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Factory Mutual Research and Approvals

An FM Global Affiliate

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On the cover: *Once implemented, the SBI test will be used to test the flammability of building materials marketed throughout Europe. Such materials include wall constructions, flooring, skylights and doors.*

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Tom Lawson Takes the Helm at Factory Mutual Research and Approvals

Tom Lawson has been appointed senior vice president of Factory Mutual Research and Approvals. Formerly vice president and operations manager for FM Global's Forest Products operations, Lawson brings an impressive background to his new position.

An expert in industrial manufacturing risks, Lawson is committed to maintaining and enhancing Factory Mutual Research's presence in the scientific and research worlds. "We employ some of the world's premiere scientists and researchers, and it is imperative that we maintain an important presence in those communities," he said.

In addition, Lawson would like to leverage the exceptional in-house Approvals and testing expertise to grow the Approvals business with a focus not only on the U.S. market, but also with added emphasis on international growth.

Lawson believes the future direction of Research and Approvals will more fully capitalize on FM Global's unique risk management capabilities. "I think I can bring to Factory Mutual Research and Approvals a new plan to capitalize on our assets and I welcome the challenge to help improve the groundwork for our success," he said.

We employ some of the world's premiere scientists and researchers, and it is imperative that we maintain an important presence in those communities.

Lawson joined the Factory Mutual System as a field engineer in 1979. In the past two decades, he has held positions in engineering, underwriting and operations management, providing a broad scope of experience from which to draw upon in leading the Research and Approvals organization.

Factory Mutual Research Approves Contractors for the First Time

After decades of Approving products, Factory Mutual Research has, for the first time in its history, developed an Approval program to cover the work of contractors. The recently introduced Approval standard is intended to improve the installation, performance and reliability of firestop systems.

Firestop systems are perhaps one of the least well-known, but most important, elements of fire protection. These loss prevention systems are used to seal penetrations, joints and gaps in buildings to prevent the spread of fire and smoke, and reduce the likelihood of structural damage.

First Ever Approval for Contractors

At the heart of the new program is the new Approval Standard 4991, *Approval of Firestop Contractors*, which was developed jointly by Factory Mutual Research and the Firestop Contractors International Association (FCIA) in an effort to address the quality issues raised by facility owners, architects, engineers and fire/code officials.

The new program offers contractors the chance to differentiate themselves within a crowded field of competitors, and to show their commitment to quality and education. Approved contractors will be listed in both the Factory Mutual Research *Approval Guide* and on the FCIA Web site at www.fcia.org. For building owners, designers, architects and code authorities, the new Approval standard provides a measure of reassurance and a way to select highly qualified contractors for an important construction element.

According to the FCIA, there are many examples of losses that have resulted from either nonexistent or improperly installed firestop systems. Below are some U.S. fires the group cites:

- **First Interstate Bank**, Los Angeles, California; 1988; heavy fire spread vertically, destroying five floors of this 62-story high-rise building; approximately US$50 million in property loss.
- **Meridian Plaza**, Philadelphia, Pennsylvania; 1991; improper disposal of oily rags in a cardboard box led to spontaneous combustion; 38-story office tower was a total loss; approximately US$300 million in property loss.
- **MGM Grand Hotel**, Las Vegas, Nevada; 1980; joints and shafts allowed smoke to travel quickly to upper floors; approximately US$223 million in legal settlements.

To become a Factory Mutual Research-Approved firestop contractor, contractors must submit to an audit of their quality control procedures, create a quality control manual, and pass a job-site inspection. In addition, a designated responsible individual (DRI) from the contracting firm must pass a two-part examination, which covers their knowledge of the FCIA *Manual of Practice*, Factory Mutual Research Approval standards, and the DRI's ability to understand and select firestop systems and assemblies from all three dimensions – penetrations, wall and floor joints, and perimeter fire containment systems.

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A firestopping device — or collar as it is called — prior to testing. Firestop systems are used to prevent the spread of fire and smoke. Here, the firestopping device has been used where the PVC pipes penetrate the side of this concrete slab that would be exposed to fire. Each pipe is installed in a round hole slightly larger than its diameter. The firestopping device, which is a metal collar, contains an intumescent strip that is designed to expand and fill the hole when the pipe burns away.

