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Society of
Fire Protection Engineers
New Jersey Chapter

FUSIBLE LINK

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President's Message

Hello Everyone,

The year is flying by. It is hard to believe that we have had three meetings already and the holiday season is quickly approaching. Our last meeting was extremely well attended with everyone enjoying the behind the scenes look at the Continental Airline Operations. We started with an overview of the Continental maintenance program. We were fortunate that there were several planes in the hangars and several engines being worked on. Most felt better about flying, at least with Continental, after the review and tour. The airlines go to great lengths to maintain their fleets. A special thanks to Rich Reitberger for setting the program up and the great meal afterward.

I want to take the time to wish everyone and their families a great Holiday Season. See you at the next meeting on December 4.

Best Regards
Glenn Deitz

The following article was taken from the Fire Protection Research Foundation's Fire Risk and Hazard Assessment Research Application Symposium.

Plastic Lumber Standards and Flame Retardant Needs

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Abstract

Certain segments of the building products market are developing and commercializing viable products using plastic materials. These include plastic lumber for decking and plastic roofing products such as shakes, shingles, slates, tiles and also membrane for commercial applications. A review of some of these products along with the current flame retardant testing standards is presented. There is a need for the development of additional effective FR test standards and also of additional improved means for educating potential users and consumers about these new plastic products.

Introduction

The plastic building products market is growing at a rate of at least twice that of traditional building products. This growth is fueled by advantages offered by plastic building products. These advantages include colorability, resistance to decay, and ease of fabrication. Also contributing to the growth are certain actions taken by various regulatory agencies. As an example, the banning in consumer markets of CCA (chromated copper arsenate) treated lumber in the near future will open further growth opportunity for plastic building products especially where raw materials are inexpensive

The recycling of HDPE products such as plastic milk jugs, post manufacture scrap and some other sources all provide inexpensive raw materials. The cost of these raw materials is more dependent on market conditions in a geographic area than on cost of recovery. Costs can vary from $0.12/pound to $0.25/pound for the same material. At the higher level of cost, virgin wide-spec materials are available, and for more critical applications low cost virgin polymers are also being used. Some of these materials are shown below:

Resin	Type
PVC	Recycle, Virgin
HDPE	Recycle, Virgin
Polypropylene	Post-manufacture scrap

Depending on the application the resistance to fire may vary between these product types. Possible fire scenarios differ widely. Consider the wide-ranging wildfires in Colorado and New Mexico, the loss of a briquette from a barbecue grill, or a simple prairie grass fire. These would place various products like roofing shingles, plastic decking, or telecommunications pedestals in very different fire scenarios requiring varying degrees of resistance to fire.

There are a variety of FR tests ranging from a UL94 Horizontal Burn used for defining flammability of window extrusions in Dade County, Florida, to more severe tests like those under development by the state of California. Below is a brief discussion of various test methods and the need for flame retardant materials in the building products market.

Modified ASTM E108 and Plastic Lumber

The standards we use to define the flammability of materials may or may not really reflect how a material will react in a specific, real fire scenario.

A fire standard that is a good approximation of a real situation is the current ASTM E6662 Plastic Lumber standard. The test environment approximates what might happen in the case of the errant charcoal briquette mentioned above. This standard includes a flame retardant performance test method which is essentially a modified ASTM E108 procedure.

Plastic Lumber Economics

Plastic lumber by definition is >50% plastic. Since most of the procedures of plastic lumber operate single screw extruders, little compounding can be done in this equipment. As a result, the usual route to incorporation of flame retardants is through the use of a FR concentrate. A 70% magnesium hydroxide concentrate is typical. To incorporate 21% magnesium hydroxide, 30% of the FR concentrate would be used.

The cost of HDPE raw material varies as mentioned previously. In a non-FR plastic lumber product, the cost of the polymer is simply the cost of the HDPE. For the following calculations, a "metropolitan" cost of $0.25/pound is used for the HDPE recycle material. Using a FR concentrate, the cost of the system would be calculated as below:

70% HDPE @ $0.25/pound	=	$0.175
30% FR Conc. @ $0.75/pound	=	$0.250
	Total	$0.425/pound

The raw material cost has increased from $0.25/pound for the non-FR product to $0.425/pound for a FR product. Production cost is not changed. The overall total cost change from non-FR to FR may range from 20% to 30% depending on the actual production cost. It is generally believed that this overall increase is recoverable for the flame retardant property provided.

