



02 51 29 SURFACE CLEANING DECONTAMINATION – COMBUSTION RESIDUE & SMOKE ODOR

V. 26074

DIVISION 02 – EXISTING CONDITIONS
02 51 29 SURFACE CLEANING DECONTAMINATION –
COMBUSTION RESIDUE & SMOKE ODOR ¹

Sentinel 538
ODOR ENCAPSULANT • SMOKE SEALER • STAIN-BLOCKER • SEALER/PRIMER
as Basis of Design

PART 1 - ENCAPSULATION PROJECT ORGANIZATION & ADMINISTRATION ²

1.0 GENERAL

SPECIFICATION to REMEDIATE – SMOKE-IMPACTED FIREPROOFING [SFRM]
MAKE MODIFICATIONS BASED ON RESTORATION WORK PLAN (RWP) TO ADJUST FOR RANGE OF
HARD, NON-POROUS & SEMI-POROUS FIREPROOFING MATERIALS COMMONLY USED ON
STRUCTURAL STEEL &/or CONCRETE SUBSTRATES

1.1 SECTION INCLUDES

A. GENERAL –

- a. This specification describes the application of a water-based sealer to address the negative impacts of combustion byproducts (e.g., soot, ash, char) after a structure fire/smoke event.
- b. Any/all of these notes for specifiers may be retained in the final project specification, or reviewed and then retained or discarded, in whole or in part. This is entirely at the discretion of the specifier. See the EndNotes, as well as the Notes to Users below for limitations and guidance to improve use of this document.
- c. Drawings and general provisions of the Contract, including General Conditions, and other applicable specification sections in the Project Manual apply to the work specified in this Section.
- d. Prepared for: [RESERVED]
- e. Support is available from Sentinel when site-specific, customized versions of this Specification are needed. Please reach out to Sentinel at:
 - i. Sentinel Products, Inc.,
 1. 8901 Wyoming Ave. N., Brooklyn Park, MN 55445
 2. P: 763-571-0630
 3. EMAIL: getinfo@senpro.com
- f. This specification may be substituted as an “or equal” methodology, and it is understood that certain project dynamics preclude the use of product or manufacturers’ names. Section 2, Basis of Design, is intended to provide the



specifier with performance criteria that can be utilized to establish minimum criteria, but without identifying any specific product by name, model number or manufacturer. The specifier can omit the product and manufacturer name and utilize those performance criteria that are most project- applicable as the minimum requirements for submittals.

- g. This document includes information, in addition to the sealing process itself, regarding cleaning prior to sealing, and some key information regarding odor management (although this should not be considered a comprehensive plan for all available aspects of deodorization, e.g., odor counteractant, desorbents, ozone).
- h. This is a “Clean For Paint” specification. This term is descriptive of situations when the Materially Interested Parties (MIPs) for a project agree that the best course of action is to remove as much contamination as possible, and that post-cleaning there will be discoloration, embedded residues, and other non-removable factors that will be addressed via sealer application
- i. Sealer shall be formulated for Fire/Smoke (Structural/Wildfire) Restoration. Sealer may also be suitable for Urine, Nicotine, Fuel Oil, Cuisine/Restaurant Residue, Decomposition/Putrefaction, Chemical, Candle Soot, Mildew/Must/Mold, Creosote & Hydrocarbons, Animal Scents, and Stagnant Water Odor Challenges. Those uses will require an independent and specific specification.
- j. Not all SFRM systems are suitable for any sealing/encapsulation process, and not all product systems are acceptable for every barrier coating against emanations and stains.
- k. The completed system will be an opaque white, clear, or natural wood tone, depending on specifier/client selection. This specification will focus on a project where the Sentinel 538 White will be used.
- l. Do not attempt to follow this specification when using solvent-based smoke sealers. There is a legacy/history of sealing fire/smoke damage with oil-based stain-killing primers, and/or alcohol-borne shellac. However, SFRM is likely to deteriorate when in contact with strong solvents
- m. The resulting encapsulation will be a laminar film of sufficient build and cohesion that it has virtually 100% hide, is contiguous and low permeability so as to restrict smoke odor emanation, and is no longer friable (from which fibers cannot become airborne, nor are fibers generated by incidental physical contact.)³
- n. For industry guidance specific to fire/smoke restoration, at the time of this writing:
 - i. Institute for Inspection, Restoration and Cleaning Certification (IICRC) S700:
 - 1. In early 2025, the IICRC had announced the imminent publication of the new and first-of-its-kind independent and



ANSI accredited standard: ANSI/IICRC S700 Standard for Professional Fire and Smoke Damage Restoration. Restorers using this specification should review the S700 Standard, and seek out training to this new guidance document as it represents the current Standard of Care.

2. The 2025 1st edition of the S700 Standard describes the potential utility of a sealer as: *“The purpose of a sealer in fire and smoke damage restoration is to cover heat and smoke discoloration, block the transmission of odors, block wood resin bleed-through. Sealers may also serve as a primer or be a final treatment (e.g., unfinished wood framing). The type of sealer and performance will vary based on site conditions and applications.”*
- ii. RIA Guidelines for Fire & Smoke Damage Repair, 2nd ed., 2007.
Author: Martin L. King
 1. The 2nd Edition RIA Guidelines for Fire & Smoke Damage Repair is a restorer-client-adjuster manual that provides a foundation for the proper training of estimators, project managers, and insurance claims personnel.
 2. It is considered the direct predecessor of the IICRC S700, and while it contains valuable information for training and development of work plans, the RIA Guidelines are subservient.
 - iii. Related & Addressed-In-Part; and/or Specified elsewhere: CSI (AIA MasterFormat Sections), CSC (US, Canada Respectively)
 1. Section 025100 – Physical Decontamination
 2. Section 028000 – Facility Remediation
 3. Section 028200 – Asbestos Remediation
 4. Section 028300 – Lead Remediation
 5. Section 028500 – Mold Remediation
 6. Section 078100 – Applied Fire Protection
 7. Section 099000 – Finishes
 8. Section 099100 – Professional/Commercial Painting
 - o. NOTE: This specification involves decontamination and application of an odor sealer to Sprayed Fire Resistive Material (otherwise referred to as spray-applied fireproofing, spray-on or SFRM).
 - i. A structure’s compliance with building code will involve satisfaction of requirements that in the case of a fire, the fireproofing can insulate steel and concrete beams, columns, etc. for a period of time to



reasonably evacuate before the heat causes buckling and collapse. The bond strength of surface to fireproofing is the key performance characteristic that substantiates compliance.

- ii. Because a smoke & odor sealer is a topical treatment that contacts the outermost surface of SFRM only, the bond strength is uninvolved, and the classification status (the “fire rating”) is unchanged (provided the smoke event did not otherwise compromise the bond).
- iii. Per the Exposed Interior Finishes section of the UL Fire Resistance Directory, the requirement for a topically applied coating atop SFRM is that the coating is Class A (minimal flame spread, minimal smoke development) when tested in accordance with ASTM E 84.
- iv. Therefore, any smoke & odor sealers, HVAC sealers, etc., be certified by the manufacturer or an accredited testing laboratory that the dry film, as applied to the project, will conform with Class A. Flame spread for a Class A fire rating is 25 or lower, and the smoke development does not exceed a maximum of 450. Many facilities require a Class A rating for building materials. For example, hospitals typically require Class A ratings.
- p. NOTE: Although not the principal purpose of this specification, there is included reference to decontamination and application of an odor sealer to fiberglass lined ductwork of air conveyance systems (HVAC). To satisfy data requirements found in building code (as well as in guidance from standards and guidance-producing organizations such as ASHRAE and NADCA), any HVAC sealant used on the project must be certified compliant by the product manufacturer in writing with NFPA 90A/90B standards. This performance threshold for resurfacing materials and other coatings in HVAC systems is enumerated by both ASHRAE and NADCA.
- q. The specifier is NOT obligated to utilize this specification in entirety, but instead is encouraged to adopt/adapt/apply those into project documents governing this work. No Restorer or Specifier should propose or assert that work fully satisfies every provision of an IICRC Standard or other standard of care/guidance document. Every project is unique, and no project will involve every issue addressed by a Standard.
- r. This is a specification prepared for Sentinel Products, Inc.⁴

B. GENERAL – ADMINISTRATIVE REQUIREMENTS:

a. Pre-Installation Conference

- i. Review of RWP (Restoration Work Plan): a description of the work to be performed on a specific site to remedy a specific condition based on direct inspection and assessment of the damage. The RWP is a component of the Scope of Work. Should include ample detail of project conditions, manufacturer requirements, delivery and storage, staging and sequencing, and protection of completed work.



