

Know your VOCs

Understanding Architectural Coating VOC Marketing Claims

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ow well do you know your VOCs? The volatile organic compound (VOC) content of architectural and industrial maintenance (AIM) coatings has become the primary metric for determining where and when a coating or treatment can be sold. As of early 2010, the U.S. market is defined by over twenty federal, state and district AIM VOC rules and regulations. Add green building and third-party certification standards to the mix and confusion is the norm.

Getting VOCs right is increasingly important since regulatory enforcement systems apply to manufacturers, applicators, specifiers and owners. Voluntary green building standards increase the stakes with owners commonly demanding contractual agreements from designers and builders to attain a certain number of credits. Upcoming green building codes such as CalGreen and the International Green Construction Code feature VOC standards, with non-conformance potentially causing delays in obtaining occupancy certificates.

This article attempts to take some of the mystery out of VOCs and explain basics about how VOCs are utilized in environmental marketing claims.

AIM VOC Regulation Basics

VOCs are a concern because they combine with nitrogen oxides (NOx) and sunlight to create ground level ozone and smog. Regulations set mass-based limits expressed in grams per liter (g/L) content. Organic solvents are the primary regulated VOCs.

AIM VOC regulations apply to any coating (including paint, coatings and treatments) field applied or impregnated into an architectural substrate for functional or decorative purposes.

VOC regulation started in the 1970s and focused initially on high-volume house paints. Policy makers were concerned that manufacturers might water down coatings and specify a thicker wet film application. Their solution was a calculation or testing method that subtracts out water and exempt solvents before determining VOC content.

The less water/exempts approach arguably works for high solids coatings, but not for lower solids, water borne coatings. To resolve this, California regulators created a low-solids coating category for products with less than 1-pound/gallon solids content. A low-solids coating's VOC content is determined without subtracting water or exempt solvents.

A low-solids coating designation can substitute for any

other regulatory category. An example would be a waterproofing concrete/masonry sealer that meets the low-solids coating definition and is marketed as such. This includes water based products like PROSOCO's Sure Klean® Weather Seal Siloxane PD.

AIM VOC regulations are fundamentally complex. Proper product categorization is one of the most difficult exercises for coatings manufacturers. Each VOC category is defined by regulation and contains a number of technologies. Depending on label, marketing and literature claims, the most restrictive category definition and limit generally apply. A typical regulation defines and sets limits for over 40 separate categories. Any product that doesn't fit a specialty or category definition defaults to the Flat or Non-flat categories where common house paint resides. The rulemaking process is complex and some niche coatings technologies fall through the cracks.

Coating or Sealant?

Manufacturers sometimes have difficulty in determining the regulatory status of certain product types. In particular, air and water resistive barrier systems can crossover between regulatory systems. As an example, a bulk sealant supplied for application as a gunnable joint sealant or a spray applied barrier coating would technically be covered by both sealant and AIM VOC regulations. Some manufacturers errantly refer to barrier coatings as sealants. If a product is not specifically designed to seal joints or gaps it would likely be classified as a coating subject to AIM regulations and limits.

This sounds like an exercise in semantics until one considers differences in VOC content limits and that many states have no sealant VOC regulations on the books. Unfortunately, some manufacturers are offering high VOC solvent-based barrier coatings as specialty sealants with the unintentional effect of skirting regulatory scrutiny or gaining advantage in specifications. The key thing to remember is the broad definition of coatings in the scope of AIM VOC regulations. Here are the definitions for reference:

***SEALANT** is any material with adhesive properties that is formulated primarily to fill, seal, or waterproof gaps or joints between two surfaces. Sealants include sealant primers and caulks. (SCAQMD Rule 1168: Adhesive and Sealant Applications)*

***COATING** means a material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealants, inks, maskants, and temporary coatings... (U.S. EPA National Volatile Organic Compound Emission Standard for Architectural Coatings)*

VOC Labeling and Marketing Regulations

AIM VOC regulations require specific labeling elements. Every regulated coating's container must be marked with a VOC content level expressed in grams per liter (g/L). Manufacturers can list the actual VOC content or a maximum VOC content. Most manufacturers opt to list the regulatory category limit for the coating as the maximum VOC content. In addition, the container must show the date of manufacture as an actual date or as a date code. PROSOCO uses a Julian date code system for consistency with California Air Resources Board (CARB) cleaning product VOC regulations.

