 30, 40, 45, 50, 60, 65, and 70 rpm. An automatic reversing function is available for 30 rpm speed.

A variety of pilling and snagging boxes and drums are available as options to meet ISO, BS, M&S and other retailer (predominately European) standards, including EN ISO 12945-1 and the new BS 8479. The pilling test in these devices has the specimen mounted on a polyurethane tube and tumbling against the cork-lined interior surface of the box. Interestingly, the authors of the EN ISO 12945-1 standard tell the user that generally, the frictional properties of the cork are not a major source of test result variation. This is in contrast to the widely used American method ASTM D3512 for the **SDL Atlas M227R&S Random Tumble Pilling Tester,** in which cork liners are used only 30 minutes per side within a cylindrical chamber and then discarded. Recent studies conducted in Australia by a group of wool testing laboratories have suggested that variation in the properties of the polyurethane tubes on which the specimens in EN ISO 12945-1 are mounted are statistically significant when studying between lab differences in pilling results.

The testing approach detailed in ASTM D3512 was originally developed in the E.I. DuPont fiber research labs in the 1950s to duplicate the type of pilling that was seen on Dacron/cotton blend shirting fabric. Their approach was to use unmounted specimens that are caused by spinning stainless steel rotors to freely tumble within a fixed cork-lined cylinder. This random tumbling motion is meant to imitate on an accelerated basis the abrasive wear the fabric would receive in actual use. In order to make the pills more visible, small amounts of cotton lint are added to the chamber prior to testing.

Cork surfaces are not the only abradant used for the mild abrasion that initiates pilling. Abrasion testers like the **SDL Atlas M235 Martindale Abrasion and Pilling Testers** are widely used for testing the abrasion and pilling resistance of all types of fabric structures. These testers are found in almost every textile laboratory. Specimens are rubbed against known and standardized abradants at low pressures and in continuously changing directions so the amount of abrasion or pilling is compared against standard parameters. The EN ISO 12945-2 Textiles—Determination of fabric propensity to surface fuzzing and to pilling—Part 2: is a modified Martindale test procedure in which a circular test specimen is passed over a friction surface comprising the same fabric or, when relevant, a wool abradant fabric, at a defined force in the form of a Lissajous figure. The test specimen is able to rotate easily around an axis through its center, perpendicular to the plane of the test specimen. Fuzzing and pilling are assessed visually after defined stages of this rub testing.

In 1974, a group of American textile experts meeting in an ASTM committee decided that a specific type of pilling was occurring on shirt collars and that this was caused by the fabric being abraded by the wearer's skin. They designed a test using the predecessor to the **SDL Atlas M282 Universal Wear Tester.** This instrument was originally designed in U.S. Army Quartermaster laboratories for determining wear and abrasion resistance of fabrics used in clothing, footwear, and industrial applications. They equipped the Universal Wear Tester with a special silicone pad to simulate human skin and created the test now known as ASTM D3514 Standard Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Elastomeric Pad.

There is no single solution for pilling testing, but SDL Atlas offers the most complete range of instruments to meet whatever test standard our customers require.

Pilling Assessment

However, the instrument used is only a part of the solution in pilling testing. Many in the standards development process have come to realize that interlab variability is often not due to differences in the instruments but rather in the Pilling Evaluation and Grading.

Visual evaluation of pilled fabrics may be specified by the standard that your laboratory must meet. Photographs or control fabrics are often used for these evaluations, but in either case, standardized lighting and viewing conditions are critical to reproducible ratings. SDL Atlas recommends the G210 60/120 Color Viewing Booths as high-specification and low-cost solutions for a laboratory.

» **M227C Pilliscope Assessment Viewer** allows the user to assess pilling on tested fabrics against five standard photographs using Halogen high-incident illumination. These comparison photographs of either knitted or woven fabrics are mounted on a 5-sided drum and used sequentially to grade the samples. M&S suppliers may order a Holoscopic viewing system with holograms of knitted or woven fabrics on the 5-sided drum.

» **M227PAV Universal Pilling Assessment Viewer** is designed for all standards where the assessment of pilling is necessary, whether grading against control fabrics or photographs. Note that photographs are not included and must be ordered separately as required by the individual standard. Visit the SDL Atlas website or see the current SDL Atlas catalog for details and ordering information.