- ii. Discussion and Agreement on Criteria of Substantial Completion of Restoration - One or both of the following should be agreed to by written consensus before the start of work:
 - 1. Post-Remediation Evaluation (PRE): an internal quality assurance inspection performed by the remediator after a remediation project, which can include visual inspection, collection of field data, odor detection to confirm the probable return of the structure, system, or contents to pre-loss condition. A post-remediation evaluation is not the same as, nor considered a post-remediation verification.
 - 2. Post-Remediation Verification (PRV): an inspection and assessment performed by an independent third-party IEP after a remediation project, which can include visual inspection, collection of field data, odor detection, analytical testing, or environmental sampling methodologies to verify that the structure, system, or contents have been returned to pre-loss condition.
- C. [RESERVED]
- D. GENERAL – Installer Expectations:
 - a. Preparation and sealer application **shall**⁵ be conducted by Installer:
 - i. In accord with mandatory work practices, licensing requirements, disposal permitting, and all other related regulatory responsibilities.
 - ii. Installer is responsible for identifying and compliance implementation with all Authorities Having Jurisdiction (AHJ, AHJs)⁶, including:
 - 1. Awareness that requirements may be in force from local, state/provincial, and/or national/federal entities; and,
 - 2. Shall abide by the strictest requirement when rules are in conflict; or for,
 - 3. Obtaining clarification from designated oversight professionals (assessor, inspector), and/or Materially-Interested Parties (MIP, MIPs)⁷ when necessary.
 - iii. Installer shall be sufficiently trained and experienced.
 - 1. The installer(s) shall have professionals on staff and associated with the project with fire/smoke restoration training such as or equivalent to (and which have not expired):
 - a. IICRC FSRT (Fire Smoke Remediation Technician)
 - b. RIA CR (Certified Restorer)
 - c. ACAC Fire and Smoke Damage Technician (CFST).



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2. Both cleaning remediators and coating applicators shall receive orientation and training cooperatively supplied by the Restorer, and the product manufacturers
 3. Restorer will be capable of ensuring that sealer application subcontractors (e.g., painters) have necessary skills and awareness, or are provided with training before installation.
- b. Installer should⁸ abide by industry standard of care by, in all project phases, utilizing best work practice standards, including selection of materials explicitly formulated for are remediation process, and which are sufficiently durable to be considered permanent.⁹

E. MANUFACTURER EXPECTATIONS:

- a. Manufacturer Responsibility for Oversight: Whenever possible, involve company representation on-site from Approved coating system manufacturer.
- b. If periodic on-site support is not possible, arrange for remote consultation with the manufacturer's Subject-Matter-Expert (SME) to verify satisfactory conduct of the surface evaluation, preparation, and installation/application methods and techniques.
- c. Document that the manufacturer's representation participated fully.
- d. Note that manufacturer oversight does not constitute assumption by the manufacturer of responsibility for proper project execution. It is not possible for manufacturer representation to ever observe all simultaneous activity on a project site, nor examine every location of installed product. Manufacturer should document quality control activities insofar that if examined areas and activities are representative of the whole, then the Owner has reasonable added reassurance that performance will be reliable.
- e. [SEE QUALITY ASSURANCE AT 1.03]

1.02 EXEMPT SUBSTRATES; METRIC CONVERSION

- A. This specification is not to be used for (Contact specification author below for support.):
- i. wildfire damage restoration, or
 - ii. other special-type fires (e.g., chemical fires, industrial, battery/EV).
 - iii. Exhaustive guidance to remedy fire/smoke impacts to:
 1. Contents/Personal Belongings
 2. Vehicles
 3. Heating, Ventilation, Air Conditioning & Refrigeration (HVAC&R) systems. Specifically Air Conveyance Systems (ACS)
 - iv. Horizontal surfaces
 - v. Roofs



B. Metric Conversions: Metric conversion, where used, is soft metric conversion.

1.03 QUALITY ASSURANCE

a. GENERAL QUALITY OF WORKMANSHIP: Apply materials consistent with workmanship that exceeds pertinent industry standard-of-care, and the following inadequate defects will not be tolerated:

i. General Coatings Best Practice, include but are not limited to:

1. Runs,
2. drips,
3. "ropiness",
4. "orange peeling",
5. uneven gloss,
6. bleed through,
7. surface imperfections,
8. uneven cut-ins,
9. over-application,
10. excessive brush marks,

ii. Project Specific Errors to Avoid:

1. Areas where coating film of smoke and odor sealer is not contiguous and consistent in film-build (Thickness);
2. Less than 100% hide of underlying surface color (white & opaque colors only, does not apply to odor encapsulation with clear products);
3. A finish inconsistent such that a light at an angle cannot yield a consistent visual observation of reflection from gloss of encapsulant (especially important with clear encapsulation as primary visual means of quality assurance);
4. The generation of friable crumbly cementitious fireproofing from physical touch;
5. Post-application delamination or deterioration of the underlying fireproofing. Either loss of integrity of fireproofing from within itself, or detachment of the fireproofing from the substrate on which it is situated (e.g., steel beam, concrete deck, etc.). This indicates that the evaluation process was insufficient; and/or the Penetrating step was lacking in execution;
6. or other defects in final finish which will not be accepted.



b. MOCKUPS/PILOT AREAS; COORDINATION & SUPERIORITY:

i. MOCKUPS/PILOT AREAS:

1. Upon request, it may be determined necessary to provide a mock-up for validation of performance expectations, and anticipated application workmanship. All parties shall consent to and fully support a mock-up application if requested. When directed by Architect/Engineer, obtain test samples from a distributor or the manufacturer.
2. Directions for Pilot Application/Mock-Up:
 - a. Prepare surfaces designated for verification of suitability of proposed surface preparation procedures.
 - b. Ensure test areas are representative in both conditions and number of test locations.
 - c. Apply at specified thickness, and ideally when (if used on project in question) penetrating encapsulation is has developed a tack to the touch by fingertip. SFRM is an inherently irregular surface, and to develop a continuous coating film and related coverage rate, a mock-up may be necessary.
3. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
4. Retain mock-up during construction as a standard for comparison with completed work.
5. Do not proceed with remaining work until pertinent project authority (By Owner, Client, Enforcement Authority, Architect or Engineer), approves the mock-up.
6. Standard for Accepting Mock-up Work: Surfaces will be deemed acceptable if among the MIPs it is agreed:
 - a. there are no insufficient or excessive application irregularities when viewed in normal lighting.
 - b. Mock-up area is free from malodor, including combustion odor of a type related to the fuel source, and other odors associated with the loss event, and which should not be present in normal conditions in type of building, with typical occupancy and function.

- ii. COORDINATION: Notify Architect/Engineer in writing of concerns with surface treatments, materials or primers installed by others and recommended remedies.



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1. If substrate preparation is the responsibility of another contractor, the installer shall notify the owner's agent of unsatisfactory preparation before proceeding.
2. Proceeding with installation indicates acceptance of surface conditions.
- iii. SUPERIORITY: Where contradicted by federal, state, or local laws and regulations, any of the preceding supplant the information in this document.

1.04 SUBMITTALS:

A. Submit electronically:

- a. Provide URL for most recent product literature including.

- i. [Technical data](#)
- ii. [Safety Data Sheet](#)
- iii. [Label](#)
- iv. [Supplementary Technical Information](#)

B. LIMITED TO PROFESSIONAL PRODUCTS

- a. Submit only products that:

- i. Are formulated for professional remediation of fire & smoke damage (structural or wildfire), and are labeled as such. Consumer-grade products will not be accepted. Irregulars, boxed surplus from previous work, or seconds will not be accepted.
- ii. Satisfy/match/surpass the product metrics in Section 2 of this Specification (see Notes below re: substitutions/change orders)

C. ALTERNATIVE – Or Equal: Bidders are encouraged to submit materials that meet the Basis of Design.

- a. In order to have an alternative material accepted as for the work, submittals must be received by the engineer/consultant/architect for evaluation and approval no less than 4 days prior to the original published bid date.
- b. Approved alternative odor sealer will be by Addendum only.
 - i. Submittals circumventing this process will not be approved and will not be acceptable for inclusion in this project.



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- ii. Only submit complying products based on project requirements including regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO). To ensure compliance with district regulations and other rules, businesses that perform coating activities should contact the local district in each area where the coating will be used.
- iii. When U.S. origin is required by the MIPs for a project: When the proposed substitute product is “all or virtually” all manufactured in the United States (in accord with the Made in USA Standard of the Federal Trade Commission (FTC) statements such as Made in the USA with Globally Sourced Products, or equivalent statements, will be accepted.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING (see [Section 01 60 00](#) - Product Requirements)

- A. Deliver manufacturer's unopened containers to the work site.
 - a. Ensure inclusion on labels of containers of bridging encapsulants:
 - i. Product name, and type (description).
 - ii. Batch Number
 - iii. Manufacture date.
 - iv. Product SKU
 - v. Color number/identification
- B. Storage of materials:
 - 1. Store only acceptable project materials on site.
 - 2. Store in suitable location convenient to progress of work.
 - 3. Comply with health and fire regulations.
 - 4. Storage temperature shall be between 40° F (4.5° C) and 90° F (32° C), or such other ambient temperature conditions as may be specifically recommended by the product manufacturer.
 - 5. Coatings shall not be permitted to freeze on site, and delivery should be refused if freezing during transit is probable.
 - 6. Avoid storage directly in hot sun exposures.
 - 7. Keep containers tightly closed when not in use.
 - 8. Keep out of reach of children.
- C. Handling:



- a. Dispose of water-based and solvent-based materials, coating and supplemental products, in accordance with requirements of local authorities having jurisdiction.
- b. Verify that coating and supplemental products are within acceptable shelf life, and do not utilize any product that is older than the maximum shelf life stated by the manufacturer.