The Human Factor in Loss Prevention

"It's a fact that people cause a significant amount of dollar losses each year; in some cases, more than product problems," notes George Smith, manager of Factory Mutual Research's materials section. "This program is an excellent start and will serve as a model for future programs we hope to develop to address other human factors in loss prevention. This is literally the tip of the iceberg."

The First Approvals

To date, 66 contractors already have taken the Factory Mutual Research examination to become a DRI and 10 firestop contractors, all from the United States, have been Approved under the new standard. The first contractors to receive Approval include:

- AF Underhill, Canton, Massachusetts
- 1 Source Firestop, Henderson, Colorado
- Barber Firestop, Oxford, Connecticut
- FireSmart Building Technology, Inc., Quincy, Massachusetts
- Gleeson Powers, Franklin, Massachusetts
- Medigas Firestopping, Bohemia, New York
- Performance Contracting Inc., Casselberry, Florida
- Superl, Fridley, Minnesota
- Tabor Insulation, Salt Lake City, Utah
- USI - Superior Insulation, Salt Lake City, Utah

(Future additions to this list will be included in the *Approval Guide* and the *Approval Guide Supplement*.)

Currently, the examinations required for DRIs are administered at FCIA meetings and conventions in the spring and fall. This may be expanded to include other sites as well. The next FCIA meeting is scheduled for late fall. Exact dates and times may be found on the FCIA Web site at www.fcia.org.

FCIA Chooses Factory Mutual Research

The idea for a certification program for firestop contractors was first proposed at an FCIA planning meeting in 1997. The FCIA evaluated three testing agencies before selecting Factory Mutual Research as a partner. Representatives from Factory Mutual Research's Approvals Division and FCIA worked on the Firestop Approval Program for over a year.

"We felt that Factory Mutual Research understood the contractor environment and the demands on contractors," explains Bill McHugh Jr., FCIA executive director. "We also believed that Factory Mutual Research understood the quality process. It was critical that any testing agency we chose understood all of these factors. We decided that there was a great match between our goals and objectives and those of Factory Mutual Research."

According to Jeff Gould, assistant manager of the Factory Mutual Research materials section, contractors do not have to be members of the FCIA to earn an Approval. However, the contractor must have at least two years of firestop business experience and meet the other requirements of the Approval standard.

A close-up of the unexposed side of the same concrete slab pictured on page 3. The wires are thermocouples, which measure the temperature of the unexposed surface. Ratings are based on the period of resistance to fire exposure, flaming on the unexposed surface, limiting thermal transmission criteria, and acceptance performance under application of a hose stream.

"A lot of people believe that a firestop is just mineral wool stuffed into a hole," says Gould, who developed the examination and served as the liaison to the FCIA. "A firestop is a system or assembly. It's usually a number of products that work together.

This program has been very well-received by not only our membership, but also the building industry in general.

"The toughest part for me in developing this program was writing the examinations," Gould notes. "You have to walk a fine line in developing test questions that are challenging, but not impossible. You want to be fair and add value at the same time. I know that our tests are not too easy because not everyone who took the first exam passed it, which is the way it should be."

Gould noted that the average cost to earn the Factory Mutual Research firestop contractors Approval rating ranges from US$4,000 to US$6,000, depending on the amount of travel required to perform the necessary inspections and audits. This does not include the cost to travel to an FCIA meeting to take the required DRI examination.

A Way to Stand Out

"This investment by the contractor is less than the cost of a Blue Book directory ad and shows a high level of commitment to quality and education," McHugh explains. "This is a way for the contractor to differentiate himself from others in the market. There are many options for building owners and general contractors to take in installing firestop systems. With this Approval program, we are providing those folks with a clearer choice."

Some of the topics included on the DRI examinations are:

- Knowledge of construction materials
- Listing agencies and their systems (e.g., Factory Mutual Research, etc.)
- Knowledge of T (temperature rise limitation), F (passage of flame) and L (air leakage) ratings as they relate to firestop systems testing under the American Society of Test and Materials (ASTM) Standard E-814
- Authorities having jurisdiction
- Nonconformances
- DRI continuing education requirements
- Terminology for systems and assemblies
- Hourly ratings
- Types of firestop systems
- Definitions/acronyms
- Building codes
- Quality control
- Terminology for systems and assemblies
- Approval markings and requirements
- Specifications, estimating and bidding
- Firestop systems selection

DRIs are required to earn a score of 80 percent or better on each of the two examination parts in order to pass. To maintain Approval, DRIs are required to pass a written examination every three years and earn at least six Continuing Education Units (CEUs) every three years.

