CPSC MEETING LOG
UPHOLSTERED FURNITURE

Meeting Between: CPSC staff and members of ASTM E.05-15 Subcommittee Task Groups

Date of Meeting: December 4-5, 2001

Meeting Site: Hyatt Regency Hotel, Dallas, TX

Log Entry By: Dale R. Ray, Project Mgr., EC, (301) 504-0962 x1323

Participants: Kurt Reimann, BASF Corp. (Task Group Chairman)
Tom Fritz, Armstrong World Ind. (Subcommittee Chairman)
Marcelo Hirschler, GBH Int'l. (Subcommittee Sec'y.)
Joe Ziolkowski, UFAC (Furniture Industry Coalition Chairman)
Dale Ray, CPSC
and others representing textile, furniture, tobacco and chemical industries (see attendance list below)

Summary:

The ASTM E.05-15 voluntary standards Subcommittee on Contents and Furnishings includes a Task Group on Small Open Flame Ignition of Upholstered Furniture. This Task Group held two meetings to present and discuss ongoing activities related to a possible standard. Only Task Group members attended the first meeting on December 4; these and others attended the second meeting on December 5, one of several task group meetings held that day. Mr. Ray presented a report on CPSC activities at this second meeting. The participants list below notes those who attended both meetings.

At the first meeting, Task Group Chairman Dr. Reimann and Dr. Grand presented an interim report on a study, sponsored by the Alliance for the Polyurethanes Industry (BASF is an API member), on the small open flame ignition behavior of currently available (i.e., conventional and FR) upholstery materials. This study is being conducted in support of the test method development work of the intra-industry Small Open Flame Technical Committee (SOFTC), and in support of possible industry comments on the expected upcoming amendments to California TB-117. Their presentation slides are attached. The study measured the mass loss and heat release over time of various upholstery materials in furniture mockup tests. Conventional cover fabrics generally performed poorly, regardless of interior filling materials; available FR fabrics all self-extinguished in these tests, regardless of fillings. They also found that component tests, such as the existing TB-117, did not adequately predict the performance of composite furniture assemblies. These findings are similar to those of the CPSC staff's testing.

The study concluded that a mass loss-based test method such as that being developed by SOFTC would yield unambiguous results, be uncomplicated, and demonstrate potential for extrapolation to full scale test results. Recommendations included conducting interlaboratory studies to establish repeatability and reproducibility, conducting full scale tests for comparison to mockup test results, and selecting one fabric/filling combination as a "standard" reference material for labs to use in testing their technique and approach. The mass loss test method is intended to relate to escape time, but no specific time target was identified. The goal is to delay "full involvement" of an article of upholstered furniture, thereby reducing the risk.

After the API presentation and discussion, the SOFTC members held a closed meeting to discuss test method issues. The group did not hold an expected public discussion of the progress of their work, instead presenting a brief update at the December 5 Task Group general meeting.

At the second meeting, Mr. Ray presented an overview of the information in the CPSC staff's October 2001 briefing package on upholstered furniture. A copy of an outline of this information handed out to participants is attached. Mr. Ray concluded that the overall direction of the CPSC staff's standard development work was similar to the general approach of SOFTC and the California Bureau of Home Furnishings (which administers that states furniture flammability regulations). He encouraged the group to build on the API-sponsored work and continue their efforts, independently and in cooperation with CPSC, to develop a standard to address the risk to consumers. He also stated the staff's recommendation in the package that the Commission solicit public comment on the information in the briefing package and hold a public meeting before the staff forwards recommendations on regulatory alternatives to the Commission.