» **M227G Pillgrade™ Automatic Pilling Grading System** removes the subjective element from grading and improves interlaboratory reproducibility. The Pillgrade 3D fabric scanning system objectively and repeatably grades fabric specimens for surface properties and can ensure agreement on grading throughout the textile supply chain. The system outputs pilling and fuzziness data plus a 1.0 to 5.0 pilling grade according to ASTM and ISO standards. A user supplied computer running either Windows 2000 or Windows XP is needed. For more details on the computer requirements and data output, please visit the SDL Atlas website, www.sdlatlas.com, or see the current SDL Atlas catalog for details and ordering information.

STANDARDS UPDATES

NEW STANDARDS

Liquid Moisture Management – New AATCC and GB Standards

AATCC has completed the lengthy approval process for a new test method titled **AATCC Test Method 195-2009 Liquid Moisture Management Properties of Textile Fabrics.** The purpose and scope of this new test method state that this procedure is for the measurement, evaluation, and classification of liquid moisture management properties of textile fabrics. The test method produces objective measurements of liquid moisture management properties of knitted, woven, and nonwoven textile fabrics. The results obtained with this test method are based on water resistance, water repellency, and water absorption characteristics of the fabric structure, including the fabric's geometric and internal structure and the wicking characteristics of its fibers and yarns.

Test method approval within AATCC is a major step for any new technology, since the process requires that all committee members fully agree on the method. Every objection and negative must be carefully considered. Complete agreement is required before a method can advance to publication. Copies of the new AATCC TM195 method may be ordered online from www.aatcc.org.

The SDL Atlas MMT Moisture Management Tester has received wide global approval and use for its ability to simply and objectively measure the important moisture handling characteristics of the newest fabric technologies for technical textiles and traditional textiles used in performance apparel. Over 40 units are in regular use in laboratories within Asia, the Americas and Europe.

Also, the newly adopted GB/T 21655.2 test method (Textiles – Evaluation of Absorption and Quick-Drying – Part 2: Method for Moisture Management Tests) passed the approval process in June 2009 and will be effective on February 1, 2010.

AATCC RA60 Colorfastness to Washing

AATCC made a Standard Reference Liquid Detergent available to its members and research committees in 2003. Recently, AATCC Committee RA60, Colorfastness to Washing, completed a detailed study of the Standard Reference Liquid Detergent in several test methods. The committee has balloted and approved the use of the Standard Reference Liquid Detergent as an alternate to the powder standard reference detergent in test methods 61, 172, and 190. Final approval is subject to the ballot through the AATCC Technical Committee on Research followed by publication.

The 2003 Standard Reference Liquid Reference Detergent is available in versions with optical brighteners and without optical brighteners (WOB). Tests involving color change or staining evaluation will use the WOB version. Since the formulation of powder and liquid detergents involve different building agents, the detergency action may be different and inter-comparison of the two detergent types cannot be made.

AATCC test method 61 has also been revised to include a new option test 1B for evaluating the colorfastness of textiles that are expected to withstand repeated hand laundering at cool temperatures. Specimens subjected to this test should show color change similar to that produced by five typical careful hand launderings at a temperature of 27 ± 3°C (80 ± 5°F).

New British Standard Test for Snagging – BS8479:2008

Snagging is a phenomenon in which undesirable loops of varying sizes appear on the surface of a garment, usually as a result of the fabric catching on sharp points or objects. Fabrics made of filament yarns, both textured and untextured, are most prone to snagging. This British standard gives a method for determining the propensity of fabrics to snagging, and related surface defects. The standard is applicable to knitted and to woven fabrics. The committee members involved in the development of this new test method found it highly effective for predicting the snagging propensity of many apparel fabrics, particularly those for which the Mace Snag Tester proved to be too severe.

The new test uses the SDL Atlas M227 ICI Pilling and Snagging Tester equipped with special octagonal rotating boxes/drums fitted with four lines of inward pointing pins. Test specimens are mounted around wool-felt-wrapped polyurethane tubes and tumbled with the chambers rotating at 60 r/min and run for a total of 2,000 revolutions. The specimens are then graded and classified within the prescribed viewing chamber. Copies of the new test method may be ordered from www.bsigroup.com. Equipment and accessories needed to perform this test may be ordered from your local SDL Atlas office or representative.