"This program has been very well-received by not only our membership, but also the building industry in general," McHugh stresses. "This is an investment in quality. If a firestop system isn't installed correctly or isn't installed at all, the entire structure could be put at risk and the safety of its occupants compromised. We believe Factory Mutual Research understands FCIA's life safety and property protection philosophy – they have been an excellent partner."

To learn more about the firestop contractor Approval program, please contact Jeff Gould at (781) 255-4873 or by e-mail at jeffrey.gould@fmglobal.com.

Proper Flammable Liquids Storage Can Save Time and Money

The proper storage of workplace liquids (see figure 1) such as gasoline, alcohol, vegetable oil, and paint thinner can protect property and save time. Factory Mutual Research-Approved storage cabinets and buildings provide safe and secure areas for the storage of flammable and combustible liquids.

Approved Storage Cabinets

Storage cabinets for flammable and combustible liquids are evaluated according to Factory Mutual Research Approval Standard 6050, *Storage Cabinets (Flammable and Combustible Liquids)*. Cabinets Approved under this standard have met the following construction criteria:

- Steel cabinets are constructed of at least 18-gauge steel with a 1-in (38 mm) gap between the inner and outer panels, including doors.
- Wood cabinets are constructed of at least 1-in (25 mm) thick exterior grade plywood.
- Door(s) of the cabinet are lockable.
- Cabinets have a 2-in (51 mm) deep spill containment sump or pan.
- Cabinets can be equipped with upper and lower diametrically opposed vents equipped with a flame arrester (a device used to stop flames from entering the cabinet through vents) and a means of plugging the vents externally.
- Cabinets must have a means for proper grounding.
- Total cabinet capacity is limited to 120 gal (455 l).

Approved cabinets also are subjected to a number of performance tests, including loading (ability to hold weight on interior shelves), fire exposure, flame arrester, self-closing/latching door operation, and spill containment. For example, Approved storage cabinets must withstand a 10-minute fire test during which an external flame reaches a maximum temperature of 1,300 F (704 C). To pass this test, the cabinet's internal temperature must not exceed 325 F (163 C). In addition, each manufacturer must demonstrate a quality assurance program and undergo a facilities and procedures audit (F&PA).

Figure 1 Common Flammable and Combustible Liquids and Their Applications

Concerns

Flammable and combustible liquids that raise fire protection concerns:

Common Liquids	Industry	Common Use
• Motor oil • Vegetable oil • Rubbing alcohol • Paint thinner • Nail polish remover (acetone)	Retail	Consumer sales
• Methyl ethyl ketone • Ethyl acetate • Toluene	Printing	Ink solvent
• Hydrocarbon solvents	Spray finishing	Paint solvent
• Cutting oils • Hydraulic fluids	Machine shop All industries	Lubrication Power delivery
• Heat transfer fluids	Textile manufacturing	Process heating

Approved Storage Buildings

Buildings intended for the storage of flammable and combustible liquids are evaluated in accordance with Factory Mutual Research Approval Standard 6049, *Flammable and Combustible Liquid Storage Buildings*. This standard applies only to buildings used in outdoor locations. These buildings are considered to be portable and must be anchored to withstand seismic and high wind conditions.

Storage buildings fall into two general categories – those with explosion relief panels and those without. Buildings without explosion relief can be Approved for storage of flammable and combustible liquids, excluding storage of Class 1A and dispensing of Class 1A and 1B liquids (see figure 2). Explosion relief is required for buildings used for the storage and dispensing of Class 1A and 1B liquids.

Some of the design requirements for Approved flammable and combustible liquid storage buildings include the following:

- Building must be capable of withstanding at least a 90-mph (144 km/h) wind load.
- Roof must be capable of supporting a dead load of 40 psf (195 kg/m^2) plus its own weight.
- A leak-tight spill containment sump must be able to contain at least 25 percent of the liquid storage capacity of the building.
- All electrical equipment within the building shall be rated Class I, Division 1 as defined by the National Electrical Code, NFPA 70; exterior-mounted ventilation and/or air conditioning systems shall be rated a minimum of Class I, Division 2 service.
- Gross floor area shall not exceed 1,500 ft^2 (139 m^2).
- Building must be grounded and provide grounding for containers.
- Natural or mechanical ventilation must be provided.