The regulations generally do not specify notification type size or format, instead requiring that VOC and date code statements be clear and conspicuous. Some regulations require listing specific category names or that a product is designed for professional use only.

A coating is categorized based on label, literature and marketing claims. Multiple function products default to the most stringent category limit with some exceptions. VOC regulations are technical and complicated giving rise to misinterpretation and misunderstandings. The regulatory category definition is as important as the category name. A film-forming water repellent marketed specifically for concrete and masonry would not be



held to the category limit for a flat paint. The low-solids coating category can be utilized for any type of coating otherwise defined in state and district regulations provided it contains less than one pound of solids per gallon.

Outside of AIM VOC regulations, the Federal Trade Commission (FTC) regulates environmental marketing claims. A simple and factual VOC content statement would not necessarily be considered an environmental marketing claim. However, statements like “Low VOC”, “VOC Free”, “Ultralow VOC” and “Zero VOC” are designed to sway the consumer therefore falling under FTC jurisdiction.

Exempt Organic Solvents

Some organic solvents have negligible potential to form ozone and can be classified as exempt. In AIM VOC regulations, exempted solvents do not count towards the VOC content of a product. Through a long and complicated process, the United States Environmental Protection Agency (USEPA) lists an exempt solvent and then each state chooses whether to add it to their list. The process of getting a solvent exempted nationwide can take years.

The USEPA list includes many solvents that have little practical formulary value. The short list of useful solvents includes acetone, PCBTF (Oxsol 100), volatile methylsiloxanes, methyl acetate and tertiary butyl acetate. Also known as TBAC, tertiary butyl acetate is exempt everywhere except in parts of California.

The exempt list also includes some toxic solvents that are restricted in some areas. In particular, methylene chloride and perchloroethylene (dry-cleaning solvent) are utilized by a few niche product manufacturers. Users and specifiers should weigh their relatively low cost against human health factors as both are classified as carcinogens. In addition, some districts, the California Bay Area AQMD included, have banned their use in AIM coatings by excluding them from their exempt solvents list.

The USEPA and some states maintain a separate regulatory system for consumer and institutional/industrial cleaning and floor care products. This set of regulations allows a much broader range of exempt solvents based on vapor pressure. The theory behind this practice is that cleaning products primarily go down the drain as opposed to evaporating. These regulations are not all inclusive; instead focusing on specific categories of household and institutional cleaning products.

Formulators must be careful to stick to the AIM VOC

exempt list for coatings products. The most common mistakes occur with these ineligible solvents: glycol ethers, isopropyl alcohol, ethylene glycol, methanol, ethanol, soy methyl esters, d-limonene, turpene hydrocarbons and Texanol. While many of these solvents would be exempt in cleaning products, all are classified as VOCs when used in coatings.

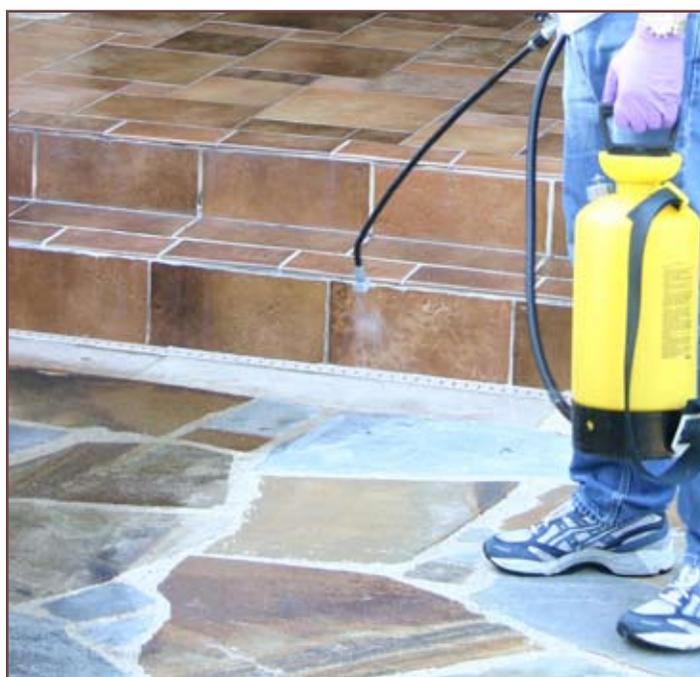
Zero VOC: Fact vs. Fiction

Zero VOC coatings are rare in the marketplace, but you would never guess that based on manufacturer’s marketing claims. The sad truth is that many so called zero VOC coatings are actually low VOC coatings. So what’s the difference?

