



Coatings & Sealers

in Fire Damage Restoration

By Cole Stanton

Coatings are an integral component of fire restoration, most crucially to prevent the recurrence of smoke odor. Coatings implemented post-fire are not finish paints, but can serve as primers while blocking stains and adhering to less-than-ideal surfaces. Those functions are valuable and fire-relevant, but alone insufficient. Fire damage sealers must primarily inhibit the release of fire-related odors days, weeks, months, and even years into the future. That performance is impossible for pedestrian primers.

Do you really need to know this much about “paint” to succeed at fire damage? Yes and no. The aim here is to help professionals ask the right questions, and who to call for accurate information. There is a confluence of confusion. New technology is rising up and forcing change to established practices. Education from oral tradition is graduating into eagerly-anticipated guidelines, stan-

dards, and certifications. Fragmentary regulation is inevitable, and like mold/lead/asbestos, there is talk of licensing. Contractors, large-loss consultants, and training providers struggle continually to incorporate innovation and consistency.

This article proposes to start with sorting our types of coatings for fire into distinct categories, also sorting the FFB (features, functions, benefits) we need/want from these products, and then connecting the dots.

Sealers vs. Encapsulants

Restoration professionals typically group their specialty coatings for fire damage restoration into a category labeled with the umbrella term *sealers*. Yet even in professional circles there are other popular category labels like *encapsulants*. Since the 1970s, encapsulation has been in many nations a legally-codified practice of permanent abatement of asbestos and lead-based paint (alongside abatement

by removal as a “management-in-place” alternative).

However, for fire damage restoration, the long-standing and understandable concern is that an encapsulation coating could be misunderstood and applied to *manage* fire contaminants in place rather than removing the contaminants first. As is common across restoration disciplines, for fire the proper procedure is to remove contaminants, and then the coating is applied among the final steps to complete the mitigation process. Since *encapsulant* conveys an inherent sense of applying over an undesirable substance rather than removal, the word itself can be at cross-purposes with arguably the most fundamental principle of restoration.

The Industry Today

For several years, a collaborative consensus body assembled by the Restoration Industries Association (RIA) and the



Indoor Air Quality Association (IAQA) has been working on the first comprehensive standard for fire damage restoration. When completed, the goal is an ANSI-accredited and peer-reviewed standard that can set the bar for restoration, and provide a valuable tool for education. The finish line for that development process is now in sight, with the probability that a year from publication of this article, the standard will be in broad use and enjoy industry-wide acceptance. Included in this standard among the addressed elements of restoration will be a Tools, Materials and Equipment chapter.

From history to present, absent a standard, the restorer has had to rely upon everything from oral tradition, to training provider's own developed curriculum, plus a smattering of industry guidelines. It is an understatement that this is a contributing factor to the aforementioned uneven at best training and usage when it comes to smoke damage sealers.

What the industry does have is the RIA's *Guidelines for Fire and Smoke Damage Repair* (formerly the ASCR Guidelines). Written by the late Martin L. King, an undisputed fire pioneer and then-RIA Technical Advisor, the *Guidelines* were reviewed by over 300 restorers, adjusters and members of the insurance community. The 2007 second edition does contain useful guidance on choice and uses of sealers in fire restoration.

