Vision 20/20

MODEL PERFORMANCE IN

FIRE PREVENTION

An Overview of Product Certification: What an AHJ Needs to know

Discussion Points

- Historical Impacts
- Code Requirements
- Lab Qualifications
- Product Evaluation/Verification Process
  - Standardized tests: ASTM, ISO, NFPA, UL, FM
- Product Development Process
- Wrap Up

Historic Perspective

- Significant Fires – Loss of Lives
- Prevention Programs Initiated
- Code Development/Enforcement Progress
- Insurance Coverage
  - Documented safety programs can save money
  - Lack of programs can result in claim denials

- Workplace Safety -- Consumer Products -- Built Environment

Historic Perspective

- Labor Laws – Workplace Safety
  - Adoption of Occupational Safety and Health Act in 1970
  - Creation of Occupational Safety and Health Administration – OSHA
- End User – Consumer Products
  - Consumer Product Safety Commission created in 1972 – CPSC
  - Passage of Consumer Product Safety Act (CPSA)
- Building & Construction Codes – Built Environment
  - Adopted by respective municipality (state, county, city, town, etc.)

Code Requirements

- Mutual/Common Language
- Workplace Safety: OSHA Regulations
  - 29 CFR, Part 1910 Subpart L, Fire Protection
    - 1910.157, Portable fire extinguishers
      - 1910.157(c)(2) : Only *approved* portable fire extinguishers shall be used to meet the requirements of this section.
- Consumer Safety: CPSC Regulations
  - 16 CFR, Part 1633 Standard for Flammability (Open Flame) of Mattress Sets
- Municipality adopted codes & standards – Construction Codes
  - I-Codes, NFPA Standards, etc.

Code Requirements (Cont'd)

- Construction Codes & Standards: overlap with OSHA
  - Fire extinguishers
  - Sprinkler systems
  - Dry/wet chemical
- How About Building Construction Materials & Assembly Methods?
- Approval & enforcement: ultimately up to AHJ
  - AHJ reviews details in construction plans
  - AHJ conducts site inspections to verify installation

Code Requirements (Cont'd)

- Construction codes and referenced standards typically specify when or where a product:
  - shall be approved by the authority having jurisdiction
  - shall be of an approved type
  - shall be labeled
  - shall be listed for their purpose
  - shall be listed for such use.
  - shall be listed in accordance with…
- Approval & enforcement: ultimately up to AHJ
  - AHJ reviews details in construction plans
  - AHJ conducts site inspections to verify installation

Code Requirements (Cont'd)

- Labeled – Identifying Mark
  - Assurance of quality
  - Consumer will get same product compared to that tested – on going evaluation of manufacturing process

Code Requirements (Cont'd)

- Listed – Published in a Directory (examples)
  - CSA Int'l – http://directories.csa-international.org/directorymain.asp
  - FM Approvals – http://www.approvalguide.com/
  - ICC-ES – http://www.icc-es.org/Evaluation_Reports/index.shtml
  - Intertek – http://www.intertek.com/directories/
    - (includes ETL, Warnock Hersey)
  - QAI Laboratories – http://www.qai.org/listing-directory.html
  - SwRI – http://www.swri.org/4org/d01/fire/listlab/listprod/director.htm
  - UL – http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm

Code Requirements (cont'd)

- Products with Marks
  - Fire rated doors
  - Fire rated walls or floor/ceiling assemblies
  - Kitchen exhaust duct protection
  - And more…

Qualifications of Facilities

- Who Tests/Evaluates/Lists Products?
- Involves Workplace Safety
  - OSHA requirements apply
    - Products are tested by OSHA recognized Nationally Recognized Testing Laboratory (NRTL)
    - Laboratory goes through application/payment process described in CFR 29, 1910.7
    - Evaluation of capabilities is completed
    - Organization is published in list of NRTL's
    - http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9703

Qualifications of Facilities (cont'd)

- Non Workplace Safety, i.e. Building Products
  - LISTED. Equipment or materials included on a list published by an approved testing laboratory, inspection agency or other organization concerned with current product evaluation that maintains "periodic inspection of production" of listed equipment or materials, and whose listing states that "equipment or materials comply with approved nationally recognized standards" and have been tested.
  - LABELED. Equipment or material to which has been attached a label, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains "periodic inspection of production" of labeled equipment or materials, and by whose labeling is indicated compliance with nationally recognized standards.

