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SOUTHWEST TYPE 7HD™

Portland Cement Based SFRM

Spray-applied Fire Resistive Material

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SOUTHWEST TYPE 7HD™

PRODUCT DATA SHEET

SELECTION & SPECIFICATION DATA

Generic Type	A Portland cement based, Spray-applied Fire Resistive Material (SFRM) designed for the fire protection of structural steel in general purpose areas with prolonged exposure to physical abuse, moisture and high humidity.
Description	A 40 lb./ft³ (640 kg/m³) density (average) SFRM intended for the fire protection of structural columns, beams, joists, decks, walls, roofs, girders, floors and pre-cast concrete units. It is tested and certified for fire resistance ratings up to 4 hours. It was specifically formulated for high humidity areas such as mechanical rooms, elevator shafts and parking garages and is resistant to damage and moisture. Southwest Type 7HD is a trademark of the Southwest Fireproofing Products Company.
Features	• Damage resistant and permanent • Noncombustible • Moisture resistant • Asbestos-free – complies with EPA and OSHA regulations. • Mineral Wool free – no airborne fibers. • Styrene free – no toxic decomposition gases. • Economical – Maintains project on budget. • Design flexibility with over 100 UL designs.
Color	Gray Product color may vary due to variations in color or portland cement.
Finish	Textured
Primer	Primers are not required or recommended. If a primer is specified or steel is primed, bond strength must meet minimum UL criteria. A/D Type TC-55 Sealer is used as a primer/bonding agent to meet this requirement where specified. Southwest Type DK3 (spatter coat) must be used as a primer/bonding agent on cellular decks and roof decks per UL design requirements. Contact Carboline Technical Service for further information. Southwest Fireproofing materials neither promote nor prevent corrosion. Fireproofing should not be considered part of the corrosion protection system.
Application Thickness	5/8" (15.9 mm)
Limitations	Not recommended for use as refractory cement or where operating temperatures exceed 200°F (93°C).
Topcoats	Not required. In corrosive atmospheres, consult Carboline Technical Service for selection of coating suitable for the operating environment.

SUBSTRATES & SURFACE PREPARATION

General	Prior to application, all substrates must be clean and free of loose scale, dirt, oil, grease, condensation, or any other substance that would impair adhesion. Mechanical attachment utilizing metal lath is required for applications to deck surfaces due to the increased weight of this product when compared to normal and medium density products. Contact Carboline Technical Service for further information. Fireproofing shall be applied to the underside of roof deck assemblies only after all roofing work has been completed, and all roof traffic has ceased. Also be sure that all roof work is completed and water tight before commencing installation of fire protection. Roof traffic shall be limited to maintenance after fire protection is applied and cured. No fireproofing shall be applied prior to completion of concrete work on steel floor decking.

SUBSTRATES & SURFACE PREPARATION

Galvanized Steel	Prior to application, all substrates must be clean and free of loose scale, dirt, oil, grease, condensation, or any other substance that would impair adhesion. For certain designs, mechanical attachment or the application of Southwest Type DK3 (spatter coat) may be required. Contact Carboline Technical Service for further information.
Painted/Primed Steel Decks	Apply to painted/primed steel decking only if permitted by the UL design. If the painted/primed deck is not an approved substrate, metal lath must first be secured to the deck surfaces in accordance with the UL requirements.
Painted/Primed Steel Joists	Painted steel joists do not require adhesive, lath or fastening devices. It is acceptable to apply directly to steel joists.
Painted/Primed Structural Steel	Painted/primed structural steel is generally not approved by UL as an acceptable substrate for SFRMs unless the paint or primer was included in the fire test and/or UL listed for SFRM applications to structural steel. UL has established conditions that must be satisfied for application to primed or painted structural steel, including: minimum bond strength criteria; dimensional limitations for the structural members; use of a bonding agent or adhesive such as A/D Type TC-55 Sealer; use of metal lath to provide a mechanical bond; or, use of mechanical breaks of metal lath strips or steel pins and disks. Refer to the UL Fire Resistance Directory-Volume 1 for details or contact Carboline Technical Service before applying to any painted/primed steel beams or columns.

PERFORMANCE DATA

All test data was generated under laboratory conditions. Field testing results may vary.

Test Method	Results
ASTM D2240 Shore D Hardness	40
ASTM E136 Combustibility	Passed (non-combustible)
ASTM E605 Density[1]	40 pcf (640 kg/m³) Average 35 pcf (577 kg/m³) Minimum
ASTM E736 Cohesion/Adhesion	>7,000 psf (335 kPa)
ASTM E759 Deflection	Passed
ASTM E760 Impact	Passed
ASTM E761 Compresive Strength	640 psi (4,412 kPa)
ASTM E84 Surface Burning	Flame Spread: 0 Smoke Development: 0
ASTM E859 Air Erosion	0.00 g/ft² (0.00 g/m²)
ASTM E937 Corrosion	Passed
ASTM G21 Fungi Resistance	Passed (no growth)

[1] Applied density is dependent upon equipment and application parameters. Air dry at ambient conditions to constant weight. Do not force cure. Use ASTM E605 Positive Bead Displacement method utilizing #8 lead shot or 1 mm unexpanded polystyrene beads. Test density in accordance with AWCI Technical Manual 12-A (Standard Practice for the Testing and inspection of Field Applied Sprayed Fire-Resistive Materials, an Annotated Guide).
All values derived under controlled laboratory conditions.
Test reports and additional data available upon written request.

MIXING & THINNING

Mixer	1. Use a minimum 12-16 cubic foot (340-453 liter) heavy-duty mortar mixer capable of rotating at 40 rpm with rubber tipped blades that wipe the sides. 2. Use continuous feed mixer. Contact Carboline Technical Service for recommendation. Densities may vary when using this type of mixing equipment.

MIXING & THINNING

Mixing	Always mix with clean potable water. The mixer shall be kept clean and free of any previously mixed materials which may cause premature setting of product. A 2 bag mix is recommended for paddle type mixers. Mix time should be approximately 2 minutes minutes at 40 rpm. Do not over mix. The material volume should not go over center bar of mixer. Use 6.5-7.5 gallons (24.6-28.3 liters) of water per 50 lb. (22.7 kg) bag. Add water to the mixer first with blades stopped. With mixer turned on, add material to the water and begin mixing.
Density	For information and recommendations to obtain the proper density and yield, contact the local Carboline representative or Carboline Fireproofing Technical Service.

APPLICATION EQUIPMENT GUIDELINES

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

Pump	This material can be pumped with a wide range of piston, rotor stator and squeeze pumps designed to pump cement & plaster materials including: Essick - model# FM9/FM5E (Rotor Stator/2L4) Putzmeister - model# S5EV(Rotor Stator/2L6) Hy-Flex - model# 321E(Piston) Hy-Flex - model# HZ-30E(Rotor Stator/2L6) Hy-Flex - model# H320E (Piston) Strong Mfg. - model# Spraymate 60 (Rotor Stator/2L6) Airtech - model# Swinger (Piston) Mayco - model# PF30 (Dual Piston) Thomsen - model# PTV 700 (Dual Piston) Graco - model# F340e (Piston) Graco - model# F800e (Dual Piston) Marvel kit must be removed from piston pumps.
Ball Valves	Ball valves should be located at the manifold and at the end of the surge hose to facilitate cleaning of the pump and/or hoses.
Material Hose	Use 2" transfer hose for maximum practical length to spray area. Follow with a 16” (406 mm) tapered fitting to a 1-1/2” (38.1 mm) I.D. hose for 50' (15.2 m). Then taper to 1-1/4” (31.8 mm) for 25'. Then taper to a 1” (25 mm) whip hose for 15' to 20' (4.6 m - 6.1 m). All connections should have conical tapered fittings.
Standpipe	Use 2” (50.8 mm) I.D. aluminum tubing with quick external disconnections. Elbows should be 2” (50.8 mm) I.D. with minimum 36” (0.9 m) lengths.
Nozzle/Gun	Use a minimum 1” (25 mm) I.D. plaster type nozzle with shut off valve, swivel and air shut off valve.
Orifice Size and Shields	1/2” (12.7 mm) I.D. “blow-off” tips (mini shields optional)
Compressor	Compressor on pump must be capable of maintaining a minimum 60 psi (413 kPa) and 9 to 11 cfm at the nozzle.
Air Line	Use 5/8” (15.9 mm) I.D. hose with a minimum bursting pressure of 100 psi (689 kPa).

APPLICATION PROCEDURES

General	Thicknesses of 3/4" (19 mm) or less can be applied in one pass. When additional coats are required to reach specified thickness, apply subsequent coats after prior coat has set. If preceding coat has dried, dampen the surface with water prior to application of additional coats. Type DK3 (spatter coat) shall be applied to all cellular floor units and to all roof deck systems where indicated by the UL design. For complete application instructions, refer to the Southwest Fireproofing Products Field Application Manual.
Finishing	Normally left as a sprayed texture finish.
Field Tests	Test for thickness and density in accordance with the applicable building code, AWCI Technical Manual 12-A (Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials, an Annotated Guide), and ASTM E605 (Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members).

APPLICATION CONDITIONS

Condition	Material	Surface	Ambient	Humidity
Minimum	40°F (4°C)	40°F (4°C)	40°F (4°C)	0%
Maximum	100°F (38°C)	125°F (52°C)	110°F (43°C)	95%

Air and substrate temperatures shall be maintained 24 hours before, during and 24 hours after application. Contact Carboline Fireproofing Technical Service for recommendations.

CURING SCHEDULE

Surface Temp.	Dry to Recoat
77°F (25°C)	4 Hours

Recoat times will vary based upon ambient conditions and air movement. Once the product has set, it is suitable for general purpose areas with high physical abuse and prolonged exposure to moisture and high humidity.

CLEANUP & SAFETY

Cleanup	Pump, mixer and hoses should be cleaned with potable water. Sponges should be run through the hoses to remove any material remaining in the hoses. Wet overspray must be cleaned up with soapy or clean, potable water. Cured overspray material may be difficult to remove and may require chipping or scraping to remove.
Safety	Read and follow all caution statements on this product data sheet and on the SDS for this product. Employ normal workmanlike safety precautions. Use adequate ventilation. Keep container closed when not in use.
Overspray	Adjacent surfaces shall be protected from damage and overspray. Sprayed fireproofing materials may be difficult to remove from surfaces and may cause damage to architectural finishes.
Ventilation	When used in enclosed areas, thorough air circulation must be used during and after application until the product is dry.

TESTING / CERTIFICATION / LISTING

Underwriters Laboratories, Inc.	Tested in accordance with ASTM E119/UL 263 at Underwriter's Laboratories, Inc. and listed by UL in the following designs (most commonly used in bold): **Protected Floor/Ceiling:** **D739, D788 (Restrained/Unrestrained)** Additional designs: A702, D701, D703, D704, D705, D706, D708, D709, D710, D711, D712, D715, D716, D722, D723, D725, D726, D727, D728, D729, D730, D740, D742, D743, D744, D745, D746, D747, D748, D750, D751, D752, D753, D754, D756, D758 **Unprotected Floor/Ceiling:** **D949 (Restrained/Unrestrained)** Additional designs: D905, D907, D909, D910, D916, D917, D920 **Concrete Floor/Roof:** **J718 (Restrained/Unrestrained)** Additional designs: G701, G702, G703, J701, J704, J705, J706, J709, J919, J957, J966 **Beam/Joist:** **N791, S740 (Restrained/Unrestrained)** Additional designs: N401, N404, N706, N708, N732, N736, N754, N756, N791, S701, S702, S715, S739 **Protected Roof/Ceiling:** **P741 (Restrained/Unrestrained)** Additional designs: P675, P676, P701, P708, P709, P710, P711, P714, P717 **Unprotected Roof/Ceiling:** **P921 (Restrained)** Additional designs: P901, P902, P907, P919, P920, P923, P937 **Metal Wall Assembly:** **U703 (Restrained/Unrestrained)** **Columns:** **X771, Y725** Additional designs: X527, X701, X704, X722, X723, X772, X751, X752, X808, X813, X819, X820, X821, X822
City of New York	MEA No. 55-04-M Vol. II (Wall) MEA No. 56-04-M Vol. II (Beam and Floor/Ceiling) MEA No. 409-02-M Vol. III (Columns and Roof/Ceiling

PACKAGING, HANDLING & STORAGE

Packaging	50 lb. (22.7 kg) bags
Shelf Life	12 months
Storage	Store indoors in a dry environment between 32°F - 125°F (0°C - 52°C) Material must be kept dry or clumping of material may occur.
Shipping Weight (Approximate)	50 lb. (22.7 kg)

WARRANTY

To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance, injuries or damages resulting from use. Carbolines sole obligation, if any, is to replace or refund the purchase price of the Carboline product(s) proven to be defective, at Carbolines option. Carboline shall not be liable for any loss or damage. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. All of the trademarks referenced above are the property of Carboline International Corporation unless otherwise indicated.