Attachments

U.S. CONSUMER PRODUCT SAFETY COMMISSION
STAFF BRIEFING PACKAGE ON UPHOLSTERED FURNITURE*

November 2001

Contact: Dale Ray, Project Mgr.
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1. October 2001 Briefing Package

--Presents CPSC technical information
--Revised draft small open flame standard
--Staff recommendation: publicize info, get public feedback before considering regulatory options under small open flame proceeding
--Staff recommendation: deny polyurethane foam petition
--NASFM petition withdrawal

2. The Continuing Fire Hazard

--Leading cause of fire deaths of any consumer product
--1998 addressable fire losses: 420 deaths, 1,080 injuries, $120 million property damage
--1998 estimated societal costs = $2.4 billion
--Still no national standard addressing the open flame risk

3. CPSC Testing & Analysis

--Establishes technical feasibility of a small open flame standard
--Evaluate new product innovations
--Basis for projected benefits of a standard
--Information base to share with manufacturers, state / local / international regulators

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***The information presented in this document was prepared by the CPSC staff, and does not necessarily represent the views of the Commission.**

4. Highlights of the Draft Small Open Flame Standard

--Objective: evaluate and reduce ignitability and flame spread, thereby limiting the early stages of fire growth

--Two basic test locations: seating areas & dust covers (where most ignitions occur)

Small Open Flame Performance Requirements

Test	Ignition Source	Maximum Flaming	Maximum Smoldering/Glowing
Seating Area	Small butane flame, 20 sec.	2 min.*	15 min.
Alternate Seating Barrier	U.K. (BS 5852) Crib #5	10 min.	60 min.**
Dust Cover	Small butane flame, 20 sec.	2 min.*	15 min.

*with no burning to any edge of the test specimen

**with limited spread of combustion of foam filling material, no dripping, and no uncontrolled flaming

--Small open flame tests:
Combinations of FR seating materials, including fabrics, generally necessary;
FR fillings or self-extinguishing interliners may be used, but not required;
Nonwoven dust covers generally necessary.

--Optional seating barrier test:
Fire-blocking barriers generally necessary; FR fabrics not needed.
Provides adequate level of safety while maintaining fabric choice.

--Sampling plan for establishing compliance for fabrics / barriers:
Similar to children's sleepwear regulations; 3 levels

Fabric / Barrier Sampling Requirements

Sampling Level	# Samples (@ 4 specimens each)	Production Unit (max. # lin. yds.)*
Initial	3	1,000
Normal	2	5,000
Reduced	2	10,000

*Multiple smaller runs may be tested together; short runs < 50 lin. yds. exempt.

Initial Sampling: products for which compliance is undetermined
Normal Sampling: products consistently passing initial sampling tests
Reduced Sampling: products consistently passing normal sampling tests

--Recordkeeping to establish information trail for finished products;
allows manufacturers, importers & suppliers to identify sources of materials

5. Economic Issues

--Evaluates significant available alternatives; provides basis for reducing potential economic burden, especially on small firms
--CPSC staff analysis revised to consider issues raised in industry studies, reflect latest version of draft standard
--A small open flame standard would have net benefits to the public

6. FR Chemical Risk Assessment

--Toxicity reviews of 16 candidate chemical categories under FHSA
--Evaluated risk for 8 compounds (not same as NAS 8):
No hazard: 4 compounds (DBDPO, HBCD, CPE, PA);
Probably no hazard: 1 compound (EHDP);
Chronic hazard: 1 compound (TDCP);
Incomplete data: 2 compounds
AT (inhalation route only)
THPC (identity / toxicity of migration products)
CPSC staff working with manufacturers to develop additional data
--EU risk assessment: risk for lower BFRs; "precautionary principle" for higher BFRs

7. Progress On Other Standards Activities

--ASTM E5.15: no action on test method, working with SOFTC
--SOFTC: continuing research to develop mass loss test method
--Industry research to develop more fire-resistant products
--California BHF: upcoming proposal to revise TB-117, possible composite & component requirements on small open flame

8. Conclusions

--Available information suggests a small open flame standard is technically & economically feasible
--CPSC briefing package presents government research, requests public input before staff makes recommendations to Commission on regulatory options
--Possible Public Meeting: early – mid 2002
--Challenges to industry following August 2000 Position Statements:
a. Develop products and materials for residential upholstered furniture
b. Commitment to participation in developing a national standard

