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DIVISION 02 – EXISTING CONDITIONS
 SECTION 02 82 00 ASBESTOS REMEDIATION/ABATEMENT
 SECTION 02 82 13 ASBESTOS ABATEMENT – ENCAPSULATION¹

Sentinel BPE (Asbestos Bridging & Penetrating Encapsulant) as Basis of Design

PART 1 - ENCAPSULATION PROJECT ORGANIZATION & ADMINISTRATION ²

1.00 GENERAL REQUIREMENTS

1.1 SECTION INCLUDES

A. GENERAL –

- a. Provide labor, equipment and materials to complete work involving long-term to permanent abatement of ACM (Asbestos-Containing Materials)³ via encapsulation. A properly planned and prepared encapsulation project can stabilize damaged ACM, prevent deterioration that creates future hazards, and satisfy government regulations for asbestos abatement.
- b. Work included requires management of fiber and particulate release from potentially asbestos-containing materials, and fiber clean-up as necessary.
- c. All construction projects are unique. Asbestos was used in over 3,000 products and can be encountered on the interior and exterior. ACM can be present in new construction, remodeling, renovation, revealed as a consequence of disaster, and in an unlimited variation of circumstances. This specification for asbestos encapsulation is not inclusive of all requirements, methods or procedures that are appropriate or necessary on a particular abatement project.
- d. Not all components with Asbestos-Containing Materials (ACM) are suitable for any encapsulation process, and not all encapsulation systems are applicable even when an ACM-containing component has been deemed suitable for encapsulation.
- e. The completed system will be an opaque white bridging encapsulation. The resulting encapsulation will be a laminar film of sufficient build and cohesion that is no longer friable (from which fibers cannot become airborne, nor are fibers generated by incidental physical contact.)⁴

B. GENERAL – Installer Expectations:

- a. Encapsulation **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;



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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.
- iii. Installer shall be sufficiently trained and experienced, and capable of ensuring that encapsulation 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 for abatement, including selection of materials explicitly formulated for an encapsulation process, and which are sufficiently durable to be considered permanent.⁹
- C. GENERAL - Encapsulation as Abatement for ACM in the United States:
- a. Encapsulation is permanent management-in-place by preparing the work environment and installing specialty coatings intended exclusively for the purpose. Ordinary paint is insufficient in regards to performance to be an encapsulant for ACM in the demanding environments where asbestos was used un buildings.
 - b. Encapsulation is: "Treatment of asbestos containing materials with a sealant material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers. A bridging encapsulant create some membrane over the surface. A penetrating encapsulant penetrates the material and binds its components together." (State of Minnesota)
 - c. Encapsulation is consistent with ¹⁰U.S. federal and state regulations and administrative rules, as a method for abatement which when performed properly can be equally valid as Removal of ACM, or Enclosure of ACM.
 - d. This specification is consistent with USEPA commissioned encapsulation research and agency's guidance publications, including the 1981-1984 seminal study of encapsulant types and performance criteria by Battelle Laboratories.
 - e. For abatement projects, typically it is required that verifying the completion of work is the responsibility of an assessor or inspector that is a third-party. Abatement contractors generally do not or cannot sign-off on their work.

Encapsulation products listed in Part 2 of this specification meet or exceed the performance thresholds developed and described by the U.S. Environmental Protection Agency (EPA)



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1.02 RELATED SECTIONS, REFERENCES, NOTES TO SPECIFIER:

A. Specified elsewhere:

- a. Section 00 26 00 – Hazardous Material Assessment
- b. Section 00 26 23 – Asbestos Assessment
- c. Section 02 82 00 – Asbestos Abatement
- d. Section 02 82 33 – Removal and Disposal of Asbestos Containing Materials
- e. Section 09 90 00 – Finishes
- f. Section 09 91 00 – Painting & Coating
- g. Section 07 81 00 – Applied Fire Protection

B. References

- a. ASTM (formerly American Society for Testing and Materials)
 - i. D 1005
 - ii. D 1212
 - iii. D 1308
 - iv. D 1475
 - v. D 1653
 - vi. D 2370
 - vii. D 2486
 - viii. D 2794
 - ix. D 3273
 - x. D 3274
 - xi. D 3363
 - xii. D 3891
 - xiii. D 3924
 - xiv. D 3925
 - xv. D 3960
 - xvi. D 4060
 - xvii. D 4214
 - xviii. D 4414
 - xix. D 522
 - xx. D 824
 - xxi. E 84
 - xxii. G 154



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b. Asbestos References

- i. Evaluation of Asbestos Abatement Techniques. U.S. Environmental Protection Agency (USEPA, EPA), Office of Toxic Substances, EPA 560/5-86-016, July 1986, Washington, DC[viii]
- ii. Evaluation of Encapsulants for Friable Asbestos-Containing Materials (1981-1984) by Battelle Laboratories, Columbus, Ohio[ix]
- iii. Managing Asbestos In Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials. EPA Office of Pesticides and Toxic Substances. 20T-2003, July 1990.[x]
- iv. Guidelines for the Use of Encapsulants on Asbestos-Containing Materials, Appendix A "A Test Which Indicates Whether Friable Asbestos-Containing Material Can Sustain the Weight of an Encapsulant", by EPA Office of Toxic Substances, June 1981, Washington, DC[xi]
- v. Fire Resistance Directory (BXRH), Underwriter's Laboratories, 2001. Fire-Resistance Ratings – ANSI/UL 263 (BXUV), II General, subsection 6 Exposed Interior Finishes[xii]
- vi. Guidance for Controlling Asbestos-Containing Materials in Buildings. Office of Pesticides and Toxic Substances, EPA 560/5-85-024, June 1985, Washington, DC. (Commonly referred to as the EPA Purple Book). [xiii]
- vii. A Coatings Compendium: Asbestos Encapsulation, by Cole Stanton. Restoration & Remediation, August 2014[xiv]
- viii. The Applicability of TAHPR and NESHAP to Painting Asbestos-Containing Materials (ACM). Texas Department of Health (TDH), Toxic Substances Control Division. ARC010, November 2001. [xv]

C. PUBLIC SECTOR SPECIFICATIONS – Integration Compatible¹¹

- a. U.S. Army Corps of Engineers (USACE) Guide Specifications (CEGS 02080)
- b. USACE Asbestos Abatement Guideline Detail Sheets
- c. United Field Guide Specification (UFGS) 028200

