Textiles 101: Antimicrobial Testing
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"Antimicrobial testing is by nature complex, delicate, and laborious; also, a lot of antimicrobial analyses, whether antibacterial or antifungal, rely on subjective assessments," notes Ian Strudwick, technical manager at Shirley Technologies testing lab. This makes choosing the right testing laboratory to test the efficacy of a fabric's antimicrobial treatment extremely important. Matt Henry, applications engineer manager for antimicrobial supplier NanoHorizons, says "Choosing the right testing laboratory is definitely a critical aspect in evaluating the antimicrobial properties of a material."

However, finding the right lab is not necessarily easy. Wayne Swofford, former vice-president of research & development for antimicrobial supplier Microban International, says, "Even with the same test methods, same protocol, and a known sample, half the labs surveyed had trouble distinguishing between treated and untreated samples. It's one of the major problems in the industry."

A large brand or retailer with experienced antimicrobial experts on staff can usually deal with any competent testing lab. "When very specific about the protocol, you stand a better chance of getting consistent results from lab to lab," notes Swofford. A small company, or one inexperienced with antimicrobially-treated products, is more at the mercy of the lab they choose to help them make critical decisions.

So how does one choose a reliable antimicrobial testing lab? What distinguishes a good antimicrobial testing lab?

Consistency & Reproducibility
Consistency and reproducibility are key. Consistency means that a lab will return equivalent results over time for the same tests, run on similar samples, using the same antimicrobial technology. Reproducibility means that a lab will return results similar to other labs, given similar
samples using the same antimicrobial technology and using the same test method.

"You want to use a laboratory that will run the appropriate antimicrobial standard both accurately and consistently," says Henry. "Inaccurate or inconsistent data generated from a laboratory could, if not discovered immediately, cost a company a significant amount of time and money in re-engineering a product to meet a necessary antimicrobial specification."

The problem is that "antimicrobial tests are very operator-sensitive," says Swofford. There can be a lot of variation in terms of how the technicians run the testing protocol, variation that's perfectly valid in terms of the test but will still cause consistency issues within the lab or reproducibility issues from lab to lab. "For example," says Swofford. "We take for granted that labs would autoclave samples before testing—but not all labs do that, or they do something else instead to achieve the same result—but doing something differently introduces variability."

**Transparency**

One way to eliminate variability is to introduce greater transparency. "If a lab modifies test protocols, they should document those variations," says Swofford. "We're all making assumptions about how these tests are conducted and taking certain things for granted," he says. "Maybe we need to write down more details."

Ben Tanner, president of Antimicrobial Test Laboratories, says detailed reports are a good idea. "An antimicrobial test should be repeatable by another lab from the first lab's report," he says. Kristofer Skantze, head of sales and marketing for antimicrobial supplier HeiQ Materials AG, agrees that "a good lab report should detail as much as possible, especially any variations in the test methods from the standard."

**Experience**

Jeff Trogolo, chief technology officer for antimicrobial supplier Agion, says that “the robustness of all tests benefit from experienced laboratory personnel.” Tanner notes that “not every microbiology lab has the expertise to do the tests. There are nuances in antimicrobial testing and in testing fabric.” So one question to ask is: How frequently does this textile testing lab do antimicrobial testing? Or, conversely: how
frequently does this microbial testing lab do textile testing? Experience in both fields is necessary.

And choosing a lab experienced in testing antimicrobially-treated textiles is sometimes not enough. Dave Rottjakob, director of microbiology services and new business development for ATS Labs, says that it can be important to choose a testing lab with experience in doing the specific test methods suitable for the antimicrobial technology being used or the end use the fabric is destined for. "While the concepts are not difficult, the majority of these tests are very technique-sensitive," he says. "A lab can give very different results if they're not experienced with doing the specific tests."

"There are numerous labs that have microbiological expertise, but few have that have a background in the actual application. As one who has been on both sides of the equation, I can say that selecting a lab that has textile development experience will help in getting the testing done correctly with better guidance and communication, which is a often a critical determinant to a successful product or technology. It's not simply the testing experience that is critical, it is an understanding of how applications are performed, the types of manufacturing variability one can encounter, and potential limitations in the technology with respect to the application or product use, that can really provide insight and help a customer get their products out the door."