SUMMARY OF FLAMMABILITY TEST RESULTS OF UPHOLSTERED FURNITURE MOCK UPS

Kurt A. Reimann, BASF Corporation

ASTM E05.15.02
December 4, 2001

Testing Scope

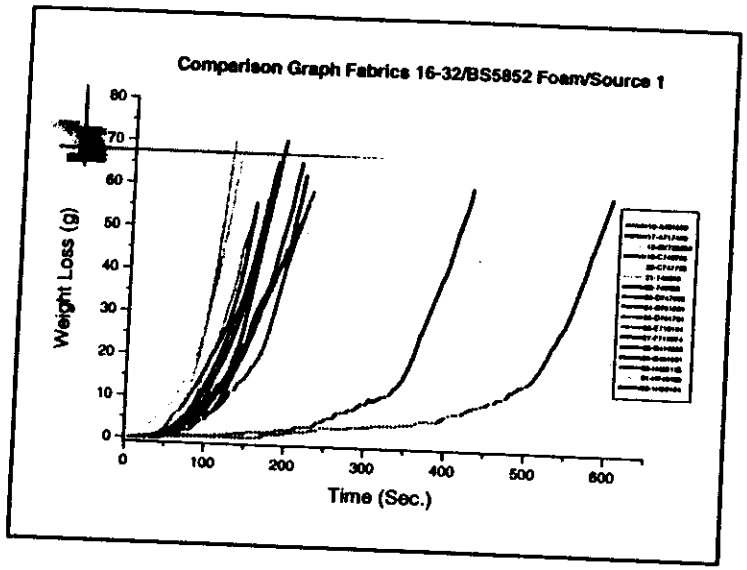
- **Foams**
  - Conventional, non-FR, 1.72 pcf, 170 cfm/ft²
  - Cal. 117, 1.75 pcf, 213 cfm/ft²
  - BS 5852 Crib 5, 1.75 pcf, 56 cfm/ft²
- **Fabrics**
  - 32 Commercially available U.S. upholstery fabrics
  - 8 FR Backcoated, BS 5852 Source 1 compliant

Testing Scope

- **Batting**
  - Slickened, adhered to Cal. 117 Foam
  - Non-slickened, BS 5852 Source 2 compliant
- **Interliners**
  - 2 Blended Basofil/Aramid
- **Tests**
  - Over 150 open flame furniture mock ups. No smoldering tests

Current California 117 Test

- Distinguishes between:
  - non-FR foam
  - minimally compliant 117 foam
  - a Cal. 117+ type foam
- Does not distinguish between:
  - a Cal. 117+ type foam and
  - foams with higher FR levels



Use of Polyester Batting

- Use of adhered and slickened batting significantly degrades performance
- Use of UK compliant batting does not significantly impede flame propagation with Crib 5 foam and commercial U.S. fabrics

Use of Polyester Batting

- 1" of U.K. Source 2 compliant batting was tested with upholstery fabrics and U.K. Source 5 compliant foam
- In all 15 cases time to full fire propagation was sooner than without the batting

APPROXIMATE TIME TO 10% MASS LOSS (Sec)

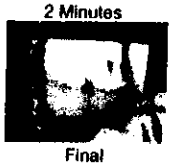
FABRIC I.D.	WITH BS FOAM	WITH BS FOAM AND BS BATTING
1	160	140
2	250	220
3	220	160
4	250	150
5	220	130
6	200	140
7	350	160
8	150	120
9	270	170
10	190	140
11	440	130
12	250	150
13	200	150
14	160	140
15	350	200

Fabric 17/Conv. Non FR Foam/Basofil Liner/Source 1

Sample ID

2 Minutes

5 Minutes



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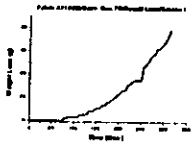
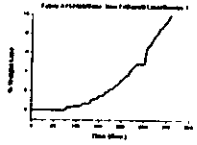




Use of FR Foam

- Mock-ups with heavily FR treated U.K. compliant foam became fully involved in fire when using current commercial upholstery fabrics

Overall Study Conclusion

- Component testing alone does not predict the flammability performance of upholstered furniture composites

REVIEW AND ANALYSIS OF API's FLAMMABILITY TEST RESULTS ON UPHOLSTERED FURNITURE COMPOSITE MOCK UPS

Arthur F. Grand, Ph. D.
Director of Research
Omega Point Laboratories, Inc.