D. NOTES TO USERS OF THIS DOCUMENT

- a. This is a Compendium-type specification. It is supplied in an exhaustive format with the intent of achieving as comprehensive inclusion of project factors as possible. The specifier is not obligated to utilize this specification in entirety, but instead is encouraged to apply those provisions which are applicable to specific projects.
- b. Support is available from Sentinel when site-specific, customized versions of this Specification are needed. Please reach out to Sentinel at:

Sentinel Products, Inc., 8901 Wyoming Ave. N., Brooklyn Park, MN 55445

PHONE: 763-571-0630

EMAIL: getinfo@senpro.com



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- c. This specification may be substituted as an “or equal” methodology with encasement protocols. From the regulatory perspective, encasement is an alternate term usable as a synonym for encapsulation, and encapsulation is the primary/dominant term of both compliance and best practice.
 - d. 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.
 - e. At the end of this document are End Notes, which often include some commercial or sales information that is helpful information, but the specifier has the option to retain the End Notes, keep certain notes relevant to a project, or delete the End Notes altogether. The availability of an End Note is indicated by a numeral. Clicking on that numeral helps the reader jump back and forth between the main text and the note.
 - f. This is a specification prepared exclusively for Sentinel and Sentinel users and specifiers by ColeTrainConsulting (CTC). Services for consulting, specialized expert, applicator training, specification development and many others can be arranged through Restoration Crosscheck at (833) 60CHECK / (833) 602-4325, or (603) 759-8503.
- E. This specification does not include guidance for ACM encapsulation or abatement related to:
- a. Floors/Horizontal traffic surfaces
 - b. Contaminated building contents
 - c. Air Conveyance Systems (ACS), aka Heating, Ventilation, Air Conditioning & Refrigeration (HVAC&R) systems
 - d. Flat and Very-Low Pitch ACM-containing Roofs
- F. Metric Conversions: Metric conversion, where used, is soft metric conversion.

1.03 QUALITY ASSURANCE

- A. DOCUMENTS RELATING TO QUALITY OF WORK: See other cited documents also to be considered incorporated by reference, as listed at REFERENCES at 1.02, B of this specification. Cited Standards below also govern the work:
- a. Occupational Safety & Health Administration (OSHA) Regulations – Safety and Health Regulations for Construction, Subpart Toxic and Hazardous Substances. Title Asbestos. Standard Number 1926.1011
 - b. South Coast Air Quality Management District (SCAQMD): Rule 1113 - Architectural Coatings.



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- c. ASTM E 1494 - Standard Practice for Encapsulation Testing of Friable Asbestos-Containing Surfacing Materials. American Society for Testing and Materials (ASTM)
 - d. Overview of the Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP)
- B. SUPERIORITY: Where contradicted by federal, state, or local laws and regulations, any of the preceding supplant the information in this document.
- C. THICKNESS OF ASBESTOS ENCAPSULATION (per EPA)
- a. Specifications, RFPs, Bid Proposals and Solicitations for encapsulation projects should clearly denote the:
 - i. Gallons/Liters to be applied.
 - ii. Wet film thickness of each application
 - iii. Dry film thickness of each application
 - iv. Coverage Rate per Gallon or Liter
 - b. EPA and Minimum Coverage for ACM Encapsulation:
 - i. Asbestos Encapsulation coatings shall not be applied at a dry film thickness of less than 100 sq. ft./ gallon. To provide insight into resulting thickness, using the product(s) listed in Part 2 as Basis of Design:
 - 1. Wet Film Thickness (WFT): 15-16 mils (381-406µm).
 - 2. Dry Film Thickness (DFT): 6 mils (152µm).
 - ii. This coverage rate is required by this specification to concur with published guidance from the U.S. Environmental Protection Agency (EPA). For more information, see Part 3 of this specification, as well as the label for the encapsulation products listed in Part 2 - Products.
 - c. Specifiers, MIPs, Owners and their agents may elect for several reasons to require during project design a dry film thickness (DFT) considerably thicker than the minimum (which will in turn result in lower yield per gallon and may increase the number of applications). Examples of why greater DFT might be preferred include demanding environments (e.g., marine exposure, high altitude, industrial chemical exposure, anticipated occupant abuse).
 - d. Wet mil film thickness should be measured throughout any encapsulation project using a wet mil gauge or coupon panel.
 - e. Wet film thickness gauges are available upon request and at no charge from the manufacturer of the encapsulant.
 - i. Another method to assure that a minimum dry film thickness is achieved, is to tape a panel ("coupon") (with a predetermined thickness), to the area being coated so that it receives the same treatment as the surrounding area. Once the film dries the panel should be measured again using a micrometer or dial caliper. Subtract overall thickness from the panel



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thickness to determine the dry film thickness. After the project, provide the coupon to the Owner with other project documentation.

D. **WORKMANSHIP:** Apply encapsulants consistent with workmanship that exceeds industry standard-of-care, and the following inadequate defects will not be tolerated:

- a. Runs, and/or "ropiness";
- b. Areas where coating film of bridging encapsulant is not contiguous and consistent in film-build (Thickness);
- c. Less than 100% hide of underlying surface color;
- d. The generation of friable fibers from physical touch;
- e. Post-application delamination or deterioration of the underlying ACM. Either loss of integrity of the ACM matrix from within itself, or detachment of the ACM from the substrate on which it is situated (e.g., fireproofing from a steel beam, concrete deck, etc.) and/or,
- f. Other defects in the final finish will not be accepted.

E. **SAMPLING & MOCK-UP:**

- a. When directed by Architect/Engineer, obtain test samples from a distributor or the manufacturer.
- b. Pilot Application/Mock-Up:
 - i. Upon request, it may be determined necessary to provide a mock-up for validation of performance expectations, and anticipated application workmanship.
 - ii. Prepare surfaces designated for verification of suitability of proposed surface preparation procedures.
 - iii. Ensure test areas are representative in both conditions and number of test locations.
 - iv. Apply bridging encapsulant at specified thickness, and ideally when (if used on project in question) penetrating encapsulation is has developed a tack to the touch by fingertip.
 - v. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
 - vi. Retain mock-up during construction as a standard for comparison with completed work.
- c. Do not proceed with remaining work until pertinent project authority (By Owner, Client, Enforcement Authority, Architect or Engineer), approves the mock-up.
 - i. Standard for Accepting Work: Encapsulated surfaces will be deemed acceptable if among the MIPs, there are no insufficient or excessive application irregularities when viewed in normal lighting.



