EVALUATION OF
DETECTABLE WARNINGS/DIRECTIONAL SURFACES
ADVISORY COMMITTEE (EDWAC)

Division of the State Architect
Underwriters Laboratories Inc.

Minutes of a Public Meeting held on:
Tuesday, December 13, 2005

1102 Q Street, 5th Floor Conference Rooms
Sacramento, California

MEETING ATTENDANCE
ON TUESDAY, DECEMBER 13, 2005

Committee Members Present
Jeff Holm
Arfaraz Khambatta
Eugene (Gene) Lozano, Jr.
Michael Paravagna
Paula Anne Reyes-Garcia
Richard Skaff
Jane R. Vogel

Committee Members Absent
David Cordova
Doug Hensel
Minh Nguyen
Tom Whisler

DSA Staff Present
Derek Shaw

UL Staff Present
Jeff Barnes
Esther Espinoza
Andre Miron

Others Present
Regina Baak, Tactile Guideways
Ron Baak, Tactile Guideways
Rodney Dombrowsk, Wausau Tile
Joanna Fraguli, City of Sacramento
Francis Hamele, Wausau Tile
Paul Hantz, Wausau Tile
Mark Heimlich, Armor-Tile
Tom Holt, Vanguard ADA Systems
Jon Julnes, Vanguard ADA Systems Of America
Russ Klug, ADA Concrete Domes
Jeff Koenig, Detectable Warning Systems Inc.
Maeve Metzger, JAC
Chris Orme, Neenah Foundry Company
John Snyder, East Jordan Iron Works
Ed Vodegel, Flint Trading, Inc.
Lex Zuber, Norsestar Construction

DECEMBER 13, 2005

***General* – A meeting of the Evaluation of the Detectable Warnings/Directional Surfaces Advisory Committee (EDWAC) was held on December 13, 2005 at the California Community Colleges Building in Sacramento, California. The purpose of the meeting was to discuss and review test programs provided in a draft of proposed requirements, and to discuss other issues related to the evaluation of detectable warnings and directional surfaces.**

The following minutes/meeting report is not intended to be a verbatim transcript of the discussions at the meeting, but is intended to record the significant features of those discussions.

1. Call to Order [Jeff Barnes/UL]

Jeff Barnes called the sixth meeting of the advisory committee for detectable warnings and directional surfaces to order at 10:00 a.m.

2. Review of Meeting Protocol [Jeff Barnes/UL]

Jeff Barnes announced that the meeting protocol continues to follow Roberts Rule of Order at this and previous meetings.

3. EDWAC Member Introductions/Roll Call [Jeff Barnes/UL]

EDWAC members, UL and DSA staff members, manufacturers, and general public, each took a turn introducing themselves.

4. Review/Adopt Minutes of October 11-12, 2005 Meetings [Jeff Barnes/UL]

Jeff Barnes reported that the October 11 – 12 2005 meeting minutes did not get published prior to the December meeting and will therefore be reviewed at the next scheduled EDWAC meeting.

5/6. Research Design – Detectable Warnings/Directional Surfaces and Manufacturer/Public Comments [Jeffrey Barnes/UL]

Topics:

a) Status of Research Design Schedule

b) Detectable Warning Sample Specifications

a) Status of Research Design Schedule –

The research design has been rescheduled for either February 3, 2006 or February 10, 2006, as part of a 2-day meeting. UL will provide a map to CALTRANS, prior to the next meeting.

b) Detectable Warning Sample Specifications – Jeff Barnes plans to send out sample specification information directly to manufacturers by email. Samples from manufacturers should be sent to CALTRANS by January 20, 2006. There will be no stated preference for color, and if possible, in-line pattern tiles should be sent for testing.

Andre Miron announced that he would conduct as many non-destructive tests as possible at the test site. The research design site will provide Andre with an opportunity to conduct various tests on larger samples, in a setting close to real life situations.

Jeff Barnes suggests that the committee should consider the best method of providing a feedback mechanisms that would collect information from installation projects, noting environmental conditions and other factors from various field installations that can be used by DSA for research and review.

