AFFIDAVIT OF ROBERT E. METZ

THE STATE OF FLORIDA §
§ ss.
COUNTY OF PINELLAS §

BEFORE ME, the undersigned Notary Public, on this day personally appeared Robert E. Metz who, being by me duly sworn on oath, deposed and said:

1. My name is Robert E. Metz, president/consultant at REMCO of Pinellas, Inc. I have over 44 years of professional experience in the technical and code areas of the roofing industry. My professional services include research and development work with roofing manufacturers related to product development, testing and manufacturing processes, code and standards development, and consultations with consumers and manufacturers on roofing technical related matters. I have been involved in roofing claim handling for commercial and residential roofing for my entire career and have served as an expert witness both during my employment and in my consulting career. My experience includes 34 years of research, manufacturing, technical service and quality assurance efforts with the Celotex Corporation and predecessor companies and since 2001 my time has been spent as a roofing consultant to the roofing industry. During my employment with the Celotex Corporation, I was involved in Roofing from 1976 through 1982 as the Quality Control Manager of the Cincinnati Lockland Plant, in 1982 was named Quality Assurance Manager of Central Quality Control and the Lab, working on specification and procedure writing, raw material approvals, claim handling, field inspections and testing, asphalt approvals and development and dotted line supervision of the Quality labs at each roofing plant. In 1988, I was named Director of Quality Assurance of the Roofing Division, responsible for all the above duties and working in settlements and negotiation of claims, legal representative of the roofing technical group and technical services. In 1997, I was named Corporate Quality Assurance Director of the Celotex Corporation with responsibility for the quality processes in five divisions. My educational background includes an Associate Degree in Chemical Engineering, a BS in Physical Science majoring in Chemistry from the University of Cincinnati and an MBA in Operations from the University of Alabama at Birmingham (UAB). I was very involved in implementation of new manufacturing processes for commercial and residential asphalt roofing products.

2. The Asphalt Roofing Manufacturers Association ("ARMA"), headquartered in Washington, DC, is the trade association representing the vast majority of the North American manufacturers and suppliers of bituminous-based (asphalt) roofing products. Those include organic asphalt roofing shingles for residential use. ARMA is committed to serving the industry and its consumers by facilitating the dissemination of up-to-date information on roofing materials, practices and issues, as well as providing technical data and information to building and code officials, regulatory agencies and allied trade groups. As a representative of Celotex, I was a member of the Asphalt Roofing Manufacturers Association ("ARMA") from 1985-2000. During my ARMA membership, I served, among other positions, as Chairman of the Research Committee from 1993-97, Chairman of the High wind Committee, Chairman of the Insulated Deck Study, Liaison for the Roofing Committee on Weather and Wind Issues from 1992-97, and was one of eight members of the Research Committee's Asphalt Durability Task Force from 1991-93.

3. I am a current member of the American Society of Testing Materials (ASTM International). I have been an active member of ASTM's D08 Committee on Roofing and Waterproofing since 1987, and continue to serve on the D08.02 Subcommittee for Prepared Roofing Products for Steep Slope Roofs and as a Task Force Chairman for three Prepared Roofing groups under that subcommittee through the present time.

4. ARMA has asked me to give my views on the proper application and use of the ASTM standard and standardized test methods, which are designated as D225 and D228 respectively. ASTM is the abbreviation for ASTM International, formerly known as the *American Society for Testing and Materials*. Most of the key product areas in industry are represented in ASTM. There is a committee on asphalt roofing designated as Committee D08, as described above, which represents roofing. There are many product standards, practices and test methods promulgated and adopted by ASTM that apply to the manufacture and use of asphalt roofing materials, which include shingles. ASTM numbers such as D225 and D228 reference product standards and technical test methods published on ASTM's web site at: http://www.astm.org. The approved standardized technical test methods can be searched and located at: http://www.astm.org/SEARCH/sitesearch.html?query.

5. ASTM, which was founded in 1898, is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. ASTM test methods, product standards and practices are produced by technical standards-writing committees, of which there are about 132. Standards are developed using a consensus method with input from manufacturers, contractors, consumers and educators. The organization has

over 9,100 standard specifications, tests, accepted practices, guides and definitions covering materials, products, systems and services.