Wood Plastic Composites

Wood plastic composites are by definition >50% wood. Wood plastic composites typically contain 40% thermoplastic and 60% wood flour which is produced by grinding wood. The ASTM D20 committee is charged with producing a standard for this product. At The recent May 2002 committee meeting, a decision was made to go with the same standard as used for plastic lumber, ASTM E6662. This decision must be balloted. Therefore it will be some time before the standard is published. The authors are not aware of any wood plastic composite lumber trials in the ASTM E6662 test. It is expected that a minimum amount of FR would be required to pass the test.

Other standards to be considered are contained in building codes. As a example, ICBO, effective May 1, 2002, published an acceptance criterion for deck board span ratings and guard rail systems. This is defined in AC174. The flammability standard in AC174 is UBC (Uniform Building Code) standard 8-1 which is essentially the ASTM E84 or Steiner Tunnel test. The actual requirements are flame spread of 100 and that this ICBO code covers wood and wood substitutes. The achievement of a <200 flame spread for a polymeric material depends on the polymer and the flame retardant formulation used in the polymer system. Also, note there is no smoke requirement.

Wood plastic composites can meet this flame spread requirement. However, they will require addition of a flame retardant system to reduce the flammability of the olefin component in the system. Typically, this would be about 40% HDPE.

Below is a possible starting formulation to achieve a Class C rating in the E84 test

Wood flour	52%
HDPE	38%
Magnesium Hydroxide FR	10%

The magnesium hydroxide flame retardant should be pre-blended with the wood flour before feeding to the extruder. Different wood flours can affect the test results and may require a somewhat different formulation.

In the above hypothetical case, magnesium hydroxide is available at $0.20/pound. Wood flour is typically $0.12/pound and HDPE is $0.25/pound. Using these raw material costs, a non-FR formulation of 60% wood flour would cost about $0.172/pound. By comparison, the FR formulation increases to $0.178/pound. This is not a significant increase.

The cost comparison is essential to know as many buyers are automatically reluctant to even consider flame retardant additives due to preconceived notions of expense.

Rigid PVC can also meet the flame spread requirement with just a small amount of synergist added to the system. Since there is no smoke requirement, this approach works very well.

ASTM E108 Roofing Applications

The wildfire occurrence is extremely severe this year. The use of alternatives to wood shakes and asphaltic shingles is being forced by codes and insurance requirements in many geographic regions subject to increased wildfire potential. One alternative is metal roofs. Another alternative is roof meeting ASTM E108 Class A requirements. There are available today many Class A synthetic shakes, shingles, slates and tiles made from recycled and virgin polymeric materials.

The largest Class A roofing market today is the commercial segment. Here insurance requirements force warehouse and other commercial and high-risk occupancy buildings to install Class A roofing. The polymer of choice is TPO due to its weldability. The color of choice is white due to its energy efficiency.

The UV stability requirements for this white roofing membrane preclude the use of halogen flame retardant systems. The processing temperature dictates the use of magnesium hydroxide flame retardant. Since the roofing membrane is a thin material, compounding of the magnesium hydroxide FR is critical. Just one fault in a roll means the whole roll is rejected. As such, most producers use a FR concentrate to assure quality. These concentrates are typically 70% active and are let down with TPO resin. Depending on the slope of the roof, 30-45% active FR is required to successfully flame retard the membrane.

Shakes, slates, and tiles are an entirely different situation. First, these are usually produced with recycle polymer, principally HDPE or PP. These products are quite thick in section and so in most cases compounding and dispersion need not be held to the same exacting standards as for the TPO membrane described above. Only when an injection molding operation used to fabricate these items is a FR concentrate required.

The usual amount of magnesium hydroxide required in these products to give a Class A rating in the ASTM E108 test is 35-42% depending on the polymer used and the product's shape and thickness.

UCFPL-DU1.0 Under-deck Test

In an attempt to more accurately simulate wildfire scenarios, the University of California Forest Products Laboratory in Richmond has done significant work on under-deck fires. These simulate a wildfire burning under the deck. Figure 4 below shows the 80 kW burner that is used in the test identified as UCFPL-DU1.0.

In this test, non-FR plastic lumber failed due to flaming and increasing combustion. Some PVC deck passed as did some wood plastic composite and glass fiber reinforced plastic lumber.

The UCFPL has added another criterion to this test protocol which takes into consideration the flying brands that accompany a wildfire. The ASTM E6662 deck test, a Class C brand is used to simulate the effect of an errant charcoal briquette. In the UCFPL test, a Class A brand is used. In both of these tests the deck is in a horizontal position. However, Class A brands are far more severe than Class C brands.

Polyolefin Siding

Another segment of the building products market to be considered is polyolefin siding. PVC and aluminum siding have been the market leaders. Polypropylene siding is now available in the marketplace. Usage is growing due to improvements in color and degradation stabilizer systems for polypropylene.