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- ii. Do not alter or remove mock-up until work is completed or removal is authorized.

F. RESPONSIBILITY FOR SURFACE PREPARATION

- a. If substrate preparation is the responsibility of another contractor, the installer shall notify the owner's agent of unsatisfactory preparation before proceeding.

1.04 SUBMITTALS:

A. Submit electronically under provisions of Section 01 30 00 - Administrative Requirements

- a. Provide URL for most recent encapsulation product literature including.
 - i. technical data/performance testing
 - ii. Safety Data Sheet
 - iii. Warranty and
 - iv. label.

B. Bidders are encouraged to submit materials that meet the Basis of Design.

- a. In order to have a material accepted as an Approved Encapsulant 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 Encapsulants will be by Addendum only.
 - i. Submittals circumventing this process will not be approved and will not be acceptable for inclusion in this project.
 - ii. Alternative/substitution products considered in accordance with provisions of Section 01 60 00 specifications attached by consulting architects and engineers to the overall scope of this project.
 - iii. 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.
 - iv. Substitutions will only be considered for products manufactured by companies of primarily U.S. ownership, and 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)).

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



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- 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. Encapsulants shall not be permitted to freeze on site, and delivery of encapsulant 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, encapsulant and supplemental products, in accordance with requirements of local authorities having jurisdiction.
- b. Verify that encapsulant 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 encapsulant materials. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

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 encapsulant coating systems can be applied.



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- 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 encapsulants 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 encapsulant 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 encapsulants 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).
 - 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").
 - 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.



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- B. Surface Protection/Prevention of Cross-Contamination:
1. Cover or otherwise protect finished work.
 2. Do not apply encapsulants in areas where dust or other airborne particulate matter is being generated.
 3. Avoid cross-contaminating encapsulation 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.
 - 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 abatement work site signage, as described in asbestos requirements.
 - 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 BRIDGING & PENETRATING ENCAPSULANT [or equal]

A. Basis of Design: Sentinel BPE™ Asbestos Bridging & Penetrating Encapsulant [or equal]

B. Performance and Design Requirements/Key Attributes for Specifier

- a. Category Type: Multi-polymer, water-based emulsion of both natural and synthetic resins.
- b. Physical State: Liquid, Paint-like, Thick
- c. Viscosity - Stormer viscosity (KU): 110-120 KU (2328 – 2976 CPS)
- d. pH - Neutral Range: 8.25 - 9
- e. Solids Content
 - i. NV% (by wt.): 55.21%
 - ii. NV% (by vol.): 42.76%
- f. Miscible (with water or other solvents): Yes. Clean, potable, ambient temperature water only. See 2.02 Mixing – as a penetrating encapsulant.
- g. Color: See 2.03 and 2.04 for additional information
 - i. Wet (unapplied): White
 - ii. Dry film: White
- h. Gloss (60°): Eggshell 17.5
- i. Hardness (of Organic Coatings by Pendulum Damping Tests, König pendulum) ASTM 4366 4 seconds



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|---|-----------|
| j. Flexibility - Mandrel bend; 1/8", ASTM D522: | Pass |
| No presence of cracking after bending | |
| k. Density of coating (lbs./gal), ASTM D1475: | 10.7 |
| l. Impact Resistance (inch-lbs); direct, ASTM D2794 | 160* |
| *Max load with no cracking | |
| m. Adhesion tape test X cut (5A best; 0A poorest), ASTM D3359 | |
| i. 4-day dry over gloss alkyd; 8 mils wet/2.3 mils dry | 4A |
| ii. 7-day dry over gloss alkyd; 8 mils wet/2.3 mils dry | 4A-5A |
| iii. 7-day dry over 59% PVC flat; 3 mils wet/1.3 mils dry | 5A |
| n. HMIS Rating (Hazardous Material Identification System) Rating: | 0 |
| o. Hazardous or Degrading Constituents | |
| i. Volatile Organic Content (VOC), ASTM D3960, g/l: 1.16 (calc-ultra-low) | |
| ii. Hazardous Air Pollutants (HAPS) | none |
| iii. Solvents | none |
| iv. Food Qualifications: Sentinel BPE Asbestos Bridging & Penetrating Encapsulant meets the not to contain provisions of 21CFR 189 Substance Prohibited for use in Human Food Requirements (FDA). | |
| p. Flash Point: >199.4°F | |
| q. Fire rating, ASTM E84 (standard flame spread and smoke development) and ASTM 2768 (Extended Duration Surface Burning 30m) | |
| i. Flame Spread Index (FSI) | 0-Class A |
| ii. Smoke Developed Index (SDI) | 0-Class A |

The ASTM E84 and ASTM E2768 were performed by a Nationally Recognized Testing Laboratory (NRTL). This test is parallel to the UL 723 test. The product was applied at a coverage rate of 228 sq. ft. per gallon on inorganic reinforced cement board. The flame spread may vary when applied over other surfaces.

Sentinel BPE Asbestos Bridging & Penetrating Encapsulant meets NFPA 90A and 90B 25/50 requirements

- | | |
|---|----|
| r. Specific Optical Density (Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials) ASTM E662 | |
| Flaming | 23 |
| Non-Flaming | 35 |



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- s. Toxic Gas Generation BSS 7239 (Boeing Safety Standard) <1.75ppm
 See test results grid at the end of this subsection
 Compliant for combustion of Carbon monoxide,
 Hydrogen Flouride, Hydrogen Chloride, Nitrogen Oxides,
 Sulfur Dioxide, and Hydrogen Cyanide
- t. Odor: Slight ammonium (or acrylic)
- u. Changes Acoustical-Sound Deadening Properties: No
- v. Dry Time @70 - 77°F, 50% RH:
- i. Touch: 2 hours
 - ii. Recoat: 4 hours
- w. Shelf Life: 24 months
- x. Freeze-Thaw: 1 cycle
- y. BSS 7239: See complete results below. Fully compliant: <1.75ppm avg