A Factory Mutual Research-Approved refrigerated petroleum laboratory storage building for flammable and combustible liquids.

To learn more about flammable and combustible liquid storage cabinets and buildings, please contact John Gutauskas at (781) 255-4862 or by e-mail at john.gutauskas@fmglobal.com.

Figure 2 Flammable and Combustible Classifications According to NFPA 30

Classifications

Flammable and combustible liquids are classified within NFPA 30, *Flammable and Combustible Liquids Code*, based on their closed-up flash points as follows:

Class	Criteria
Flammable Liquids	
1A *Examples*: Ethyl, ether, isoprene, pentane	**Flash point** below 73 F (23 C) **Boiling point** below 100 F (38 C)
1B *Examples*: Acetone, benzene, gasoline, heptane	**Flash point** below 73 F (23 C) **Boiling point** at or above 100 F (38 C)
1C *Examples*: Styrene, methyl isobutyl ketone, isobutyl alcohol, turpentine	**Flash point** at or above 73 F (23 C) and below 100 F (38 C)
Combustible Liquids	
2 *Examples*: Fuel oils, kerosene, stoddard solvent	**Flash point** at or above 100 F (38 C) and below 140 F (60 C)
3A *Examples*: Aniline, pine oil, nitrobenzene	**Flash point** at or above 140 F (60 C) and below 200 F (93 C)
3B *Examples*: Animal oils, vegetable oils, ethylene glycol, transformer oil, benzyl alcohol, hydraulic fluids	**Flash point** above 200 F (93 C)

SBI Test to Benefit Building Materials Manufacturers Despite Inconsistent Results

Reduced testing expenses and faster time to market – these are just two of the benefits building materials manufacturers can expect from the new Single Burning Item (SBI) test currently being considered for use throughout Europe. Yet despite these benefits, Factory Mutual Research has uncovered some inconsistencies in test results that require further investigation.

While the new test promises to simplify the approval process in Europe, our research has uncovered discrepancies between results from testing conducted at the FM Global Test Center in West Glocester, Rhode Island, USA, and the SBI test. These discrepancies require further investigation before we can determine the correlation with the existing Factory Mutual Research Class 1 rating.

"The SBI test is not the best indicator of actual performance in all cases. It doesn't tell you exactly what the material will do if you have a real fire (e.g., in our full-scale corner test)," explained George Smith, manager of Factory Mutual Research's materials section. "Some products may not perform similarly when compared to full-scale corner test performance."

SBI Test Standardizes European Classification

Developed as part of the European Union's (EU) initiative to standardize a method of ranking the flammability of building materials, the SBI test – which is still being considered for formal adoption – focuses on ignition and reaction to fire. Specifically, it will be used to classify building products into one of six EUROCLASSes based on their burning behavior, including fire and smoke growth rates, the occurrence of burning droplets/particles, flame spread and time to ignition:

A – No contribution to fire

B – Very limited contribution to fire

C – Limited contribution to fire

D – Acceptable contribution to fire

E – Acceptable reaction to fire

F – No performance determined

Once implemented, the SBI test will become a prerequisite for any building materials manufacturer who wants to market its products in Europe, offering a number of benefits previously not available. According to Smith, manufacturers could use the SBI test to determine which products are the best candidates for large-scale performance-based testing.

"Manufacturers could use the SBI test to conduct a screening program," he explained. "They could quickly test large quantities of materials to determine the best candidate out of the bunch, to narrow the field of candidates to those that are more likely to pass performance-based tests. If those better performers don't pass performance-based tests, then it's likely that none will pass. This saves the trouble – and the expense – of going through unnecessary testing. Manufacturers

Once implemented, the SBI test will standardize the building materials approval process in Europe.

won't have to waste valuable resources conducting large-scale tests on all assemblies."

In addition to providing a screening process that will reduce testing time and related expenses, the test will standardize the building materials approval process in Europe. Currently, each country uses a different testing method to classify building products for sale within its borders. The SBI test will not only simplify the process of meeting jurisdictional requirements, it will result in faster time to market. According to Smith, the SBI test, which is a relatively inexpensive test, likely will be required in the future to meet some jurisdictional code requirements.