Qualifications of Facilities (cont'd)

- In years gone by, AHJ's were often taught
  - LISTED = Underwriter's Laboratories
  - LABELED = Factory Mutual
- Testing, listing/labeling is a global market
- Many other laboratories and listing agencies exist
- AHJ's cannot require products be listed/labeled by a particular company
  - A legal requirement is needed – codified (i.e. OSHA NRTL)
  - Doesn't exist in any model building code/standard

Qualifications of Facilities (cont'd)

- Two Key Elements for Listing/Label
  - "Periodic inspection of production"
    - Is manufacturing process producing products of equal quality as was tested/evaluated to standard
  - "Equipment or materials comply with approved nationally recognized standards"
    - It passes a nationally recognized testing standard
- Product Listing/Label (or certification) may involve multiple entities

Qualifications of Facilities (cont'd)

- Simplistic Overview of Listing/Labeling Process
  - Qualitative inspection of product(s)/material(s)
  - Quality Assurance (QA) manual of manufacturing process is reviewed (previously developed)
  - Production of sample is witnessed
    - Pull part from manufacturing process assembly line
  - Product/material/equipment is sent to the laboratory for testing
    - An assembly is built for fire testing (i.e. wall or floor/ceiling)
  - Product passes: confirmation of QA manual
  - Product is issued a mark, listed in published directory
  - Certification agency conducts inspections on regular (i.e. quarterly) basis to confirm manufacturing process – follow up

Qualifications of Facilities (cont'd)

- From the "listed" and "labeled" definitions
  - testing laboratory, inspection agency or other organization
  - Not required to be the same entity
- 1: Inspection Agency/Laboratory are same
- 2: Inspection Agency utilizes independent qualified laboratory to only test product
  - Testing is almost always done with supervision of the inspection agency
  - Samples can be documented; similar to evidence without inspection agency present

Qualifications of Facilities (cont'd)

- 3: Inspection Agency/Laboratory are the same – use of another laboratory
  - Products tested at other qualified testing facility
  - Products tested at another facility; witnessed by primary agency

- 4: Cross Certification Programs
  - Becoming prevalent in global market
  - One listing/labeling/certification agency recognizes and accepts evaluation from another qualifying agency

Qualifications of Facilities (cont'd)

- 5: Field Certification
  - Equipment or construction assemblies built in place
  - Modifications made to previously listed equipment or assemblies
  - Listed components are assembled or have installation restrictions in the field

Qualifications of Facilities (cont'd)

- Approved Inspection Agency or Other Organization
  - Coincides with agency who provides directory of products
- Testing Laboratory Requirements
  - What constitutes a
    - Listed – approved testing laboratory
    - Labeled – nationally recognized testing laboratory
  - What are the nationally recognized standards

Qualifications of Facilities (cont'd)

- Test Standards Laboratories Follow
  - Identify specific requirements/steps for conducting a test, such as but not limited to:
    - Sample preparation
    - Instrumentation required (temperature, pressure, heat flux,etc.) & locations
    - Fire source (gas, wood crib, radiant panel, etc.)
    - Exposure duration
    - Data collection and analysis
    - Criteria for passing

Qualifications of Facilities (cont'd)

- Who Develops Standards
  - Government
  - Non-profit entities
  - Private for profit companies
  - Trade groups & industry associations
- Purpose Unique to Organization/Agency
  - Not limited to equipment/products
  - Usually done in open process
  - Harmony among many standards between agencies
- ANSI

Qualifications of Facilities (cont'd)

- NON INCLUSIVE LIST – Standards Making Org's
  - American Society of Testing and Materials – ASTM
  - American Petroleum Institute – API
  - British Standards – BS
  - California Fire Marshal's Office
  - CSA Group (CSA Int'l)
  - Compressed Gas Association – CGA
  - Factory Mutual – FM
  - Federal Government, CFR's/DoD/USCG
  - International Standards Organization – ISO
  - National Fire Protection Association – NFPA
  - Southwest Research Laboratories – SwRI
  - Underwriters Laboratories – UL/ULC

Qualifications of Facilities (cont'd)