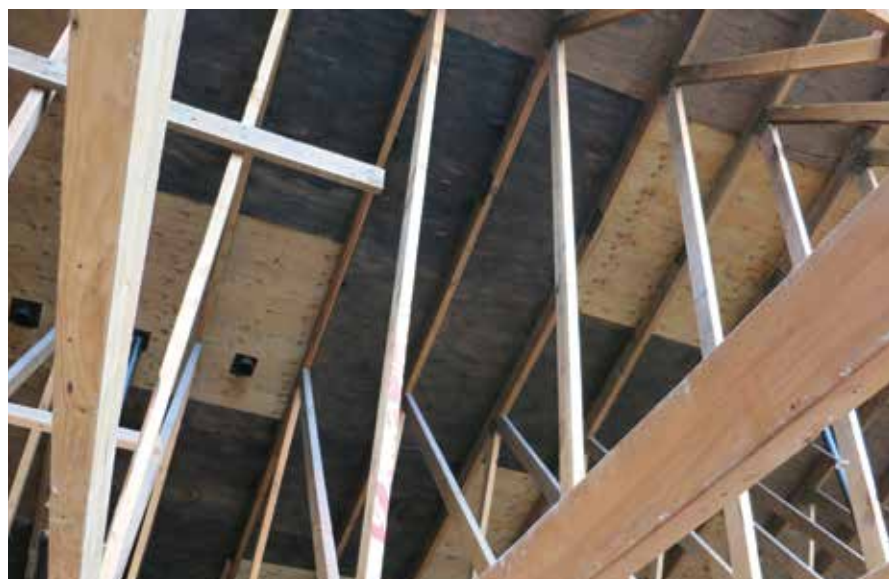
Overall Sealer Limitations

The most common concern regarding the use of sealers involves overreliance

on these tools instead of conducting source removal properly. Sealers can be useful and complementary tools to professionally-conducted contaminant removal, cleaning, and deodorization.

When sealer use is intended, it is important that all materially-interested parties concur that the agreed upon extent of cleaning and deodorization has been fulfilled. Thorough cleaning and odor removal performed before sealing is the most reliable way to prevent the reappearance of fire residues and odors. Ideally, an intensive visual and olfactory examination of the areas in question should be performed prior to the application of any sealer.

If a third-party consulting professional is engaged in the design and monitoring of the project, it should be *required* in the project scope that an opportunity



is given for that entity to conduct an inspection (or PRV-Post Remediation Verification) before sealer application begins.

Fire Sealers Organizing the Data

The *Guidelines* provide an excellent start for prioritizing the FFB of generally high importance to the restorer. Here are six criteria to consider:

1. Does it **STICK**?
2. Will it **SUPPRESS** fire odors?
3. Can reliably **SEAL** bleeding stains and residues?
4. **SELECTIVELY**, can water vapor "breathe"?
5. Will it **SIMPLIFY** complications of cleanup, etc.?
6. Is it **SUSTAINABLE** to use for years to come?

The *Guidelines* excerpts reinforce our six integral attributes by requiring stain/bleed-thru blocking, and permeability. The additional key FFB found in the excerpts from the RIA *Guidelines*:

7. The sealer should be specifically for fire damage restoration (not a primer or product intended for some other purpose)
8. The sealer has to be capable of providing a continuous and unbroken film
9. Vapors and odors should be avoided when possible due to sensitive or vulnerable occupants

Can we round out this punchlist to an even top 10 for fire sealers? Absolutely:

10. Trust: Identify manufacturers and suppliers that have invested the time to understand the demands inherent to fire damage restoration, and the needs of the fire restoration professional. Remember that coatings and chemicals are not intuitive. The PRO can pick up a handtool and get a sense of relative quality and probable performance.

Sealer Formulation Types: Attributes & Limitations

Now that we've talked about how to choose a sealer, it's time to clarify the different sealer types including their capabilities and limitations. The four readily apparent sealer categories are:

- Shellac
- Alkyd
- Water-based
- Fixatives

Understanding the attributes and limitations of the sealers available can, in large part, be organized by the type of chemical formulation. The attributes and limitations that follow are by necessity generalizations for the purpose of organizing content and concepts. Specific manufacturers and particular products can offer innovations that may transcend a category. However, when a product makes claims that supersede the typical characteristics attributed to that formulation type, that anomaly signals the restorer to require additional information to substantiate.

As you take a look at these attributes,

here are some questions to ponder to help you decide which sealer is best for your company's average application, or unique job:

- 1) Which capabilities and limitations match the project's needs best?
- 2) Which criteria are most important to you when choosing a sealer? (i.e. performance, price, VOCs, sustainability, etc.)