APPLICATION MANUAL AND RECOMMENDATIONS FOR
TYPES 5GP™, 5MD™, 5AR™, 7GP™, 7HD™, 7TB™ and DK3™

DOCUMENT No.: 091919-SW-A
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DOCUMENT CONTENTS

SECTION 1: Project Setup

1.0 Product Description and Use

Southwest Fireproofing cementitious fire protection materials are spray applied using either piston or rotor stator or squeeze type pumps. These products are mixed with water, using conventional plaster or continuous mixers. They are a mixture of plaster, cement, vermiculite and proprietary ingredients, specifically formulated to be applied at high production rates.

Southwest materials are listed in the Underwriters Laboratories, Inc. Fire Resistance Directory in many designs, and have been in production since the early 1970's. The products covered in this manual are:

Type 5GP™: general purpose, low density gypsum based product
Type 5MD™: medium density gypsum based product
Type 5AR™: extended set, low density gypsum based product (Appendix C)
Type 7GP™: medium density cement based product
Type 7TB™: medium density cement based Thermal Barrier use over plastic foam insulation. (Appendix C)
Type 7HD™: high density cement based product
Type DK3™: cement based spattercoat bonding agent

These products are produced under license from the Southwest Fireproofing Products Co. in several regional facilities and are distributed from strategically located warehousing operations.

All Southwest Fireproofing products must be applied to meet UL minimum densities as listed in appropriate designs.

For additional technical data and assistance, please reference the product literature, or call

Carboline (USA):
Tel: 800 848 4645 or 314 644 1000, Fax: 908 362 7520 www.carboline.com

1.1 Material Storage

All Southwest Fireproofing products must be stored in a dry environment, off the ground and protected from weather.

Material must remain dry or clumping may occur, materials subjected to moisture should not be used. Storage under inside dry conditions should not exceed 12 months.

Rotate stock at all times.

1.2 Pump Station Recommendations

Choose a location on a project that will allow for a permanent location for the duration of the project. The area should drain well, and if necessary should have a base of crushed rock, to minimize collection of mud during rain or cleaning of equipment. When materials trailers are to be dropped, build a sturdy and safe platform at the height of trailers, for easy unloading of palletized materials. The platform size should accommodate at least 4 pallets of product, the mixer and water metering system, and adequate area for proper and safe mobility.

The entire platform should be properly covered, so that pumping operations are not compromised during inclement weather.

Position the mixer, so that discharge of mixed product can be easily poured into the hopper of the pump. Pumps should be located on the ground, directly below the mixer. When using continuous mixers, be sure the pump tube is centered over the middle of the hopper.

It is recommended that pump hopper sides are elevated, as most are too low to contain excess mixed materials. This will prevent spillage and a sloppy work area around the pump.

Finally, it is suggested that a portable pallet jack is on hand to move product from the trailer to the work platform.

1.3 Water Requirements

Potable water (drinking water) is required. Be sure you obtain a dedicated water source to ensure that an uninterrupted water supply is always available. This is very important if using continuous mixers. When using regular paddle mixers, use a water measuring system as described later in this procedure.

1.4 Equipment

1.4.1 Mixers

Paddle Type Mixers: Be sure that the mixer capacity exceeds the pump capability. It is recommended that 2 bag mixes be used. Material should not be over the center bar of the mixer when mixing. Therefore, the mixer must have a capacity of at least 12 cubic feet. Mixer blades should be equipped with replaceable rubber tips, so that the interior of the mixer hull is wiped fairly clean during the mixing process. This also promotes easier clean-up and removal of residual matter from prior mixes. The speed of the mixer should be approximately 40 RPM. If to slow or too fast, the product will not mix properly, resulting in poorer yields and productivity.

Continuous Mixers: There are several quality continuous mixers on the market today. See Section 6 for details. Be sure when buying and using such mixers, they are made for plaster based materials and have the capacity to mix product adequately for the production rates you anticipate. An important requirement is the ability of the mixer to vary the water ratios sufficiently that low, medium and high-density products can be mixed.

1.4.2 Pumps

Southwest products can be pumped with a wide range of acceptable piston, rotor/stator and squeeze pumps, designed to pump cement/plaster materials. Manufacturers of pumps must state that their pumps are capable of pumping these products, specifically at high volume rates. Be sure to use proper hoses and observe the maximum recommended length suitable for each type of equipment – reference section 1.4.4. All connections and fittings should be tapered to allow for unrestricted flow of materials. Refer to Section 6 for a list of recommended pump, mixer manufacturers and distributors.

Piston pump pressures may reach 800 psi, therefore use pumps rated with pressure relieve valves rated at 800 – 1000 psi (56 – 70 kg/cm2) at the pump manifold. Hoses must also be able of withstanding such pressures, with a large margin of safety. Delivery rates for pumps are generally rated in bags per hour, which can vary greatly with each pump and products used. Call Carboline Fireproofing Technical Service before making a purchase to make sure a particular pump is in compliance with our recommendations and specifications.

Compressors: on pumps should be able to maintain a minimum of 40 psi at the nozzle, and capable of producing 20 cfm of air (570 liters/min.)

1.4.3 Water Measuring Systems

Water measuring devices, such as sump pumps, water meters (such as Neptune or Fill-Rite) and quick fill tanks are recommended to assure an effective operation. Again, these systems are available from several distributors, or you can make your own system using 55 gallon barrels as water reservoirs.

1.4.4 Material Transfer Hoses, Couplings and other Hose Equipment

Stand Pipes and Hoses: Aluminum pipes used for stand pipes or rubber hoses for lateral transfer should be a minimum 2" I.D. to allow for unrestricted flow of products. Couplings should be smooth bore, and reducers must be tapered. The conveying system should follow these recommendations from the pump forward:

Length/Inside Diameter	Recommended Length (ft.)
2" transfer hose or aluminum conduit	Maximum practical length before 1-1/2" line
1-1/2" transfer hose	50
1-1/4" transfer hose	25
1-1/4" – 1" whip hose	15

2" Ball Valves: A ball valve should be attached to the manifold, prior to attaching the hose. This will allow the disconnection of the hose for cleaning pump and/or hoses at end of the workday, by inserting a sponge to facilitate cleaning the hoses. It is recommended that a second ball valve is attached to the other end of the 2" material hose.

Note: All Hoses and pipes should be rated to withstand a minimum of a 1000 psi. Remember to keep hose and pipe connections and reducers to a minimum for optimum production and minimizing backpressures.

Couplings: Couplings for hoses should be screw types or quick release systems. Couplings must be tapered to allow unobstructed flow of materials. Standpipe couplings should be the tapered threaded type. Double female swivels, victualic couplings, or "Kam Lock" connector couplings are types of connectors typically used.

Note: Do not use brass or aluminum couplings or reducers. Be sure to use only tapered connectors.

Standpipes: Use only metal standpipes, 2" ID. It is suggested that standpipes are used on high rise projects. Do not use threaded connections. Use only clamps or Kam Lock type connectors to facilitate a quick connection and disconnection process. If you use "quick disconnect" connectors be sure they do not have internal restrictions.

Elbows: Should be 2" with a minimum radius of 2".

Spray Nozzle Assembly: Use a regular plaster type nozzle with a minimum 1" ID, with a shut off valve and a swivel. Pole guns are not recommended, except when certain job conditions require it. Pole guns are sometimes effective in low ceiling applications, when a scratch coat is necessary, such on roof systems requiring multiple coats, or when applying Type DK3 spatter coat to decks. Be sure the nozzle has a proper air shut off valve.

Orifice Tips and Shields: Have a supply of nozzle tips at all times. We suggest typical "blow off" tips with "mini shields" that will assist in controlling the spray pattern. Orifice sizes should be 9/16" to 5/8" ID.

ON/OFF switches for material flow should be comfortably located and taped securely to the nozzle and hoses.

Air Supply: A minimum 5/8" ID air supply hose should be used. Air must be minimum 20 psi, preferably up to 40 psi continuous pressure. Type 7 products may require higher air pressure. Be sure the air stem is always free and can be easily adjusted to allow for a proper and desired spray pattern.

Note: Use the minimum spray air in order to achieve maximum product yield. Excessive air pressure will result in higher densities.

Scaffolds: Wheels should be 8" to 12" in diameter, for ease of movement. Use open steel grate type flooring with guardrails. Do not use wooden planks, as these will not allow overspray to fall thru and can cause slippery conditions. Any cantilever sections must be properly secured and balanced to allow for adequate safety for spraying spandrels and perimeter columns. Be sure that all scaffolds meet current OSHA and/or project safety regulations. Scaffolds should be at least 5'x10'.

Tarps and Masking: Use lightweight tarps that allow for airflow in summer working conditions. For cold climate conditions use canvas tarps. Be sure to mask off and protect adjacent areas and surfaces from overspray as Southwest Fireproofing products may be difficult to remove from sprayed surfaces and may permanently discolor surfaces such as anodized aluminum.

SECTION 2: Project Conditions and Preparations

2.0 Substrate and Surface Conditions

All surfaces must be clean, free of loose scale, free of dirt and other substances that would prevent adequate adhesion. This includes untested primers not approved by UL or Carboline. Refer to the UL guidelines when primers are on steel to be sprayed.

Oily Decks: Note, that at times steel deck manufacturers use non – evaporative roll oils to form galvanized decks. This condition will prevent adhesion of any fire protection materials. In order to check for oily decks, spray a fine mist of water to deck and note if water collects into "fish eye" droplets. Another way is to use a clean white cloth and wipe the deck surface: black oily residue should be noticed. Contact deck manufacturer for cleaning method.

Flexible Decks: Only UL rated steel decking is approved for application of fire resistive materials. Refer to specific UL fire test design for a list of approved decks. If decking on the project is not listed in the UL fire test design, call Carboline Fireproofing Technical Service for recommendations.

Roof Decks: All roof work, including the placement of air handling units and other roof equipment must be completed prior to the application of Southwest Fireproofing products. Check for residual roll oils on the decking by wiping the surface with a white cloth. Any such oils will definitely prevent proper adhesion, and must be removed. Carboline requires the use of Type DK3 spatter coat on all flexible roof decks.

Clips, hangers and other supports such as pipe clamps: These attachments should be in place before fireproofing commences. Please refer to AWCI Technical Manual 12-A for recommendations.

Note: Commencement of application of fire protection to steel surfaces effectively results in the applicator's acceptance of these surfaces. Do not commence if conditions exist that may compromise adhesion, until this situation is resolved with the General Contractor

2.0.1 Use of Type DK3 Spatter Coat

Type DK3 spatter coat must be used as a bonding agent on all cellular decks and roof decks as per UL design requirements. Refer to Type DK3 datasheet for additional details and application instructions.

Type DK3 materials are Portland cement based products and may be used both as an adhesive and over coat. They can be pumped through the main plaster pump used to apply any Southwest Fireproofing product, or with smaller separate pumps. Generally, it is better to use a smaller pump to apply DK as this product is quite wet and will go on fast.