Changes to ASTM D3786-2008A Under Ballot

ASTM D3786-2008A Test Method for Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method was revised in 2006 and 2008 to admit the use of the new pneumatic burst testers such as the SDL Atlas M229P PnuBurst. An error in the editing of the published method was found regarding the calculation of the diaphragm correction technique. See the proposed correction below.

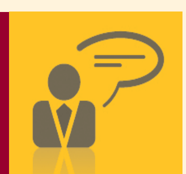
» Current:

11.3.2 Diaphragm Correction (Tare Pressure)—Using the same settings as employed to burst the specimen, record the pressure required to distend only the diaphragm to the same pressure and height as used to burst the specimen. Record this as the diaphragm correction (tare pressure).

» Proposed change:

11.3.2 Diaphragm Correction (Tare Pressure)—Using the same settings as employed to burst the specimen, record the pressure required to distend only the diaphragm to the same height as used to burst the specimen.

SDL Atlas presents...



SDL Atlas is a proud exhibitor at:

> ITMA Asia and CITME 2009

Shanghai, China • 22–29 June 2010

Colorfastness to Perspiration Testing

Manufacturers of textile dyes, apparel manufacturers, and retailers (often through third-party laboratories) routinely test the colorfastness of textiles to perspiration by use of either AATCC Test Method 15 or ISO 105-E04. AATCC Executive Vice President Jack Daniels recently wrote about this simple but very important test used globally for quality control and research:

AATCC began developing what has now become AATCC Test Method 15 Colorfastness to Perspiration, in 1949, and that method has been revised many times, particularly in the 1950s and 1960s. When ISO Technical Committee 38, Textiles was developed in 1947 a subcommittee was established to derive an ISO method based on the work of the Americans, through AATCC, the British, through the work of the Society of Dyers and Colourists (SDC) and including work being done on the European continent through the ECE. At that time the work through ECE appeared to be lead by the Germans and Swiss.

A very good account of the early history of colorfastness to perspiration may be found in an article by B. A. McSwiney, Professor of Physiology, at Leeds University, in the June 1929 issue of the Journal of the Society of Dyers and Colourists on Physiology and Industry. Work was being done on this subject in a number of countries, as color changes and staining were being observed that were differing from simply treating textile materials in dilute acidic solutions that had been proposed as early as 1905 by Cain and Thorpe. They had reported that fastness to perspiration is analogous to fastness to acids. In that early work, acetic and sulfuric acids were used. A very detailed chemical analysis of human perspiration was again reported by McSwiney and C. C. N. Vass in the June 1930 issue of the Journal of the Society of Dyers and Colourists.

In McSwiney's initial article, he mentioned that the American "Commission" had determined that freshly secreted perspiration contains 1-1.5% solids, 50% sodium chloride; 10% other inorganic constituents, such as phosphates, sulfates, and chlorides of magnesium, calcium, and potassium; 30% nitrogenous matter, chiefly urea; and 10% of organic acids, chiefly lactic acid, with possibly a little acetic acid.

The initial artificial perspiration solutions investigated by the various research groups incorporated varying amounts of sodium chloride, lactic acid, and disodium hydrogen

continued on next page »

STANDARDS UPDATES continued

phosphate for acidic solutions and sodium chloride, ammonium carbonate or ammonium hydroxide, and disodium hydrogen phosphate for alkaline solutions. Early work had reported that human perspiration varies between males and females and varies when people are under stress through fear or sports. For instance, females and the obese typically have higher glucose levels in their perspiration. It was reported that human perspiration is always slightly acidic, pH 5.1 to 6.77. On standing, however, it was found that perspiration can become alkaline through the decomposition of urea and other nitrogenous compounds which are present, converting into ammonia or ammonium carbonate. It was found that an increase in temperature speeds this conversion, and later it was determined that bacteria on the skin or in the perspiration can act as an accelerant. Typically the alkaline perspiration solutions were found to produce much more severe shade change and staining than the acid solutions, but there were a few exceptions.