- American National Standards Institute – ANSI
  - Market/coordinate US based standards in global market
  - Not standards making organization
  - Accredit standards developed by standard making organizations
    - Consensus based, open development/change process and allow option to appeal
    - Common example – NFPA Standards follow an ANSI process
    - List of organizations that make standards
    - http://www.ansi.org/internet_resources/standards_devel_organizations/resources.aspx?menuid=12

Qualifications of Facilities (cont'd)

- Harmonized Test Standards
- Designation is Not Required to be Same

Description	Organization Designation						
Fire Test of Building Constructions and Materials	ASTM E119	BS 476		NFPA 251	ISO 834	UBC 7-1	UL 263
Fire Tests of Door Assemblies	ASTM E152			NFPA 252	similar to ISO 3008		UL 10A/10B, UL 155
Surface Burning Characteristics of Materials	ASTM E84			NFPA 255		UBC 8-1	UL 723
Test Method for Fire Testing of Real Scale Upholstered Furniture Items	ASTM E 1537		CA TB 133	NFPA 266			UL 1056

- Consistency Between Labs
  - Eliminates confusion
  - Repeatability
  - Reproducibility

Qualifications of Facilities (cont'd)

- Test Standards Evaluate Specific Criteria
- Verify Applicability of Test
  - Polyurethane foam will achieve superior flame spread results – sample melts from holder and therefore no spread
- Read the standards "Use & Scope" sections
  - Testing is under controlled and limited conditions
  - Samples are constructed in a specific fashion
  - Does Not always provide complete evaluation of risk

Qualifications of Facilities (cont'd)

- ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Materials

Significance and Use

These test methods are intended to evaluate the duration for which the types of building elements noted in 1.1 contain a fire, retain their structural integrity, or exhibit both properties during a predetermined test exposure. The test exposes a test specimen to a standard fire controlled to achieve specified temperatures throughout a specified time period. When required, the fire exposure is followed by the application of a specified standard fire hose stream applied in accordance with Practice E2226. The test provides a relative measure of the fire-test-response of comparable building elements under these fire exposure conditions. The exposure is not representative of all fire conditions because conditions vary with changes in the amount, nature and distribution of fire loading, ventilation, compartment size and configuration, and heat sink characteristics of the compartment. Variation from the test conditions or test specimen construction, such as size, materials, method of assembly, also affects the fire-test-response. For these reasons, evaluation of the variation is required for application to construction in the field.

The test standard provides for the following:

For walls, partitions, and floor or roof test specimens:

Measurement of the transmission of heat.

Measurement of the transmission of hot gases through the test specimen.

For loadbearing elements, measurement of the load carrying ability of the test specimen during the test exposure.

For individual loadbearing members such as beams and columns:

Measurement of the load carrying ability under the test exposure with consideration for the end support conditions (that is, restrained or not restrained).

The test standard does not provide the following:

Information as to performance of test specimens constructed with components or lengths other than those tested.

Evaluation of the degree by which the test specimen contributes to the fire hazard by generation of smoke, toxic gases, or other products of combustion.

Measurement of the degree of control or limitation of the passage of smoke or products of combustion through the test specimen.

Simulation of the fire behavior of joints between building elements such as floor-wall or wall-wall, etc., connections.

1. Scope

1.1 The test methods described in this fire-test-response standard are applicable to assemblies of masonry units and to composite assemblies of structural materials for buildings, including loadbearing and other walls and partitions, columns, girders, beams, slabs, and composite slab and beam assemblies for floors and roofs. They are also applicable to other assemblies and structural units that constitute permanent integral parts of a finished building.

1.2 It is the intent that classifications shall register comparative performance to specific fire-test conditions during the period of exposure and shall not be construed as having determined suitability under other conditions or for use after fire exposure.