Please note that cement products will set up any residual plaster materials in the equipment and hoses; hence if using the same equipment for both products, it is essential that equipment and hoses must be thoroughly flushed out prior to spraying Southwest Type 5 or Type 7 series products.

Reference Appendix C for further information in relation to Type DK3.

2.0.2 Use of A/D TC-55 Adhesive/Sealer

A/D TC-55 adhesive should be used on all concrete decks and painted, primed or hot dip galvanized steel. The product is applied just prior to the application of Southwest Fireproofing products at a WFT of 4 mils. A/D TC-55 must remain tacky to wet when Southwest Fireproofing products are applied.

A/D TC-55 can be used as a topcoat/sealer over Southwest Fireproofing products to enhance the physical characteristics, reduce air erosion losses and surface sealant. A/D TC-55 is normally supplied as a clear sealer, but is also available in blue, white or black.

Reference Appendix C for further information in relation to A/D TC-55 adhesive/sealer.

2.03 Painted/Primed Steel Decks, Structural Steel – Beams, Columns and Joists

Decks: Unless specifically listed in the UL fire test design, painted or primed steel decks will require the installation of metal lath, prior to application of Southwest Fireproofing products. Metal lath must be secured to all deck surfaces in accordance with the UL requirements.

Beams and Columns: Painted/primed structural steel is generally not approved by UL as an acceptable substrate for SFRMs unless the paint or primer was included in the fire test and/or UL listed for SFRM applications to structural steel. UL has established conditions that must be satisfied for application to primed or painted structural steel, including: minimum bond strength criteria; dimensional limitations for the structural members; use of a bonding agent or adhesive such as A/D Type TC-55 Sealer; use of metal lath to provide a mechanical bond; or, use of mechanical breaks of metal lath strips or steel pins and disks.

Joists: Painted or primed steel joists do not require adhesive, lath or fastening devices. It is acceptable to apply fire protection directly to painted and primed steel joists. Fiberglass mesh or metal lath can be used as an optional application aid to reduce overspray, waste and cleanup time. To minimize material loss and improve application efficiency, it is recommended that fiberglass mesh be used with all application of Southwest Fireproofing products, when applied to steel joists. Please contact Carboline Fireproofing Technical Service or Sales Representative for further details on products and application procedures.

Refer to the UL Fire Resistance Directory-Volume 1 for details or contact Carboline Fireproofing Technical Service before applying Southwest Fireproofing products to any painted/primed steel decks, beams or columns.

2.1 Communications

Have available "walkie-talkies" or other communication devices to allow for smooth operations and trouble shooting. Be sure the remote control on the pump is working properly. If using “Y” (dual hose) systems from a large pump, be sure that all sprayers have duplicate set-ups and communication devices to talk with the pump operator.

SECTION 3: Application Procedures & Recommendations

3.0 Equipment Setup

Working Platform: The pump should be at ground level, next to the mixer, which should be raised to allow for easy dumping of mixed product. No matter what mixer is used be sure that a sufficient material supply is near and available, so that one person can handle this operation. Minimizing operator fatigue will allow for maximum speed of operations.

Product Storage: Southwest Fireproofing materials should be stored in dry conditions at all times. Use pallets to store products above dirt floors to prevent them from getting wet. If using trailers, be sure that they are positioned properly for ease of delivery and removal of empty vans. Be sure that at least one day of material is always on hand to allow for unexpected delivery delays.

Pump Placement: The pump / mixer operation should be as close to the building as possible. Allow for drainage necessary for clean out and start up procedures.

Mixer Preparations: Whether using a paddle or a continuous mixer, it is important to prime the pump and hoses with water. With blades stopped, charge at least 40 gallons of water into mixer, then start mixer for a few moments and dump water into the pump hopper. When using a continuous mixer, fill the pump hopper with water and pump to nozzle. Begin product mixing cycles.

Note: For paddle mixers, blades should be stopped except when actually mixing the product, so as to minimize the generation of foam.

Pump Preparations: Be sure nozzle is detached, and nozzle valve is open. Commence all pumping in low gear, until water is flowing freely from end of hose. Prepare the first mix, attach nozzle and commence pumping. Be sure sprayer is aware that material is being pumped, so that application of Southwest Fireproofing products can commence immediately. Mix according to instructions - do not over-mix, as this will result in lower density and poorer pumpability.

Injection Pump Preparations: Set up mixer, hoses and spray pump per the application instructions in the Accelerator A-20 datasheet. Use Injector Unit with one or two 55-gallon plastic drums, 110V electric agitators to stir the solution, and 110V electric injection pump to move Accelerator A-20 solution through 3/8" hose to the injector housing on the material hose. Injector pump is controlled by an on/off toggle switch and pump rate by a dial valve. Dial valve has rates in percentages (0 – 100%). Run the injection hose from the pump to the injection housing, attachments should be made with quick disconnect fittings. Attach the injection housing at the start of the whip hose. Injector housing is a 2" long 1" diameter pipe with a ½" diameter pipe feeding in at a 45°angle. It attaches to the whip hose by cup locks or cam lock fittings. The injection housing is attached to the material hose 15' to 25' back from the nozzle (This depends on the length of the whip hose). A backflow valve on the housing prevents material from pushing back into the injection hose. A shut off valve upstream or prior to the backflow valve is used to turn off the Accelerator A-20 solution flow through the injector housing.

3.1 Product Mixing

Paddle Type Mixers: Mix Southwest Fireproofing products for approximately 2 minutes using the correct water volume per product as listed below. Do not over mix. Also, remember that maximum water content will increase product yield, but may limit the thickness per pass. More water will increase the mix density and increase product yield. Over mixing will decrease the mix density. Mixer capacity should be at least 12 cubic ft. to handle a 2 bag mix. Always be sure that water is in mixer before adding dry materials and that mixer blades are stopped – blades should be always be stopped except for specified mixing time so as to minimize the generation of foam.

Water Metering Units: Water meters are available from a number of sources as identified in Section 6. Generally, a 40 to 55-gallon barrel is used with a water metering system that can be adjusted to introduce the correct amount of water into the mixer. Remember, it is important that water usage be consistent.

Continuous Mixers: When using continuous mixers, adjust the water flow so that the mixed material pouring into the pump hopper is properly mixed and free flowing.

3.1.1 Water Ratio Recommendations

The following water ratios are recommended for these products. However, it is important to consider recommendations and adjustments that may be necessary as discussed above under Section 3.2 Product Mixing.

Product	Water to be Used per 50 lb bag, gal
Type 5GP™	8.0 – 10.0
Type 5MD™	8.0 – 10.0
Type 7GP™	10.0 – 11.0
Type 7TB™	10.0 – 11.0
Type 7HD™	6.5 – 7.5
Type DK3™	9.0 – 10.0

3.1.2 Accelerator A-20 Mixing Procedures

When injecting Southwest Type 5GP or Southwest Type 5MD to achieve a 15 lbs. per cubic foot density (pcf), the standard mix is one 50 lbs. bag of Accelerator A-20 with 8.5 gallons of clean potable water, or four bags of Accelerator A-20 with 34 gallons of water. The total solution volume will be 44 gallons.

The Accelerator A-20 solution concentration can be checked with a hydrometer or by weight of a known volume. By hydrometer measurement, the target specific gravity for 15 lbs. pcf is 1.260 with range of 1.250 to 1.270. To check by net weight of a filled container, a full 1-liter container should weigh 1260 grams ± 10 grams.

When injecting Southwest Type 5MD to achieve a 22 lbs. per cubic foot density (pcf), the standard mix is one 50 lbs. bag of Accelerator A-20 with 12.5 gallons of clean potable water, or three bags of Accelerator A-20 with 37.5 gallons of water. The total solution volume will be 45 gallons.

The Accelerator A-20 solution concentration can be checked with a hydrometer or by weight of a known volume. By hydrometer measurement, the target specific gravity for 22 lbs. pcf is 1.200 with range of 1.190 to 1.210. To check by net weight of a filled container, a full 1-liter container should weigh 1200 grams ± 10 grams.

Refer to the Simplified Yield Charts for all Southwest Fireproofing products attached to Appendix B.

Continue mixing until Accelerator A-20 powder is dissolved completely. Re-circulate Accelerator A-20 solution back into the mixing tank for 5 minutes allowing all bubbles to come out of the solution.

Set injection pump flow rate to 30-40% and adjust as necessary to increase or decrease the flow rate to achieve desired density. Refer to the Southwest Type 5GP and Southwest Type 5MD Simplified Yield Charts for additional information.

3.2 Application Techniques

Air: Use the minimum air to get a proper spray pattern. The air "sound" should achieve a low pitch.

Material Flow: Commence initial application with pump in low gear and increase as required. It is recommended to run pump in low gear. This results in adequate production of applied product, but substantially reduces line pressures. Nozzle: Hold the nozzle perpendicular to the spray surfaces whenever possible. Use a circular motion. Hold nozzle about 20 to 25" from the substrate. Use the minimum nozzle extension so that you are close to the spray surface. Using nozzle extensions generally results in increased waste. Use a 9/16" or 5/8" orifice, with a mini-shield.

Nozzle Density Checks: Perform nozzle density checks a minimum of 2-3 times per day to verify yield in accordance with the instructions below.

Injected Application (Type 5 Series only)

1. Set the accelerator flow rate to 30% - 40%. (this can be adjusted to suit target density)
2. Commence spraying and pump for roughly 60 seconds until the system stabilizes.
3. After 60 seconds, spray Type 5GP or Type 5MD directly into the Carboline 1000 ml cup. Position the nozzle 12-18" above the cup and overfill.
4. Strike off any excess Type 5GP or Type 5MD and level to the top of the container. Wait a further 60 seconds or until such time the material has stopped swelling. Again, strike level with the top of the container.
5. Place an empty container on the scale and press "on/tare"
6. Replace the tared container with the identical container, filled with Type 5GP or Type 5MD and record the net weight.
7. Reference Simplified Yield Charts attached to Appendix A to verify proper density and yield.

The use of Accelerator A-20 allows for fast set, continuous application of Type 5 series products. Materials are ready to be re-coated after the initial coat has set which is between 10 – 20 minutes.

Un-Injected Application (Type 5 and 7 Series)

1. Spray un-injected Southwest Fireproofing product directly into the Carboline 1000 ml cup. Position the nozzle 12-18" above the cup and overfill.
2. Strike off any excess Southwest Fireproofing Product and level to the top of the container.
3. Place an empty container on the scale and press "on/tare"

4. Replace the tared container with the identical container, filled with Southwest Fireproofing Product and record the net weight.
5. Reference Simplified Yield Charts attached to Appendix A to verify proper density and yield.

The application of un-injected Southwest Fireproofing products allows for recoat to occur after the initial coat has set which is approximately 4 hours.

3.3 Shut Down Procedures

1. After the last batch is dumped into the pump hopper, run material low in the hopper
2. Add water to mixer and dump into hopper as the last of the material is being pumped out
3. Spray product on to steel surfaces until too thin to adhere
4. Wash down the mixer and sides of pump hopper
5. Slow down the pump speed
6. Continue pumping clean water until it reaches the nozzle
7. Stop pump at the nozzle with the remote switch, and relieve pressure at the pressure relieve valve
8. Close ball valve at the end of the hose, disconnect 2” line and insert sponge
9. Remove nozzle, and disconnect at the 2” connection and whip hoses; put end of nozzle in water
10. Reconnect hoses and start to pump water until the sponge exits the end of the 2” line
11. Repeat procedures for all hose sections.
12. At pump, shut off material valve and detach surge hose with valve. Open and allow standpipe and/hose water to flush out.

It is recommended that a sponge be passed through all transfer hoses to provide additional cleaning of hoses. Have drums on the spray floor for wastewater, if unable to pump onto the ground. With continuous mixers, perform the same functions, making sure that the mixer tube is clean of any remaining product.

Note: Ensure area is cleaned adequately before leaving premises. Always reference pump manufacturers recommendations for cleaning, maintenance and service.