D. Extra Materials:

- a. Furnish extra materials. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- b. Furnish Owner with sufficient additional smoke & odor sealer to address an additional one percent of overall surface area, but not less than 1 gal (3.8 l), pail (19 l), or 1 case, as appropriate and collectively agreed upon in advance of substantial completion.

1.06 JOB CONDITIONS

A. Environmental requirements

1. Installer should keep a log of environmental site conditions during the project and provide that to Owner or their agent upon substantial completion.
2. Comply with manufacturer's recommendations as to environmental conditions under which coating systems can be applied.
 - a. Temperature:
 - i. At Application: Surfaces to be coated and ambient air temperature shall be between 45° F (7.2° C) and 100° F (38° C). Do not apply at temperatures beyond those limits.
 - ii. After Application: Site temperature shall remain within the manufacturer's acceptable range for no less than ten (10) days post-application.
 - iii. Fluctuating Conditions: Supply of air movement may be recommended to aid curing when site conditions are minimal for application.
 - b. Humidity:
 - i. Ideal humidity for encapsulant application is 40-50% Relative Humidity (%RH).
 - ii. Humidity in excess of 70% RH will slow the drying and curing of encapsulant coatings. Supply of air movement may be recommended when site conditions are minimal for application.



- iii. Do not apply when the Relative Humidity is above 85% or when the Dew Point is closer than 3 degrees to the ambient air temperature.

3. Surface/Substrate Moisture:

- a. Do not apply smoke sealer to wet surfaces. Surfaces may be lightly damp to the touch. At no time should coatings be applied where significant topical moisture is present (such as droplets, “beading” water). Applicators are expected to account for slow-drying surface elements (such as shaded areas, hairline cracks, nail holes)¹⁰.
- b. Review carefully and comply with manufacturer’s permissible maximum moisture content (MC%) for product and substrate combinations where entrained substrate moisture could influence curing and performance, especially when trapped substrate moisture will attempt to escape or balance in future, such as when influenced by radiant heating/cooling cycles (or other similar causes of “vapor drive”).
 - i. Fireproofing will not generally be a moisture content concern, but causes such as roof leaks or when building systems have been inoperable for extended periods of time can create unusual moisture conditions. When reasonable causes are known or suspected conduct a moisture content survey including both fireproofing and underlying substrates
- c. Moisture content readings taken should be recorded alongside other notes on environmental site conditions in the applicator’s project log.
- d. For all products, prevent wide temperature fluctuations that could cause moisture condensation on freshly coated surfaces.

B. Surface Protection/Prevention of Cross-Contamination:

- 1. Cover or otherwise protect finished work.
- 2. Do not apply coatings in areas where dust or other airborne particulate matter is being generated.
- 3. Avoid cross-contaminating sealed areas with dust. Such particulate may contain asbestos, lead and other hazardous contaminants. These contaminants may bias clearance testing as well as introduce unwanted and potentially health-affecting substances.

A. Worker Safeguards: Shall exceed activity-specific requirements as promulgated by OSHA and relevant AHJs. To include but not limited to:

- a. Provide adequate illumination (Maintain minimum 80 footcandles (861 lx) on surfaces to be coated) and ventilation during application.



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- b. Utilize adequate engineering controls to ensure worker and occupant safety and health and prevent cross-contamination by satisfying requirements of regulations for relevant AHJs.
 - i. Engineering controls may include, but are not limited to, source containment, isolation barriers, pressure differentials, dust suppression, and high efficiency particulate air (HEPA) vacuuming and filtration.
 - c. Contractor is to ensure and document provision with and training for use of all necessary Personal Protective Equipment (PPE).
 - i. No other party shall be responsible for failure of Installer to properly equip and train workers with PPE.
 - B. Damage: Each Contractor and Subcontractor shall be held responsible for and shall pay for all damage to or soiling of other work caused by its work or operations.
 - a. Maintain adequate safeguards concerning the premises and protecting the public from hazards associated with the work of this Section.
 - b. Post work site signage.
 - c. Ensure that site and on-site supplies are secured, locked, wheels chocked, powered down and protected against accident, intrusion, vandalism, and curiosity.



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PART 2 – MATERIALS AND MANUFACTURERS as Basis of Design

2.00 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer

- a. Sentinel Products, Inc., 8901 Wyoming Ave. N., Brooklyn Park, MN 55445
- b. PHONE: 763-571-0630
- c. FAX: 763-571-1819
- d. EMAIL: getinfo@senpro.com

B. Substitutions:

- a. Only with advance written consent of MIPs
- b. See above Section 1.04, and provisions of 01 60 00 – Product Requirements
- c. See below Section 2.02 for functions and characteristics a substitution may need to match.

2.02 ACCEPTABLE SMOKE & ODOR SEALER, ENCAPSULANT/PRIMER [or equal]

A. Basis of Design: FORMULA 538 SEALER/PRIMER ODOR ENCAPSULANT™ [or equal]

B. Specific Objective of Installation:

- a. Intended for use after cleaning as a topically applied opaque white¹¹ sealer to:
 - i. lockdown residual/non-removable particulates,
 - ii. prime
 1. to enhance adhesion on less than ideal surfaces,
 2. block migration of underlying stains, and,
 - iii. inhibit future release of smoke odor from the preceding combustion event.
- b. SEE SECTION 3 RE: SFRM (Fireproofing) FOR INSTALLATION GUIDANCE
- c. SEE SECTION 3 RE: HVAC (ACS Air Conveyance System) FOR INSTALLATION GUIDANCE



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- d. SEE SECTION 3 RE: HARD NON-POROUS STRUCTURAL SURFACES (GYPSUM WALLBOARD) FOR INSTALLATION GUIDANCE
- e. Recommended for cleaning and deodorizing as odor counteractant
 - i. Sentinel 522 Cleaner and Odor Destroyer™ [see section 2.02.D]

C. Performance and Design Requirements/Key Attributes for Specifier

- a. Category Type: Styrene Acrylic Copolymer, water-based emulsion
- b. Physical State: Liquid, Paint-like
- c. Exposure: Interior. Check with manufacturer before using outdoors
- d. Viscosity - Stormer viscosity (KU): 95-105
- e. pH - Neutral Range: 8.25 – 9
- f. Solids Content
 - i. NV% (by wt.): 36.97%
 - ii. NV% (by vol.): 25.94%
- g. Miscible (with water or other solvents): Yes. Clean, potable, ambient temperature water only. See 2.02 Mixing – as a penetrant.
- h. Color: See 2.03 and 2.04 for additional information
 - i. Wet (unapplied): White
 - ii. Dry film: White
- i. Gloss (60°): Eggshell
- j. Permeability (1 coat): Extremely Low [RESERVED]
- k. Boiling Point: 212°F
- l. Flash Point: None to boiling
- m. Relative vapor density at 20 °C : Heavier than air
- n. HMIS Rating (Hazardous Material Identification System) Rating: 1
- o. Hazardous or Degrading Constituents
 - i. Volatile Organic Content (VOC), ASTM D3960: < 5 g/L (Calculated) [A zero V.O.C. coating by industry standard means the product contains less than 5 grams of V.O.C.'s per liter. Tints and colorants may add V.O.C.'s to the product.]



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- ii. Hazardous Air Pollutants (HAPS) none
 - iii. Solvents none
- p. Fire rating, ASTM E84
 - i. Flame Spread Index (FSI) 0-Class A
 - ii. Smoke Developed Index (SDI) 0-Class A
- q. Odor: Slight
- r. Changes Acoustical-Sound Deadening Properties: No
- s. Dry Time @70 - 77°F, 50% RH:
 - i. Touch: 2 hours
 - ii. Recoat: 4 hours
- t. Shelf Life: 36 months
- u. Freeze-Thaw: DO NOT FREEZE
- v. This product is acceptable for use inside HVAC systems. For information on proper use of chemicals and coatings inside of HVAC systems, consult the manufacturer and review the most recent guidance from the [National Association of Duct Cleaners of America \(NADCA\)](#).
- w. CPVC Compatible:
 - i. When CPVC compatibility is a concern, use a straight edge when spraying to avoid contact between sealer and surface (such as when sealing fireproofing). Incidental contact allowed with certain brands CPVC pipe.
 - ii. Spears® laboratory testing has shown these products to be compatible with satisfactory performance in normal installation of CPVC products. However, the potential for compatibility problems can be present in installations where CPVC materials are highly stressed. Proper installation is essential.
 - iii. Not yet rated with FBC system.
- D. Sentinel 522 Cleaner and Odor Destroyer™ (cleaner & odor counteractant)[or equal]
 - a. Sentinel 522 Smoke & Odor Cleaner & Destroyer is a professional strength, cleaner and odor control product used to clean surfaces and destroy odors, especially those caused by smoke
 - i. Alt: Sentinel 522RW Smoke & Odor Destroyer Restoration Wipes
 - ii. Performance Characteristics
 - 1. Non- flammable
 - 2. Suitable for all indoor and outdoor cleaning
 - 3. This product may be used for residues from structural fire or wildfire.
 - 4. Odor destroying on hard or soft surfaces,such as, floors, walls, ceilings, carpets, upholstery and other surfaces.