In the early 1950's work was being done to assess colorfastness to perspiration on copper-complex and copper after-treated direct dyes which were popular in those days for dyeing cotton and wool, which were producing poorer results in actual wear than the artificial perspiration solutions up to that time were predicting. It was found that the copper atoms were being sequestered in certain direct dyes causing sever shade change, and if these same tested samples were retreated with copper salts, a restoration of the shade occurred. Of the many amino acids found in perspiration, histidine was by far the most active, and therefore the British, Americans, Germans, and Swiss began investigating the inclusion of various amounts of histidine hydrochlorides. The British wanted to include as much as 5.0 grams per liter, but the Americans had found that amount to produce far too severe results and would result in significant shade change in dyes that had previously be classified as being fair-to-good performers. The Americans began work using 0.25 grams of

AATCC Perspiration Tester

histidine monohydrochloride per liter in the acid perspiration solution and the Germans agreed with the Americans on this amount. The Swiss ignored the acid solutions and began incorporating 0.5 grams per liter histidine monohydrochloride in the alkaline their perspiration solution.

After the above groups began studying the inclusion of varying amounts of histidine monohydrochloride in artificial perspiration solutions, the Canadians became involved. They began looking at the general methods of application of the solutions, the influence of wet pickup and various staining fabrics. The Americans developed the Perspirometer, and later asked the Atlas Electric Devices Company (now SDL Atlas) to manufacture what became the simpler AATCC Perspiration Tester, designed by a Canadian, Carl Tiechgraber, who became involved with AATCC, as the Canadian work declined.

In 1974 the AATCC began listing only the acid perspiration solution, but continues to reference the alkaline solution, and articles that appeared in the October and November 1974 issues of Textile Chemist and Colorist provide good background information and laboratory versus wear trial data.

As of this time, AATCC continues to incorporate 0.25 grams per liter of L-histidine monohydrochloride in its acid perspiration solution. ISO 105-E04 currently specifies 0.5 grams per liter L-histidine monohydrochloride, so the AATCC and ISO methods are related, but not identical. Obviously, AATCC believes its method to provide the best representation of end-use performance. The ISO method continues to provide an alkaline perspiration solution that AATCC does not believe predicts normal end-use performance, as being much too severe.

Daniels wrote that he does not have an answer as to why the different sodium phosphates may be employed in these various methods, but suspects it had to do with chemicals that were readily available in the various laboratories around the world doing the early exploratory work. From the articles mentioned, the researchers realized they needed these types of compounds to produce artificial perspiration solutions that would contain phosphates as found in human perspiration and that would yield solutions having specific pH ranges.

We hope you find the above information useful. Over the years there have been many researchers studying colorfastness to perspiration, and it is interesting that this activity became one of the very first projects undertaken by ISO/TC38/SC1-Tests for Coloured Textiles and Colorants.

At the Testing Forefront

STR India Accredited for Prestigious ISO 17025

STR India's state-of-the-art testing laboratory has achieved the prestigious ISO 17025 accreditation by National Accreditation Board for Testing and Calibration Laboratories (NABL). Considered the gold standard in the industry, this accreditation recognizes STR's implementation of a rigorous quality management system to ensure conformance to high standards of testing and quality assurance, enhancing the confidence of its clients.

The Manesar (Greater New Delhi) facility, a 16,500-square-foot, state-of-the-art testing lab, was accredited in December 2008. STR India is one of the few laboratories to have cleared the complex, three-stage accreditation process in the first attempt. The $2+ million lab opened in March 2008 and got off to a quick start, achieving prestigious accreditations and memberships, including Marks & Spencer, Arcadia, and United Nations Global Compact (UNGC). The lab's world-class technology and instruments from top names like SDL Atlas give STR an edge in the competitive market.

Setting a test on the SDL Atlas ICI Pilling Tester

STR India further differentiates itself from the competition by providing clients with a 48-hour turnaround on laboratory sample testing, from receipt of a sample to generation of a final report. STR also offers free sample collection services, transporting samples from throughout India to the Manesar laboratory (subject to certain conditions). By continually striving to deliver the highest level of quality, STR helps clients mitigate supply chain risks and achieve product success in the global marketplace.