3.4 Cold Weather Applications

If overnight outside temperatures were below freezing, steel temperatures may take a long time to reach the minimum acceptable temperature of 40 degrees F. Maintain air and substrate temperatures of 40° F for 24 hours prior, during, and for a minimum of 24 hours after application of fireproofing. Be sure adequate ventilation, i.e.: forced air drying is provided until adequate drying has occurred, otherwise adhesion will be compromised, as interface dew point freezing may occur.

Use forced air-drying in enclosed areas whenever possible. Use appropriate ventilation, to allow moisture removal from the area. These areas should have at least 4 complete air changes per hour.

Additional notes on Cold Weather Applications pertaining to pump cautions:

1. After clean out at end of day, be sure that all water is drained from hoses and nozzle. Turn off ball valve at the manifold. Attach a secondary hose, open ball valve and drain water from pump.
2. It may be prudent to remove the manifold, and make sure balls and seats are dry, so that they do not freeze up overnight. You may use windshield washer fluid and run it thru the pump if you do not remove the manifold. That will assist in preventing ice built up in the pump parts.
3. Air Lines: As all compressors will take in humid air, be sure that air lines are also checked for water collection to prevent ice built up in these lines.

Note: It is important during winter operations that the pump is in a heated environment, and exhausted to the outside air.

3.5 Patching & Repair Procedures

Types 5GP, 5MD, 7GP, 7HD & 7TB may be hand patched in all designs, in areas up to 144 sq. in., following the guidelines listed below:

1. Completely remove the Southwest Fireproofing product slightly beyond the damaged are, using a grinder, utility knife, chisel. The patch area should be left at a 90º butt joint.
2. Remove all dust and debris in and around the patch area.
3. Clean steel surface of any dust, dirt, grease or any other material that may impair bond and reapply primer if the existing primer is damaged (if applicable).
4. Wet the area with water just prior to applying the patch repair to prevent water being drawn out of the patch area.
5. Mix a full bag of Southwest Fireproofing following the written application instructions and using the correct amount of water specified. When patching by hand, use the lowest amount of water required to achieve a thicker consistency suitable for hand packing or trowel application. Apply the Southwest Fireproofing material to the thickness specified for the required hourly protection by means of trowel or spray application.

3.6 Controlling Density

Density is controlled by several factors that must be monitored, these are:

A. Proper water and material ratios
B. Distance of nozzle and angle of nozzle relative to the substrate
C. Pump pressures and air pressure
D. Use of orifice “mini shields and orifice size: use 9/16” or preferably 5/8” orifices with mini-shield
E. Mixing time: under mixing will result in higher densities, overmixing will result in lower densities.
F. Accelerator A-20 concentration and flow rate.

3.7 Thickness Control

Thickness control is extremely important in order to achieve minimum product usage. The use of a thickness gauge is very important to eliminate guesswork. The thickness gauge should be attached to the sprayer’s wrist and used frequently. See appendix for details of gauge availability.

Since some projects require several thickness passes to be applied, a proper check list should be available at all times for reference at the job site.

Thickness gauges are available from Hydro Cone: 1 800 673 2437 or Carboline upon request.

3.8 UL Application Requirements

Be sure to carefully read all appropriate UL designs for specific recommendations, when applying products to items such as electrified floors, trench headers, primed steel, flat plates, lath requirements etc.

Also, be sure minimum densities are achieved. Refer to specific UL designs and Carboline / Southwest Fireproofing product datasheets for further information.

SECTION 4: Inspection Procedures and Safety

4.0 Inspection Procedures

Refer to AWCI Technical Manual 12-A, Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials, an Annotated Guide. This should be used as the standard guideline for testing and inspection of applied Southwest Fireproofing products.

This document can be obtained from Carboline or by contacting AWCI: 703-534-8300, www.awci.org

4.1 Personal Protective Equipment

Carboline / Southwest Fireproofing products do not contain asbestos and have no known health hazards, either during mixing or application.

Follow all safety precautions on the product Safety Data Sheets. It is recommended that personal protective equipment be worn, including spray suits, gloves, eye protection and respirators. Mixer personnel should wear respirators with replaceable disposable filter masks, protective goggles, gloves and eye shields protection. All fireproofing products can be slippery when wet and therefore proper precautions must be taken. It is suggested that caution signs be posted to alert other trades.

SECTION 5: Equipment Manufacturers and Suppliers

5.0 Pumps

Southwest Fireproofing ™ products can be pumped with a wide range of piston, rotor/stator and squeeze pumps designed to pump cement/plaster materials, including the following:

Manufacturer	Model	Type	Size
Essick	FM9/FME51	Rotor / Stator	2L4
Muller	R - Tex	Rotor / Stator	2L6
Goldblatt	Supertex	Rotor / Stator	2L6
Graco	ToughTEK F340e	Patch Pump	-
Graco	ToughTEK F800e	Piston	-
Hy-Flex	HZ-30E	Rotor / Stator	2L6
Hy-Flex	H321E	Piston	-
Hy-Flex	HF-15 Spray Buddy	Patch Pump	-
PFT	ZP3 (HM2)	Rotor / Stator	-
Mayco	PF30	Piston	-
Strong	Spraymate 60	Rotor / Stator	2L6
Putzmeister	Thomson PTV 700	Piston	-
Putzmeister	S6EV	Rotor / Stator	2L6

Note: Marvel kit must be removed from piston pumps.

We suggest you contact the Carboline Company for up-to-date information before purchasing equipment.

5.1 Preventive Maintenance

1. Be sure that all pump and mixer manufacturers' guidelines are followed regarding safety, lubrication, filter changing, oil replacement, etc.
2. Check to make sure all pressure gauges are in good working condition
3. Routinely check to make sure optimum production levels are being achieved
4. Do keep logs of all activity, so that changes are noted and can be attended to

5.2 Mixers

There are many mixer companies to choose from. Paddle mixers must have a speed of about 40 RPM, with safety grid and preferably with dust covers. It is recommended that all mixers have rubber tipped replaceable blades, which will wipe

the drum of the mixer. These blades should be replaced periodically. Mixer should be a minimum 12 cubic feet capacity to accommodate a 2 bag mix.

Continuous mixers may also be used.

If using a continuous mixer made specifically for the Thomsen–Putzmeister "Big Blue" machine, contact Carboline for specific recommended changes that must be made to the mixing tube to accommodate ***Southwest*** *materials. The blades should have 32 –34 flights.*

Paddle Mixers	**Continuous Mixers**
Essick	Hy-Flex
Spray Force	Stone Type FP
Donnelly	Sun Spray
Multi Quip	Putzmeister
Stone	-

5.3 Hoses, Nozzles and Miscellaneous Equipment

Most pump manufacturers supply all types of accessories. Below listed is the regional supplier we recommend for equipment and pumping expertise:

The Donnelly Co. T: 1-585-924-0640

Safety Data Sheet
prepared to UN GHS Revision 3

1. Identification of the Substance/Mixture and the Company/Undertaking

1.1 Product Identifier 55ADS1NL

Product Name: SOUTHWEST TYPE 7HD

Revision Date: 10/02/2015

Supercedes Date: 05/21/2015

1.2 Relevant identified uses of the substance or mixture and uses advised against Fireproofing Material

1.3 Details of the supplier of the safety data sheet

Manufacturer:

Carboline Company
2150 Schuetz Road
St. Louis, MO USA 63146

Regulatory / Technical Information:
Contact Carboline Technical Services at
1-800-848-4645

Datasheet Produced by: Schlereth, Ken - ehs@stoncor.com

1.4 Emergency telephone number:

CHEMTREC 1-800-424-9300 (Inside US)
CHEMTREC +1 703 5273887 (Outside US)
HEALTH - Pittsburgh Poison Control 1-412-681-6669

2. Hazard Identification

2.1 Classification of the substance or mixture

Carcinogenicity, category 1A
Serious Eye Damage, category 1
Skin Irritation, category 2
Skin Sensitizer, category 1

2.2 Label elements

Symbol(s) of Product

Signal Word

Danger

Named Chemicals on Label

CALCIUM OXIDE, MICROCRYSTALLINE SILICA, PORTLAND CEMENT

GHS HAZARD STATEMENTS

Skin Irritation, category 2	H315	Causes skin irritation.
Skin Sensitizer, category 1	H317	May cause an allergic skin reaction.
Serious Eye Damage, category 1	H318	Causes serious eye damage.
Carcinogenicity, category 1A	H350-1A	May cause cancer.

GHS PRECAUTION PHRASES

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P280	Wear protective gloves/protective clothing/eye protection/ face protection.
P284	Wear respiratory protection.
P301+310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P302+352	IF ON SKIN: Wash with plenty of soap and water.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
P308+313	IF exposed or concerned: Get medical advice/attention
P332+313	If skin irritation occurs: Get medical advice/attention.
P333+313	If skin irritation or rash occurs: Get medical advice/attention.

2.3 Other hazards

No Information

Results of PBT and vPvB assessment:

The product does not meet the criteria for PBT/VPvB in accordance with Annex XIII.

3. Composition/Information On Ingredients

3.2 Mixtures

Hazardous Ingredients

CAS-No.	Chemical Name	%
65997-15-1	PORTLAND CEMENT	50-75
1317-65-3	LIMESTONE	2.5-10
1305-78-8	CALCIUM OXIDE	2.5-10
1309-48-4	MAGNESIUM OXIDE	2.5-10
14808-60-7	MICROCRYSTALLINE SILICA	0.1-1.0

CAS-No.	GHS Symbols	GHS Hazard Statements	M-Factors
65997-15-1	GHS05-GHS07	H315-317-318	0
1305-78-8	GHS05-GHS07	H315-318-335	0

1317-65-3	GHS07	H315-319	0
1309-48-4			0
14808-60-7	GHS08	H350-370	0

Additional Information: The text for GHS Hazard Statements shown above (if any) is given in Section 16.

4. First-aid Measures

4.1 Description of First Aid Measures

AFTER INHALATION: Remove person to fresh air. If signs/symptoms continue, get medical attention.
AFTER SKIN CONTACT: Wash off with soap and plenty of water.
AFTER EYE CONTACT: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
AFTER INGESTION: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If swallowed, call a poison control centre or doctor immediately.

4.2 Most important symptoms and effects, both acute and delayed

Irritating to respiratory system.

4.3 Indication of any immediate medical attention and special treatment needed

No Information

5. Fire-fighting Measures

5.1 Extinguishing Media:

Carbon Dioxide, Dry Chemical, Foam, Water Fog

UNUSUAL FIRE AND EXPLOSION HAZARDS: No Information

5.2 Special hazards arising from the substance or mixture

No Information

5.3 Advice for firefighters

The product is not flammable.

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Sweep up to prevent slipping hazard. Forms slippery/greasy layers with water.

6.2 Environmental precautions

No Information

6.3 Methods and material for containment and cleaning up

No Information

6.4 Reference to other sections

No Information

7. Handling and Storage

7.1 Precautions for safe handling

INSTRUCTIONS FOR SAFE HANDLING : Avoid breathing dust. Do not breathe vapours or spray mist. Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing.
PROTECTION AND HYGIENE MEASURES : Handle in accordance with good industrial hygiene and safety practice. Do not breathe dust. Wash hands before eating, drinking, or smoking.

7.2 Conditions for safe storage, including any incompatibilities

CONDITIONS TO AVOID: Exposure to moisture.
STORAGE CONDITIONS: Keep containers tightly closed in a dry, cool and well-ventilated place.