Shellac

Shellac is a coating composed of processed lac resin (a secretion from an insect indigenous to areas in and surrounding India to Indonesia) dissolved into suspension in alcohol. Historically, this is the primary sealer type utilized in fire damage restoration with a legacy of successful application for fire odor control when used properly.

• Attributes:

- Readily available at retail paint stores and home centers
- Capable of application and curing at colder temperatures than other sealer formulation types (as low as 10°F)
- Excellent history of sealing in smoke odor from decades of use in fire restoration
- Adhesion to less than pristine substrate surface conditions
- Cured finish is much harder than other sealers
- Accepts most topcoats as a primer
- Dries rapidly (often less than 30 minutes)
- Excellent stain blocking
- Most expensive of the sealer formulation types with raw material insecurity causing ongoing trend in elevated product cost

• Limitations:

- Lacks flexibility
- Impermeable to transmission of water vapor (can trap moisture; form an unintended condensation layer/vapor barrier)
- Brittle if exposed to direct impact
- Unsuitable for exterior (outdoor) use [even with a topcoat]
- Can pose an ignition/fire hazard if off-gassing alcohol vapors accumulate in presence of ignition sources (pilot light, water/space heater, cigarettes, sparks)
- Meticulous cleanup with denatured alcohol exclusively (inadequate cleanup can result in irreparable damage to spray equipment)
- Excess material disposal requires special handling by solvent recycling
- Pungent solvent (lacquer) odor that can persist for up to a week, and may require air scrubbing with carbon filtration to eliminate most but not all residual shellac odor
- Tightening regulations governing maximum volatile organic contents (VOCs) are making availability in certain areas problematic (e.g., available only in small container sizes) or completely unavailable
- PPE protection needed to protect from inhalation

Water-based Sealers

This type of sealer involves acrylic polymer systems, potentially blended with additional specialty resins in a water-based vehicle designed to cure via coalescence. Group includes water-based products specifically formulated for fire damage restoration. Historically, there has also been use of water-based primers primarily formulated for sealing stains.

• Attributes:

- Readily available at professional restoration distribution; to a lesser extent at retail paint stores and home centers
- Generally higher cost than alkyds, but comparable cost or less expensive than shellac
- Can be formulated to seal smoke odor yet offer permeability to water vapor transference (sometimes with permeability lab data on request; ask for ASTM E96B, dry cup and wet cup)
- Highest flexibility among formulation types
- Available in a variety of finishes from high-gloss to matte
- Sometimes tintable, including to “woodtone” colors
- Low odor and VOC content
- Generally, formulation category requiring least pre-application mixing
- Most probable category applicable to spray-foam insulation without adverse effects to the foam and/or deterred adhesion of the sealer
- Most versatile category with some products performing also over potential odor sources from residual nicotine, protein, blood/OPIM, hoarding damage, kitchen/cooking residues (e.g., curry)
- Formulation type most likely to be acceptable when sensitive occupants and environments are present
- Not combustible or flammable; safest to use when potential ignition sources are present
- No specialized handling for waste disposal
- No additional PPE requirements (beyond already typical for project site)
- Formulation type least likely to have availability adversely affected by tightening environmental restrictions

• Limitations:

- Less tolerant of imperfect substrate surface conditions; greater preparation required
- Drying/curing times can vary widely with some products offering rapid curing, but extended dry time for other versions
- Stain blocking performance is variable with some products effective in one coat, but some requiring two or more applications, especially for certain surface issues, such as rust.
- Cured films are typically softer than other formulation types
- May be deteriorated by topcoats with high solvent content (alkyd, epoxy, urethane)
- May not accept sanding prior to topcoat as well as other formulation types
- Not all formulations are universally applicable via brush, roller and airless spray
- Unlikely to provide a vapor barrier where one is desired
- Compatible with most caulk and foam, but may be repelled by high-silicone content
- Not applicable when ambient surface and air temperatures are below 45°F