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5. Safe for ULV fogging applications

- a. ULV: use undiluted or up to 32 oz. of Sentinel 522 to 1- gallon of water.
- b. Thermal Fog: No.

iii. General Mixing Guide and Directions for Use:

1. (For low pressure sprayers & bucket cleaning:

- a. Heavy Soils & Odors: 8 -10 oz. of Sentinel 522 to 1- gallon of water.
- b. Medium Soils & Odors: 3-6 oz. Sentinel 522 to 1- gallon of water.
- c. Light Soils & Odors: 1-2 oz. Sentinel 522 to 1- gallon of water.
- d. For Bucket Cleaning: wipe surface to be cleaned and or deodorized with a damp towel or sponge.

E. Sentinel Direct-To-Metal DTM ¹²Primer

2.03 COLORS

- A. White (this specification)
- B. Clear (request specification)
- C. Natural Wood (request specification)
- D. Colors Other Than Standard:
 - a. Do not add more than two-ounces per gallon of universal liquid colorant when tinting to custom colors.
 - b. Medium and deep-base tints are not possible without changing the performance characteristics.
 - c. Tinting should only occur at a paint store or similar acceptable to the manufacturer and conducted by experienced staff.
 - d. The manufacturer is not responsible for fading, or other deterioration of custom-tinted coatings.
 - e. Field tinting is not permitted, unless expressly instructed in writing in advance by the manufacturer.

2.04 MIXING

A. GENERAL MIXING INSTRUCTIONS:

- a. Accomplish job mixing and application only when acceptable to the Owner/GC/Architect/Engineer.
- b. Mix components only in containers furnished or approved in writing by the Manufacturer.
- c. Cleaning/Odor Counteractant Solution Management
 - i. Dilution only by designated personnel.



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- ii. Solution to be kept clean and mixed fresh weekly.
- iii. Dispose of cleaning solution per building procedures and supervisor instructions
- iv. Label all containers of mixed solution with workplace label provided by manufacturer. Note solution dilution ratio and mix date on label with permanent marker.

B. FOR USE AS A PENETRATING TREATMENT (see 3.03 below for additional information):

- a. Dilute only with clean, potable, ambient temperature water.
 - i. Dilution ratio will be project specific, however the following dilutions are common:
 - 1. 1:1 (1 part coating + 1 part water) [can be referred to as 50%]
 - 2. 2:1 (2 parts water + 1 part coating) [can be referred to as 33%]
 - 3. 3:1 (3 parts coating + 1 part water) [can be referred to as 75%]
 - ii. Do not follow this dilution schedule when using solvent-based smoke sealers. There is a legacy/history of sealing fire/smoke damage with oil-based stain-killing primers, and/or alcohol-borne shellac. However, SFRM is likely to deteriorate when in contact with strong solvents.
- b. Mix with paddle on electric drill or equal.
 - i. Hand mixing to disperse bridging encapsulant into penetrating encapsulant may be insufficient or time consuming.

SPECIFICATION CONTINUES IN PART 3



PART 3 – EXECUTION

3.01 PURPOSE, EXAMINATION, SITE CONTROLS, REQUIRED PRACTICES

A. PURPOSE

- a. This specification describes the remediation steps to clean and deodorize SFRM (Sprayed Fire Resistive Material), and then apply a smoke and odor sealer. Cleaning removes contaminants that could be an irritant and accomplishes some deodorization by eliminating sources of smoke odor. However, for this project, there is a reasonable presumption that some combustion particulate (CP) cannot be completely addressed by surface cleaning, that not all discoloration is correctable, and future odor can be better controlled by using a sealer. To maximize the deodorization process, a sealer system will inhibit the future emission of smoke odor. Sealers will also lockdown residual particulates, and perform as a primer to retard stains.
- b. The purpose of the cleaning and sealing process is to assuage owners' and occupants' odor, comfort or health concerns. To achieve these goals, all cleaning and sealing efforts must be VERY thorough and detailed. Smoke contamination cannot be reliably removed unless all dirt, dust, and debris has been removed from every surface within the workspace; and, all to-be-sealed surfaces are consistently coated with a continuous application of the specified sealers. Smoke and odor reduction projects are challenging because even one missed area, even of small size, can be the source of noticeable future odor. Work must be professional, careful, documented and tested before build-back can take place. In addition to evaluations and record-keeping required of the Restorer, it is recommended that there will be independent testing conducted to verify the sequence of tasks has been completed properly, and is successful. It is imperative that testing is passed, MIPs express olfactory and aesthetic satisfaction, and recordkeeping documentation is provided before payment can be released (substantial completion criteria as agreed before start of work).
- c. Restorers are encouraged to copy from here into Restoration Work Plans (RWPs).
- d. Different structural surfaces, as well as for HVAC, have adjusted instructions. The instructions in this specification are emphasized for SFRM, but there is some information for other surfaces.
- e. Standard of Care: In early 2025, the IICRC had announced the imminent publication of the new and first-of-its-kind independent and ANSI accredited standard: ANSI/IICRC S700 Standard for Professional Fire and Smoke Damage Restoration. Restorers using this specification should review the S700 Standard, and seek out training to this new guidance document as it represents the current Standard of Care.



f. [RESERVED]

g. [RESERVED]

B. PRE-WORK VISUAL INSPECTION

- a. Examine areas and conditions in which smoke odor sealer coatings will be installed. The purpose of the visual inspection is to evaluate existing surface conditions and overall stability of material. If the surface cannot be put into an acceptable condition, do not proceed. This includes if substrate preparation can be achieved safely, and in compliance
- b. Do not proceed with installation until unsatisfactory conditions (e.g., inadequate cleanliness) have been corrected (ALSO see COORDINATION above in Section 1.

- A. Owner's agent immediately upon determination that surfaces scheduled to receive coating are unacceptable.
- B. Work should commence only after conditions have been corrected and approved by all parties.
- C. Preparation and application will be considered as an acceptance of surface conditions.
- D. [RESERVED]

c. PERSONAL PROTECTIVE EQUIPMENT

- A. All personnel MUST wear PPE at all times while in the affected uncleaned/not-yet-cleaned areas. PPE for cleaning personnel includes; protective suits, gloves, and respiratory protection.
- B. Sealers are water-based and low-odor, so applicators will determine PPE based on a combination of spray equipment, size of space and other factors; but eye, dermal, and respiratory protection shall be assured by Restorer.

C. PRE-WORK SURFACE ASSESSMENTS:

- a. SUBSTRATE STABILITY (DEGREE OF DETERIORATION, SUITABILITY OF PURPOSE):
 - A. PHYSICAL STABILITY: SFRM surfaces may appear intact, but within the fireproofing the bond between certain elements can be compromised. While mindful of generating and cleaning up airborne fibers that can minimally occur, the MIPs should select an expert (which may be installer) to conduct common-sense evaluations that stress the adhesion and cohesion of the surface (e.g., gentle tapping with a rubber mallet).
 1. For Sprayed-Fire Resistive Materials (SFRM, aka Fireproofing), all parties should agree to performing the "pull



test” – the ASTM E 736 *Cohesion/Adhesion of Sprayed Fire-Resistive Materials*.¹³

- B. PILOT/SAMPLE/TEST/MOCKUP: Described at 1.03.b of this specification.
- C. WATER-BREAK & pH TESTS: To check for unseen adhesion-preventing factors (such as hydrophobic (water repellent, oily contamination); and high or low pH), perform pH and water-break tests, especially where these conditions are probable to expect.¹⁴

3.02 PREPARATION OF SURFACES, SITE CONTROL

A. SITE CONTROL:

- A. Unimpeded movement of particles should be assumed to include contamination, and therefore containment of the work area shall be established, and kept in place until MIPs concur substantial completion has been achieved.
- B. It is recommended that containment continue for the duration of the source removal process as long as:
 - i. as particulate redistribution is a concern.
 - ii. Demolition of combusted contents and structural elements
 - iii. Cleaning (including gentle to aggressive methods, e.g., wiping to blasting)
- C. Personnel will maintain negative pressure in contaminated work areas, when directed. Positive pressure may be used to protect clean areas from cross-contamination