7.3 Specific end use(s)

No Information

8. Exposure Controls/Personal Protection

8.1 Control parameters

Ingredients with Occupational Exposure Limits (US)

Name	%	ACGIH TLV-TWA	ACGIH TLV-STEL	OSHA PEL-TWA	OSHA PEL-CEILING	OEL Note
PORTLAND CEMENT	50-75	10 MG/M3	N/E	5 MG/M3	N/E	
LIMESTONE	2.5-10	N/E	N/E	5 MGM3	N/E	
CALCIUM OXIDE	2.5-10	2 MGM3	N/E	5 MGM3	N/E	
MAGNESIUM OXIDE	2.5-10	N/E	N/E	N/E	N/E	
MICROCRYSTALLINE SILICA	0.1-1.0	0.025 MG/M3 (respirable)	N/E	0.1 MG/M3 (respirable)	N/E	

FURTHER INFORMATION: No Information

8.2 Exposure controls

Personal Protection

RESPIRATORY PROTECTION: Respirator with a dust filterUse the indicated respiratory protection if the occupational exposure limit is exceeded and/or in case of product release (dust). Use NIOSH approved respiratory protection.

EYE PROTECTION: Safety glasses with side-shields.

HAND PROTECTION: For prolonged or repeated contact use protective gloves.

OTHER PROTECTIVE EQUIPMENT: Ensure that eyewash stations and safety showers are close to the workstation location.

ENGINEERING CONTROLS: Avoid dust accumulation in enclosed space.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance:	Grey Powder Mixture
Physical State	Unknown
Odor	Unknown
Odor threshold	N/D
pH	N/D
Melting point / freezing point (°C)	N/A
Boiling point/range (°C)	N/A - 662 F (350 C)
Flash Point, (°C)	999
Evaporation rate	N/A
Flammability (solid, gas)	Not determined
Upper/lower flammability or explosive limits	N/A - N/A
Vapour Pressure, mmHg	N/A
Vapour density	N/A
Relative density	Not determined
Solubility in / Miscibility with water	N/D

Partition coefficient: n-octanol/water	Not determined
Auto-ignition temperature (°C)	Not determined
Decomposition temperature (°C)	Not determined
Viscosity	Unknown
Explosive properties	Not determined
Oxidising properties	Not determined

9.2 Other information

VOC Content g/l:	0
Specific Gravity (g/cm3)	Unknown

10. Stability and Reactivity

10.1 Reactivity
No Information

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Hazardous polymerisation does not occur.

10.4 Conditions to avoid
Exposure to moisture.

10.5 Incompatible materials
Strong oxidizing agents.

10.6 Hazardous decomposition products
None known.

11. Toxicological Information

11.1 Information on toxicological effects

Acute Toxicity:

Oral LD50: N/D

Inhalation LC50: N/D

Irritation: Unknown

Corrosivity: Unknown

Sensitization: Unknown

Repeated dose toxicity: Unknown

Carcinogenicity: Unknown

Mutagenicity: Unknown

Toxicity for reproduction: Unknown

If no information is available above under Acute Toxicity then the acute effects of this product have not been tested. Data on individual components are tabulated below:

CAS-No.	Chemical Name	Oral LD50	Dermal LD50	Vapor LC50
65997-15-1	PORTLAND CEMENT	Not Available		Not Available
1305-78-8	CALCIUM OXIDE	Not Available		Not Available
1317-65-3	LIMESTONE	6450 mg/kg, oral, rat	Not Available	Not Available
1309-48-4	MAGNESIUM OXIDE	Not Available		Not Available
14808-60-7	MICROCRYSTALLINE SILICA	Not Available	Not Available	Not Available

Additional Information:
Irritating to respiratory system.

12. Ecological Information

12.1 Toxicity:

EC50 48hr (Daphnia): Unknown

IC50 72hr (Algae): Unknown

LC50 96hr (fish): Unknown

12.2 Persistence and degradability: Unknown

12.3 Bioaccumulative potential: Unknown

12.4 Mobility in soil: Unknown

12.5 Results of PBT and vPvB assessment: The product does not meet the criteria for PBT/VPvB in accordance with Annex XIII.

12.6 Other adverse effects: Unknown

CAS-No.	Chemical Name	EC50 48hr	IC50 72hr	LC50 96hr
65997-15-1	PORTLAND CEMENT	No information	No information	No information
1317-65-3	LIMESTONE	No information	No information	No information
1305-78-8	CALCIUM OXIDE	No information	No information	No information
1309-48-4	MAGNESIUM OXIDE	No information	No information	No information
14808-60-7	MICROCRYSTALLINE SILICA	No information	No information	No information

13. Disposal Considerations

13.1 WASTE TREATMENT METHODS: Dispose of in accordance with local regulations.

14. Transport Information

14.1	**UN number**	None
14.2	**UN proper shipping name**	Not Regulated
	Technical name	N/A
14.3	**Transport hazard class(es)**	None
	Subsidiary shipping hazard	N/A
14.4	**Packing group**	N/A
14.5	**Environmental hazards**	No
14.6	**Special precautions for user**	Unknown
	EmS-No.:	N/A
14.7	**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code**	Unknown

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation for the substance or mixture:

U.S. Federal Regulations: As follows -

CERCLA - Sara Hazard Category

This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Chronic Health Hazard

Sara Section 313:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372:

No Sara 313 components exist in this product.

Toxic Substances Control Act:

All components of this product are either listed on the TSCA Inventory or are exempt.

This product contains the following chemical substances subject to the reporting requirements of TSCA 12(B) if exported from the United States:

No TSCA 12(b) components exist in this product.

U.S. State Regulations: As follows -

New Jersey Right-to-Know:

The following materials are non-hazardous, but are among the top five components in this product.

Chemical Name	CAS-No.
VERMICULITE	1318-00-9
CALCIUM SULFATE	13397-24-5

Pennsylvania Right-To-Know

The following non-hazardous ingredients are present in the product at greater than 3%.

Chemical Name	CAS-No.
VERMICULITE	1318-00-9
CALCIUM SULFATE	13397-24-5

California Proposition 65:

Warning: The following ingredients present in the product are known to the state of California to cause Cancer:

Chemical Name	CAS-No.
MICROCRYSTALLINE SILICA	14808-60-7

Warning: The following ingredients present in the product are known to the state of California to cause birth defects, or other reproductive hazards.

No Proposition 65 Reproductive Toxins exist in this product.

International Regulations: As follows -

* Canadian DSL:

No Information

15.2 Chemical Safety Assessment:

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

16. Other Information

Text for GHS Hazard Statements shown in Section 3 describing each ingredient:

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H350	May cause cancer.
H370	Causes damage to organs.

Reasons for revision

No Information

No Information

LEED® v4 Technical Bulletin
Building Design + Construction

Background
This document outlines Carboline's contributions towards available LEED v4 credits. Carboline is committed to developing and manufacturing environmentally compliant coatings and fire protection products. Carboline fireproofing products can contribute towards points under the LEED Green Building Rating System. The LEED Green Building Rating System does not certify construction products and materials. Instead, entire projects are certified on the basis of the environmental impact of the building materials employed and the overall building design.

What is LEED?
Leadership in Energy and Environmental Design (LEED) is the most widely used green building rating system in the world. LEED was developed by the United States Green Building Council (USGBC) to evaluate the environmental performance of buildings and promote sustainable design methods. LEED certification provides independent verification of environmental features which allow for efficient, high performance, cost-effective building design and construction. There are four levels of certification that can be reached for LEED v4 which are awarded based on achieving a minimum number of points (Certified, Silver, Gold and Platinum).

Carboline products can contribute toward the following LEED v4 credit categories:

Energy & Atmosphere
- ✓ EA Prerequisite – Minimum Energy Performance
- ✓ EA Credit – Optimize Energy Performance

Materials and Resources
Materials and Resources
- ✓ MR Prerequisite: Construction and Demolition Waste Management Planning
- ✓ MR Credit: Building Life Cycle Impact Reduction
- ✓ MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials
- ✓ MR Credit: Building Product Disclosure and Optimization – Material Ingredients

Indoor Environmental Quality
- ✓ EQ Credit: Low-Emitting Materials

Energy and Atmosphere

EA Prerequisite: Minimum Energy Performance

Intent: To reduce the environmental and economic harm of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.

Requirements: Follow the criteria in the LEED New Construction Energy Design Guide as specified in LEED v4 (page 66).

Carboline Contributions: Carboline wet mix materials provide thermal resistance and noise reduction coefficient values. This will reduce the amount of energy needed for climate control and any added materials needed for soundproofing. This credit only applies to Carboline materials when used within the building envelope.

Carboline Products That Contribute: Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500

EA Credit: Optimize Energy Performance (1-18 points)

Note: This credit requires that an energy analysis be done that includes all energy costs within and associated with the building project. Points for this credit are assigned from 1-18 based on the percentage of energy cost savings the building materials or systems will provide.

Intent: Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements: Follow the criteria in EA Prerequisite Minimum Energy Performance to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline. Points are awarded according to Table 1 in LEED v4 (page 75). Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building.

Carboline Contributions: Carboline wet mix materials provide thermal resistance and noise reduction coefficient values. This will reduce the amount of energy needed for climate control and reduce any added materials needed for soundproofing. This credit only applies to Carboline materials when used within the building envelope.

Carboline Products That Contribute: Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500

Materials and Resources

MR Prerequisite: Construction and Demolition Waste Management Planning

Intent: To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

Requirements:
Option 1 (page 106) Diversion (1–2 points)
Path1: Divert 50% and Three Material Streams (1 point)
Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.

OR

Path 2: Divert 75% and Four Material Streams (2 points)
Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams. The minimum percentage debris to be recycled or salvaged for each point threshold is as follows: 50%: 1 point, 75%: 2 points

Carboline Contributions: Carboline products are supplied in paper bags, plastic pails or metal pails which can be recycled. The pallets used for shipment are also recyclable.

Carboline Products That Contribute: Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, Pyroprime® 775 WB, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

MR Credit: Building Life-Cycle Impact Reduction (2-5 points)

Intent: To encourage adaptive reuse and optimize the environmental performance of products and materials.

Requirements: Reuse or salvage building materials from offsite or onsite as a percentage of the surface area as listed in Table 1 (page 91). Include structural elements (e.g., floors, roof decking), enclosure materials (e.g., skin, framing), and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project.

Materials contributing toward this credit may not contribute toward MR Credit Material Disclosure and Optimization.

Percentage of completed project surface area reused	Points BD&C	Points BD&C (Core and Shell)
25%	2	2
50%	3	3
75%	4	5

Carboline Contributions: Carboline wet mix and intumescent materials are utilized for retrofit and rehab construction. These materials provide fire resistance ratings to unprotected structural members which will bring the existing building up to code. This will eliminate the need to replace the structural elements that were not code compliant.

Carboline Products That Contribute: Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1 XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK3 Spattercoat, A/D Type TC-55, Pyroprime® 775 WB, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

MR Credit: Building Product Disclosure and Optimization-Sourcing of Raw Materials (1-2 points)

Intent: To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

Requirements:
Option 1 (page 95) Raw Material Source and Extraction Reporting (1 point)
Use at least 20 different permanently installed products from at least five different manufacturers that have publicly released a report from their raw material suppliers which include raw material supplier extraction locations, a commitment to long-term ecologically responsible land use, a commitment to reducing environmental harms from extraction and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria

Carboline Contributions: Carboline has publicly released reports from their raw material suppliers which include raw material supplier extraction locations for our wet mix and intumescent materials fire resistive materials.

Carboline Products That Contribute: Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

Option 2 (page 95). Leadership Extraction Practices (1 point)
Use products that meet at least one of the responsible extraction criteria below for at least 25%, by cost, of the total value of permanently installed building products in the project.

Recycled content: Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost. Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

Carboline Contributions: Carboline wet-mix products are manufactured with post-consumer recycled materials.

Carboline Products That Contribute: Southwest™ Type 5GP (10% recycled content), Southwest™ Type 5MD (10% recycled content), Southwest™ Type 5EF (10% recycled content).

MR Credit: Building Product Disclosure and Optimization-Material Ingredients (1-2 points)

Intent: To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts.

Requirements:
Option 1 (Page 97) Material Ingredient Reporting (1 point)
Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product.

Carboline Contributions: Carboline wet mix and intumescent products have complete Declare Health Product Declaration: The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open standard.