Asbestos Encapsulent

Gas	Test Mode	Dräger Tube	Sample Volume (cc)	Specimen		Average (ppm)
				#1	#2	
Carbon Monoxide (CO)	Flaming	CH20601	1000	10	10	10
	Non-Flaming	CH20601	1000	10	9	9.5
Hydrogen Fluoride (HF)	Flaming	CH30301	2000	0	0	0
	Non-Flaming	CH30301	2000	0	0	0
Hydrogen Chloride (HCl)	Flaming	CH29501	1000	0	0	0
	Non-Flaming	CH29501	1000	0	0	0
Nitrogen Oxides (NO + NO ₂)	Flaming	CH31001	1000	0	1	0.5
	Non-Flaming	CH31001	1000	1	1	1
Sulfur Dioxide (SO ₂)	Flaming	CH24201	1000	0	0	0
	Non-Flaming	CH24201	1000	0	0	0
Hydrogen Cyanide (HCN)	Flaming	8103601	1000	0	0	0
	Non-Flaming	8103601	1000	0	0	0

2.03 COLORS

- A. White
- B. Custom: See 2.04

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.



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- c. Colors Other Than Standard:
 - i. Do not add more than two-ounces per gallon of universal liquid colorant when tinting any encapsulant to custom colors.
 - ii. Medium and deep-base tints are not possible without changing the performance characteristics of an encapsulant.
 - iii. Tinting should only occur at a paint store or similar acceptable to the manufacturer and conducted by experienced staff.
 - iv. The manufacturer is not responsible for fading, or other deterioration of custom-tinted encapsulant.
 - v. Field tinting of the encapsulant is not permitted, unless expressly instructed in writing in advance by the manufacturer.
- B. FOR USE AS A PENETRATING ENCAPSULANT (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%]
 - 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



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PART 3 – EXECUTION

3.01 EXAMINATION

A. PRE-WORK VISUAL INSPECTION

- a. Visually examine surfaces to be encapsulated. The purpose of the visual inspection is to evaluate existing surface conditions and overall stability of the asbestos-containing material. If the surface cannot be put into an acceptable condition, do not encapsulate. This includes if substrate preparation can be achieved safely, and in compliance with all asbestos handling rules in force at the project site.
- b. Notify Owner's agent immediately upon determination that surfaces scheduled to receive encapsulant are unacceptable. Note even with preparation for proper adhesion or subsequent performance, other factors can make a proposal for encapsulation unacceptable.
- c. Work should commence only after conditions have been corrected and approved by all parties.
- d. Preparation and encapsulant application will be considered as an acceptance of surface conditions.

B. PRE-WORK SURFACE ASSESSMENTS:

- a. SUBSTRATE STABILITY (DEGREE OF DETERIORATION, SUITABILITY OF PURPOSE):
 - A. VISUAL INSPECTION: Installer should perform their own visual inspection to verify conditions have not changed since the scope of work was written/most recent jobwalk/etc. Visual inspection is also a critical opportunity to verify that encapsulation and ACM composition and function are not incompatible.
 - B. PHYSICAL STABILITY: ACM surfaces may appear intact, but within the surface the bond between certain elements can be compromised. While mindful of generating and cleaning up airborne fibers that can minimally occur, the Installer should conduct common-sense evaluations that stress the adhesion and cohesion of the surface (e.g., adhesion tape tests on ACM paint, gentle tapping with a rubber mallet on galbestos or transite).
 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*.¹²



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- C. ENCAPSULANT PILOT TEST/MOCKUP: Described at 1.03 of this specification.
- D. 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.
1. Use a pH meter designed for use by professional painting contractors. Avoid pH indicator paper if possible due because of potential for error. If pH paper is the only available technique, affix paper to surface to be tested. A few drops of distilled water are placed on the surface, or apply by spray from trigger bottle, or apply a light splash from a drinking cup. pH indicator paper should be sufficiently moistened for color change, but not washed out.
 2. Hydrophobic: If the water does not break into droplets (i.e., the water scattering from a newly waxed car), then the surface is free from contamination.
 - a. Specifiers and installers should be aware of water- and damproofing treatments, often below-grade and highly water repellent, that either contain asbestos themselves, or the waterproofing is atop as ACM surface. Encapsulating may not be possible, or a special “tie-coat” primer may be necessary.
 - b. Note that ACM that contains Amosite asbestos (also known as “brown asbestos” and considered one of the most hazardous types of asbestos) is almost always highly water-repellent. Consult the encapsulant manufacturer, as it is typically more practical to remove. Amosite makes up about five percent of asbestos materials used in buildings in the United States.¹³
 3. Excess acid or alkaline pH: the ideal pH is 7, which is neutral. Encapsulants can typically tolerate conditions in a “neutral range” of 6-8. If this test indicates conditions below 6 or above 8, then the ACM surface may be too acidic or alkaline respectively. Frequently alkaline surfaces, such as stucco, concrete and block can pose unique circumstances when it comes to properly preparing and encapsulating these substrates. Contact the manufacturer to develop site-specific recommendations.

3.02 PREPARATION OF SURFACES



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- A. All surfaces to be encapsulated should be properly prepared so that all are clean, stable and dry at the time of application.

- B. ACM should be sufficiently intact and free of deterioration such that the barrier formed by the cured encapsulant is stable; or, by using asbestos-safe methods the dimensional stability of the ACM-containing surface can be improved to soundness that can support the cured encapsulation. Stabilization will be referred to in the descriptions of penetrating encapsulation, as well as in encapsulation matrix in the following section. REMINDER – Not all ACM surfaces can be encapsulated. Preparation may be impossible, or the necessary preparation may not be cost feasible or compliant with regulated work practices.

- C. GENERAL CLEANING: Typical Recommended Practices (consider adjustments for every project)
 - A. Initial general preparation is typically to HEPA-vacuum all surfaces. HEPA equipment should employ a bristle intake nozzle fixture or similar to agitate surface contaminants and encourage removal into the airstream suction of the vacuum. HEPA-vacuum may be the only preparatory step required for clean areas of the project.