In the coatings world, VOC semantics often make the difference between being specified or not. A coating that contains any amount of intentionally added non-exempt VOCs is not a zero VOC coating. To put it bluntly, a manufacturer who makes an unwarranted zero VOC claim is engaging in false advertising and greenwashing.

The zero VOC shell game is played in various ways. Some manufacturers claim they received guidance from an agency saying that an almost zero product can be claimed to be zero. Some manufacturers call a solvent exempt because it wouldn’t be counted in a cleaning product.

These approaches are incorrect and misleading. The current consensus at the USEPA, CARB and the South Coast Air Quality Management District (SCAQMD) is that zero means zero and only listed AIM exempt solvents can be claimed as exempt.



If product labels, MSDS or literature show a VOC component, it is not a zero VOC material. As an example, a product containing 2% ethanol as disclosed on an MSDS could not be claimed as zero VOC. Its calculated low solids VOC content would likely be in the 20 g/L range. While laudably low, that is not zero.

Some manufacturers fudge the truth on reactive curing materials like silane, siloxane, ethyl silicate or potassium methyl silicate and market them as zero VOC. Some of these materials have a theoretical in-can VOC content of zero. However, once applied and reacted with the substrate, they release VOCs (cure volatiles) that are detected and counted in current standard laboratory tests including the new ASTM Method 6886. Upon testing, this type of zero VOC marketing claim may result in regulatory agency enforcement action.

Manufacturers can formulate hazardous, yet legitimate, zero VOC products. A zero VOC resin mixed with a flammable or carcinogenic exempt solvent is the type of tradeoff specifiers and users should look out for. Acetone is the predominant exempt solvent, but in contrast with higher flashpoint solvents like mineral spirits, it is extremely flammable and potentially explosive.

Solvents used for field dilution in accordance with label instruction count as VOCs. Always pay attention to the type of solvent required and any potential hazards. Some concentrates are claimed to be “safe” due to the manufacturer conveniently ignoring dilution solvent properties.

Low VOC Marketing Claims

Low VOC claims are often based on subjective comparisons to other products in the same technology group or against a regulatory standard. This type of claim isn't necessarily bad, but it helps to know the manufacturer's criteria. Many manufacturers utilize compliance with CARB or SCAQMD Rule

1113 VOC limits as a primary metric for low VOC claims.

In order to make a CARB compliance claim, manufacturers need to have an understanding of current and upcoming regulations. In 2007 the California Air Resources Board updated its AIM VOC Suggested Control Measure (SCM) for optional adoption by areas outside of SCAQMD. The 2007 SCM has

since been adopted by the Bay Area and San Joaquin AQMDs with a 2011 effective date. It has also been incorporated in the indoor environmental quality section of the new CalGreen building code which becomes mandatory in 2011.

The 2007 SCM features a comprehensive revision of category names, definitions and limits. Some current categories no longer exist, instead being combined into a master category or broken into niche categories. Some categories have VOC limits more stringent than the SCAQMD's. Most importantly, the 2007 SCM does not rely on gimmicks like corporate averaging. As it migrates to other parts of the U.S., building inventory may be an issue. As an example,

California features relatively little of the carbonate stone construction commonly found in the Northeastern states.

SCAQMD Rule 1113 compliance claims mean that a product conforms to the strictest regulatory standard in the country. The context of geographic setting is important when picking a product solely based on Rule 1113 compliance. Rule 1113 is designed for the Mediterranean climate specific to the greater Los Angeles basin. Performance and application problems are common for many SCAQMD market specific products applied in less temperate climates. In addition, some high VOC products are only compliant with Rule 1113 because of corporate VOC averaging programs utilized by high volume paint manufacturers.

If a manufacturer claims Rule 1113 compliance, the company and product should be registered under the new SCAQMD Rule 314 registration and emissions fee payment



program. As part of the program, manufacturers must divulge VOC formulary information to the agency to confirm compliance.