Research Uncovers Inconsistencies

According to Smith, Factory Mutual Research recently commissioned a study to compare results from the SBI test to results from testing conducted at the FM Global Test Center. "All indications are that the SBI test will be adopted by the EU and we wanted to learn more about it," he explained. "We wanted to see if there was added value by including it within our Approval standards, but we also wanted to better understand the subtleties of the test method. This is a jurisdictional standard and it's in our best interest to know what it means."

By gaining a stronger understanding of the SBI test and its results, Factory Mutual Research would be better positioned to help field engineers, as well as Approvals customers and FM Global insureds, once it's implemented throughout Europe. "Field staff likely will be inundated with SBI results eventually. We wanted to be able to help them interpret the results," said Smith, explaining, "If our field people don't understand, they can't help our insureds determine the best material to use in their facilities.

The SBI test will not only simplify the process of meeting jurisdictional requirements, it will result in faster time to market.

"All material used in Europe eventually will have this rating," he continued. "If insureds will be using materials rated according to SBI test results, we as an organization can't afford not to know what it means." So in an effort to better understand the SBI test, Factory Mutual Research recently commissioned SBI testing in the U.K. Factory Mutual Research-Approved assemblies of low combustibility and non-Factory Mutual Research-Approved assemblies of high combustibility were tested. All the assemblies had been tested previously at the FM Global Test Center with consistent results.

"We didn't select samples that were marginal, that passed one day and failed the next," said Smith. "We selected samples that have passed every test every time or failed every test every time. We know beyond a shadow of a doubt that those samples either do or don't propagate fire."

Yet, despite the known differences between the products, results from the SBI testing showed less discrimination. "The Approved products look good in the SBI test," explained Smith. "The problem is the non-Approved products also look almost as good in the SBI test. The assemblies we expected to perform badly didn't perform as poorly as they should have or could have. We know, based on testing and loss history, that these things perform badly. We're very confident of that. The problem is the test indicates they should perform better than we expected based on historical data."

Further distorting reliability is the fact that the SBI test isn't based on a "parent test" with which questionable results can be compared. "There's nothing to fall back on if SBI numbers are skewed," explained Smith. "Every intermediate small-scale test has a parent to go back to. That doesn't really exist yet with the SBI test. "

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SBI Test to Benefit Building Materials Manufacturers Despite Inconsistent Results continued

According to Smith, small-scale tests developed by Factory Mutual Research are typically derived from an existing large-scale test to help ensure the reliability and accuracy of results. "But the SBI test wasn't developed from a large-scale test," he explained. "Instead, researchers developed the SBI test and later tried to correlate it to the ISO 9705 Room/Corner Test. Development of that correlation usually takes significant time and resources."

One issue, said Smith, is that the SBI test uses a small burner flame and heat from the flame is allowed to escape quickly into a powered ventilation system. During the ISO 9705 Room/Corner Test, however, heat is trapped in an enclosure. "The specimen is not subjected to continued heat flux simulating realistic fires," he explained. "As a result, some materials tested in the SBI test may show different performance in the ISO 9705 Room Test or the Factory Mutual Research Corner Test."

Factory Mutual Research Explores Possibilities

As a result of these preliminary findings, Smith said Factory Mutual Research does not plan to incorporate the SBI test into its existing Approval standards at this time. However, the company will rely on interlaboratory agreements with testing facilities in Europe to conduct SBI tests for its customers.

To learn more about the SBI test or Factory Mutual Research testing methods, please contact George Smith at (781) 255-4870 or by e-mail at george.smith@fmglobal.com.

Wall constructions, flooring, skylights and doors are several types of building materials that will be evaluated using the SBI test.

In Brief

FM 4880 Adopted as ANSI Standard

Factory Mutual Research Approval Standard 4880 – commonly referred to as the Factory Mutual Research Corner Test – has been adopted by the American National Standards Institute (ANSI). According to Martha McHatton, Factory Mutual Research standards coordinator, this move not only signifies a first for the company, but also lends credibility to FM 4880, which addresses the flammability of Class 1 building materials.