6. ASTM D225 and D228 are two of those published standards/test methods. D225 is the ASTM standard specification for asphalt roofing shingles made with organic felt as the base mat; D228 is the ASTM standard test method for sampling, testing and analyzing asphalt based roofing shingles as well as saturated felts, asphalt roll roofing and cap sheets. Other components used in these materials include, but are not limited to, felts, fiberglass mats, and polyester type films, other types of asphalts, mineral stabilizers, papers, and mineral surfacing. ASTM D225 applies to organic shingles and is titled "Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules."[1] D225 was established to only serve the Roofing industry. This standard includes product specifications for design, production and performance, which must be met if a manufacturer is to certify that their products meet the standard. ASTM D228 provides the only accepted methodology for sampling, physical testing and analyses to verify the shingles and rolls tested meet the ASTM standard that they were designed to meet and are tested for compliance. That is, D228 has the standard accepted and recommended test methods for determining whether asphalt roofing products meet the ASTM Specification they are purported to meet. Some examples are as follows: organic asphalt shingles that must meet the specifications set forth in D225, fiberglass asphalt shingles that must meet D3462, organic roll products that must meet D226, D2626, D4869 or D6380 and glass roll products that must meet D2178, D3909, D4601 or D4897.

7. D225 was first established as an ASTM Product Standard in 1925. It has undergone several revisions over the 86 years it has been a standard, yet the basic standard criteria for an organic shingle has remained the same. The last revision was completed in 2007 and involved adding a reference test method that has been a part of the standard for years. The basic requirements for performance have been the same throughout its history. The product standard indicates that testing of products and inspection of the product is based on agreement of seller and buyer. The standard is setup for product as produced and as being shipped to a job prior to application.

8. As a threshold matter, it is critical to note that D228 is a test method for roofing products (including organic asphalt shingles) *as manufactured* because it defines lots in rolls or bundles. Attempts to define *"as manufactured"* as far as definitive time, have been hard. However, while D225 doesn't define *"as manufactured"*, the conclusion at ASTM is that it is a time within hours or days of when the product is produced and definitely

[1] American Society for Testing and Materials, *Annual Book of ASTM Standards*, Volume 04.04, West Conshohocken, PA, 1996.

application of product to a roof. While ASTM D225 does not define it directly, D3462 for Fiberglass Shingles defines "*as manufactured*" in its scope. The statement in the scope is that "test methods, physical requirements and minimum masses are to be measured immediately after manufacture and before installation. Physical and performance requirements after application and during in-service use of products described herein are beyond the scope of this material specification." The ARMA Technical Bulletin on "When Does a Shingle Comply with ASTM D3462" explains "*as manufactured*" and is attached as a reference document and supports D3462 scope and has been in effect for years.

9. Sampling and testing for all properties is done according to ASTM D 228. This test method was also established in 1925 at ASTM. Over the 86 years, this test method has undergone many updates based on the update of equipment and more defining test methods. The current method is D 228 -09 1e. Major changes in the 1990s and 2000s has been the addition of the fiberglass shingle and roll test methods. Much work has also been done on the reproducibility of the standard. Product sampling is essential as there can be a confidence that the results from properly selected sample bundles can be related to the entire lot of material.

10. ARMA Technical Bulletin "Sampling Shingles for ASTM Testing" is the process for selecting roofing shingles for testing. In order to comply with the ASTM standard, sampling and testing must be done within hours or days of time of production. The outside range of the standard requires sampling of shingles prior to shipment or at shipment to a job as agreed upon by seller and buyer. ASTM D3462 directs the user to consult ASTM D228 guidance for selecting samples and D225 references ASTM D228 in its reference documents. Product is sampled and tested in lots following the directions in D228 using the "lot-based" sampling method. Relevant to this is ASTM E456 that defines lot as "a definite quantity of a product or material accumulated under conditions that are considered uniform for sampling purposes."

11. D228 directs random selection of five bundles from lots of 1000 bundles or less. A lot is defined by ASTM in two manners in D1079 on Standard Terminology Related to Roofing and Waterproofing. A lot in roofing can be (1) a production lot – all materials produced in one eight hour shift of the same type and color. If the color is changed in a production shift that becomes a new lot by color; (2) a delivery lot - all material of the same type delivered at one time by truck or railroad car. For lots less than a 1000 bundles five random samples are required. For lots larger than 1000 bundles, a formula is used to determine the minimum number of bundles to select. Random is the key term in the sampling process. Grabbing the first five bundles available does not satisfy the random criteria. Random selection requires that each bundle in the lot has the same chance (probability) of being selected. This

includes the bundle on the bottom row of the least accessible pallet. Many times a bundle is sampled off each pallet in a shipment, which might amount to more samples, but the randomness must be preserved.