 - B. The second general step in preparation, and only if necessary, is a damp, very-low moisture cleaning treatment by wiping. Because airborne asbestos fibers are a potential concern, all surfaces where very friable ACM fibers would be rendered airborne by ordinary encapsulation activity (airless spray of penetrating encapsulant), these areas should be wet wiped with clean rags/towels and minimal moisture and detergent. Wiping media should be discarded properly and replaced frequently to avoid moving contaminants from area to area, rather than removing contaminants from the substrate.
 - I. New cementitious materials must cure for 28 days before accepting any water-based coating (including the BPE encapsulant, either as penetrating or bridging, that is the Basis for Design).
 - II. Avoid the following preparation methods unless authorized by the project's MIPs (including possibly local code enforcement), and installer is provided with written authorization (variance):
 1. blowing with compressed/pressurized air,
 2. pressure washing,
 3. "shop vac" or other suction cleaning without filtration capable of capturing ACM fibers & particulate matter,



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4. Washing or other wet cleaning using more than slight amounts of topical moisture.
 - A. Consideration for wet cleaning. Where extensive soot (industrial smoke, automobile-diesel residue) is present wiping media may be premoistened with a mild alkaline detergent solution or degreaser¹⁴.

3.03 APPLICATION

C. VERIFICATION OF CONDITIONS AT APPLICATION START

- a. Apply encapsulant 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.
- b. Application of encapsulant to surfaces that are not clean, dry, and prepared/free from defect, will void all reasonable expectations of performance.
- c. Installer is responsible for daily verification of jobsite environmental conditions when application is to commence. This quality control check should be documented.

D. PREPARATION AND UTILIZATION OF PENETRATING ENCAPSULANT

a. GENERAL INFORMATION RE: PENETRATING ENCAPSULATION

- i. The primary role of a penetrating encapsulant is to get resinous material, once sprayed via capillary action, to “soak” up/into dimensionally unstable ACM – imparting the ability to bear the weight of the bridging encapsulant
 1. In alternate words: Penetrating Encapsulant (or Treatment) will solidify unstable ACM into something that can be encapsulated.
- ii. Penetrating encapsulation is a surface preparation technique, not abatement of ACM. Penetrating Encapsulants provide ACM stabilization, and typically lockdown or bridging encapsulants cannot supply.
 1. A lockdown encapsulant is not to be used as a penetrating encapsulant. A lockdown encapsulant has insufficient resinous solids to stabilize the ACM.
 2. Bridging encapsulants are typically too viscous and lack sufficient vehicle to yield capillary action that yields penetration, and stabilization of the ACM.
- iii. Penetrating encapsulations should be water-based, but approximately 20-30% volume solids in content. However, supplier of penetrating product should provide guidance on whether their product can be diluted on a project-by-project basis



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- iv. NOTE: As of the publication date for this specification, there are no pre-blended/ready-to-use penetrating encapsulation products for asbestos control or abatement. Instead, the installer is expected to dilute the bridging encapsulant following the manufacturer instructions.
- v. NOTE: Not all asbestos bridging encapsulants can be diluted for use as a penetrating encapsulant. Often bridging encapsulants 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.
- b. PREPARATION AND UTILIZATION (The following section follows the instructions for use for the BPE product listed in the Basis of Design).
- i. Dilute only with clean, potable, ambient temperature water.
1. Dilution ratio will be project specific, however the following dilutions are common:
 - a. 1:1 (1 part coating + 1 part water) [can be referred to as 50%]
 - b. 2:1 (2 parts water + 1 part coating) [can be referred to as 33%]
 - c. 3:1 (3 parts coating + 1 part water) [can be referred to as 75%]
 - ii. Mix completely with paddle on electric drill or equal.
 1. Hand mixing to disperse bridging encapsulant into penetrating encapsulant may be insufficient or time consuming.
 - iii. Stability of Mixed Solution
 1. Bridging encapsulants in the Basis of Design (e.g., BPE in Section 2 of this specification) are formulated to be miscible, and resist separation for the workday (10 hours), but best practice is to apply penetrating encapsulation as soon as possible after mixing.
 2. 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.
 - a. Boxing to Remix:
 - i. When remixing box between two pails so any solids can be assessed visually, and possibly scraped back into the liquid for remixing.
 - ii. 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



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and be conservative regarding whether mixing will completely reincorporate.

- b. Pails of Penetrating 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.
3. Failure to remix/keep mixed can result in solid contents separating out and accumulating at the bottom of the pail.
 - a. 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.
 - b. Solidified contents can clog airless spray tips, and even damage application equipment, including sprayers.
 - c. Consult manufacturer before remixing mixed penetrating encapsulant that has frozen.
4. If mixed material does not return to the same consistency and odor as when originally mixed, do not use and replace with fresh material.
 - a. [RESERVED]
- c. PENETRATING ENCAPSULATION - APPLICATION
 - i. Penetrating encapsulations should not soak through all the way to the substrate. That will alter the ACM-substrate bond. If this occurs, the ACM will need to be removed.
 1. "Soaking thru" or saturation is especially a consideration with application to fireproofing/soundproofing. Introduction of water-based encapsulant 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.
 - ii. Typical Application of Penetrating Encapsulation:
 1. Apply mixed penetrating encapsulant solution to the ACM by airless sprayer (or roller) until surface is visibly saturated.
 2. Multiple passes will be required, allowing time between passes for dissipation of the solution into the ACM matrix. Full saturation is achieved when the ACM will not absorb any more of the encapsulant into the matrix.