B. SURFACE PREPARATION

- a. Dry Cleaning: Dry clean surfaces to remove gross amounts of combustion particulate. Permitting excess combustion particulate to remain on the surface can compromise performance of the smoke and odor encapsulant/sealer.
 - i. Remove loosened particulate by vacuum with a HEPA vacuum and brush (to agitate contaminants up and into the air stream).
 - ii. SFRM SAMPLE PROCEDURE; *“Repeat vacuuming and wiping stage three (3) times in heavily contaminated areas, repeat two (2) times for all others. (verify with supervisor amount of rounds). Vacuum brushes MUST be changed BEFORE the final vacuum step”*



- iii. For mostly non-adhered residues (and especially hard, non-porous surfaces), the restoration personnel can use cellular sponge, towelette/wipe, feather duster, microfiber cloths, lint roller.
 - 1. Cleaning putty (e.g., absorene, magic eraser) may be the most effective method/tool for ceiling tile, paintings, window shades, blinds, lamp shades, tapestries, ornamental wallcoverings.
 - iv. To continue cleaning dry, but for more stubborn residues manual abrasive techniques may include steel wool, abrasive pads, wire brushing, scraper, etc. These techniques should be used carefully because removal of residues may also irreversibly change surface appearance and properties.
 - v. Dry methods that are aggressive can generate substantial airborne material. The resulting challenges to containment and PPE should be considered carefully.
 - 1. When sealer is to be used on concrete, wire brush all concrete,
 - 2. HEPA vacuum resulting dust.
 - 3. Check with a pH pen or similar to ascertain where surface is sufficiently neutral to accept the water-based sealer.
 - 4. New concrete must have aged no less than 28 days before accepting any coating.
 - vi. Laser ablation generates harmful fumes and particulates, necessitating effective fume extraction systems to protect operators and maintain a safe working environment. Implementing these systems adds to the operational costs and logistical challenges of laser ablation processes.
- b. Char Removal: (Generally for Structural Wood only)
- i. SFRM does not normally char, but any combustion residue that appears to exhibit like char (e.g., does not wipe away as soot), should be cautiously treated as compromised and unsuitable for a cleaning-sealer approach. Consult with SFRM manufacturer regarding feasibility of removing “charred SFRM”, and a certain distance beyond the “char” in order to execute patching new SFRM that will restore contiguous fireproofing.



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- ii. When significant loss of surface and integrity of a wood structural element is not a risk, then char up to ¼ inch thick can be removed, and the wood then cleaned and sealed.
 - iii. Sealer should not be applied over charred wood that has not been abraded to remove as much charcoal as possible, cleaned, and treated with a desorbent or liquid smoke odor counteractant.
- c. Wet Cleaning: Typically wet cleaning is conducted either after dry options have been used as much as effective, or after surface examination determined dry methods would be ineffective. To determine which liquid method is to be used, test various products for their efficacy.
 - i. Do not wet clean fireproofing unless circumstances make it necessary.
 - ii. It may be necessary in localized areas to wet clean SFRM to remove combustion particulate from surfaces of SFRM. Clean outermost surfaces only. Take care not to saturate SFRM.
 - iii. This is a damp, very-low moisture cleaning treatment by wiping. Because airborne combustion particulate cross-contaminating areas outside of containment is a potential concern, all surfaces where very friable, these areas should be wet wiped with clean rags/towels and minimal moisture and detergent and odor counteractant. Wiping media should be discarded properly and replaced frequently to avoid moving contaminants from area to area, rather than removing contaminants from the substrate.
 - iv. Using a cleaning solution that provides odor reduction and contaminant removal simultaneously can reduce cost for labor and timeline for projects by b e
- d. Regarding other structural surfaces, combustion particulates for low temperature fires, or when more than one floor or other significant distance from the seat of the fire, will result typically in PICs (products of incomplete combustion) that are more adhered and require a wet cleaning step:
 - i. Use dual function soot cleaner degreaser & odor counteractant, as specified in Section 2.02 of this specification [or equal].
 - 1. Dilute and mix per 2.02.D; or,
 - 2. Use pre-soaked towels with same chemistry as cleaner/odor counteractant¹⁵
 - ii. Wipe concrete with towel and degreaser.
 - 1. Procedure: Wipe concrete with towel and degreaser.
 - 2. Submerge towel in cleaning solution (degreaser), then remove and completely wring out the towel.



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3. Fold towel into a square, wipe with a clean side, then unfold towel to a clean side for each additional wipe until all sides are used.
 4. Direction of cleaning should always be top to bottom
 5. When bucket cleaning, once a towel has been used: **AT NO POINT SHOULD A TOWEL BE PLACED BACK IN THE CLEANING SOLUTION AFTER BEING USED.** It will be thrown away.
- e. Remove hardware, accessories, plates and similar items that cannot be coated, or protect in place. Such surfaces will need to be cleaned off-site or in place to remove combustion residues.
 - f. Gaps and junctions of surfaces and structural elements may be too large for a coating too bridge once dry. These micro-cavities can contain PICs and emit smoke odor indefinitely. Similar to best practice in painting, it is advisable to seal such areas with foam (appropriate SPF can foam) or caulk. Note that foam is typically more permanent and less vulnerable to future shrinkage than caulk.
 - g. Rusted metal will need to be primed. The specified sealers are an excellent stain blocker for water and general combustion discoloration, but spot priming of metal will be needed when rust is present. When possible to ensure compatibility, use direct-to-metal specified in Section 2.02.E.
 - h. HVAC Cleaning: [A specialist in cleaning and remediation of air handling systems should be directed to add/subtract to these general cleaning steps, as determined necessary by the Restorer and MIPs.]:
 - i. HVAC soot remediation will require isolation of the system from the structural remediation phases.
 - ii. The HVAC project plan will account for
 1. Containment
 2. Particulate Collection
 3. Controlling Odors
 4. Component Cleaning
 5. Air distribution devices (registers, grilles & diffusers)
 6. Air handling units



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7. VAV, Dual duct boxes, blowers and exhaust fans

8. Service Openings

iii. The HVAC project plan will accomplish:

1. Clean all air handling units (AHU) internal surfaces, components and condensate collectors and drains.
2. Put operative drainage system in place prior to beginning wash down procedures.
3. Clean all coils and related components, including evaporator fins
4. Solution mixing, disposal, workplace label – see hard surfaces above
5. Create service openings as necessary to accommodate cleaning of otherwise inaccessible areas.
6. Mechanically clean all duct systems to remove all possible visible contaminants
7. Consider using extension wands/poles and other HVAC tools to clean inaccessible surfaces of shafts and ducts.
8. Capture contaminants at selected registers/grills/grates; block off those not needed for cleaning
9. [RESERVED]

3.03 APPLICATION

NOTES ON SEALER APPLICATION: [This section insert informs the user about the overall features, functions, benefits and limitations of sealers used to control odor, especially for combustion byproducts. This is not specifically for SFRM. This information may be useful for training restorers, and/or providing knowledge to owners and other MIPs. When incorporating pieces of information from this specification into an RWP (Restoration Work Plan), this insert is typically dropped.]

In the aftermath of structural fire and wildfire, it is not always possible to remove all the damage, and there can often be residual contamination despite best efforts and methods at removal by cleaning. For these projects, deodorization is crucial, and one of the techniques available to the restorer after all feasible cleaning, is to apply an opaque or clear sealer.



In the disciplines comprising professional fire/smoke restoration, application of sealers (which are specifically designed for the purpose of sealing against smoke odor, not just stains) has been an available practice for almost three decades. Both the existing Guidelines for Fire and Smoke Damage Repair (NIDR/ASCR 1997, 2003; RIA 2007), as well as the new industry Standard from the Institute for Inspection, Cleaning and Restoration Certification (IICRC S700 Fire, 1st ed., 2025) describe that sealers may be used when non-removable contamination remains after cleaning.

THREE PURPOSES OF SEALERS

Sealers are frequently used for one or more of these three purposes:

- block/inhibiting transmission of future odors
- stain blocking (bleed-thru of heat and smoke discoloration, as well as wood resin (tannin) bleed-thru)
- lockdown of non-removable residuals after all other restoration processes

LIMITATIONS OF SEALERS

However, it is important to recognize that sealers have inherent limitations:

- A smoke sealer can only seal what it is atop, and against odors are moving in the direction blocked by the barrier formed by the sealer.
- A smoke sealer must be a contiguous film without gaps or holidays. Even pinholes can transmit odor. Inadequate or insufficient coverage will result in the failure to block smoke odor emissions.
- In some situations, more than one application of a sealer may be required for satisfactory results
- A smoke sealer should be used in conjunction with foams, caulks and similar solutions for surface profiles too large for a coating to bridge^{xvii}.
- It is recommended that the use of clear sealers be applied only on those surfaces where a white finish would be (cosmetically) inappropriate. Close inspection, often aided by spotlight, magnification, and paint gauge is often required for verification of the thorough application of clear sealer.
- Sealers may be useful for cleanable, closed-cel sprayed polyurethane foam (SPF). Other types of insulation (such as fiberglass batt, open-cel, rock wool, etc.), are too difficult to clean, and cannot be bridged by any coating to achieve an uninterrupted coating film.