12. Proper sampling is of critical importance. If the correct number of bundles are sampled from either production or delivery lots as selected, and the criteria of randomness is satisfied, the tester can have reasonable confidence that the results would be similar if additional sampling would occur if different bundles in the lot were tested. Results from testing properly selected sample bundles will be indicative of the results if the entire lot of material were tested. If sampling is not done correctly, test results can or will be unreliable and may not support the product characteristics of the lot.

13. For example, if five bundles of shingles are purchased at a retail outlet without being randomly selected and tested, the process has been altered and the results from testing the bundles most probably will not support the true characteristics of the lot because of improper sampling. The tester cannot properly infer that the results on shingles taken from pallets that were improperly sampled will represent the remainder of stock in the warehouse of that specific brand and style of shingles, because the randomness requirement of the sampling methodology was not satisfied. All that can be concluded is that the five-bundle sample met or failed to meet the criteria being evaluated.

14. As another example, if we assume a purchaser and seller agreed to testing of product and the tester selects three bundles from four pallets at a job site and tests for D225 compliance. What can be concluded based on the results? What can be concluded is that the samples were not sampled and tested per ASTM procedures. Suppose the shingles meet all the requirements of D225. Can the tester conclude that all the shingles on the job site are D225 compliant? Can he conclude that the shingles on any one of the four pallets are compliant? The only conclusion is the test results are invalid because the sampling was not conducted according to ASTM procedures. The results really only represent the material that was tested and does not represent the larger group because of the sampling process used. Again, ASTM D228 prescribes selection of a minimum of five bundles from lots of 1000 bundles or less, and that those bundles must be selected at random. Failure to follow these aspects of D228 sampling methodology invalidates any test results of the product in the lot and does not allow it to be certified as ASTM compliant.

15. If the sampling procedures prescribed in ASTM D228 are not followed, conclusions drawn from results of testing are limited to the samples selected, and cannot be applied to the entire lot of material from which the samples were selected. If variations from the standard in sampling and testing are made, they also must be reported so the receivers of the test results know

there was a modification to the sampling and/or testing procedure. This does not make the data valid but does explain any deviation from test procedures. ARMA has a Technical Bulletin describing and supporting the proper sampling methods and "as manufactured" definitions that indicates product sampled correctly and tested within the definition of "as manufactured" within the scope of ASTM D3462 has a proven history of meeting customer expectations. Again the standard states that compliance after application and during the service life of the shingle is beyond the scope of the standard. D225 for organic shingles would have the same scope applied.

16. In considering proper application of ASTM D228, it is important to understand the composition of organic asphalt shingles and how they are made. Organic-based asphalt shingles ("organic shingles") are made using a base organic felt or paper felt (also known as mat or substrate) composed of cellulose material (*i.e.*, recycled waste paper, cardboard, wood chips and/or rags). This felt is saturated with asphalt based oil that is saturant-grade having a low softening point in the 100 to 130 degree F softening point range. The felt is then coated both top and bottom with a coating grade asphalt with a softening point of 200 to 225 degrees F blended with between 55 and 70 percent filler (usually limestone, calcium carbonate or similar). This coating is applied to both the top and bottom of the organic felt and then the top side is finished with mineral granules and the back side has a sand, limestone or talc applied as an anti-sticking agent so the product does not stick in the bundles. The layers of a shingle from top to bottom include the top granule surfacing, the top filled asphalt coating, the felt saturated with saturating oil, the bottom filled asphalt coating and the anti-sticking surfacing such as sand, talc or sand. There is also a tape on the shingle to prevent sealant from sticking in the bundle.

17. The production process of organic shingles starts with a dry organic felt being saturated with asphalt based oil as described in paragraph 16 above by going through a saturator or deep dip tank. The material then moves to a coater where a mixed coating-grade asphalt and mineral stabilizer (as filler) is applied to the top of the felt. Product then moves forward where squeeze rolls apply a small quantity of coating to the bottom and distribute it evenly. Mineral granules are then applied and imbedded into the hot coating on the top of the asphalt-saturated felt and then the product goes through a press roll where the granules are imbedded in the filled asphalt coating. After some cooling, the granule surface sheet passes through a series of press rolls that further imbeds the granules in the coating. Following this process, an asphalt adhesive is applied to the shingle to seal the shingle to the shingle below it during the application process to prevent shingle blow off after the roof is completed.