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3. Apply bridging encapsulant ideally when penetrating encapsulation has developed a slight tack to the touch by fingertip. This can improve penetration of penetrating encapsulation already applied.
- E. BRIDGING ENCAPSULATION - COVERAGE (aka SPREAD RATE, YIELD) for all (unless otherwise noted) BRIDGING ENCAPSULANTS for ACM, Asbestos Abatement
- a. BRIDGING ENCAPSULATION: Dry-Film Thickness for Each Specific Project:
 - i. Successful encapsulation to reduce the probability of future friable fiber generation is contingent on application to achieve a contiguous film across all areas of the surface designated by the scope of work.
 - ii. The necessary dry film thickness of a bridging encapsulant for asbestos containing materials (ACM) will vary from project to project as ACM can have a wide range of characteristics, including density, porosity, and surface profile.
 - iii. All parties should determine and agree to the necessary dry film thickness for any project during the bid solicitation process (See Section 1.03,B of this Specification, used with this section). Ideally, this determination is in consultation with the approved encapsulant manufacturer.
 - iv. Specifications, RFPs, Bid Proposals and Solicitations for encapsulation projects should clearly denote the:
 1. Gallons/Liters to be applied
 2. Wet film thickness of each application
 3. Dry film thickness of each application
 4. Coverage Rate per Gallon or Liter
 5. Volume Solids % of the encapsulation product in submittals
 - b. THICKNESS OF ASBESTOS ENCAPSULATION (per EPA)
 - i. EPA and Minimum Coverage for ACM Encapsulation: Asbestos Encapsulation coatings shall not be applied at a dry film thickness of less than 100 sq. ft./ gallon. Thicker application is acceptable.
 - ii. The 100 sq. ft. / gallon is in accord with EPA publications.
 1. In the EPA's Guidance for Controlling Asbestos-Containing Materials in Buildings, the primary instruction regarding dry film thickness states that when encapsulating ACM, the coating is to be applied "*considerably thicker than recommended for painting*" and at no more than 100 sq. ft./gallon.
 2. At this proscribed maximum of no more than 100 sq. ft. / gallon, the following are anticipated ideal coverage rates, using the product(s) listed in Part 2 as Basis of Design:
 - a. Wet Film Thickness (WFT): 15-16 mils (381-406µm).



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- b. Dry Film Thickness (DFT): 6 mils (152µm).
- i. Note that corrugation will seem to reduce coverage. To establish a true coverage rate on these substrates, contact manufacturer with measurements of corrugation including depth from height to peak, distance from peak to peak, and overall surface area. Manufacturer can then assist with estimation.
 - ii. Overage from the product used as the basis of design is typically about 5% for brush or roller applications, and a minimum of 10% for applications via airless spray. The overage % is lower than paint because the encapsulant has a higher viscosity and solids content.
 - iii. Encapsulation overage for certain projects, especially those with narrow surface facings, can be 20-40%. ACM is often found on beams and pillars as fireproofing to thermally protect those structural elements from rapid collapse in the fire event. Even the most skilled airless spray applicators will “lose” product due to “blow-by”. Switching to a smaller fan size, and use of a paint edger board can reduce overage.¹⁵

F. Application of Bridging Encapsulation:

- a. For most ACM surfaces, apply bridging encapsulant at full strength to ACM by airless sprayer.
 - i. Adjust spray settings such that encapsulant coating is delivered to the surface with sufficient velocity to wet the ACM (overcome surface tension, if any), and create a contiguous film without high or low spots exposed; but achieve this without excessive force that upon impact with the surface can dislodge particulates and create airborne fibers.
 - ii. With the exception of small projects, airless spray is also more efficient, immediately wets the ACM upon delivery, and requires fewer applications.
 - iii. Other tools/methods can be used to apply bridging encapsulant, such as brush/roller (asbestos-containing paint), painter’s mitt (TSI, Thermal Systems Insulation, pipe lagging, wrap), putty knife (window glazing), or squeegee (horizontal, floor surfaces).¹⁶



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G. APPLICATION – QUICK REFERENCE TABLE for TYPE of ACM SUBSTRATE

- a. This table includes examples of encapsulation on different types of ACM (using the BPE product as Basis of Design). This list is not definitive. It is not an exhaustive list of acceptable ACM substrates. For each of the substrates included on the table, the guidance and considerations are not to be treated as complete. More information may be available from the manufacturer regarding key details of the application process for that ACM substrate type.

ACM Material Type	Preparation	Consider
Acoustic /Soundproofing, compressed material less than 2 inches thick. Unpainted Texture Finishes.	<p>HEPA clean safely</p> <p>Penetrating encapsulation to improve/enhance dimensional stability. . Field test solutions to determine dilution ratio. Typically expect 1:1 or 2:1 (water to BPE)¹⁷</p> <p>Bridging Encapsulation (BPE): 1-2 coats with airless sprayer using cross-hatch technique</p>	<ul style="list-style-type: none"> • “Pull Test” is important to verify encapsulation generally is serviceable for these surfaces. • Corrugated (or Fluted, Cellular) structure, and porosity of lower density fireproofing will increase bridging encapsulant required for encapsulation • Wet wiping will be difficult because inherently unstable friable matrix may come apart. High-foaming hydrogen peroxide cleaner may substitute as no-scrub, low-touch cleaning method
Cementitious Construction Board	<p>HEPA clean safely</p> <p>For cementitious surfaces exhibiting aging, chalking, spalling and similar gradual deterioration, use primer, penetrating encapsulant or masonry conditioner to enhance the dimensional stability of deteriorating surfaces to provide BE with a surface receptive to adhesion. Dilution of as much as 1:1, or less (BPE to water)</p> <p>Bridging Encapsulation (BPE): 1-2 coats with airless sprayer using cross-hatch technique</p>	<ul style="list-style-type: none"> • Ideal for cement asbestos sheet, millboard, hardiplank used to form interior/ exterior walls (and some sloped roofs) • Includes galbestos and other asbestos-containing building felts since these materials are usually found in conjunction with ACM board. • Stain and rust -inhibiting primers may be required to prevent further corrosion and migrating stains • Hard cementitious ACM can be wet cleaned (washed) using controlled and compliant processes. If pressure washing, use lowest possible settings, and drying must be monitored and moisture content % reduced into the paintable range. • Corrugation should be factored into estimating spread rate and product need.