Because of the magnifying effect of VOC calculation methods, a spread in VOC content ranges can be deceiving. In a low-solids coating, the difference between a 10 g/L and 50 g/L is an actual VOC content difference of less than 1% by weight. The difference between 10 g/L and zero is less than 0.5% by weight.

The math gets fuzzy as formulators juggle solids content and the subtraction of water and exempt solvents. A theoretical 40% water-carried silane evolves around 0.5 pounds of ethanol per gallon of product with a regulatory VOC content of 330 g/L. A theoretical 90% solids industrial maintenance coating evolves around 0.6 pounds of toluene or xylene per gallon of product with a regulatory VOC content of less than 100 g/L. The lowest regulatory VOC number isn't always indicative of the lowest impact to the environment or indoor air quality.

Independent Testing and Third-Party Certification

Third-party testing and certification can provide an avenue for legitimate VOC claims. Independent laboratories can measure product VOC content using regulatory methodologies to confirm AIM VOC regulation compliance.

Specialized laboratories also offer testing to verify conformance with California's Specification 01350 indoor air

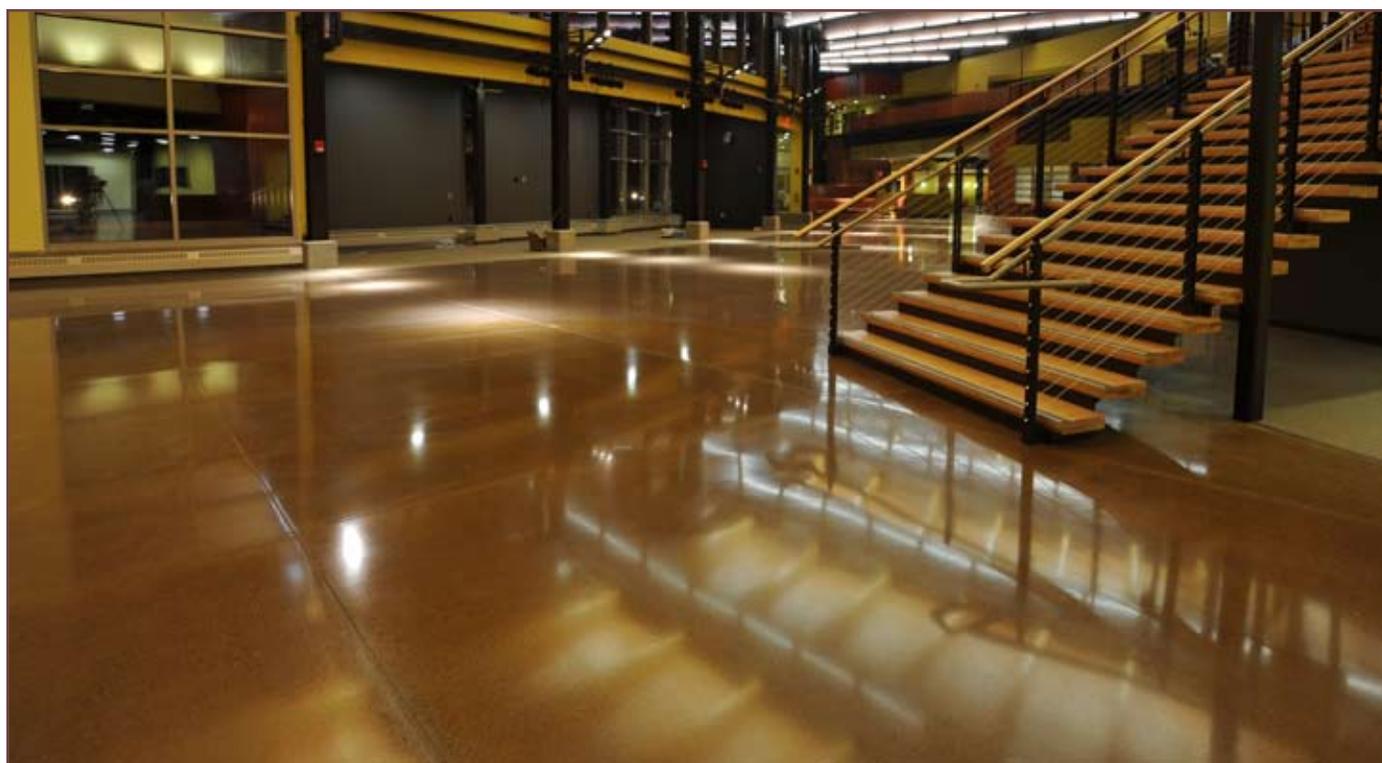
quality standard. This testing involves placing coated sample substrates in a test chamber to verify actual VOC emissions in conditions that mimic typical HVAC systems in commercial or institutional settings. Testing is generally expensive and reserved for high volume products.