Several committee members agreed with establishing a feedback mechanism, and recommended that a process of collecting data be started as soon as possible. Questionnaires or similar methods could be used, and submitted directly to DSA. This system would be useful in tracking products that have common defects or are not durable for 5-years. It establishes a baseline, and can be used to verify that products actually endure for 5 years as required by DSA. In addition, patterns of failures can be tracked, and addressed as needed.

Derek Shaw and other committee members were concerned that reviewing and interpreting the feedback data would be difficult without a thorough review of the installation process of the entire product. Failures of some detectable warnings might occur as a result of installation problems, and not necessarily from the detectable warning product. Derek suggested that providing data online would be useful for public work entities when reviewing the collected data.

Richard Skaff recommended using the Global Information System (GIS) data collection method, which is a site-based collection system.

Lex Zuber suggested a database link be provided on the certification page, that provides a report of the performance level percentage of the product, with printouts available as an option.

Several manufacturers recommended that required colors, such as Federal Yellow, should allow a plus/minus tolerance, since obtaining the correct shade of Federal Yellow can be difficult because the color may vary between different certification agencies.

Andre Miron reported that he is working on determining the shades of Federal Yellow to be added to the standard, using test equipment to provide guidelines.

Derek Shaw asked if there was a proposed method of testing products with various colors available on their line of products.

Andre replied that testing would be based on pigmentation of colors. A series of tests might be needed for each type of color. However, from a color fade perspective, the colorfast test might not be needed. An acceptable test practice is to test several colors that have a heavy pigment, light pigments, and red or green colors, to represent all colors for a particular product.

The committee discussed whether or not to test various colors, in addition to Federal Yellow. If assorted colors were tested, a minimum test value, or percentage range would need to be determined for test purposes. Until a final decision is made to use only one color, such as Federal Yellow, the committee recommends testing other colors, to verify contrast, and that the colors do not fade.

Jeff Barnes agreed that this issue should be clarified further, and will be discussed further at the next meeting.

The importance of using Federal Yellow on detectable warning products was emphasized, and Jane Vogel, Richard Skaff and Gene Lozano agreed to continue work on preparing a written document that proposes the adoption of the color Federal Yellow by the State of

California. Testing has shown that Federal Yellow is the most widely recognized and visible color, and also serves as a “warning” color to many with limited vision.

7. Research Findings/Draft Standard Revisions (Exhibit A) [Andre Miron/UL]

Andre Miron has reformatted the test procedures into a more reasonable format. Andre researched the test methods and test procedures, and split some tests into smaller cycles, to be tested in a repetitive manner.

Section 7 Test Sequence

1) Andre notes that the exception to 7.1 allows a set of specimens to be subjected to a given condition independent of the test cycle and tested on its own, eliminating that condition from the test cycle. It may cost more to test additional samples, however the testing could be completed sooner and save possibly weeks of testing.

2) Table 7.1 has two conditioning cycles, consisting of outdoor and indoor cycles. Footnotes in Table 7.1, makes note that each cycle has a different chemical reagent. Different agents should be used, with a light rinsing applied between each reagent, to remove surface debris. This will help prevent damage to the test equipment. Although this method is not reflective of testing all conditions at once as might appear to be needed to represent the real world, it still is effective, since not all conditions would happen at once anyway. Andre added that there is a need for a tiered classification of products to address the different levels of testing. For example, 40 hours of salt spray tests could be waived, if the product will not be used in an icy area or a coastal town.

Abrasion Test

The abrasion test method may change. Andre will review this test closely, after review of some field-testing. Andre plans to conduct his own tour of assorted detectable warning products installed in the bay area. Andre will review detectable warnings of different ages to study the age differences between products. Andre is considering adding a test consisting of pouring or brushing on and off of sand with salt spray.

Elevated Temperature Exposure

Andre is working on determining if cycles of elevated temperatures will cause deterioration of the samples, and/or causes a minor increase of the aging process. This is not a long-term aging test. We may expand the test duration from 24 hours to 48 hours or more. All this is one cycle, and then repeated for five cycles.

Comments:

Jeff Barnes: Should combine the UV exposure with the other conditions. Seems important to have them done together, since this is more likely in real life.

Arfaraz Khambatta: Suggests changing each order of exposure for each cycle, for test variety.

Mark Heimlich: Since abrasion affects everything, suggest adding the abrasion test to the beginning of the cycle.