18. Why can't weathered shingles from the roof be held to the same standard as "at the time of manufacture" shingles that have not been applied to the roof? The standards for shingles "at the time of manufacture" have only a couple of variables involved in forming their level of performance. They include the manufacturing process, the raw materials and the product storage at the manufacturer. Once the product is made, the shingles begin their weathering process. Shingles once they are sold, are subject to not only the variables mentioned in the production "at time of manufacture", but many other variables begin to play into the weathering cycle. The storage at the distributor, the stacking on the trucks, storage on the job, the lack of proper ventilation, application over insulated decks without proper ventilation, improper underlayment, improper application related to nailing, the use of staples, the environment around the roof system and the variables of weathering in the shingle itself can all affect the test results on weathered shingles, such as tear strength, percent saturation, drying out of shingles and composition of product. While these shingles may have met specs and been perfectly fine at time of manufacture, the numbers will be different after they have weathered and been exposed to the environment. Yet we know that shingles meeting the D3462 standard "at time of manufacture" have a proven track record for meeting customers' expectations for performance related to weathering and shedding water.

19. In reading the report of John Wm. Ricketts produced on May 6th, 2011, in *IKO Roofing Shingle Products Liability Litigation*, Case No. 09-md-2104 MDL Docket #2104, (U.S. District Court for Central District of Illinois, Urbana Division), and the report by Dean A. Rutila, P. E., of Simpson, Gumpertz & Heger, I support the serious concerns that Ricketts expressed related to Rutila's report about the way Item 17 in D228 – 09 was carried out related to composition and percent saturation analysis. The analysis of shingle composition is an analytical analysis that requires a scale accurate to at least three decimal places or preferably four decimal places. In analytical testing, items being measured must be dried and cooled in a desiccator, with much care and precision in the cleaning of filter paper, brushing the residue from the filter paper and tests must be performed at a very careful and precise level. Weights at the end of measuring after breaking the sample down into its raw material components must add up to the initial weight of the test sample. It is imperative that the data gathered on the component samples at the end of testing add up to the initial sampling. If the data does not add up as in the case of some of the IKO samples, it puts all the data in question and makes the test invalid. As described in D228-09, it is imperative to test and use the procedures for analytical material usage by following Sections 17, 18, 19 and 20 of the method exactly. If there is a variation in the test method from the standard, it can affect the results and make the testing and the results invalid. Depending on the assumptions and changes made, the product data results can be such that the accuracy of the testing and

product makeup is compromised and the test results are invalid. Based on Rutila's reporting of his methodology his data is invalid.

20. It should be noted that any test method is only as good as the technician that is using it. If any test method is not done according to instructions the results can be severely altered and the results are invalid. D228 is a procedure for determining the physical and compositional properties of shingles and in organic shingles the standard D225 is the product specification for those products. The physical and performance tests include Wind, Fire and Heat resistance, granule loss and pliability at 73.4 F degrees. The masses or composition of the shingles include saturation weight of product and after extraction asphalt content, felt weight, granule coverage, filler level and coating on the shingle. All weights at the end of the composition sections (17, 18, 19, and 20) must add up to the weight of the sample before the analysis begins. Otherwise the data will be wrong and useless. I have a concern that Mr. Rutila did not work to make sure the breakdown of his compositional analysis (breakdown of product by its components) added back to his initial weight according to procedure. It appears that some of the components that were calculated by difference from other component weights should have been direct results of the testing per the procedure.

21. Based on my reading of the Ricketts and Rutila reports, my knowledge of ASTM standards and test methods and the information provided in the reports related to the sample of claims investigated, the results quoted in the report are not valid as an ASTM compliance test. ASTM does not provide for sampling from the roof as a valid test for compliance. The samples must be taken and tested "as manufactured" and prior to application. Samples can be taken from a roof for testing, but there is no way to translate the data gathered as meeting or not meeting the standard at the time of manufacture. The concerns about accuracy of the results of testing, and the time and sampling of the shingles and the defining of a lot as reported by Rutila invalidates the data related to testing to ASTM D228 procedures, ASTM D225 compliance and invalidates the conclusions being drawn on the inspection of these shingles.

FURTHER AFFIANT SAYETH NOT.

Robert E. Metz

Robert E. Metz

SUBSCRIBED AND SWORN TO BEFORE ME, on this 28th day of November, 2011, to certify which witness my hand and official seal.

Jinsuk Tedesco

Notary Public in and for the State of Florida

My Commission Expires: June 12, 2015