SELECTION OF SEALER TYPE (alcohol-based shellac, alkyd/oil-based, water-based, fixatives):

Considerations should be made as to the surface and intent for using a particular type of sealer prior to the application including but not limited to:



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- Surface & Site conditions — for example, in conditions consistently below freezing, only alcohol-based shellac may be applicable. However, persistent odor and low ignition temperature may in normal conditions preclude the use of shellac.
- Degree of surface adhesion — surfaces should be dry, clean, and clear of untreated combustion particles, rust (untreated rust may continue to degrade metal under the sealer coating), grease, wax, oil, and mold;
- Appearance — application of tinted sealers on unfinished building surfaces permanently alters the visual appearance; and
- Degree of vapor permeability of various materials – Typically water-based sealers are the type least-likely to trap moisture, cause hidden condensation, and lead to mold and rot.

For more information on the advantages and limitations of sealer types: *An Introduction to Sealers Across Restoration*, Cleaning & Restoration Magazine, Cole Stanton (May 2023)

<https://www.candrmagazine.com/an-introduction-to-sealers-across-restoration/>

3. APPLICATION

A. VERIFICATION OF CONDITIONS

1. Apply only after the surface has been examined, assessed, prepared, cleaned, and dried, as outlined in the surface assessment and preparation sections of this specification, as well as relevant guidance on product label, and technical data
2. Installer is responsible for daily verification of jobsite environmental conditions when application is to commence. This quality control check should be documented.

B. PREPARATION AND UTILIZATION OF PENETRANT STEP

1. A penetrating treatment is not necessary for SFRM which is very dense, very smooth and offers a profile much like concrete. Once established by a mockup that this is the case, and there is consensus in writing among the MIPs, the penetrating treatment can be omitted from the RWP.



C. GENERAL INFORMATION RE: PENETRATING STEP

1. The primary role of a penetrating encapsulant is to get resinous material, once sprayed via capillary action, to “soak” up/into dimensionally unstable substrates – imparting the ability to bear the weight of the contiguous coat of smoke and odor sealer

a) Alternate: Penetrating Encapsulant (or Treatment) will solidify unstable SFRM into something that can be encapsulated.

2. This specification is intended to cover a “clean for paint” (see pg 2) approach to smoke impact across a range of the most popular commercial-density, dry-mix, spray-applied fire-resistive materials (SFRM) that provide fire protection for structural steel and concrete in commercial construction. While the current generation of SFRM are asbestos-free, they are so similar in many physical properties that the same technique developed decades ago to encapsulate ACM (Asbestos-containing Materials) is readily usable to paint cleaned but smoke-impregnated SFRM with a sealer. The same terminology is used: after preparation, this is a two-step application: penetrating then bridging.

a) A lockdown encapsulant is not to be used as a penetrating treatment. A lockdown encapsulant has insufficient resinous solids to stabilize the friable substrate material.

b) Do not substitute an encapsulant for lead-based paint. These products are not formulated for dilution, among other features making them unsuitable.

c) Do not use bridging encapsulation coatings formulated for asbestos abatement.

d) Full-strength smoke & odor sealer encapsulants are typically too viscous and lack sufficient vehicle to yield capillary action that yields penetration, and stabilization of the surface.

3. NOTE: Not all smoke & odor sealers are “miscible”, i.e. can be diluted. Often products specialized for demanding service environments are not formulated to be miscible/dilutable. If a manufacturer label does not offer dilution instructions specifically to use as a penetrant, then do not dilute.

D. PREPARATION AND UTILIZATION (The following section follows the instructions for use for the 538 White product listed in the Basis of Design).

1. Dilute only with clean, potable, ambient temperature water.



a) Dilution ratio will be project specific, however the following dilutions are common:

(1) 1:1 (1 part coating + 1 part water) [can be referred to as 50%]

(2) 2:1 (2 parts water + 1 part coating) [can be referred to as 33%]

(3) 3:1 (3 parts coating + 1 part water) [can be referred to as 75%]

2. Mix completely with paddle on electric drill or equal.

a) Hand mixing to disperse may be insufficient or time consuming.

3. Stability of Mixed Solution

a) The product in the Basis of Design (e.g., 538 White in Section 2 of this specification) is formulated to be miscible, and resist separation for the workday (10 hours), but best practice is to apply penetrating step as soon as possible after mixing.

b) If application is paused overnight, remix with drill paddle thoroughly in the morning for at least 5 minutes per pail. It is not unusual to see solids drop out of solution, while resins remain mixed.

(1) Boxing to Remix:

(a) When remixing box between two pails so any solids can be assessed visually, and possibly scraped back into the liquid for remixing.

(b) Boxing will also enable the user to notice and assess when the mixture is partially or entirely unusable. When scraping settled material, use common sense and be conservative regarding whether mixing will completely reincorporate.

(2) Pails of Penetrating Sealer/Encapsulant that have been sitting between use for 10-24 hours might need to be sifted through filtration (e.g., cheesecloth), and solids disposed. Dispose properly of mixed product than has been sitting for 24+ hours.



c) Failure to remix/keep mixed can result in solid contents separating out and accumulating at the bottom of the pail.

(1) Some solid contents allowed to settle at bottom of pail may no longer reincorporate into product. Higher ratio solutions (e.g., 50%, 75%) are more likely to experience a small amount of solid “chunk” or “brick” that will not remix back into solution, and these hard, dense residues may be discarded following local rules for disposal of water-based housepaint.

(2) Solidified contents can clog airless spray tips, and even damage application equipment, including sprayers.

(3) Consult manufacturer before remixing mixed penetrating solution that has frozen.

d) If mixed material does not return to the same consistency and odor as when originally mixed, do not use and replace with fresh material.

(1) [RESERVED]

E. PENETRATING UTILIZATION - APPLICATION

1. SFRM in the work area is clean having used dry processes, escalating to wet methods as needed.

2. Permit surfaces that have been wet cleaned to dry or damp, but not wet to the touch.

3. Penetrating treatments should not soak through all the way to the substrate. That will alter the SFRM-substrate bond. If this occurs, the SFRM will need to be removed and replaced.

a) “Soaking thru” or saturation is especially a consideration with application to fireproofing/soundproofing. Introduction of water-based coating to the site of adhesion of fireproofing/soundproofing to the underlying substrate may change the UL Classification of a known fire rating, into an unknown system. Fortunately, this is highly unusual, and difficult to happen accidentally.

4. Typical Application of Penetrating Step:

a) Apply mixed penetrating solution by airless sprayer (or roller) until surface is visibly coated completely. Coverage, depending on thickness



and porosity of the material, can vary between 50-75 sq. ft./gal (of mixed solution)

b) Multiple passes often will be required, allowing time between passes for dissipation of the solution into the SFRM. Typically, the penetration step of encapsulation can be deemed adequate when a visible glistening effect is observable. Completion is achieved when the SFRM will not absorb any more of the sealer into the matrix.

c) Consider apply bridging step (full-strength laminar final step) ideally when penetrating step has developed a slight tack to the touch by fingertip. This can improve penetration of penetrant already applied.

F. SEALER FOR ODOR CONTROL FOR SFRM (Full-Strength/"Bridging" Step):

1. Apply the full strength Smoke and Odor Sealer in 1-2 applications utilizing the cross-hatch method described above in Section 3.

2. Spread rate, minimum film thickness, porosity, etc, are all dependent on factors unique to each project because every applicator of any drymix, on-site bagged cementitious fireproofing applied as a mixture subject to variables like moisture percentage, ambient temperature, overage, etc.

3. Coverage, depending on thickness and porosity of the material, can vary between 100-200 sq. ft./gal

4. Success to reduce the probability of future smoke odor emanation is contingent on careful application of a contiguous film across all areas of the surface.

5. If the penetrating application was conducted correctly, the porosity of the SFRM should have been reduced such that a single coat of the bridging step will yield a contiguous film.