Table 7.2

Andre Miron reports that Table 7.2 has been revised to confirm that shape requirements are still met after testing. The Impact Test notes that a 10 percent limit, and a 3.4 J value have

been added. These values are commonly used among many standards, and at first seemed a little severe for this product. A lot of the energy of a dropped product is in the product dropped, and not as much on the floor. This is a starting point test value, and Andre will also use a steel ball, and drop luggage with heavy weights to test the domes. Andre is working to develop tests that will determine if the products are easily destroyed. However, the tests should not be so stringent that it would be impossible to break a dome.

Andre is currently conducting tests to determine the typical COR for the surrounding material around detectable warnings. Additional research will be needed.

Bond Strength Test

Andre notes that the bond strength test is unchanged. Andre needs to determine if an adhesion type test is needed under the bond strength test. There are two types of tests, which consist of a flexible matt, and a regular adhesion test.

Compression Test

A compression test has been added to the draft standard, which is based on input from a previous meeting. Andre explained that although the impact test is a quick test, the compression test applies a regular force for a specified time. Andre found that most materials could handle up to 1000 lbs on one dome, before failure occurred. The committee needs to create a maximum value to be used for conducting the compression test. UL test equipment can apply up to 5000 lbs of force. This type of test can adjust the force, once the impact angle force has been determined. A worst-case setup for most materials needs to be developed. Andre Miron emphasized that it was important to be consistent in test methodology

Snow Clearing Load Test

Andre suggests placing samples and the loads at an angle to see how much force it will accept before the domes are displaced. Lots of good data could be made available, and could be compared to previous data, so that Andre can develop minimum test loads.

Color Fastness

Andre will work to define the color “federal Yellow” in the standard. However, additional discussions will be needed to clarify the requirements for the color Federal Yellow, and other colors in the proposed standard draft. Other issues to discuss include the following:

1) Testing for light on dark, or dark on light.

2) Create a color fade requirement, and if yes how would this be done? If federal yellow is not used to providing a warning, why test for light to dark, or dark to light?

3) Would there be an exception for steel products since colors do not adhere to steel?

4) Gene Lozano notes that curb ramps in Chapter 11b of the building code, is the only area that does not require federal yellow. All other areas require the Federal Yellow color.

5) Discuss a request to verify that the color Federal Yellow is the standard color used throughout the building code. DSA needs to standardize this requirement, and standardize curb ramp construction. Would like to request DSA indicate where they are in this process.

Acoustic Quality

Andre has been working on this test using new software, and is waiting for additional data that will be collected from the research site data.

Slip Resistance

Andre recommends using the James machine, which uses a larger surface (rubber foot) to collect data, and has been found to work well on uneven surfaces. A small rubber foot can be used to test the areas between domes. Andre notes that the Brungraber machine will not work for detectable warning products since the Brungraber was designed to work on flat surfaces. Andre proposes using a base value of 0.5 COF with the James machine.

Richard Skaff notes that some crutches are more apt to fit between the domes and on the sides of the domes, and therefore recommends that the field area between domes should be tested. It might be possible to test for this by using a rubber cap on the snow equipment, applied at an angle.

Andre Miron agreed to look into this recommendation. This test might be possible, although when speaking about slippage, Andre questioned whether we should be concerned with typical foot position on domes, and/or non-typical positions too? Does the committee support more research and test development on this type of testing?

Jon Julnes was in support of additional testing, possibly with more grips provided along the sides of the domes.

Mark Heimlich notes that as a manufacturer, it makes sense to look at the size of the tester, which may influence slippage.

John Snyder questioned whether a product that slips a couple of inches, or less, may not be considered to have a slippage problem.

Richard Skaff notes that once slipping starts, it may continue beyond two inches. Richard suggests using two different values for dry and wet surfaces, such as 0.6 and 0.8 COF.

Andre Miron notes that the James machine won't work as is, and will need to be modified to fit our purposes. UL intends to modify the shoes, or consider using another apparatus on a spring. Question is what value should be used, and on what type of surfaces?

Jeff Barnes proposes using UL 635 requirements, with a 0.5 COF base line value on flat surfaces. The committee could consider higher values for slanted surfaces.