Today there is no ASTM standard for polypropylene siding. Since the competitive polymer, rigid PVC, is fairly resistant to fire, no requirement was written into the PVC siding standard. Polyolefin is much less resistant to fire than PVC. Therefore, there must be a standard applied to polyolefin siding and it must consider the increased fire hazard of this product. In a recent ASTM committee meeting, preparation of just such a standard was initiated. Included in the standard is a flame retardant is a flame retardant requirement. The actual requirement is yet to be decided.

Review and Conclusions

The two main FR standards used in the plastic lumber market are the modified ASTM E108 test and the ASTM E84 test. In the roof market, the ASTM E108 standard is used to test flammability. Additional standards are used to measure flammability in other building product segments. These include ASTM E162 flame spread and even the relatively simple UL94 HB (Horizontal Burn) test.

Other tests such as the UCFPL-DU1.0 are under development. This test is used to define resistance to fire of a short severe duration much like what might occur in a wildfire. The fire service will be the approving body on this standard in California. Expanding usage of alternative wood products requires the establishment of additional effective FR test standards.

Also needed and perhaps just as critical is a means for educating the consumer about the availability of these alternate products. As an example, consider a recent conversation between the author and a potential user of plastic railroad ties. The potential user was told he could not use plastic lumber because the fire chief with jurisdiction believes all plastic lumber burns much more fiercely than wood and always drips. If this is indicative of the state of knowledge of our fire service people, what do you suppose the average consumer knows about FR plastic lumber?

Meeting Dates/Programs 2006-2007

DATE	TOPIC
December 4, 2006	Life Safety in Health Care Facilities - Tony Meehan RJA New York
January 8, 2007	Industrial Post Fire Restoration - Rich Reitberger, Affiliated FM
February 5, 2007	NIST Station Night Club Fire Analysis - Dan Madrowski, Chuck Gandy
March 5, 2007	Commodity Classification Changes - Joe Janiga, FM Global
April Meeting/Seminar Day	Homeland Security/Disaster Protection of gas and chemical plants
May 7, 2007	Insurance Industry Update - Bob Baker, FM Global, Mike Newman, Johnson & Johnson; Brad Hart, Lockton
June 11, 2007	J&J Explosion - Mike Newman, Johnson & Johnson
June 25, 2007	Golf Outing - West Point

CAREER OPPORTUNITY

Schering Plough is looking for someone with about 10 years experience with a good rounded loss prevention background and having worked on construction projects. Experience in the pharmaceutical industry and/or chemical industry a plus, but not essential. Working in Kenilworth, NJ with the ability to travel to SP sites through out the world. Will work on providing property loss prevention advice and criteria to SP sites and projects. Risk Assessment surveys of locations and dealing with insurance company recommendations. Will interact with all levels of management and divisions in SP and outside. Involvement in the insurance placements.

Send/fax/email resume to:

Glenn Deitz, Manager, Property Loss Prevention and Control
2000 Galloping Hill Road, K-6-2, D440
Kenilworth, NJ 07033
email - glenn.deitz@spcorp.com
Phone - 908-298-2199
Fax - 908-298-07033

Because of the special nature of the November 6th field trip to the Continental Airlines Maintenance operations in Newark, NJ, the Chapter did not have an Executive Board meeting nor a Chapter meeting. Thus, there are no minutes to be published in this edition of the *Fusible Link.*

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MEETING NOTICE

Date: December 4, 2006

Place: Hanover Manor
16 Eagle Rock Avenue
East Hanover, NJ

Price: In Advance - $22 At door - $25

Dinner: 5:00-6:00 (Cash bar for mixed drinks)
Dinner at 6 PM

Speaker(s): Tony Meehan, RJA New York

Topic: Life Safety in Health Care Facilities

Please note for this meeting:
All officers, directors and committee chairman are requested to attend a meeting at 4:00 p.m. at the Hanover
Manor.

PLEASE COMPLETE AND RETURN WITH YOUR CHECK PAYABLE TO "SFPE NJ CHAPTER" TO:

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NAME: _____

COMPANY:_____TELEPHONE:_____

ALL RESERVATIONS SHOULD BE RECEIVED BY FRIDAY, DECEMBER 1, 2006. TELEPHONE RESERVATIONS OR CANCELLATIONS SHOULD BE RECEIVED BY NOON OF THE MEETING DAY.

2006-2007 Chapter Committees

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Consulting - Nick Chergotis & Peter Rullo

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Vicki Serafin, Chairperson

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Dave Gluckman, Chairman

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Rick Reitberger, Chairman
Chuck Gandy
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Historian
Jim Tolos

Communications
Fusible Link—Brad Hart
Ana Crisostomo—Coordinator
Mailing/Automation/e-mail—Vicki Serafin, Chairperson

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