SGS Egypt Laboratory

SGS EGYPT LIMITED, one of the affiliated companies of the SGS group worldwide, has combined its global expertise with the local market expert, EOS. The combination brings a dynamic presence to textile testing in Egypt. SGS and EOS successfully blend over 35 years of local presence and market knowledge, a worldwide UKAS (ISO 17025) network, and NEXT accreditation. In 2006, SGS-EOS established a comprehensive, 850-square-meter textile testing facility staffed with over 30 highly skilled professionals. This state-of-the-art commitment to the Egyptian textile market houses an Atlas Ci3000+ Weather-Ometer®, Tinius Olsen Universal Testing Machine, SDL Atlas Martindale and Pilling Tester, and Whirlpool washers and dryers, among their complete lab offering.

SGS-EOS is committed to helping clients improve efficiencies and reduce risk by assuring high quality testing services.

Testing Yarn Strength

By Sylvia Hillier, Product Application Specialist, Textiles

Spun yarn made by twisting or bonding staple fibers together to make a cohesive thread through the process of spinning dates back to the Stone Age, yet it is a product and process that continues to be exposed to ongoing evolution and technical development. It was one of the very first processes to be industrialized and today what is perhaps considered by some users as the "humble yarn" is as we in the business know an exacting technology both in construction and process, thus requiring an equally exacting testing and proving regime including Twist, Tensile, Yarn Count, Evenness, and Friction tests.

The technology required to ensure a successful tensile test is being driven by the evolution of yarn and cord technology through the use of carbon fiber, aramid, polyester, polypropylene, polyethylene, PTFE (fluorofiber), and blends of fiber in both spun and continuous filament yarn. This evolution is reflected in updates to International Testing Standards, notably BS EN ISO 2062 updated version release imminent (contact BSI for latest copy), and consequently in the evolution of the equipment needed to accurately and successfully hold or grip the yarn and cord during the tensile test.

In response to the growth in high-strength, high-tenacity yarns and cords with differing frictional properties, I have led a project at Tinius Olsen to evolve the gripping technology used in tensile tests offered through SDL Atlas. Specifically, we took a fresh look at the "humble bollard" technology pictured below.

A bollard is used to provide a greater gripping surface and load transition, thus avoiding stress concentration on the yarn or cord, which occurs if attempting to use a flat vice-type clamping arrangement, which creates a pinch point and concentration of stress on the test specimen as it enters the vice clamping surfaces. Such stress concentration causes premature breaks—referred to as "jaw breaks"—resulting in a tensile strength significantly lower than expected.

Following exhaustive testing using the most demanding yarn and cord materials, we are releasing two new bollard grips-based technologies for testing yarns. The manual grip is for yarns with an expected breaking strength between 2.5 N and 1 kN, and a pneumatic version is for yarns with an expected breaking strength between 25 N and 5 kN *(below)*.

At first glance, these may appear to be a regular bollard offering, but the key to their proven success lies in the bollard profile, its surface finish, and the specimen clamping arrangement—a technology combination that, like a good blended yarn, delivers a perfect performance, no slippage, no premature breaks, and expected ultimate tensile strength.

Both of these bollard technologies are available in "manual clamping" or "pneumatic activation" formats to support the familiar test for R&D or quality control. Specifically, pneumatic formats ensure routine optimal clamping pressures, reducing operator-induced variance in results and boosting testing efficiency in high-volume labs. Besides being compatible with Tinius Olsen tensile testing machines, the bollard grips are also available in formats directly compatible with other common brands of testing machine, including Instron.