Carboline Products That Contribute: Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 241, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

MR Credit: Construction and Demolition Waste Management (1-2 points)

Intent: To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

Requirements:
Option 1 (page 106) Diversion (1–2 points)
Path 1: Divert 50% and Three Material Streams (1 point)
Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.

OR

Path 2: Divert 75% and Four Material Streams (2 points)
Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams. The minimum percentage debris to be recycled or salvaged for each point threshold is as follows: 50%: 1 point, 75%: 2 points

Carboline Contributions: Carboline products are supplied in paper bags, plastic pails or metal pails which can be recycled. The pallets used for shipment are also recyclable.

Carboline Products That Contribute: Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, Pyroprime® 775 WB, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

Indoor Environmental Quality

EQ Credit: Low Emitting Materials (1-3 points)

Intent: To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

Requirements: This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in seven categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system such as waterproofing membranes and air- and water-resistive barrier materials.

Option 1 (Page 118) Product Category Calculations (1-3 points)

Achieve the threshold level of compliance with emissions and content standards for the number of product categories listed in Table 2 (page 118).

Category	Threshold	Emission & Content Requirements
Interior paints and coatings applied onsite	At least 90% by volume for emissions, 100% for VOC content	• General Emissions Evaluation for paints and coatings applied to walls, floors and ceilings • VOC content requirements for wet applied products
Interior adhesives and sealants applied onsite	At least 90% by volume, for emissions 100% for VOC content	• General Emissions Evaluation • VOC content requirements for wet applied products
Ceilings, walls, thermal and acoustic insulation	100%	• General Emissions Evaluation • Healthcare, schools only
Healthcare and schools projects only: Exterior applied products	At least 90% by volume	• General Emissions Evaluation • Exterior applied products

Emissions and Content Requirements

To demonstrate compliance, a product or layer must meet all of the following requirements, as applicable.

Inherently non-emitting sources: Products that are inherently non-emitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant without any VOC emissions testing if they do not include integral organic-based surface coatings, binders, or sealants.

General emissions evaluation: Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario. The default scenario is the private office scenario. The manufacturer's or third-party certification must state the exposure scenario used to determine compliance. Claims of compliance for wet-applied products must state the amount applied in mass per surface area.

Manufacturers' claims of compliance with the above requirements must also state the range of total VOCs after 14 days (336 hours), measured as specified in the CDPH Standard Method v1.1:

- 0.5 mg/m3 or less;
- between 0.5 and 5.0 mg/m3; or
- 5.0 mg/m3 or more.

Additional VOC content requirements for wet-applied products: In addition to meeting the general requirements for VOC emissions (above), on-site wet-applied products must not contain excessive levels of VOCs, for the health of the installers and other trade workers who are exposed to these products. To demonstrate compliance, a product or layer must meet the following requirements, as applicable. Disclosure of VOC content must be made by the manufacturer. Any testing must follow the test method specified in the applicable regulation.

- All paints and coatings wet-applied on site must meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.
- All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.
- For projects outside the U.S., all paints, coatings, adhesives, and sealants wet-applied on site must either meet the technical requirements of the above regulations or comply with applicable national VOC control regulations such as the European Decopaint Directive (2004/42/EC), the Canadian VOC Concentration Limits for Architectural Coatings, or the Hong Kong Air Pollution Control (VOC) Regulation.

As there is no fireproofing category in the LEED v4, the SCAQMD regulations are commonly used to designate specialty coatings classifications for LEED applications. The SCAQMD (Rule #1113) outlines the current VOC limits as of January 1, 2014 for several categories of specialty coatings as follows:

Specialty Coating Type	Current VOC Limit (g/l)
Concrete surface retarders	50
Driveway Sealers	50
Faux finishing coatings	200
Fireproofing coatings	**150**
Graphic art coatings	150
Mastic coatings	100
Metallic pigmented coatings	150
Anti-graffiti coatings	50

The following Carboline products meet current VOC requirements:

Carboline Compliant Fireproofing Products	VOC Limit (EPA Method 24) (g/l)
A/D Firefilm® III	20 g/l
A/D Firefilm® III C	20 g/l
Firefilm® IV	4 g/l
Thermo-Sorb® VOC	142 g/l
Thermo-Sorb® E	147 g/l
Thermo-Sorb® 263	148 g/l
Thermo-Lag® E100	13 g/l
Thermo-Lag® E100 S	64 g/l
Thermo-Lag® 3000 A	13 g/l
Thermo-Lag® 3000 SA	64 g/l
A/D Type TC-55	0 g/l
Pyroprime® 775 WB	81 g/l
Southwest™ Series	0 g/l
Pyrolite® Series	0 g/l
Pyrocrete® Series	0 g/l

Carboline Contributions: Carboline has wet mix and intumescent materials that meet the required VOC limits and VOC emissions requirements for this credit.

Carboline Products That Contribute: Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, Pyroprime® 775 WB, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

Manufacturing Locations

Products manufactured in Louisa, VA:
Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500

Products manufactured in Green Bay, WI:
Pyroprime® 775, Thermo-Sorb® E, Thermo-Sorb® 263,

Products manufactured in Dayton, NV:
Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

Products manufactured in Lake Charles, LA:
A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, A/D Type TC-55, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

Raw Material Extraction Locations

NOTE: For raw material extraction locations and distance to manufacturing plants, please contact your local Carboline technical sales representative or Carboline fireproofing technical service.

Certificate of Compliance

Certificate Number **20050324-R8213B**
Report Reference **R8213B**
Issue Date **2005 March 24**

Underwriters Laboratories Inc.®

Issued to:

Southwest Vermiculite Co

5119 Edith Blvd NE, Po Box 6287
Albuquerque, NM 87197

This is to certify that representative samples of

Spray-applied Fire Resitive Materials

Type 5MD, Type 7GP, Type 7HD, Type 7TB, Type 7HX

Have been investigated by Underwriters Laboratories Inc.® in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety:

UL 263 Fire Tests of Building Construction and Materials
ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials

Additional Information:

See addendum for system listings

Only those products bearing the UL Classification Mark should be considered as being covered by UL's Classification and Follow-Up Service.

The UL Classification Mark includes: UL in a circle symbol: with the word "CLASSIFIED" (as shown); a control number (may be alphanumeric) assigned by UL; a statement to indicate the extent of UL's evaluation of the product; and, the product category name (product identity) as indicated in the appropriate UL Directory.

Look for the UL Classification Mark on the product

Issued by:
Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:
John Mammoser
Underwriters Laboratories Inc.

Certificate of Compliance

Certificate Number 20050324-R8213B
Report Reference R8213B
Issue Date 2005 March 24

Underwriters Laboratories Inc.®

This is to verify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Type 5MD Spray-Applied Fire Resistive Materials for use in

Beam Design Nos. N401, N404, N706, N708, N732, N736, N754, N756, N791, S701, S702, S715, S739 and

Column Design Nos. X527, X701, X704, X722, X723, X751, X752, X771, X772 and

Floor-Ceiling Design Nos. A702, D701, D703, D704, D705, D706, D708, D709, D710, D711, D712, D715, D716, D722, D723, D725, D726, D727, D728, D729, D730, D739, D740, D742, D743, D744, D745, D746, D747, D748, D750, D751, D752, D753, D754, D756, D758, D905, D907, D909, D910, D916, D917, G701, G702, G703, J701, J704, J705, J706, J709, J919, J957, J966 and

Roof-Ceiling Design Nos. P675, P676, P701, P708, P709, P710, P711, P714, P717, P741, P901, P902, P907, P908, P919, P920, P921, P923 and

Wall-Partition Design No. U703.

Issued by:

Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:

John Mammoser
Underwriters Laboratories Inc.

Certificate of Compliance

Certificate Number 20050324-R8213B
Report Reference R8213B
Issue Date 2005 March 24

Underwriters Laboratories Inc.®

This is to verify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Type 7GP and 7HD Spray-Applied Fire Resistive Materials for use in

Beam Design Nos. N401, N404, N706, N708, N720, N732, N736, N763, N754, N756, N791, S701, S702, S715 S725, S739 and

Column Design Nos. X527, X701, X704, X722, X723, X738, X751, X752, X771, X772, X794, Y725 and

Floor-Ceiling Design Nos. A702, D701, D703, D704, D705, D706, D708, D709, D710, D711, D712, D715, D716, D722, D723, D725, D726, D727, D728, D729, D730, D739, D740, D742, D743, D744, D745, D746, D747, D748, D750, D751, D752, D753, D754, D756, D758, D905, D907, D909, D910, D916, D917, G701, G702, G703, J701, J704, J705, J706, J709, J919, J957, J966 and

Roof-Ceiling Design Nos. P675, P676, P701, P708, P709, P710, P711, P714, P717, P741, P901, P902, P907, P908, P919, P920, P921, P923.

Wall-Partition Design No. U703.

Issued by:
Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:
John Mammoser
Underwriters Laboratories Inc.

Certificate of Compliance

Certificate Number 20050324-R8213B
Report Reference R8213B
Issue Date 2005 March 24

Underwriters Laboratories Inc.®

This is to verify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Type 7TB Spray-Applied Fire Resistive Materials for use in

Column Design No. X737 .

Types 7HX, Aerex-S Spray-Applied Fire Resistive Materials for use in Design No. XR708 .

Issued by:

Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:

John Mammoser
Underwriters Laboratories Inc.

Bodycote MATERIALS TESTING CANADA INC. www.na.bodycote-mt.com

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Deflection Testing of a SFRM

A Report to: **A/D Fire Protection Systems Inc.**
420 Tapscott Rd., Unit #5
Scarborough, Ontario
M1B 1Y4

Attention: **Jason Bergman**

Tel: 416-292-2361
Fax: 416-298-5884

Submitted by: Building Performance
Materials Testing

Report No.: 98-J53-M0196-C1 Revision 2
1 Page

Date: 12 January, 1999

INTRODUCTION

A sample of fire protection coating material, identified as **Southwest Vermiculite Inc. 7HD** was submitted by **A/D Fire Protection Systems Inc.** for physical testing. A/D Fire Protection Systems requested the material to be tested to ASTM E759 Test Method for Effect of **Deflection** of Sprayed Fire-Resistive Material Applied to Structural Members.

SAMPLE IDENTIFICATION

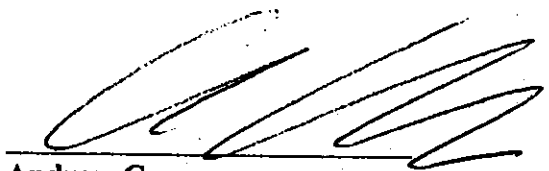
The sample submitted by AD Fire Protection Systems was designated with the **Bodycote** Sample No. 98-J53-M0196-C. The test sample was manufactured and finished by A/D Fire Protection Systems to the required dimensions and / or substrates for the test requested.

TEST PROCEDURES & RESULTS

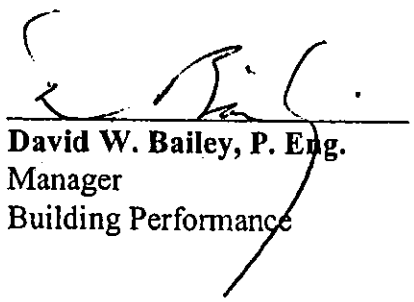
The testing was performed according to the method of ASTM E759-92 Test Method for Effect of Deflection of Sprayed Fire-Resistive Material Applied to Structural Members. The **Southwest Vermiculite Inc. 7HD** was applied to a steel deck which consisted of a fluted steel roof deck and a steel top sheet. The **7HD** was reported by A/D Fire Protection Systems to be applied to a dried thickness of 19mm.

Instrumentation utilized for this test included Digimatic Indicator MII B02000, Load Cell MII B00355, Conditioner MII 11013, Digital Multimeter.

The specimen required 2.5 kN (419 lbs.) to deflect the centre of the panel 25mm (1 in.). Following deflection of the panel for five minutes, no spalling or cracking of the **Southwest Vermiculite Inc. 7HD** was observed.