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	Spray and backroll will likely yield the desired film thickness most efficiently	
Fireproofing, Lower Density inc "Cotton-Candy"	<p>HEPA clean safely</p> <p>Penetrating encapsulation to improve/enhance dimensional stability. Field test solutions to determine dilution ratio. Typically expect 2:1 or 3:1 (water to BPE)¹⁸</p> <p>Bridging Encapsulation (BPE): 1-2 coats with airless sprayer using cross-hatch technique</p>	<ul style="list-style-type: none"> • "Pull Test" is important to verify encapsulation generally is serviceable for these surfaces. • Corrugated (or Fluted, Cellular) structure, and porosity of lower density fireproofing will increase bridging encapsulant required for encapsulation • Wet wiping will be difficult because inherently unstable friable matrix may come apart. High-foaming hydrogen peroxide cleaner may substitute as no-scrub, low-touch cleaning method. Dislodged contaminants will need to be vacuumed to finish cleaning process
Fireproofing, Medium to High Density	<p>HEPA clean safely</p> <p>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.¹⁹</p> <p>Bridging Encapsulation (BPE): 1-2 coats with airless sprayer using cross-hatch technique</p>	<ul style="list-style-type: none"> • "Pull Test" is important but may not be practical for the cement-like, higher density fireproofing products. See endnote 11. • 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.
Floors, Floor Underlayments	<p>After removal of tile and/or residual mastic, spread BPE over floor area, and let cure. Then install manufacturer recommended impact-resistant protective finish, or new rigid/resilient flooring</p>	<ul style="list-style-type: none"> • BPE can be used in the context of an interim control program, but cured encapsulant will need to be protected from impacts and traffic. • In regulations and work practice standards, encapsulants applied to floors cannot be considered abatement. Locally, a variance may be needed before use as an Interim Control. • Monitoring and repair shall be required for use as an interim control • Contact manufacturer for more detailed information before using an encapsulant on a flooring application.



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		<ul style="list-style-type: none"> Do not attempt to encapsulate Asphalt Floor Tile.
HVAC	On external surfaces of HVAC system, use replacement lagging material if applicable and follow instructions for TSI.	<ul style="list-style-type: none"> Application to airstream surfaces inside HVAC: Contact manufacturer. Sentinel BPE Asbestos Bridging & Penetrating Encapsulant meets NFPA 90A and 90B 25/50 requirements (Testing required by IBC for use inside HVAC)
Painted Asbestos (i.e., Painted Soundproofing, Texture/"Popcorn" Ceiling, Painted Stucco & Plaster,) and asbestos-containing paint	<p>Use good painting practice and asbestos-safe procedures (HEPA clean safely) for preparation and application.</p> <p>Bridging Encapsulation (BPE): 1-2 coats with airless sprayer using cross-hatch technique</p>	<ul style="list-style-type: none"> Penetrating encapsulation is not required Do not attempt to encapsulate unstable paint. Prepare properly to clean, dry and sound In pre-1978 structures, determine if lead-based paint is also present, and use lead-safe work practices (EPA RRP) accordingly Verify pH is "paintable", as alkalinity can repel water-based topical applications, especially with stucco. Primer may be required When efflorescence is present, seek and correct moisture problem, and expect to neutralize alkalinity after cleaning.
Radiological Fixative	BPE can be ideal as a highly sag resistant, 1-coat applied, surface tolerant dry film that locks down irradiated dust and particulates that would otherwise become airborne when substrates are disturbed. Demolition adhesive.	<ul style="list-style-type: none"> Non-ACM usage Used to secure particulates onto substrate during demolition, site storage and eventual transportation to disposal Fixatives are used to control otherwise health-harming radioactive particulates during a shut down process. No encapsulant can encapsulate (i.e., provide a barrier) that contains radioactivity. Contact manufacturer for more information.
SFRM (Sprayed Fire Resistive Materials)	Including several formulations of Grace/GCP Monokote, Retro-Guard, Cafco, Blaze-Shield – Contact manufacturer for more information.	<ul style="list-style-type: none"> See Fireproofing
Silica, Reduction of particulate "shedding"	Follow BPE instructions for low or medium high-density fireproofing	<ul style="list-style-type: none"> Non-ACM use case.. Used as "encapsulation" treatment to prevent silica particulates in new construction. Applied identical to BPE onto dust-prone cementitious fireproofing Depending on alkalinity of new fireproofing, it



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		<p>may be necessary for fireproofing to cure like new concrete (as much as 28 days) before coating.</p> <ul style="list-style-type: none"> Because fireproofing is new, the HEPA vacuum may be unnecessary
Soil Encapsulation	<p>Apply BPE penetrating encapsulation to reduce porosity while increasing stability. Coverage range 10-40 sq. ft./gallon. Penetrating mixture will not involve much water in this application.</p>	<ul style="list-style-type: none"> Only certain situations are suitable. Indoor applications, primarily in crawlspaces where there is no traffic, or seldom entry (e.g., maintenance personnel have to enter once a year. For hard packed soils, the dilution rate may need to be increased to improve penetration. High sand or gravel content (very porous), may require more penetrating product per square foot, or multiple applications.
Thermal Systems Insulation	<p>Follow the saying: <i>Cap It, Wrap It and Coat It.</i></p> <p>Use mineral wool fiber cement to cap, patch and stabilize ragged ends and deep cuts. Lagging that is falling off, is moldy, or contains soot should be snipped back, or removed.</p> <p>Dip and Wrap old TSI with new water-activated, rewettable lagging cloth (atop old insulation and wrap).</p> <p>Using stub paint brush or painters/palm mitt, apply BPE encapsulant until evenly applied around entire circumference of TSI. Coating film should extend continuously over all seams and ridges.</p>	<ul style="list-style-type: none"> High solids, viscosity and sag resistance are preferable in order to build film with minimum drippage, even on underside. New lagging/wrap is surface preparation. New cloth can be applied instead of trying to clean filthy, soiled, etc. surfaces. Do not attempt to clean old TSI using compressed air or by washing. Contact manufacturer for assisting with estimation for pipes for both repair wrap and encapsulant Water-based cured encapsulants generally tolerate no more than 115°F constant, and/or intermittent spikes of 130°F. To estimate the surface area of a pipe without the ends, use the formula: Surface Area = $2\pi rh$ where "r" is the radius of the pipe and "h" is the length of the pipe. You need to know the radius (half of the diameter) of the pipe and its length to use this formula.
Window Glazing	<p>Remove and replace failed glazing</p> <p>Using paint edger and small brush or thin putty knife, apply BPE</p>	<ul style="list-style-type: none"> Spread 2 coats to achieve DFT of 6 mils (for Basis of Design)



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H. APPLICATION METHODS AND EQUIPMENT