6. For very rough and irregular surface profiles, consider backrolling immediately after airless spray. For smoke and odor sealers to perform optimally, no voids should persist beneath the dry, cured film.^{xviii}

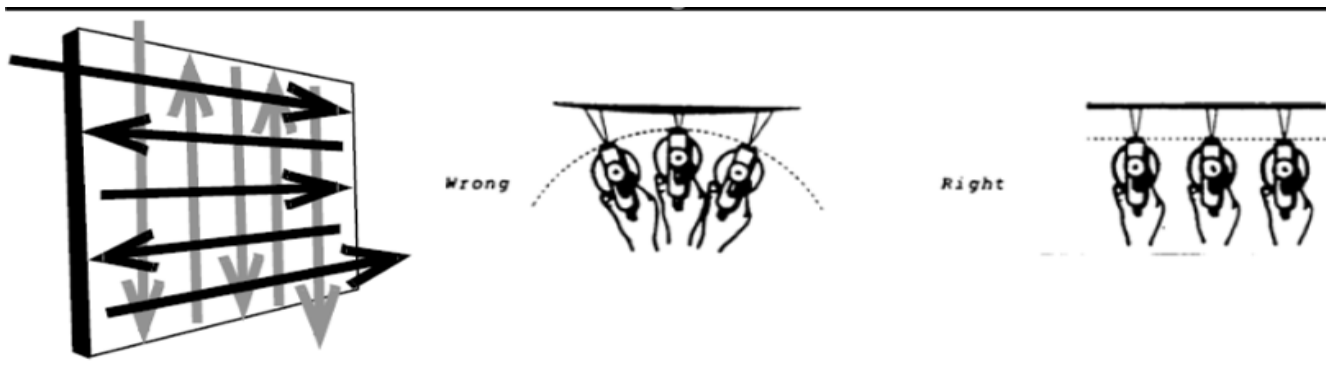
a) Backrolling can eliminate surface issues that can lead to unaddressed odor sources, including holidays, and meniscus-like hold out in larger surface pores that are bridged when wet, but pull back when dry, yielding uncoated spots.



- b) Protect all surfaces not to be coated with any method of application, but provide additional attention when spraying as the atomized mist of coating can spread unpredictably.

7. Methods of Application:

- a) Brush: Apply liberally and uniformly with a polyester or nylon brush
- b) Roller: 3/8"-1/2" nap synthetic
- c) Airless Spray:
 - (1) Mix coating thoroughly
 - (2) Tip orifice size: .015-.019 tip size.
 - (3) Set pressure on sprayer to 2200-3000 psi.
 - (4) Adjust fan size to 3" to 5" which will yield spray pattern of 6-10" (15-25cm)
 - (5) Technique of Spraying - For best results, apply smoke odor sealer coating in sweeping strokes always keeping the tip of the gun parallel to the surface at a distance between 12" to 18" inches
 - (6) With airless spray (preferred method), apply smoke odor sealer in a double crosshatch pattern taking care to deliver a consistent and contiguous wet film to all surfaces. Note that any uncoated surface can provide a significant opportunity for residual smoke odor to release in the future.
 - (7) This technique is slower, requires extra passes and attention, and therefore production rates are lower. However, it may eliminate dry time between coats because proper film build can be accomplished by the cross-hatch.



(8) When using a double cross hatch technique, apply with added angle to the 2nd pass. If necessary, an angular mist coat may be applied to even out irregularities. Generally do not deviate from perpendicular more than 30%.

(9) Best results are achieved when the filter in the spray gun handle is removed. For production work, a front feed gun produces best results. For finish quality application, a coarse filter in a standard gun is ideal.

8. Allow coating to dry until tacky to the touch then inspect for areas where application was insufficient. A consistent contiguous wet film is required to yield a dry film that is a tangible (by touch) membrane effective to retard odor.

9. Consult with coating product manufacturers regarding the wet and dry film requirements product by product. Have wet film gauges provided to supervisors, and encourage frequent (and documented) use.

10. When coating thickness is insufficient once dry, it may be due to not enough product being delivered to the surface, or a porous "thirsty" surface has drawn in the wet coating product. In either case, the results will be a membrane that is not 100% continuous over the high points and low points of the fireproofing (SFRM) surfaces. Remedy with additional application.

11. Additional product can be applied while the first application is still tacky to touch or when completely dry

12. Coverage rate via airless spray will be lower (less square feet per gallon) compared to brush or roller application. While this difference can be as much as 50% less than other methods, adjustment of spray equipment and proper training of applicators can reduce this differential substantially.

G. GYPSUM WALLBOARD (included in this specification because often also present on SFRM projects)



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1. Doublecheck that wallboard to be cleaned and coated is salvageable.
 - a) Thermal Damage: Gypsum wallboard exhibits remarkable fire resistance, but when exposed to intense heat, it undergoes significant damage, including calcination, shrinkage, cracking, and a loss of mechanical strength. The term "thermal shock" is less applicable to gypsum in the traditional sense of a brittle material fracturing from a sudden temperature change, as the material's inherent properties actually buffer against rapid thermal changes.
 2. Combustion Particulates (including Hidden CBP in wall cavities):
 - a) If there is reason to suspect accumulation of combustion byproducts behind wallboard that is thereby unreachable, uncleanable – then restorer should bring this complication to the attention of relevant MIPs. Adjustment of demolition and/or cleaning procedures may be necessary. Continuation indicates acceptance of conditions.
 - b) Prior to sealer application, follow dry/wet surface preparation because gypsum board shares characteristics that lend towards dry cleaning wherever possible, and wet cleaning only when necessary.
- H. HVAC (Interior of Ductwork): (included in this specification because often also present on SFRM projects, e.g., SFRM and HVAC concurrently in plenum spaces)
1. The crucial requirement is to achieve a continuous, uninterrupted film. The thirst, porosity, profile, etc. of fiberglass liner (or fiberboard) can have a significant effect of decreasing square foot coverage per gallon. Contractor should project usage very conservatively, and when possible, conduct a test application to a prepared representative area.
 2. During work, move air (exhausted outdoors when possible), and consider passing air through charcoal or similar odor reduction filters.
 3. HVAC General Procedures (also see general guidance on cleaning HVAC, as found above).
 - a) Clean HVAC system components from point where air enters system to each point where air is discharged from system.
 - b) Clean HVAC system components as indicated on Drawings. j. Clean fan coil units in building. Clean cabinets, coils, and blowers located within fan coil units.



- c) Clean existing supply, return and exhaust air ducts in building after structural soot remediation is complete. During structural and HVAC phases, isolate each from the other using (including) engineering controls, critical barriers, negative and/or positive pressure. Ensure airflow does not cross-contaminate unaffected or already cleaned spaces and systems.
- d) Perform HVAC system cleaning in accordance with ACR, The NADCA Standard.
- e) Remove visible non-adhered substances.
- f) Clean HVAC components employing agitation device to dislodge contaminants from HVAC component airside surfaces, and then capturing contaminants with vacuum collection device.
- g) Acceptable methods include those that do not damage integrity of ductwork and other system components, and does not damage porous surface materials including internal insulation and duct lining.
- h) Clean HVAC components using source removal mechanical cleaning methods designed to extract contaminants from within HVAC system components and safely remove contaminants from facility.
- i) Select source removal methods rendering HVAC system components visibly clean and capable of passing cleanliness verification methods as described in ACR, The NADCA Standard.
- j) Do not employ cleaning method, or combination of methods, that can damage HVAC system components or negatively alter system integrity.
- k) Do not damage HVAC system and components with wet cleaning, power washing, steam cleaning and other wet process cleaning.
- l) Apply cleaning materials in accordance with manufacturer's instructions. [see 2.02.D, or equal]
- m) Do not apply cleaning agents or water to electrical, fibrous glass or other porous HVAC system components.
- n) Capture removed contamination and cleaning materials and legally dispose.



- o) Verify HVAC system surface and component cleanliness in accordance with ACR, The NADCA Standard
- p) Clean blowers, fan housings, ducted plenums, scrolls, blades, or vanes, shafts, baffles, dampers and drive assemblies.
- q) Clean air handling unit (AHU) internal surfaces, components and condensate pans, and drains.
- r) Clean heat transfer coils, fans, condensate pans, drains and similar non-porous surfaces in conjunction with mechanical methods as described in ACR, The NADCA Standard
- s) Isolate coil from duct system during cleaning process. Do not allow removed particles to migrate to, or redeposit on, unintended areas.
- t) Apply coil cleaning products in accordance with manufacturer's published data and labeling.
- u) Clean and flush condensate drain pan and drain line. Verify proper drainage operation before and after cleaning.
- v) Reference NADCA standard for detail re: Type I Dry cleaning method, Type 2 Wet Cleaning Method, duct mounted inline coils, electric resistance coils
- w) Do not employ cleaning methods that damage HVAC components.
- x) Mark position of dampers and air-directional mechanical devices inside HVAC system prior to cleaning.
- y) When cleaning is complete, restore dampers and devices to their marked positions