Arfaraz Khambatta notes that if the top and sides of the domes have the same type of material, does it make sense to test both, since the parts have the same surfaces? If not of the same material typically, should the committee recommend that these surfaces be constructed of the same material?

Andre Miron adds that some domes have different textures from the top of the dome and from between the fields.

<u>Acoustic Quality (Continued)</u>

Paul Hantz requested that the committee continue to discuss acoustic quality. Paul volunteers to send pouring samples, so that UL would have a base material to run some of the tests discussed earlier, and to help determine the baseline for other materials in various tests.

Andre Miron replies that looking at concrete is always a good baseline or starting point for setting threshold values. Detectable warnings should not be stronger than concrete as a rule. Basic sidewalk material would be good for testing. Andre notes that the drop test vs. the sweep test, takes texture into account. The base of acoustic quality is concrete, and glue down styles are available in the field. There are many different products and companies who manufacturer the detectable warnings, and resiliency tests may discount some of these products.

Jeff Barnes notes the problem is that there is no consistent method of duplicating the use of a cane. Some individuals sweep or tap, or use both methods in different motions. The whole purpose of the acoustical program has been to determine if there has been a change in sound. And a tap or hit on material should provide this data. As far as suitability is concerned, whether acoustic ability is required, that would depend on location and the code requirements for that location.

Richard Skaff suggested that test materials under test should be noted, and it's surrounding area and test values recorded. Suggests that a standard method should be developed for this. Baseline values should be provided as part of the test method.

Jeff Barnes replies that tests are being developed to detect if there is a sound difference, distinguishable over an audible range.

Andre Miron notes that he is not sure how this will affect concrete manufacturers, and further research and discussions may be needed.

Maeve Metzger asked if there had been prior discussions about the type of cane tips being considered for testing?

Andre Miron replied that he would bring audio samples of different types of cane tips to the test site for testing. Andre asked Gene Lozano if he could provide some backup details and information for further review.

Gene Lozano reports that generally nylon tips provide the worst-case sound scenario so nylon tips should be used as the starting point for the sound tests.

Andre Miron notes it is very difficult to test for this type of sound, and he hopes that the software will help provide the information that is needed for the test procedure. It is difficult to predict conclusions that will occur as the result from this new test.

Jon Julnes notes that the building code allows detection by resiliency, so a test for this should be provided as part of the test program.

Andre Miron suggests that the committee may want to create a classification, or rating on the DSA website for authorized detectable warnings, noting that resiliency is not required for all products.

<u>Clause 7.3 and Table 7.3 Requirements.</u>

The tests specified in Table 7.3 are not required to be part of the cycling tests.

Cold Impact

Andre Miron intends to conduct additional research to verify if the applied test force is suitable for this test.

Ball Pressure

The test apparatus will provide a force that applies a ball to a test surface. This test is intended to evaluate material that might soften under higher temperatures.

Hot Adhesion

The hot adhesion test is conducted to ensure that the adhesion on the product does not soften under elevated temperatures. The proposed test temperature of 75 degrees C is suitable for most products tested to elevated temperatures. The tests might be a peel or lift type test, and an edge lift or edge peel is very likely. These tests are not required for "indoor only" products, or on steel materials that do not use attachment of domes.

Clause 7.4.1 and 7.4.1.2

Andre Miron notes that this requirement may permit certain test conditions and/or tests to be waived when certain conditions are met. In addition, some of the UV tests may be waived, if the products are not subject to the types of damage caused by UV exposure.

Gene Lozano asked if ceramic tile or the finish on tiles would also be waived?

Andre Miron replied that he would conduct more research to check on this material, and its history under UV exposure, but it is likely that this material can be waived too, although the tile finish may need to be tested.

Bond Strength

Jeff Barnes notes that if the detectable warning is thicker than 3.0 mm thick at its thinnest area, then the bond strength test can be waived. Unless a transparent surface is used, this thickness should be sufficient.

Additional Tests

Mark Heimlich asked about UL conducting other tests not currently part of the proposed test program. For example, a toxic smoke burn test, corrosion tests, and an aluminum and concrete corrosion test.

Andre Miron replied that the aluminum and concrete tests would be covered by the tests currently proposed.

Jeff Barnes asked Andre if the test duration for the tests were long enough and effective enough to show corrosion problems?