Andrew Cameron
Project Technologist
Building Performance



David W. Bailey, P. Eng.
Manager
Building Performance

ACCREDITATION

Canadian General Standards Board #76002, Standards Council of Canada #1(formerly #101).

REGISTRATION

ISO 9002-1994 registered by QMI, Registration #001109.

03-3

Cambridge
materials testing limited

Product Development
6991 Millcreek Drive, Unit 13,
Mississauga, Ontario L5N 6B9
Tel: (905) 812-3856 Fax: (905) 812-3866
www.cambridgematerials.com
ISO 17025 Accredited

Report For:	AD Fire Protection Systems 420 Tapscott Road, Unit #5, SCARBOROUGH, Ontario M1B 1Y4 Phone: (416) 292-2361 Fax: (416) 298-5887	**Laboratory #:** **Report Date:** **Received Date:** **Customer P.O.#:**	**366888E-04** September 16th, 2004 August 13th, 2004 7688
Attention:	Stevo Miljatovich		
Specimen:	A/D Type 7 HD		

TEST REPORT

RE: TESTING OF A/D TYPE 7 HD FOR CORROSION OF STEEL

On August 13th, 2004, CMTL received one (1) set of samples of A/D Type 7 HD for determination of steel corrosion.

The submitted samples were identified as:

Sample #1 - A/D Type 7 HD

The samples were tested for corrosion of steel (ASTM E937-93) in accordance with applicable ASTM standards.

The results of testing are attached hereto.

Cambridge Materials Testing Limited

Per _____
QUALITY ASSURANCE

Per Derek Wild
TECHNICIAN

Cambridge
materials testing limited

Product Development
6991 Millcreek Drive, Unit 13,
Mississauga, Ontario L5N 6B9
Tel: (905) 812-3856 Fax: (905) 812-3866
www.cambridgematerials.com
ISO 17025 Accredited

AD Fire Protection Systems Inc.
Laboratory #366888E-04

RESULTS OF TESTING

ASTM E937-93: Corrosion of Steel by A/D Type 7 HD Applied to Structural Members

The A/D Type 7 HD were applied to twelve (12) metal plates of the following type and grade:

Set #1 - Four (4) Metal Plates - 8 by 8 inches (12 gage) - Bare Steel (A36 grade)
Set #2 - Four (4) Metal Plates - 8 by 8 inches (12 gage) - Shop Coated (A36 grade)
Set #3 - Four (4) Metal Plates - 8 by 8 inches (12 gage) - Galvanized Steel (G60 grade)

NOTE: AD Fire Protection Systems was to measure the weight of the metal plates prior to application of the coating. An extra plate from each set was cleaned and weighed to use as a "control" sample.

Two (2) metal plates from each set were exposed to an initial aging period of 240 hours at 23°C and 50% RH, while the remaining plates were exposed to a 240 hour humidity test at 35°C and 95% RH. Prior to exposure, the underside of the metal plates was sealed to prevent corrosion.

After the exposure period the A/D Type 7 HD and sealing membrane was removed from each of the twelve (12) metal plates. The plates were then weighed to determine the "relative" weight change.

Sample #1 – A/D Type 7 HD (2 Replicates Per Set)

Set #1 – Bare Steel (A36)	**Weight Change (g/mm^2)**	
	Initial Aging Period	**Humidity Test**
Replicate #1	-1.0×10^{-5}	3.0×10^{-5}
Replicate #2	-4.0×10^{-5}	-4.0×10^{-5}
Average	***-2.5×10^{-5}***	***-5.0×10^{-6}***

Set #2 – Shop Coated (A36)	**Weight Change (g/mm^2)**	
	Initial Aging Period	**Humidity Test**
Replicate #1	8.0×10^{-5}	7.0×10^{-5}
Replicate #2	-1.5×10^{-4}	-1.1×10^{-4}
Average	***-3.5×10^{-5}***	***-2.0×10^{-5}***

Set #3 – Galvanized (G60)	**Weight Change (g/mm^2)**	
	Initial Aging Period	**Humidity Test**
Replicate #1	4.0×10^{-5}	-3.9×10^{-4}
Replicate #2	-3.1×10^{-4}	1.0×10^{-5}

REMARKS

There did not appear to be any visual evidence of corrosion of steel after the required exposure periods.

Bodycote MATERIALS TESTING CANADA INC. www.na.bodycote-mt.com

2395 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO CANADA L5K 1B3 • TEL: (905) 822-4111 • FAX: (905) 823-1446

Impact Testing of a SFRM

A Report to: **A/D Fire Protection Systems Inc.**
420 Tapscott Rd., Unit #5
Scarborough, Ontario
M1B 1Y4

Attention: **Jason Bergman**

Tel: 416-292-2361
Fax: 416-298-5884

Submitted by: Building Performance
Materials Testing

Report No.: 98-J53-M0196-C4 Revision 2
1 Page

Date: 12 January, 1999

INTRODUCTION

A sample of fire protection coating material, identified as **Southwest Vermiculite Inc. 7HD** was submitted by **A/D Fire Protection Systems Inc.** for physical testing. A/D Fire Protection Systems requested the material be tested to ASTM E760 Test Method Standard Test Method for Effect of **Impact** on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.

SAMPLE IDENTIFICATION

The sample submitted by AD Fire Protection Systems was designated with the **Bodycote** Sample No. 98-J53-M0196-C. The test sample was manufactured and finished by A/D Fire Protection Systems to the required dimensions and / or substrates for the test requested.

TEST PROCEDURES & RESULTS

The testing was performed according to the method of ASTM E760-92 Test Method Standard Test Method for Effect of **Impact** on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members, with the exception that the SFRM material was applied to a decking assembly without 64mm thick concrete. The sample consisted of a corrugated steel deck with a steel top sheet and the **Southwest Vermiculite Inc. Type 7HD**. The **7HD** was reported by A/D Fire Protection Systems to be applied to a dried thickness of 19mm.

The sample utilized for the impact test was previously used for the deflection test, at the request of A/D Fire Protection personnel. Instrumentation utilized for this test included electronic balance MII A07485.

The test specimen cracked (1mm width) the full length of the test sample after the impact with the 27.2 kg bag from a height of 1.2m. No spalling or delaminations of the **Southwest Vermiculite Inc. Type 7HD** were observed after the impact.

Andrew Cameron
Project Technologist
Building Performance

David W. Bailey, P. Eng.
Manager
Building Performance

ACCREDITATION

Canadian General Standards Board #76002, Standards Council of Canada #1(formerly #101).

REGISTRATION

ISO 9002-1994 registered by QMI, Registration #001109.

Intertek

TEST REPORT

REPORT NUMBER: 3171245MID-022
ORIGINAL ISSUE DATE: October 23, 2009

EVALUATION CENTER
Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO

Southwest Fireproofing Products Co.
5119 Edith Blvd. NE
Albuquerque, NM 87107

PRODUCT EVALUATED: 7HD cementitious fireproofing
EVALUATION PROPERTY: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E736: Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

Report of Testing 7HD cementitious fireproofing for compliance with the applicable requirements of the following criteria: ICC-ES AC 23: *Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials* as detailed in ASTM E736: *Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members*

1 Table of Contents

2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 7HD cementitious fireproofing. Testing was conducted in accordance with ASTM E 736 - 00 (Reapproved 2006) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek observation at the Intertek Evaluation Center.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The dry fireproofing material as removed from bags was mixed with water to produce a coherent pumpable slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. The slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table.

Product - Bag No.	Net material weight (lbs)	Water added (lbs)	Substrate of Application
Type 7HD - Bag 3	49	68	Steel plates per ASTM E 736

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD 1 – ASTM E736

The substrate was a 16 gauge galvanized steel sheet measuring 12" x 12". The sample was conditioned at 72 hours at a room temperature of 68 +/- 18 ℉ followed by oven drying at 110 +/- 10℉ at humidity not exceeding 60% until a constant weight was reached. The fireproofing thickness is 1/2" to 1". The sample was restrained to prevent flexing during the test. The hook and pulling force was centered in the cap.

Adhesive was applied at sufficient volume to secure the plug, and the plug was placed against the surface of the sprayed fire-resistive material. The cap was supported until the adhesive dried, and any excess adhesive was removed. The sample was placed with the sprayed fire-resistive material facing up, and restrained to prevent movement and flexing. A scale with hook was engaged and exerted an increasing force perpendicular to the surface until failure occurred.

4.2. TEST STANDARD 2 – ASTM E605

Thickness of each sample was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The densities of the tested materials were determined by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

E736 – Cohesion / Adhesion

Test results including the applied force, cup diameter, calculated Adhesive/Cohesive force, failure mode and the sample thickness and density are tabulated below. The density of the sample was determined on a second plate sprayed with the same batch of wet material prepared at the same time as the test sample.

The specified 3 1/4 inch bottle screw cap called for by the ASTM Standard Procedure was replaced by the 1 3/8 inch wood disk described in Appendix B of AWCI Technical Manual 12-A for fireproofing having bond strengths exceeding 1,146 psf.

Sample Tested	Applied force (lbf)	Cap diameter (in)	Cohesive Adhesive force (psf)	Mode of failure	Thickness (in.)	Density (lbs/ft3)
7 HD	175.40742	1 3/8	17009	Cohesive	0.75	41.74

6 Conclusion

The Adhesive/Cohesive force at failure of the tested material is 17009 pounds per square foot. This exceeds the 150 psf or 20 times the weight of the fireproofing requirement of ICC-ES AC23 acceptance criteria for this physical property.

Intertek has conducted testing for Southwest Fireproofing Products Co. Type 7HD cementitious fireproofing. Testing was conducted in accordance ASTM E 736 - 00 (Reapproved 2006) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by:

Randy Sundby
Project Engineer, Construction Products

Reviewed by:

Rhonda Byrne
Operations Manager

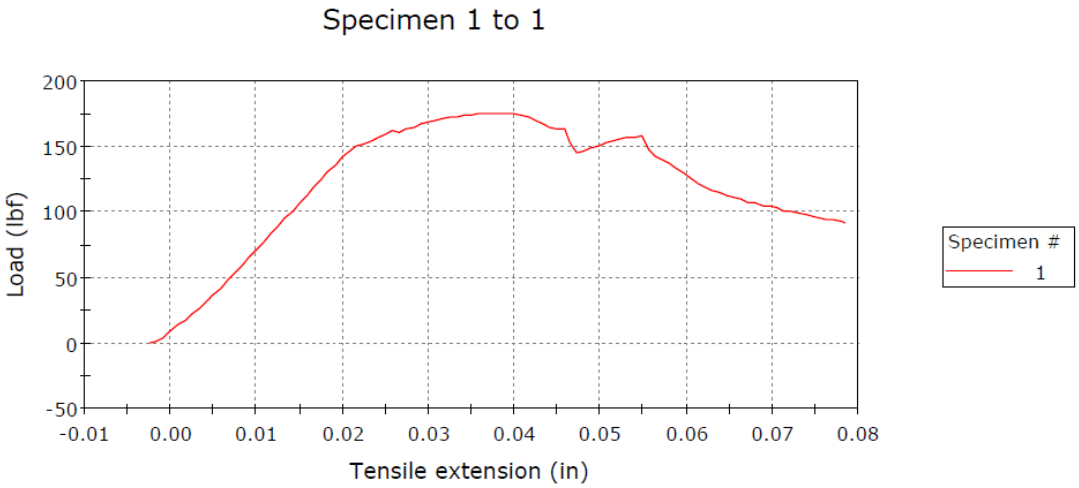
APPENDIX A

Test Data

Southwest Fireproofing Products Company
Project #3171245
April 15, 2009

ASTM E736: Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

Type 7HD
Substrate: 16ga Galvanized Steel Sheet, 12"x12"
Fireproofing Thickness: 1/2" to 1"



	Maximum Load (lbf)
1	175.40742
Mean	175.40742

REVISION SUMMARY

DATE	SUMMARY
October 23, 2009	Original

03-3

Cambridge
materials testing limited

Product Development
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Mississauga, Ontario L5N 6B9
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ISO 17025 Accredited

Report For:	AD Fire Protection Systems 420 Tapscott Road, Unit #5, SCARBOROUGH, Ontario M1B 1Y4 Phone: (416) 292-2361 Fax: (416) 298-5887	**Laboratory #:** **Report Date:** **Received Date:** **Customer P.O.#:**	**366888D-04** September 16th, 2004 August 13th, 2004 7688
Attention:	Stevo Miljatovich		
Specimen:	A/D Type 7 HD		

TEST REPORT

RE: TESTING OF A/D TYPE 7 HD FOR AIR EROSION

On August 13th, 2004, CMTL received one (1) set of samples of A/D Type 7 HD for determination of air erosion properties.