1.3 This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products or assemblies under actual fire conditions.

1.4 These test methods prescribe a standard fire exposure for comparing the test results of building construction assemblies. The results of these tests are one factor in assessing predicted fire performance of building construction and assemblies. Application of these test results to predict the performance of actual building construction requires the evaluation of test conditions.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Qualifications of Facilities (cont'd)

- What are "Approved" and "Nationally Recognized" Laboratories
- Start With Legal Requirements
  - Workplace Safety?
    - Has to be OSHA recognized NRTL
  - Building Product – strictly lab testing?
    - AHJ has flexibility to accept from larger pool
    - Want to investigate capabilities of laboratory
    - Accredited labs has been vetted

Qualifications of Facilities (cont'd)

- Accreditation or Approval Process
  - Depends on accreditation/approval agency
    - Federal Gov't (OSHA) defines criteria for laboratories that want to become a NRTL
    - Laboratory: may be evaluated against ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories
    - Inspecting Agency: may be evaluated against ISO/IEC 17020, General Criteria for the Operation of Types of Bodies Performing Inspection

Qualifications of Facilities (cont'd)

- What does process entail?
- Evaluation of capabilities, including and not limited to:
  - Building/facility/equipment adequate
  - Record keeping
  - Quality Assurance (QA) Process
    - Equipment calibrated/records available
    - Adequately educated/trained staff
  - Impartiality of staff/personnel
  - Certificate issued or included on a list

Qualifications of Facilities (cont'd)

- Lab Accreditation/Evaluation Agencies
  - A2LA – American Association for Laboratory Accreditation
  - IAS – International Accreditation Service, Inc.
  - L-A-B – Laboratory Accreditation Bureau
  - NACLA – National Cooperation for Laboratory Accreditation
  - NVLAP – National Voluntary Laboratory Accreditation Program (http://www.nist.gov/nvlap)

Qualifications of Facilities (cont'd)

- Lab Accreditation/Evaluation Agencies

Intertek Testing Services NA, Inc. - SAT (Elmendorf, TX)

CPSC Identification Number for this Laboratory: 1303

Lab Address 16015 Shady Falls Road
City Elmendorf
State/Province Texas
Country United States
Postal Code 78112
Laboratory Mike Dey

Accreditation Body	Certification #
IAS (International Accreditation Service, Inc)	TL-143

Scope Name	Certificate #	CPSC Approval Date	Original CPSC Approval Date
16 CFR Part 1632, Standard for the Flammability of Mattresses and Mattress Pads (FF 4-72, Amended) (Except 16 CFR part 1632.7)	TL-143	12/31/2010	12/31/2010

Intertek Testing Services NA, Grand Rapids MI (Kentwood MI)

CPSC Identification Number for this Laboratory: 1291

Lab Address 4700 Broadmoor Ave Suite 200
City Kentwood
State/Province MI
Country United States
Postal Code 49512
Laboratory Ralph Buckingham Ralph

Accreditation Body	Certification #
A2LA (American Association for Lab Accreditation)	78.02

Scope Name	Certificate #	CPSC Approval Date	Original CPSC Approval Date
16 CFR Part 1632, Standard for the Flammability of Mattresses and Mattress Pads (FF 4-72, Amended)	78.02	04/04/2011	09/07/2010

Interlab Agreements

- Who oversees the accreditation agencies?
  - ILAC – International Laboratory Accreditation Cooperation
    - Worldwide promotion of accredited test/calibration results
    - Assessed by ILAC accreditation bodies
    - Peer reviewed for competence
  - IAAC – InterAmerican Accreditation Cooperation
  - APLAC – Asia Pacific Laboratory Accreditation Cooperation
- Enforcing Authority
  - Ensure laboratories follow the requirements

Qualifications of Facilities (cont'd)

- AHJ's Verify by Requesting Credentials
- A2LA Directory
  - http://www.a2la.org/dirsearchnew/newsearch.cfm
- CPSC Accredited Labs
  - 16 CFR required test – required to maintain a list
  - http://www.cpsc.gov/cgi-bin/labsearch/
- IAS Accreditation – Issue a Certificate
  - www.iasonline.org/PDF/TL/
- OSHA Recognized NRTL's
  - "recognized by OSHA in accordance with 29 CFR 1910.7 to test and certify equipment or materials (products) requiring approval by certain OSHA safety standards"
  - http://www.osha.gov/dts/otpca/nrtl/nrtllist.html

Qualifications of Facilities (cont'd)

- Regional Requirements – Not Inclusive
- State Specific?
  - Maryland State Fire Marshal's Office
    - Testing laboratories
    - http://www.mdsp.org/Organization/OfficeoftheStateFireMarshal/CodeEnforcementLicensingRegulation/TestingLaboratories.aspx
  - California State Fire Marshal's Office
    - Laboratory accreditation program
    - http://osfm.fire.ca.gov/strucfireengineer/strucfireengineer_labaccreditation.php