—Don Satchell, Situ Biosciences LLC
"To minimize the chance of error or misleading data, when selecting a lab, one should determine if the requested test protocol is conducted by the facility on a routine basis," says Dave Klein, project manager at Thomson Research, supplier of Ultra-Fresh brand antimicrobials. "Submitting a sample to a microbiology lab that normally is doing only sterility testing or plate counts just because they may offer a cheaper price usually leads to confusing and conflicting information—you do get what you pay for."

"Just because a testing lab can do antimicrobial testing doesn't mean they have expertise in antimicrobial textile testing," affirms Mark Wiencek, development manager for antimicrobials at Milliken & Company. He says that an experienced lab is especially a boon for a smaller brand or retailer, or a company that's inexperienced with antimicrobially-treated products. "A good lab is especially important if the lab needs to make decisions for the customer. If the customer is inexperienced, an experienced lab is vital. These labs can make modification decisions and ask the customers the right questions."

Strudwick feels that it's also very important that "a trained microbiologist knows the most appropriate method for a certain test request, as often the clients do not know this. A microbiologist should be able to argue with a client that the test he is requesting is not appropriate, even if he is asking for a method that he has had tested previously by another lab." According to Strudwick, there is "far more onus on a microbiologist to educate the client than there is on a technician in any other area of physical or chemical testing."

**Skill**

Schantze says that a lab also needs to be able to adapt the tests within the boundaries given in the standards, which is important for different fabrics. Here the skill of the lab technicians comes into play as well as their experience.

Klein says that quantitative test protocols in particular are extremely sensitive to subtle variations in technique and methodology. "It is therefore particularly important that any lab doing such testing understands the tests and the role the type of antimicrobial and the test specimen properties can play on test conditions," he says.

**Certifications**

As well as experience and skill, Strudwick says it's important that a lab's staff undergoes regular monitoring and training, and that the lab itself have been independently accredited by agencies such as UKAS (United Kingdom Accreditation Service). "Bodies such as UKAS put a lot of reliance on labs performing continuous in-house monitoring, and accreditation programs are a good way of doing this," he says.

Peter Stutte, head of the technical department for antimicrobial supplier Santized AG, recommends that antimicrobial testing labs have accreditation for the test methods they perform, work under GLP (Good Laboratory Practices), and be ISO 9001 certified, at a minimum. Rottjakob adds that it's useful for the lab to be
familiar with regulatory procedures like those of the US Environmental Protection Agency (EPA), "in case the EPA wants data to support any claims," he says.

There is no government-based certification program available in North America or Europe to guarantee the quality of a textile antimicrobial testing lab. In Japan, there is a government program that says if you achieve X level of performance for your antimicrobial, you can claim Y, but there is no program to measure the ability of labs to do the testing, notes Wiencek.

AATCC's Antibacterial Proficiency Testing Program is currently the "only program where a lab can establish its performance versus other laboratories by the agency overseeing the method," says Klein.

Robert Monticello, chief technology officer for Aegis Environments (now a part of Microban), says that some antimicrobial supply companies, like Aegis, have also created certification programs for the third-party labs testing textiles treated with the antimicrobial products that these companies sell. He says that "Third-party antimicrobial test facilities are pre-qualified on a yearly basis to run specific antimicrobial test methods in accordance with very specific testing parameters." These parameters were the ones used in the suppliers' internal development of the antimicrobial used on the treated product.

Henry believes third-party certification is important. It gives customers confidence that "the results generated at that laboratory can be trusted and used to make critical product development and/or business decisions," he says. With confidence that they've chosen the right lab, a company's won half the battle in getting textile antimicrobial testing right.

**AATCC Can Help!**

The [AATCC Antibacterial Proficiency Program](#) helps your lab stay on track.

The 2010 [AATCC Antimicrobial Monograph](#) is a free download for AATCC members. (US$129 for non-members)