I. APPLICATION – QUICK REFERENCE TABLE for TYPE of SFRM SUBSTRATE

SFRM Type	Preparation	Consider
Acoustic /Soundproofing, compressed material less than 2 inches thick. Unpainted Texture Finishes.	Dry methods clean safely Penetrating to improve/enhance dimensional stability. . Field test solutions to determine dilution ratio. Typically expect 1:1 or 2:1 (water to 538)^{xix} Bridging (538): 1-2 coats with airless sprayer using cross-hatch technique	• “Pull Test” is important to verify smoke seal generally is serviceable for these surfaces. • Corrugated (or Fluted, Cellular) structure, and porosity of lower density fireproofing will increase quantity of product needed. • Wet wiping will be difficult because inherently unstable friable matrix may come apart. High-foaming hydrogen peroxide cleaner may substitute [for 522] as no-scrub, low-touch cleaning method (e.g., Sentinel 300 EnviroWash Peroxide Cleaner^{xx}). Dislodged contaminants will need to be vacuumed to finish cleaning process
Fireproofing, Lower Density inc “Cotton-Candy”	Dry methods clean safely Penetrating encapsulation to improve/enhance dimensional stability. Field test solutions to determine dilution ratio. Typically expect 2:1 or 3:1 (water to 538)^{xxi}	• “Pull Test” is important to verify smoke seal generally is serviceable for these surfaces. • Corrugated (or Fluted, Cellular) structure, and porosity of lower density fireproofing will increase quantity of product needed. • Wet wiping will be difficult because inherently unstable friable matrix may come apart. High-foaming hydrogen peroxide cleaner may substitute [for 522] as no-scrub, low-touch cleaning



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	Bridging Full Strength (538): 1-2 coats with airless sprayer using cross-hatch technique	method (e.g., Sentinel 300 EnviroWash Peroxide Cleaner). Dislodged contaminants will need to be vacuumed to finish cleaning process
Fireproofing, Medium to High Density	Dry methods clean safely Penetrating encapsulation may need to be field tested to determine mix rate with water for dilution. Depending on circumstances expect 2:1, 1:1, or even less water, but can be less or more.^{xxii} Bridging – Full Strength Smoke Seal (538): 1-2 coats with airless sprayer using cross-hatch technique	• “Pull Test” may not be practical for the cement-like, higher density fireproofing products. See endnote. • Corrugated (or Fluted, Cellular) structure, and porosity of lower density fireproofing will increase bridging encapsulant required for encapsulation. Similarly, when encapsulating pillars, columns, purlins, rafters or beams, the user should anticipate need for additional product because of inevitable “blow-by” when spraying.

J. POST APPLICATION (SITE CLEANING, PROTECTION)

1. All products in this specification are best cleaned up while still wet (up to 2 hours) with a mixture of warm water and mild soap or detergent. For application tools, immerse into soap and water, soak if necessary, and work water-soap through and around all surfaces (such as brush bristles, roller nap).
2. Damage: Each Contractor and Subcontractor shall be held responsible for and shall pay for all damage to or soiling of other work caused by its work or operations.



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3. Maintain adequate safeguards concerning the premises and the public from hazards associated with work of this Section.
4. Post "Wet Paint" signs at surfaces subject to contact.
5. Ensure that site and on-site supplies are secured, locked, chocked, powered down and protected against accident, intrusion, vandalism, and curiosity.
6. Remove spilled, splashed, or splattered coating materials from all surfaces.
7. Do not mar surface finish of items being cleaned.
8. In areas of older buildings where significant paint was disturbed by remediation operations, wipe any occupant-accessible surfaces with manufacturer approved lead-specific surface cleaner .
9. Cleanup tools and other equipment with warm, soapy water before coating dries.
10. Review product labels for proper disposal of unused product and empty containersClean spray equipment according to manufacturer directions.
11. Remove cured coatings using Sentinel 206 Peroxystrip Paint & Coatings Remover.

K. DOCUMENTATION

1. All contractors shall document their work, and supply recordkeeping and documentation to the Restorer when requested during and/or at completion of the work.
2. A legible organized site log/daily activity record
3. Use wet film thickness gauges to monitor coatings. Test surfaces where end brackets are both flush such that all teeth are evenly in contact with wet film. Designate a quality assurance person for all documentation, including taking wet film measurements using a metal wet film thickness gauge, and recording results 2-3x daily in the project log.
4. Document all cleaning and coating with pictures/video, tape lift (before/after with cleaning; for coatings; after with modified X-cut tape test for adhesion – N.B., the x-cut is only practical when the SFRM substrate underneath is of the dense, hard, cementitious type, for more see below).



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- a) “Modified” includes one “X”, 2” x 2” axis, no more than ½” removed away from cut. Some removal expected along cut. Tape should be 6-10”,
- b) Use tape: #311 #3M Scotch High Tack Box Sealing Tape, or equal.

5. Tape test will likely be impractical on irregular profile substrates such as fireproofing and fiberglass HVAC liner. MIPs should determine before project start a consensus for a different QA/QC procedure for such surfaces, and how documentation will be created and maintained.

L. WARRANTY

1. Due to the variable nature of SFRM, any warranty must be determined on a project-specific basis, and owner should not have any expectation of warranty from installer or manufacturer without analysis and consensus prior to bid solicitation.
2. Unpaid invoices void all warranties.
3. Seller makes no warranty, expressed or implied, nor accepts any responsibility for any direct or consequential damages beyond the purchase price because seller cannot control users handling and use, or any consequential effect of that use.

END OF SECTION

This section is provided as a courtesy to the specifier or project designer/manager.

- This section may be included or excluded in the project specific specification at discretion.
- The effective combustion odor and residue encapsulation of any project is contingent upon the competence of the applicator.
- If surfaces are damaged, repair immediately to prevent exposure to potential hazards.
- This specification does not fully describe all the limitations, warnings and precautions related to the products described herein.



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- Reference should be made to the Product Data Sheets, in conjunction with Product Labels, for complete technical information on all products manufactured by Sentinel. Technical Bulletins may also be available.
- Safety Data Sheets (SDS) should be referred to for health and safety information. SDS sheets can be obtained by visiting our website at <https://www.senpro.com/technical-resources/safety-data-sheets/>

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END NOTES FROM WITHIN SPECIFICATION TEXT:

¹ The following list is a more exhaustive citation of the construction specifications that this document can interface with easily, can inform “boilerplate” spec frameworks, and /or building project workplans that this manufacturer (Sentinel) has prior experience. This list remains a work in progress, and integration of this document with any entry on the following list must be the responsibility of the specifier:

- UFGS 02 82 14.00 10 Asbestos Hazard Control Activities
- NIBS/WBDG/UFGS 02 82 13.00 10 Asbestos Abatement
- AIA/CSI 02 82 13.31 Asbestos Transite-Type Abatement
- USACE / NAVFAC / AFCEC 02 41 00 Demolition and Deconstruction

² This specification is in U.S. English. Partial translations may be available. Please contact your Sentinel representative for more information.

³ Whether a penetrating pre-treatment is necessary will be reviewed in Part 3 – Execution.

⁴ Services for consulting, specialized expert, applicator training, specification development and many others can be arranged: COLE STANTON: colettrainstanton@outlook.com or 603-759-8503

ColeTrain Consulting, LLC

Specialized Consulting for Restoration & Environmental Challenges
Independent Estimate Reviews | Expert Witness Services | Customized Continuing Education |
Risk Management | Work Scope & Specifications | Regulatory & Standards Compliance |
Materials & Methods Analysis | Product Research & Development
Chemistry Serving Construction

⁵ In this specification, **shall** is to be interpreted as mandatory not optional, and reflects issues inherently determined by laws (as legislated by humans, or the immutable laws of nature).

⁶ Authorities Having Jurisdiction (AHJ, AHJs)

⁷ Materially-Interested Parties (MIP, MIPs)

⁸ In this specification, **should** is to be interpreted as the installer and specifier conducting project design and execution in accord with the generally accepted standard of care whenever regulatory requirements are not explicit (e.g., placement of a decontamination shower may be only vaguely described in regulation).

⁹ Permanent when properly maintained and repaired when damage results from causes outside normal performance conditions.

¹⁰ Moisture content in different types of structural materials are measured on different scales, and the measurement scales of moisture detection instruments (e.g., moisture meters) can vary among manufacturers of these devices. Consult the

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manual from the moisture meter manufacturer for instructions concerning substrate type and scale of measurement for that material.

¹¹ This specification is for the white finish. This product is also available in clear and natural wood finish formulas.

¹² [Sentinel DTM Direct-to-Metal primer](#)

¹³ Contact Sentinel for more information on how to properly perform a pull test.

¹⁴ For more detail on water-break and pH evaluations check out the [Sentinel BPE Specification](#) in the Technical Resources section of our website. See page 20 top or near [here](#).

¹⁵ Sentinel 522RW Smoke & Odor Destroyer Restoration Wipes offer the same formula as the Sentinel 522 but in a towelette wipe. Each Sentinel 522RW towel is pre-soaked with Sentinel 522 Smoke & Odor Destroyer and is ready-to-use.

Note: For best results, before using this product to rid a space of unwanted odors, first clean the dirt, grease, grime, smoke, and soot from floors walls, ceilings and other surfaces with Sentinel 315 Carbon & Soot Cleaner/Wa