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EVALUATING COATINGS BASED ON PROVEN PERFORMANCE, NOT TESTING

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Engineers are faced with an extraordinary challenge when developing high-performance coatings specifications. Coating selection is a science unto itself, which requires one to have access to the best information. Unfortunately, the information available to most specifying engineers has been supplied by sales representatives whose interest lies in creating advantageous specification position rather than maximizing outcomes for the asset owner.

THE PROBLEM

Specifying engineers are faced with the challenge of undertaking proper due diligence of the materials included in their specification to ensure that they are appropriate for the required service and expected service life. This challenge is made all the more difficult by the requirement to allow competitive approaches to meeting the required service. After all, the asset owner, rate payers, and other stakeholders are seeking the most efficient use of their dollars. We must not only seek performance, but diligently seek this performance in the most cost efficient manner possible. For this reason, projects funded with public dollars require the inclusion of multiple supplier options.

In balancing these complex demands to ensure product serviceability and allow for competitive, cost-effective approaches, the specifying engineer is often left with only a single source of input: the information provided by sales representatives from various coatings manufacturers. This information is often provided in the form of self-reported ASTM testing results. While ASTM testing offers the illusion of sound, science-based decision making, it has unfortunately fallen well short of that bar in actual practice. As a result, these tests have become highly-manipulated and their data has been weaponized among some coatings companies to (often illegally) restrict competition.



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LOOKING CLOSER

In 2010, this issue was tackled by a well-respected technical publication in an article titled “Hubble Bubble Tests and Trouble: The Darkside of Misreading the Relevance of Coating Testing.” In this article, several scenarios are examined to illustrate multiple common problems:

- These tests are self-reported. There is an obvious concern that individual companies may misreport their own performance results. However, even if we assume that all data is properly reported in good faith, there remains a large amount of concern over this data. It is well understood that testing methodology, ambient conditions, equipment operators, lab equipment used, as well as many other variables, will alter the measured values. Therefore, if the tests are not conducted by the same people in the same lab, they cannot credibly be used to compare two coatings. As stated in the article, Dr. O’Donoghue put it this way:

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Comparing test data obtained at different times, by different operators, or in different laboratories must be done carefully. Many standard coating test methods were originally designed for comparative testing in a single test series, not for generating an absolute test value. Other methods have options that can significantly affect results. Some ASTM test methods contain precision and bias statements based on round robin studies. Unfortunately, the statements are often ignored when comparing data. Equally unfortunately, many test methods have not been studied to properly ascertain their reproducibility and repeatability. Unless you understand the fine details of a test method, you cannot compare data generated at different times and places. Consequently, unless the details of the test methods used for coatings are understood, the data is often assumed to have a much higher accuracy than the method deserves. During new coating product development, the test method is good enough if it can differentiate between experimental formulations that are obviously unsuited to a certain set of service conditions and formulations that will perform well. With coatings that perform reasonably well, the ability of most methods to finely distinguish different levels of performance is often dubious because of the inherent variability in many test methods (and operators).

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- The question of scientific viability is also very real. If the outputs of a given test do not produce consistent enough results, they may be useless for drawing conclusions. For example, if we explore adhesion testing per ASTM D4541, we find that there is no instruction for how many tests should be conducted to provide a data set that would be suitable for drawing conclusions with any confidence. There is nothing stopping someone from reporting adhesion values of 5000psi, even if that reading of 5000psi was the only reading over 100psi in a data set of 1000 readings. You simply cannot consider the data credible for apples-to-apples comparison without knowing these details. Further, who defines how much adhesion is enough? The ASTM standard offers no pass/fail guidance. This is one example, but we find similar problems with nearly any analysis of ASTM testing on protective coatings.
- We must also evaluate the appropriateness of the testing required by the specification to evaluate the coating. Is UV testing relevant for coatings that are not exposed to UV radiation? Is salt fog testing relevant to coatings in potable water immersion? Should an owner of a water tank really be barred from enjoying the competitive advantages of one epoxy lining simply because another epoxy lining has a better rating for immersion in sulfuric acid? Is that data relevant for this specific application? It is very common for specifications to list these tests without considering the relevance of the data required to the service proposed.

EXPLORING ALTERNATIVES

If manufacturer provided ASTM testing cannot be used as a viable method for comparing coating systems, how can one properly evaluate these options? As it pertains to potable water structures, AWWA D102 provides a fantastic template for how we might approach this evaluation. D102 has evaluated several coatings systems for interior and exterior service, which are divided into generic formulation chemistry. In this manner, a specifier can simply require that the coatings used by a contractor meet the requirements of, for example, AWWA D102 Inside System Number 6 and know that they will receive a coating system vetted by a panel of industry experts for this service.

This however, is only half of the story. While specifying generic chemistry can provide a fantastic basis for system selection, it is fair to recognize a difference in quality from manufacturer to the next. In our quest to ensure appropriate coatings are selected for a project, we often find that the most relevant data point is ignored: experience on actual projects in real world application.

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If one were to imagine the most robust of coatings evaluation processes, in which cost and resources were not an issue, we would likely decide the most robust analysis would require the application of the products on thousands of structures, in multiple geographic locations, applied in different conditions by different applicators. A truly robust evaluation would look at the performance of these coatings over decades. Fortunately, this data set exists. Each of the major coating manufacturers in the United States who are selling coatings for the water tank market have a robust history. Simply put, speaking with engineering peers who specialize in water tanks, talking to owners who have used specific products over the course of decades, and listening to input from the applicators who work with these products every day is a far more robust and accurate indication of quality than that provided by ASTM testing provided as part of a sales and marketing effort.

As simple as it sounds, our conclusion is this: **believe what you can see with your own eyes.** Evaluate coatings based on how they have actually been used and how they have performed on real projects. Our proposition is that a specifying engineer should spend time evaluating references, visiting sites and requesting case studies rather than accepting ASTM testing. Any manufacturer who has a place on the job site will be able to provide these references readily.

Including multiple, competitive manufacturers is both a legal requirement and a best practice. There are multiple manufacturers who are qualified to supply water tank coatings. Induron is proud to be one of them.