ASTM E 5.15 Meeting: December 2001

SUMMARY (1 of 3)

- Procedure based on BS 5852
- Fabric/foam composite specimen (with interliner or batting)
- "Source 1" small flame ignition burner
- Laboratory tests conducted by BASF
- More than 40 different fabrics, four foams, two interliners, three polyester battings

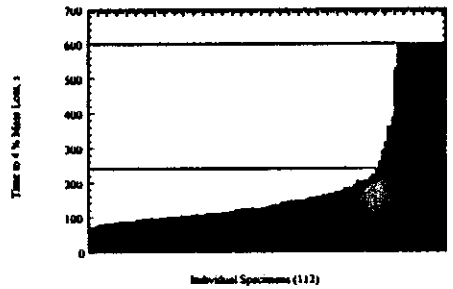
SUMMARY (2 of 3)

- Mass loss rate (MLR) and time to ML
- 4 % ML criterion selected
  - Past 4 % ML, continue to burn
  - Safety
  - Avg MLR represents earlier stages of burning
- MLR quantitative, related to HRR, represents rate of burning

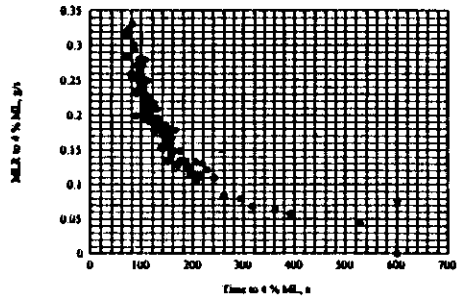
SUMMARY (3 of 3)

- Extrapolation to full scale
- Time to 4 % ML
  - Generally tracks with MLR
  - Confirmation of progress of burning
  - Disadvantage: not always a number
- Always a number for MLR

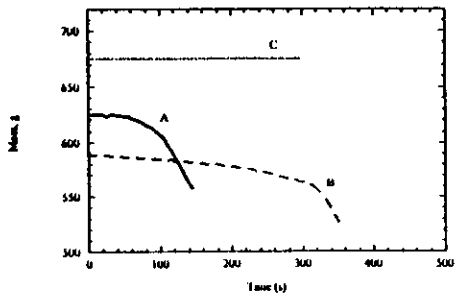
Time to 4% ML for 112 Specimens



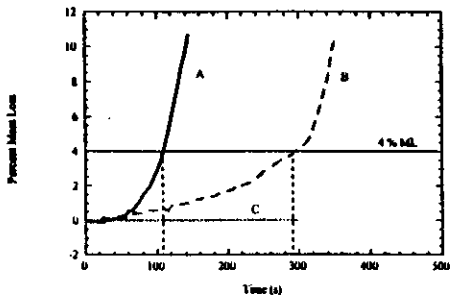
MLR v. Time to 4% ML



Mass v. Time



Percent Mass v. Time



RELEVANCE TO FULL SCALE TESTING (2)

- Hc range 20 to 40 MJ/kg
- 30 MJ/kg & 1.2 g/s (max MLR) = 36 kW
- Note in comparing lab scale to full scale:
  - MLR average from start of experiment
  - different surface areas of specimens
  - average MLR or HRR not the same as peak
- "Time to 4 % ML" possibly relevant to escape time
- Point of ignition until item "takes off"

CONCLUSIONS (1)

- Data from BASF experiments analyzed
- Time and Mass Loss Rate (MLR) to given end point (4 %) selected
- Not complicated to measure
- Unambiguous result for regulatory
- Understandable as test output (Time)
- Scientific measurement (MLR)

CONCLUSIONS (2)

- Minimal instrumentation required
- Results suitable for categorization or statistical analysis
- Test method suitable for wide range of furniture composites
- Potential for extrapolation to full scale
- Repeatability similar to other fire tests
- Repeatability of "better" specimens requires further analysis

RECOMMENDATIONS

- Conduct further studies for repeatability and reproducibility (ILS)
- ILS in accordance with ASTM Practice E691
- Conduct full scale tests for comparison
- Select one fabric/foam combination as "standard" test material.
- Collect heats of combustion of fabrics and foams
  - literature values,
  - bomb calorimetry, or
  - cone calorimetry