Pneumatic Bollard Grip

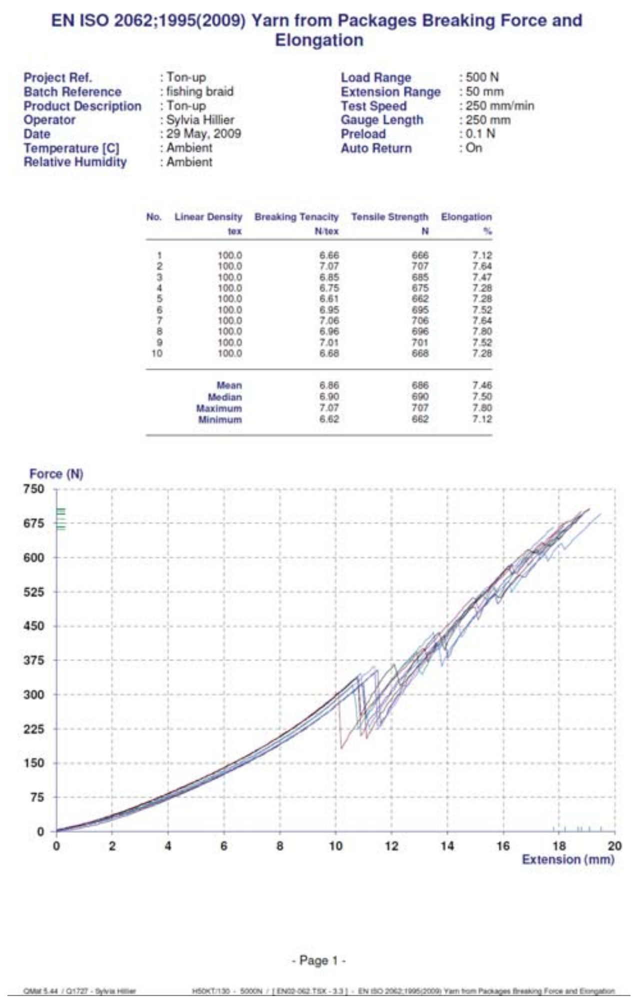
Manual Bollard Grip

On the subject of variance, I often observe technicians not always recognizing the correct clamping points on a bollard grip with respect to the defined gauge length.

Get the gauge length right (Point A – Point B), as shown on the next page, and results for elongation % will meet expectations even though flat vise clamping plates are not used. Accuracy in gauge length definition can be further supported using Tinius Olsen test software for yarns and cords, which includes an automatic preload and gauge length correction function.

Additional photos and charts on page 10 »

» Sylvia Hillier may can be contacted through Tinius Olsen's "Ask the Expert" at http://www.testingtextiles.com/ask-the-expert.



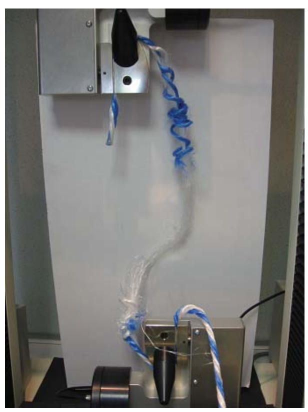
EN ISO 2062;1995(2009) Yarn from Packages Breaking Force and Elongation

Project Ref.	: Ton-up		Load Range	: 500 N
Batch Reference	: fishing braid		Extension Range	: 50 mm
Product Description	: Ton-up		Test Speed	: 250 mm/min
Operator	: Sylvia Hillier		Gauge Length	: 250 mm
Date	: 29 May, 2009		Preload	: 0.1 N
Temperature [C]	: Ambient		Auto Return	: On
Relative Humidity	: Ambient			

No.	Linear Density tex	Breaking Tenacity N/tex	Tensile Strength N	Elongation %
1	100.0	6.66	666	7.12
2	100.0	7.07	707	7.64
3	100.0	6.85	685	7.47
4	100.0	6.75	675	7.28
5	100.0	6.61	662	7.28
6	100.0	6.95	695	7.52
7	100.0	7.06	706	7.64
8	100.0	6.96	696	7.80
9	100.0	7.01	701	7.52
10	100.0	6.68	668	7.28
	Mean	6.86	686	7.46
	Median	6.90	690	7.50
	Maximum	7.07	707	7.80
	Minimum	6.62	662	7.12