Qualifications of Facilities (cont'd)

- Regional Requirements – City Specific
- New York City, Department of Buildings
  - Materials & Equipment Acceptance (MEA):
  - http://www.nyc.gov/html/dob/html/codes_and_reference_materials/mea_resource.shtml
  - Office of Technical Certification & Research (OTCR):
  - http://www.nyc.gov/html/dob/html/development/otcr.shtml
  - Types of Agencies
    - Materials and Equipment Certification Agencies, Approved Inspection Agency, Approved Testing Agency
    - Progress Inspection Agency, Elevator, Boiler, Concrete, Exterior Wall, Pipe Welders and Fabricators

Product Development

- The new product quandary
  - Model Codes/Standards don't recognize solutions that new products bring to market
  - Evaluation standards within codes/standards by reference don't apply to new technological solutions
  - Existing evaluation standards don't apply or aren't appropriate evaluation method
- Fire protection products; either active or passive equipment is relatively slow to react in comparison with say electronics market
  - Rightfully so – life safety deserves a thorough review
- Existing markets have a pre-determined path
  - Issues still arise with advances of new technology

Product Development

- Original Equipment Manufacturer (OEM) develops new product
- Establish/Identify Code Requirements
- Identify market segment and appropriate testing laboratory or laboratories
  - Selling only in CA? – Lab needs to be on BML Program
  - Selling in US including CA? Need BML and more
- Investigate if a test standard exists
  - Some tests are nearly identical but identified uniquely by the respective agency

Product Development (cont'd)

- Example of listing in UL Directory

ONLINE CERTIFICATIONS DIRECTORY

Home Quick Guide Contact Us UL.com

GAQF.EX6174
Clean Agent Extinguishing System Units

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Clean Agent Extinguishing System Units

See General Information for Clean Agent Extinguishing System Units

SEVO SYSTEMS INC EX6174
14335 W 97TH TER
LENEXA, KS 66215 USA

PRE-ENGINEERED UNITS 3M™ Novec™ 1230 Fire Protection Fluid (dodecafluoro-2-methylpentan-3-one) Extinguishing System Units, stored pressure type, having nominal charging capacities of 40, 76, 164, 322 and 601 lb (18.1, 34.5, 74.4, 146.1 and 272.6 kg) Novec™ 1230 Fluid, respectively. The units are super-pressurized to 25 bar (363 psig) with operating temperatures of 0 F to 130 F. The units are designed for total flooding protection against Class A surface burning, Class B flammable liquid and Class C fires occurring within an enclosure.

A description of these extinguishing system units, and the design and installation limitations are contained in the Listee's installation manual dated October 17, 2002 (p/n SE 1230). Copies are available from the above Listee.

AGENT STORAGE CONTAINER ASSEMBLY

Product Development (cont'd)

- What's the Significance?
  - Important to verify during plan review and inspections
  - Manufacturer may have unique or specific design criteria in product manual
  - Most importantly, make sure listing/label is appropriate for installation
    - Design limitation
    - Smoke detector vs. duct detector

Product Development (cont'd)

- New Product in Marketplace – No Standard
  - Option 1
    - Pay laboratory to develop test standard
      - Significant monetary commitment
      - Risk that standard may change
    - Competitors bring competing but slightly differing products to market
      - Original test standard may not fit all products
      - New standard is developed to incorporate all
      - Original OEM now has to retest to new standard
    - OEM's at least have a listing/labeled product
    - Also a significant time period to complete

Product Development (cont'd)

- New Product in Marketplace – No Standard
  - Option 2
    - Remember definitions?
      - Approved: Acceptable to the Authority Having Jurisdiction
    - OEM may conduct a fire test with the AHJ present to observe
    - The AHJ has the ability to approve based on observations and "technical" reports provided
    - "Technical" reports can be sent to independent 3rd party review acceptable to both parties

Summary

- AHJ's Have Role of Verifying Equipment/Assemblies are Used Properly
  - Witnessing an "amazing" demonstration may not prove the product is safe
  - Avoid the media to remain objective; don't be a spokesperson
- Many Laboratories Capable of Running Tests
  - Be sure it's an applicable test by qualified agency
- Lab Can be Distinct from Certification/Listing Agency
- Understand the agencies jargon
  - Listing : Labeled : Certification