"It gives the standard credibility," said McHatton. "It's been through a process where there has been consensus among a reviewing body. It's a standard that's been developed by the Factory Mutual Research Approvals Division, with buy in from industry and regulatory bodies. It's not just Factory Mutual Research saying this."

ANSI is a private, nonprofit organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system.

According to McHatton, Factory Mutual Research became accredited as an ANSI standards developing organization in 1998. As such, the company must present standards submitted for adoption to a consensus body comprised of Factory Mutual Research Approvals cus-

tomers, jurisdictional and regulatory boards, and general interest groups. Feedback then must be solicited and, by the ANSI process, addressed with an attempt to resolve all negative issues before final adoption. Fifteen months from the start of this process – and a few edits later – FM 4880 became an ANSI standard.

While FM 4880 is the first Factory Mutual Research Approval standard to be adopted as an ANSI standard, the company has submitted 10 others, which are now in various stages of the adoption process.

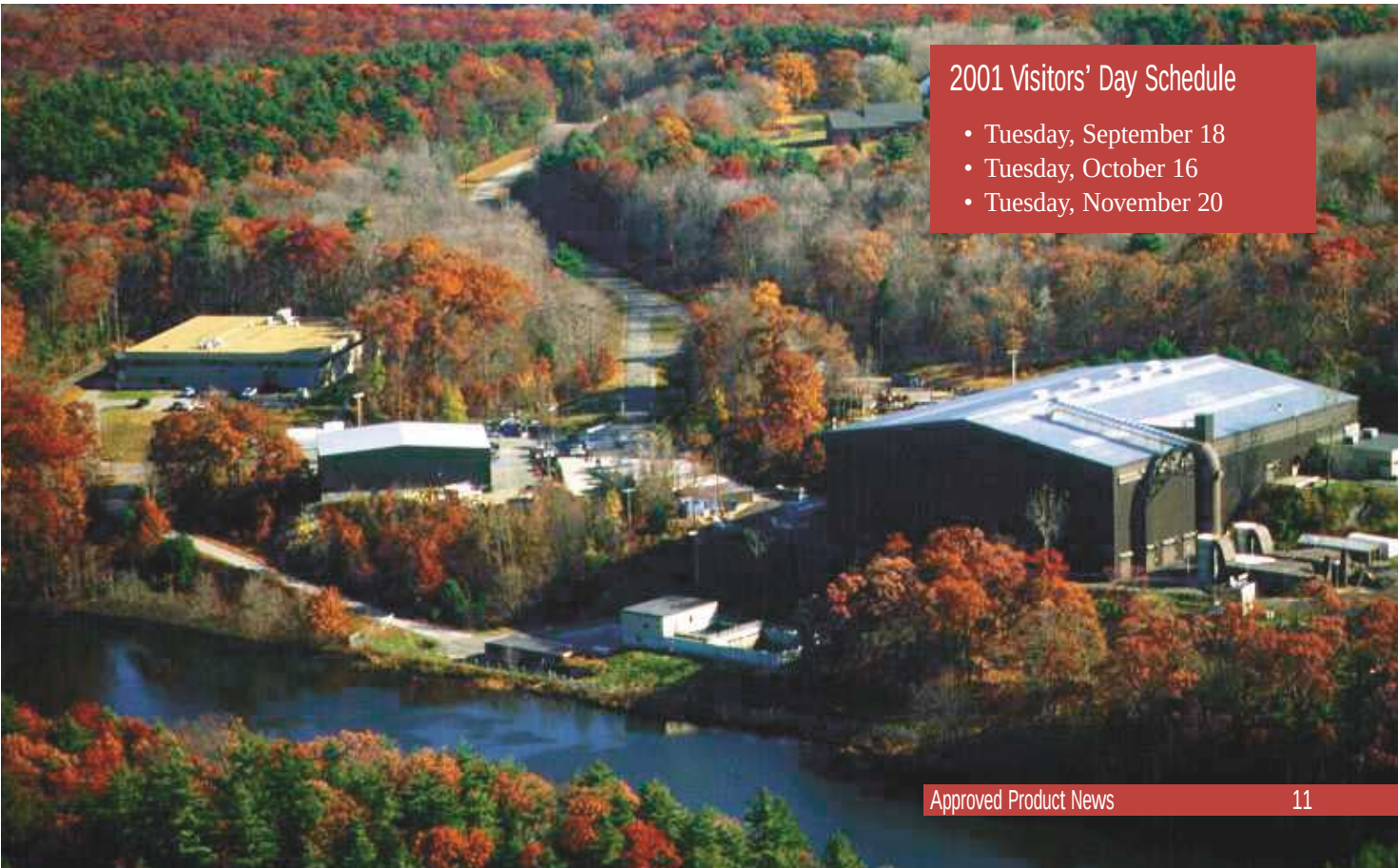
Tour the FM Global Test Center and Factory Mutual Research Hydraulics Lab