- Page 1 -

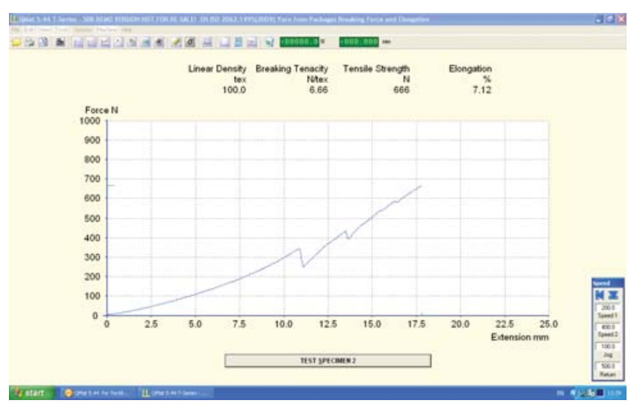
Before testing



After testing

Related Published Standards

- BS EN ISO 2062
- ASTM D7269
- ASTM D885
- ASTM D2265

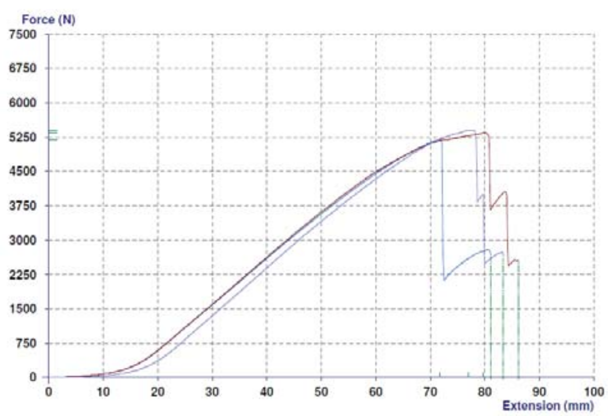


Braided fishing line with a final breaking force > 85 lbs.

Continued from page 9 »

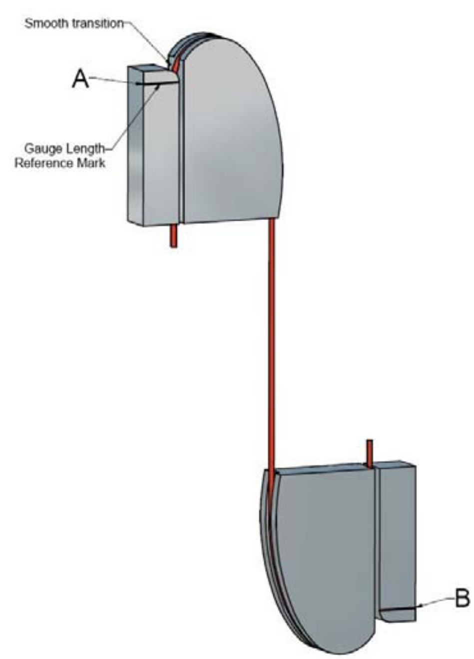
Carbon fiber and polypropylene thread being tested for strength before being made into its final composite of a solid sheet.

No.	Tensile Strength N	at Maximum %	at Break %
1	5198	14.36	16.20
2	5340	15.92	17.22
3	5393	15.38	16.68
Mean	5310	15.22	16.70
Median	5340	15.38	16.68
Maximum	5393	15.92	17.22
Minimum	5198	14.36	16.20



5 kN Pneumatic yarn & cord grips

Polypropylene Cord



Aligning Gauge Length

Performance Fabric Testing, continued from page 1 >>

Hotplate. Other products include the Air Permeability Tester, Hydrostatic Head Tester and a number of other water protection instruments, Flammability Testers, and several personal protection testing instruments.

The MMT has revolutionized the method for evaluating the moisture management properties of fabrics by measuring the most important requirements of these fabrics in a single test and giving the results on each variable. By providing a quick and simple measurement of the dynamic movement of moisture from the skin side of a fabric to the air side, the user receives an easy-to-understand index of the moisture management handling capability of the fabric used in activewear. The relationship of the index to human wearer trials gives the user confidence that the right, reliable attributes are being measured and reported.

Much like the MMT, the Sweating Guarded Hotplate takes several parameters into account during a single test. While the MMT focuses on the liquid moisture movement, the Sweating Guarded Hotplate focuses on the effect of water vapor movement that affects a fabric's thermal insulation. The ASTM standard for the Sweating Guarded Hotplate tells us, "The thermal resistance and evaporative resistance provided by fabrics, films, coatings, foams, and leathers, including multi-layer assemblies, is of considerable importance in determining their suitability for use in fabricating protective clothing systems." In this "skin model test," the instrument simulates the conditions created by a human body so that measurements can be made on the heat and vapor retention or release by a fabric or system of fabrics. Getting the heat and vapor retention of items such as coats, blankets, and technical apparel is important and can significantly impact their ultimate comfort and safety of the end customer. Breathability is one of the many factors outlined in a U.S. National Institute of Standards and Technology publication for rating and choosing firefighter turnout coats. Breathability indicates the flow of heat and moisture from the skin to the environment by measuring the amount of energy required to maintain a constant suit temperature using the SDL Atlas Sweating Guarded Hotplate.