Specification 01350 conformance serves as the basis for a variety of third-party certification programs. Third-party certifiers verify test results and typically conduct facility audits in addition to monitoring manufacturer's activities to assure that the product going into the container matches what was actually tested. Several of PROSOCO's Consolideck interior coatings and treatments have been independently certified by Scientific Certification Systems (SCS) under their Indoor Advantage Gold indoor air quality (IAQ) certification program.

Performance and Sustainability

The sole focus on VOC content isn't always the best way to judge a product's contribution to architectural sustainability. A product that works well in Los Angeles may not hold up to freeze/thaw cycles elsewhere. That may be OK if it only has a decorative function, but most coatings, sealers and treatments must also protect the substrate from premature weathering and failure.

Sustainability and life cycle metrics for buildings and construction products are in their infancy. The practice of life cycle assessment is expensive and complex. Until metrics are



normalized for individual technology categories, users should consider how a product contributes to the overall longevity of an architectural component or assembly.

After all, a building assembly is the sum of its parts. In many ways building construction is like a manufacturing process that just happens to take place in the field. Owners wouldn't accept a refrigerator that needed repainting every two years; nor should they accept poorly executed concrete and masonry assemblies.

Rapidly evolving VOC regulations and green building standards continue to push manufacturers towards ever lower VOC formulations and technologies. Not every new coating technology pans out. Laboratory and field testing can only attempt to replicate actual field conditions and complex assemblies. Responsible manufacturers rapidly reformulate or phase out products that don't meet expectations in large scale applications.

Regardless of any other factor, credible manufacturers adopt a "do no harm" approach to product development. No one wants a return to the days when exterior masonry was permanently damaged by application of non-breathable methacrylate and heavy wax coatings. Yet the same issues are reemerging today with some manufacturer's recent attempts to control graffiti by piling on multiple layers of water based coatings.

Conclusion

Regulatory VOC compliance is a shared responsibility between manufacturers, specifiers, distributors and applicators. AIM VOC regulations and green building standards are changing

at an ever increasing pace. For a more in depth look at VOC policy and regulation, refer to PROSOCO's Volatile Organic Compound Regulation and Standards Update at www.prosoco.com.



About the Author: Dwayne Fuhlhage is the corporate regulatory manager for PROSOCO. A Certified Hazardous Materials Manager, he is active in the county level Emergency Management Board. Dwayne serves as PROSOCO's representative to the American Coatings Association and the Consumer Specialty Products Association where he participates in various VOC, environmental marketing and chemicals management policy committees. He has acted as a primary advocate for concrete and masonry specialty coatings in state, regional and federal AIM VOC regulations development. Dwayne is an active member of the ASTM E60 Committee on Sustainability and the NSF/GCI Greener Chemical Products and Processes ANSI standard Joint Committee.

What to Look for in VOC Marketing Claims

In summary, here are some of the factors to consider when scrutinizing VOC claims:

- Does the manufacturer have regulatory management programs in place to assure understanding of all district, state and federal AIM VOC rules?
- Does the manufacturer clearly state where a product is compliant?
- Is the manufacturer willing to disclose a product's VOC content?
- For products marketed as low solids coatings, is the solids content less than 1 pound/gallon?
- Is the product formulated with flammable or carcinogenic exempt solvents?
- Are claimed exempt solvents on the state and federal AIM exempt solvents list?
- Does the manufacturer provide safety information for finished product made from concentrates and field diluted with exempts (e.g. acetone)?
- Is VOC information consistent between the MSDS, technical data and label?
- Is the manufacturer attempting to market reactive curing materials as zero VOC?
- Is the manufacturer willing to certify, on company letterhead, that a product is zero VOC?
- Does the product meet critical performance criteria such as water vapor transmission?
- Does product use require waste generation?
- Is the product properly categorized as a sealant or coating?
- For South Coast AQMD compliance claims, is the manufacturer registered with the district under Rule 314?

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