Your clients demand quality and there is no better way to ensure that quality than by obtaining third-party certification from Factory Mutual Research.

Industrial and commercial companies around the world rely on products and services that are Factory Mutual Research-Approved and listed. If you would like to see where this Approvals testing is conducted, then register now for a tour of the FM Global Test Center in West Glocester, Rhode Island, USA, the world's largest and best-equipped full-scale fire testing facility. In addition to seeing a large-scale fire demonstration showing sprinklers in action, you'll witness a dust explosion and receive a tour of the Factory Mutual Research Hydraulics Laboratory, where automatic sprinklers are tested and Approved.

For more information on our 2001 Visitors' Days or to register for a tour, please contact your Factory Mutual Research Approvals representative.

The FM Global Test Center in West Glocester, Rhode Island, USA.



2001 Visitors' Day Schedule

- Tuesday, September 18
- Tuesday, October 16
- Tuesday, November 20

Interlaboratory Agreements: Your Link to Global Markets

Take advantage of Factory Mutual Research's interlaboratory agreements, which allow you to have your product tested by Factory Mutual Research to standards used throughout the world.

The resulting test report will be submitted by Factory Mutual Research to a participating laboratory of your choice. The report serves as a basis for the designated laboratory's certification.

Upon your request, a participating laboratory may also conduct testing and submit a test report based upon Factory Mutual Research Approval standards, which become the basis for Factory Mutual Research Approval.

Factory Mutual Research participates with testing laboratories on almost every continent of the world. The number of signed agreements continues to grow; here is a current list of international laboratories with whom Factory Mutual Research has reciprocal agreements.

For additional information on these agreements, please visit **www.fmglobal.com/approvals**.

TESTING LAB

- Building Research Establishment (BRE) UNITED KINGDOM
- Canadian Standards Association (CSA International) CANADA
- Centro de Pesquisas de Energia Elétrica (CEPEL) BRAZIL
- China National Center for Quality Supervision and Testing of Fixed Fire Extinguishing Systems and Fire Resisting Building Components CHINA
- China National Quality Supervision and Test Center of Explosion Protected Electrical Products (CQSTEx) CHINA
- Deutsche Montan Technologie (BVS/DMT) GERMANY
- Electrical Equipment Certification Services (EECS/BASEEFA/MECS) UNITED KINGDOM
- Hurricane Engineering & Testing Inc. (HETI) UNITED STATES
- Institut National de l'Environnement Industriel et des Risques (INERIS) FRANCE
- Intertek Testing Services NA Inc. (ITS) UNITED STATES
- KEMA Registered Quality Nederland BV (KEMA) NETHERLANDS
- Laboratoire Central des Industries Electriques (LCIE) FRANCE
- Le Centre National de Prevention et de Protection (CNPP) FRANCE
- NGC Testing Services UNITED STATES
- Norges Elektriske Materiellkontroll (NEMKO) NORWAY
- Physikalisch-Technische Bundesanstalt (PTB) GERMANY
- Quest Engineering Solutions UNITED STATES
- Safety in Mines Testing and Research Station (SIMTARS) AUSTRALIA
- Scientific Services Laboratory (SSL) AUSTRALIA
- Shanghai Institute of Process Automation (NEPSI/SIPAI) CHINA
- Sira Certification Service (SCS) UNITED KINGDOM
- South African Bureau of Standards (SABS) SOUTH AFRICA
- Swedish National Testing Institute (SP) SWEDEN
- TestSafe Australia (formerly LOSC) AUSTRALIA
- TÜV Rheinland GERMANY
- TÜV Product Service GERMANY
- Verband der Sachversicherer (VdS Schadenverhutung) GERMANY
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