Particulate Fixatives

A family of sealers that are typically a very small amount of film forming material suspended in a coating that is otherwise almost entirely water. Designed to adhere residual particulates to surfaces for fast and easy prevention of inhaling residual particulates. The term fixative has not been traditionally used in fire damage restoration. In this article, the term is introduced as a proposed category to help restorers differentiate sealers that form a distinct and tangible coating on surfaces, from very different products that yield a residue that is often difficult to observe.

• Attributes:

- Can be lowest cost type of fire sealer formulation
- Can be available in a dilutable concentrate (further reducing cost)
- Offers extremely high coverage rates (as much as 1,000 sq.ft./gal.)
- Deliverable via equipment that generates a fog/mist
- Deliverable via pump-up compression (bug ‘n garden) sprayer
- Deliverable via consumer-grade electric sprayer (HVLP)
- Deliverable via wipe
- Potentially applicable via electrostatic equipment
- Least likely to alter surface appearance
- No tangible film is formed
- Rapid drying
- Dispersable to greater distances than conventionally sprayed products
- May be useful for surfaces not appropriate for paint-like coatings (e.g., ceiling tiles, architectural textiles, some fire-impacted contents)
- Could be code-compliant for HVAC application (with proper testing)

• Limitations:

- Least likely to provide odor suppression as does not form substantial topical coating film
- Concentrates require accurate dilution
- Residue-like film most subject to unintended removal from contact/abrasion/cleaning
- Very difficult to visually verify application
- Can require repeated applications over time
- Offer no stain-blocking capability
- Do not offer service as a primer for finish topcoats
- Virtually clean surface expected for application



Alkyd (Oil)-based Sealers

These are generally primers intended for the purpose of sealing stains such as from water intrusion into drywall, plaster. Also, primers for other stains are likely to migrate into finish coats if left unaddressed, such as: wood tannins, nicotine stains, etc. Hybrid coatings such as water-based alkyds are emerging technology to watch in this space. None are currently marketed as fire/smoke restoration products, but there are potential applications.


• Attributes:

- Readily available at retail paint stores and home centers
- Can be the least-expensive of sealer formulation types
- Tolerates imperfect substrate surface conditions
- Excellent stain blocker
- Accepts most water and oil-based topcoats as a primer only after thorough curing
- Rapid drying
- Sands easily

• Limitations:

- Generally makes no performance claims regarding containment of fire/smoke-related odor
- Prior to application, separated components require extensive mixing to reincorporate into a uniform coating
- Lacks flexibility
- Flammable and/or combustible
- May need specialized handling for waste disposal
- Lengthy cleanup using mineral spirits reduces productivity, increased labor costs for downtime, and increases solvent exposures
- PPE protection needed to protect from inhalation
- VOC restrictions expected to curtail availability in sizes larger container sizes
- Persistent odor
- Permeability is uncertain

Continued Innovation

Innovation will continue, and the imminent fire restoration standard will raise the bar for professional restoration. In large part, however, the 10 criteria for sealer selection are not likely to change much. Much of it is based on common sense, as well as decades of collective experience. The goal here is not to make recommendations, but to bring together in one place the crucial criteria, substantiate their importance, and organize the information into a simpler system for product evaluation. As is true throughout restoration, more informed decisions from better access to information will result in an improved and more sustainable industry for our professionals and the public we serve. 



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Notes from the Author:

Portions of this article were adapted from:

- ANSI/IICRC S520-2008, Second Edition, Reference Guide Equipment, Tools and Materials, pages 117 and 120.
- NIDR 10-8.3. 2002
- ANSI/IICRC S520-2008, Second Edition, Reference Guide Equipment, Tools and Materials, page 177; and from NIDR 10-8.3, 2002