Andre Miron replied that the testing was sufficient to detect corrosion problems.

Richard Skaff asked that if the concrete was located where the flange is, and was deteriorating, would the core pull detect this deterioration?

Andre Miron responded that if there is corrosion, it may not occur until after 5 years, and Andre also noted that in general lab conditions are harsher than normal field conditions.

Richard Skaff suggested that if a questionnaire is issued, should ask if this type of corrosion has been a problem.

Andre Miron suggested, that the standard require a barrier on products with aluminum material to prevent corrosion.

Gene Lozano also recommended that UL consider developing flame tests, toxic tests, and electrical dielectric tests,

Andre Miron reports that he can contact the other offices to see what the requirements may be for these types of tests.

Richard Skaff suggested that some products could be marked that certain materials should not be used indoors, or in transit areas.

John Snyder asked if DSA was resigned to the fact detectable warning products would be replaced after 5 years. What about products that are around 10 or 15 years?

Derek Shaw replied that legislation was very specific that we not look at more than 10 percent degradation, after 5 years.

Richard Skaff suggests that product testing will demonstrate that some samples will endure for more than 5 years. The “5 years” is a minimum value, and is required by legislation.

Andre Miron notes that the value is a minimum useful service life, but keep in mind that 90 percent retention is a very high value. Plastic materials in Christmas lights products for example, after testing, are required to have 70 percent retention for some of the tests. So

90 percent is very stringent. And if they meet the requirement, it is likely that they will last longer than 5 years.

Joanna Fraguli points out that the committee needs to consider the human factor, and the real usability of those individual using the materials. The percentage level changes at certain levels, may affect the use of the product for those in need of the devices. Therefore, it is important to look at the actual properties of the products whenever possible.

Andre Miron replied that this is why it's important to set some minimum requirements for most of the tests.

Environmental Conditioning

Standard dirt has been added to the conditioning test, because this could be a problem with dirt built up on detectable warning products.

Richard asked if sand would be added to the dirt?

Andre replied that if sand were to be added, it would be added to the abrasion test, not as part of the standard dirt. Abrasion test has been added to 8.6. Note that the "500 cycles" limit may still need to be modified after more research is done.

Jeff Barnes notes that Andre will be running samples through the test cycles, to determine if they work properly, and to determine if UL is obtaining the expected test results.

Andre Miron announces that he will be conducting new tests as soon as the new test equipment arrives.

8.7 Elevated Temperature

Andre Miron notes that the temperature value of 70 degrees C will be revised further. Will probably use a 75 degree C value instead, which is slighter higher that the recorded 67 degrees found typically in desert areas in California.

Andre Miron reports that he is still working on reducing sample sizes and the number of samples that need to be tested. Andre would like to request that some 6 by 6 inch or 4 by 4 inch samples in substrate be sent to his attention for additional testing. Andre intends to test the smaller samples to determine if size matters when conducting tests, or in obtaining test results. However, it is possible that the12-inch specimens are the best size for most of our tests.

8. Product Identification (New Agenda Item) [Jeff Barnes/UL]

Jeff Barnes suggests that DSA should encourage that products be marked with a simple ID or symbol for identification purposes. Jeff Barnes would like all samples to be marked or identified and made available for future research and tracking purposes.

John Snyder notes that most cast iron and aluminum products are required to provide markings or other identification information, such as name, date code, shift, country of origin.

Joanna Fraguli suggested that it would be useful if the manufacturers provided markings with full name or logo for easier detection. These types of labeling would also be good for marketing purposes.

Richard Skaff suggests another option would be to provide a bar code to the back of detectable warning products. Industry can decide how they can mark their products, providing the necessary information. We should ask industry how this can be done, and what effects will this have on the product.

UL suggested that DSA keep track of company logos and company IDs in a database, or as part of the DSA website, so that there is no duplication among companies with similar names or logos.

9. Meeting Evaluation [Jeff Barnes/UL]

No comments.

10. Next Meeting Date [Jeffrey Barnes/UL]

Next meeting will be on a Thursday/Friday on either on February 2 and 3 or on February 9 and 10.

11. Adjourn [Jeffrey Barnes/UL]

Jeff Barnes adjourns meeting at 5:00 pm.