Sweating Guarded Hotplate

Outdoor apparel and gear such as tents, awnings, umbrellas, and sails require testing for hydrostatic and air permeability properties. Hydrostatic testing, as provided by the SDL Atlas M018 Hydrostatic Head Tester, also plays an important role in qualification and rating of surgical drapes and clothing for healthcare workers. A publication by the Association for the Advancement of Medical Instrumentation (AAMI) classifies the barrier performance (protection against blood-borne and liquid-borne pathogens) of surgical gowns, surgical drapes, and other protective apparel for levels 1 through 3 by results using the AATCC test 127 for which the SDL Atlas instrument was designed. SDL Atlas has developed market-leading instruments with excellent testing capabilities for these important parameters.

While performance fabrics require the standard tests of other fabrics, they also require an extra level of specialized testing to measure their engineered properties. SDL Atlas remains committed to supporting new textile technology with innovative testing solutions.

Contact SDL Atlas for further assistance with your performance fabric testing requirements. Contact information can be found on the back page.

Milestones Demonstrate Global Quality Assurance at SDL Atlas


Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2008

This is to certify that:

SDL Atlas Ltd.
1/F (South-East) & 2/F, Shenjian Mansion
Central District (West) Hi-tech Park
Nanshan District
Shenzhen
Guangdong
518057
China

锡莱亚太拉斯（深圳）有限公司
中国
广东省
深圳市
南山区高新中区
深健大厦一楼东南面、二楼全层
邮编：518057

Holds Certificate No: FM 532381

and operates a Quality Management System which complies with the requirements of ISO 9001:2008 for the following scope:

The design and manufacture of textile and safety test instruments for laboratory use.
实验室用纺织品、安全检测仪器的设计及制造。

For and on behalf of BSI:

Managing Director, BSI Management Systems (China), Liu Mo Yuan

Originally registered: 02/01/2008 Latest Issue: 24/06/2009 Expiry Date: 01/01/2011

Page: 1 of 1

This certificate was issued electronically and remains the property of BSI and is bound by the conditions of contract.
An electronic certificate can be authenticated online.
Printed copies can be validated at www.bsi-global.com/ClientDirectory or telephone +86 10 85157060.
Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the organization.
This certificate is valid only if provided original copies are in complete set.
China Headquarters: Floor 20 East Ocean Center, No. 24A Jianguomenwai Street, Beijing 100004, P. R. China.
BSI China is a subsidiary of British Standards Institution.

BSi

The SDL International Group was the first in the textile testing and quality control equipment industry to be awarded ISO 9000 certification in 1993. In 2001, SDL Atlas UK updated this accreditation to the latest and coveted ISO 9000:2000 certification including product design. Additionally in 2001, SDL Atlas was accredited by the UK Accreditation Service (UKAS) for establishing a calibration system in conformance with ISO 17025. This allows us to provide ISO 17025 Traceable Calibration Certificates with new instruments and during subsequent re-calibrations.


United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

Copy

UKAS UNITED KINGDOM ACCREDITATION SERVICE

CALIBRATION LABORATORY
No. 0688

SDL Atlas Ltd

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005 *General Requirements for the competence of testing and calibration laboratories.*

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated 18 June 2005).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.org.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.

Accreditation Manager, United Kingdom Accreditation Service

Initial Accreditation date
17 July 2001

This certificate issued on
23 April 2007

The Department for Innovation, Universities and Skills (DIUS) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products and persons

To enhance SDL Atlas' capacity in all sectors to ensure compliance with international standards of production and operation, SDL Atlas China headquarters passed the accreditation of the world's authoritative certification body – BSI in January 2008 and was awarded ISO 9001:2008 certification.

This certification confirms that all departments in SDL Atlas, including manufacturing, service, sales and administration, operate in a system that is dedicated to continuous improvement.

SDL Atlas China achieved another important milestone in our quality program in 2008. We have extended our ISO 17025 (UKAS) accreditation to cover service technicians in Hong Kong and China. These technicians can now provide local ISO 17025 calibration for 13 products and provide UKAS – Traceable Calibration Certificates. The same accreditation had been expanded to our American office, where we continue to offer ISO 17025 calibration throughout the Americas.

The quality systems within SDL Atlas that are represented by these ISO and UKAS certifications assure our customers that they will receive a high level of product, service, and support.

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