- a. This subsection provides additional information to complement application guidance provided elsewhere in this specification. Utilizing information relevant to the project, combine guidance from all Sections of this specification to yield a customized process.
- b. Airless Spray: Encapsulants can be successfully applied with most major brands of airless spray equipment. Consult with manufacturer for spray instructions. Example spray settings are included below as an example.
 - i. For very rough and irregular surface profiles, consider airless spray immediately followed with backrolling. For encapsulants to perform optimally, no voids should persist in the dry, cured film.
 - ii. Techniques of spraying: Dependent on type and location of ACM. E.g., a double cross-hatch is employed when encapsulating fireproofing to address the fireproofing surface from different angles (thus counteracting some of the irregular surface profile) and assisting with build-up of the contiguous dry film thickness required, with minimized runs and drips.
 - iii. Spray Settings for Encapsulant listed in Section 2 Basis of Design (Using Titan Impact 440X Sprayer fitted with an RX-80 3600 PSI Spray Gun with a low pressure HEA TR1 517 tip.):
 1. Recommended High-Pressure Tip Size: .017
 2. Recommended P.S.I.: 2500 - 3000 P.S.I.
 3. Recommended Low-Pressure Tip Size: .017
 4. Recommended P.S.I.: 1200 - 1500 P.S.I.
- c. Roller: For best results apply with a 1/2" nap roller (manufacturer recommendations may vary) due to the inherently rougher profile of a substrate.
- d. Brush: Consult manufacturer.
- e. Palm-Painter's Mitt: Consult manufacturer
- f. Trowel: Consult manufacturer. Field amendment with thickening agent may be necessary.



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3.04 POST APPLICATION (SITE CLEANING, PROTECTION)

- A. 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).
- B. Remove debris promptly from work area and dispose of it properly.
- C. Remove spilled, splashed, or splattered coating materials from all surfaces. Products, such as that in Section 2 as basis of design, will likely be dry in two hours.
- D. Do not mar surface finish of items being cleaned.
- E. Clean spray equipment according to manufacturer directions.
- F. Remove cured encapsulant using Sentinel 206 Peroxystrip Paint & Coatings Remover.

3.05 FINISH SCHEDULE

- A. Decorative & Protective Topcoats: use water based paints, preferably 100% acrylics with a high binder content to topcoat the BPE encapsulant cured film. Clean the surface of construction dust or any other particular matter that may have accumulated. Product will accept full range of gloss from flat to high gloss. For protective coatings (e.g. against abrasion), avoid if possible products with harsh solvents that could soften or delaminate BPE. To apply a topcoat over an eggshell paint finish, but it's important to lightly sand the surface first to ensure proper adhesion; a water-based polyurethane or a clear varnish are common choices for topcoats over eggshell paint, depending on the desired level of durability and sheen you want to achieve. Try to wait for full cure of the BPE before any topcoat.

3.06 WARRANTY

- A. Due to the variable nature of asbestos containing materials (ACM), 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.
- B. Unpaid invoices void all warranties.
- C. 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



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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 encapsulation of any abatement project is contingent upon the competence of the applicator.
- If encapsulated surfaces are damaged, repair and re-encapsulate immediately to prevent exposure to potential hazards. HUD, EPA and state governments recommend periodic and/or annual examination of all encapsulated surfaces for damage.
- This specification does not fully describe all the limitations, warnings and precautions related to the products described herein.
- Reference should be made to the Technical 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
- AIA/CSI 00 31 26.23 for existing asbestos information provided to bidders or proposers before construction begins.
- AIA/CSI 02 26 23 for asbestos assessments performed under the contract.
- AIA/CSI 02 61 26 for removal and disposal of asbestos site materials.
- AIA/CSI 02 82 11 Asbestos Abatement
- AIA/CSI 02 82 13 Asbestos Abatement
- AIA/CSI 02 82 13.16 Precautions for asbestos abatement
- AIA/CSI 02 82 16 Engineering Control of Asbestos Containing Materials
- AIA/CSI 02 82 33 Removal and Disposal of Asbestos Containing Materials



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- Canadian National Master Construction Specification 02 82 00.01 Asbestos Abatement – Minimum Precautions [02 82 00.01 Désamiantage - Précautions Minimales]
- Canadian National Master Construction Specification 02 82 00.02 Asbestos Abatement – Intermediate Precautions [02 82 00.02 Désamiantage - Précautions Moyennes]
- Canadian National Master Construction Specification 02 82 00.03 Asbestos Abatement – Maximum Precautions [02 82 00.03 Désamiantage - Précautions Maximales]
- University of California, San Francisco – 02 83 13 Asbestos Abatement

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

³ ACM (Asbestos-Containing Materials)

⁴ Whether a penetrating pre-treatment is necessary will be reviewed in Part 3 – Execution.

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 This specification has been prepared for projects governed by the laws of the United States; however, the content is broadly applicable worldwide. Projects encapsulated in Canada, Australia, NZ and the UK will be able to use this document with minor adjustments. Contact Sentinel's technical team for more information at:

Sentinel Products, Inc., 8901 Wyoming Ave. N., Brooklyn Park, MN 55445

PHONE: 763-571-0630

EMAIL: getinfo@senpro.com

¹¹ Contact Sentinel for project-specific integration assistance with public sector specifications.

¹² Contact Sentinel for more information on how to properly perform a pull test.

¹³ <https://www.pennmedicine.org/cancer/types-of-cancer/mesothelioma/asbestos-cancer/types-of-asbestos>

¹⁴ Sentinel 317 Multi-purpose Cleaner & Degreaser

¹⁵ Reducing overage is also known as improving Transfer Efficiency. Two websites (neither affiliated with Sentinel) that offer more detailed discussion of overage/wastage/transfer efficiency are [Increase Transfer Efficiency in Your Paint Finishing Process \(chreed.com\)](#) and [Paint Coverage Rates Demystified: Your Expert Guide \(horizonpainting.ca\)](#).

¹⁶ Contact Sentinel for technical guidance re: when BPE has a role in the interim control or in-place management of ACM Floor situations.

¹⁷ A penetrating encapsulant is a surface preparation technique, not abatement of ACM. A lockdown encapsulant is not to be used as a penetrating encapsulant.

¹⁸ A penetrating encapsulant is a surface preparation technique, not abatement of ACM. A lockdown encapsulant is not to be used as a penetrating encapsulant. See 3.03 for details.

¹⁹ A penetrating encapsulant is a surface preparation technique, not abatement of ACM (which is satisfied by bridging). Also, a lockdown encapsulant is not to be used as a penetrating encapsulant. Water content of a lockdown is too high. See 3.03 for details.