The submitted samples were identified as:

Sample #1 - A/D Type 7 HD

The samples were tested for air erosion (ASTM E859-93) in accordance with applicable ASTM standards.

The results of testing are attached hereto.

Cambridge Materials Testing Limited

Per Steve Brown
QUALITY ASSURANCE

Per Derek Whitt
TECHNICIAN

Cambridge
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ISO 17025 Accredited

AD Fire Protection Systems Inc.
Laboratory #366888D-04

RESULTS OF TESTING

ASTM E859-93: Air Erosion of A/D Type 7 HD Applied to Structural Members

The A/D Type 7 HD were applied to two (2) 12 by 12-inch metal plates at an approximate thickness of ¾ inches.

NOTE: AD Fire Protection Systems supplied the blower and duct system for the air erosion testing.

The metal plates were positioned in the middle of the duct and a 30-denier nylon filter was placed upstream and downstream of the samples prior to running of the blower unit. The opening in the duct was covered with plastic wooden boards and sealed with tape.

The filter downstream from the samples was weighed before and after 1, 6 and 24 hour intervals to determine the percent weight gain of the filters from the cementitious coatings.

Sample #1 – A/D Type 7 HD (2 Replicates)

		Replicate #1	Replicate #2	Average
Original Weight of Filter	(g)	17.914	17.914	17.914
Weight Gain After 1 Hour	(%)	< 0.001	< 0.001	< 0.001
Weight Gain After 6 Hours	(%)	< 0.001	< 0.001	< 0.001
Weight Gain After 24 Hours	(%)	< 0.001	< 0.001	< 0.001

Intertek

TEST REPORT

REPORT NUMBER: 3171245MID-022
ORIGINAL ISSUE DATE: October 23, 2009

EVALUATION CENTER
Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO

Southwest Fireproofing Products Co.
5119 Edith Blvd. NE
Albuquerque, NM 87107

PRODUCT EVALUATED: 7HD cementitious fireproofing
EVALUATION PROPERTY: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E761: Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.

Report of Testing 7HD cementitious fireproofing for compliance with the applicable requirements of the following criteria: ICC-ES AC 23: *Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials* as detailed in ASTM E761: *Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.*

1 Table of Contents

2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 7HD cementitious fireproofing. Testing was conducted in accordance with ASTM E 761 - 92 (Reapproved 2005) Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members. This evaluation began April 14, 2009 and was completed October 27, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek observation at the Intertek Evaluation Center.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The dry fireproofing material as removed from bags was mixed with water to produce a coherent pumpable slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. The slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table.

Product - Bag No.	Net material weight (lbs)	Water added (lbs)	Substrate of Application
Type 7HD - Bag 3	49	68	Steel plates per ASTM E 761

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD 1 – ASTM E761

The substrate was a 16 gauge galvanized steel sheet measuring 7" x 24". The sample was conditioned at 72 hours at a room temperature of 68 +/- 18℉ followed by oven drying at 110 +/- 10℉ at humidity not exceeding 60% until a constant weight was reached. The fireproofing thickness is a minimum of 3/4" with a variation of thickness less than or equal to +/- 1/8". The surface was evened on opposite ends of the sample for testing.

The load (bearing block) of 0.1 psi was applied perpendicular to the face of the sample. The initial thickness, the distance between the plane bearing surface of the assembly and the steel plane, was recorded. The sample was compressed until a deformation of 10% or ultimate load was reached.

4.2. TEST STANDARD 2 – ASTM E605

Thickness of each sample was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The densities of the tested materials were determined by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

E761 – Compressive Strength

Test results including the compressive load, compressive strength, maximum extension, mode of failure at two locations. One at each end of the sample. The density of the sample was determined at the mid section. Results are tabulated below.

Sample Number	Compressive Load (lbf)	Compressive Strength (psi)	Maximum extension (in)	Mode of failure	Thickness (in.)	Density (lbs/ft^3)
7 HD (1)	23385.01004	649.6	0.08900	Maximum extension	0.89	41.74
7 HD (2)	22917.11549	636.6	0.08901	Maximum extension	0.89	41.74

6 Conclusion

The average compressive strength of the two determinations is 643.1 pounds per square inch. This equates to 92,606 pounds per square foot which exceeds the 750 psf requirement of ICC-ES AC23 acceptance criteria for this physical property.

Intertek has conducted testing for Southwest Fireproofing Products Co. Type 7HD cementitious fireproofing. Testing was conducted in accordance ASTM E 761 - 92 (Reapproved 2005) Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members. This evaluation began April 14, 2009 and was completed October 27, 2009.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by:

Randy Sundby
Project Engineer, Construction Products

Reviewed by:

Rhonda Byrne
Operations Manager

APPENDIX A

Test Data

ASTM E761 DATA SHEET

Project #: ___3171245_____ Client: ____SWF_____

Date: _____10/27/09_____ Tech/Reviewer: Randy

Sample:.7HD_____ Temp: ___74.2 F_____

Thickness of SFRM: 1 inch.

Density of SFRM: 41.74 (lbs/ft^3)

Mode of Failure: Maximum Extension

	Compressive load at Maximum Compressive extension (lbf)	Maximum Compressive extension (in)
1	23385.01004	0.08900
2	22917.11549	0.08901

REVISION SUMMARY

DATE	SUMMARY
October 27, 2009	Original

Bodycote MATERIALS TESTING CANADA INC. www.na.bodycote-mt.com

2395 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO CANADA L5K 1B3 • TEL: (905) 822-4111 • FAX: (905) 823-1446

ASTM E 84 Surface Burning Characteristics of "A/D Type 7 HD" Fire Resistance Coating

A Report To:	**A/D Fire Protection Systems** 420 Tapscott Road. Unit # 5 Scarborough, Ontario M1B 1Y4
Phone: Fax:	416-292-2361 416-298-5887
Attention:	Stevo Miljatovich
Submitted by:	Fire, Flammability & Explosivity
Report No.	04-02-825 4 Pages
Date:	October 7, 2004

ACCREDITATION Standards Council of Canada, Registration #1.

REGISTRATION ISO 9001:2000, registered by QMI, Registration #001109.

SPECIFICATIONS OF ORDER

Determine the Flame Spread and Smoke Developed Indices based upon a single test conducted in accordance with ASTM E 84-04, as per our Quotation No. 04-06-322, and Purchase Order No.7726.

SAMPLE IDENTIFICATION

Sample submitted for testing was identified as: "A/D Type 7 HD", cementious fire resistance coating material.

(BMTC sample identification number 04-02-S0825)

TEST PROCEDURE

The method, designated as ASTM E 84-04, "Standard Method of Test for Surface Burning Characteristics of Building Materials", is designed to determine the relative surface burning characteristics of materials under specific test conditions. Results are expressed in terms of flame spread index (FSI) and smoke developed (SD).

Although the procedure is applicable to materials, products and assemblies used in building construction for development of comparative surface spread of flame data, the test results may not reflect the relative surface burning characteristics of tested materials under all building fire conditions.

SAMPLE PREPARATION

The sample, consisting of 3 (2 inch x 21 inch x 96 inches) panels were conditioned to constant mass at a temperature of 73°F and a relative humidity of 50% prior to testing.

SUMMARY OF TEST PROCEDURE

The tunnel is preheated to 150°F, as measured by the floor-embedded thermocouple located 23.25 feet downstream of the burner ports, and allowed to cool to 105°F, as measured by the floor-embedded thermocouple located 13 feet from the burners. At this time the tunnel lid is raised and the test sample is placed along the ledges of the tunnel so as to form a continuous ceiling 24 feet long, 12 inches above the floor. The lid is then lowered into place.

SUMMARY OF TEST PROCEDURE (continued)

Upon ignition of the gas burners, the flame spread distance is observed and recorded every 15 seconds. Flame spread distance versus time is plotted ignoring any flame front recessions. If the area under the curve (A) is less than or equal to 97.5 min·ft, FSI = 0.515·A; if greater, FSI = 4900/(195-A). Smoke developed is determined by comparing the area under the obscuration curve for the test sample to that of inorganic reinforced cement board and red oak, arbitrarily established as 0 and 100, respectively.

TEST RESULTS

SAMPLE	FSC1	SD
"A/D Type 7 HD"	0	10

Observations of Burning Characteristics

- The sample began to ignite and propagate flame at approximately the 4.75 minute mark.
- The flame front propagated to a maximum distance of 1.0 foot at the 6.50 minute mark of the test where it remained.
- Maximum amounts of smoke developed were recorded during the early stages of the test coinciding with the flame propagation (see accompanying graphs).

Authorities having jurisdiction usually refer to these categories:

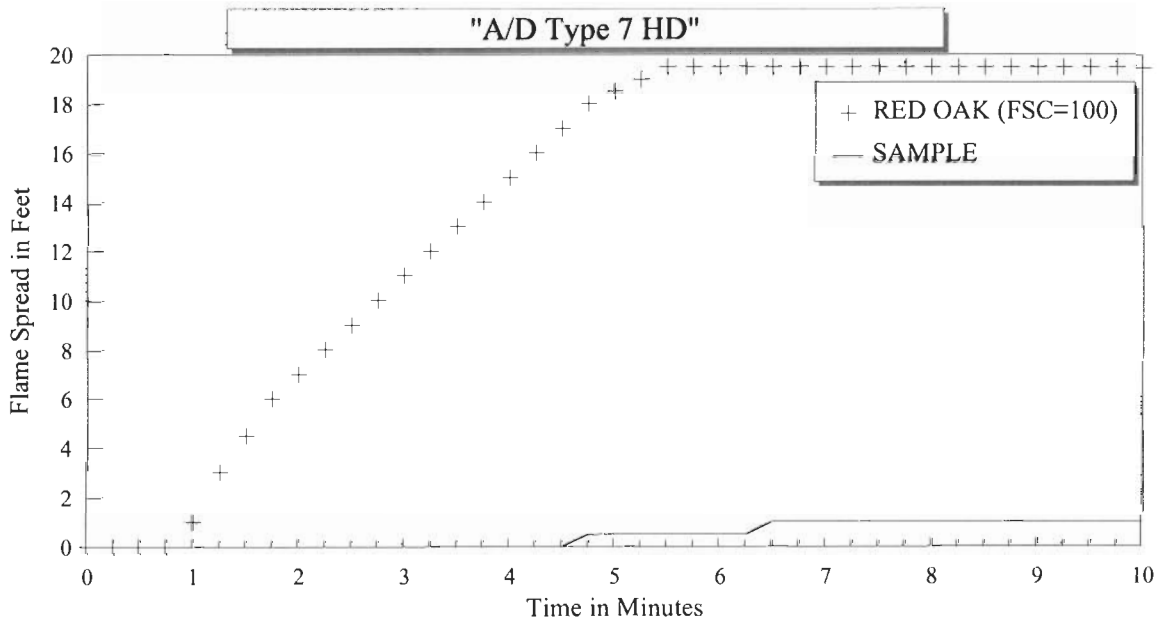
	Flame-Spread Index	Smoke Development
Class 1 or A	0 - 25	450 Maximum
Class 2 or B	26 - 75	450 Maximum
Class 3 or C	76 - 200	450 Maximum

Robert A. Carleton,
Fire, Flammability & Explosivity.

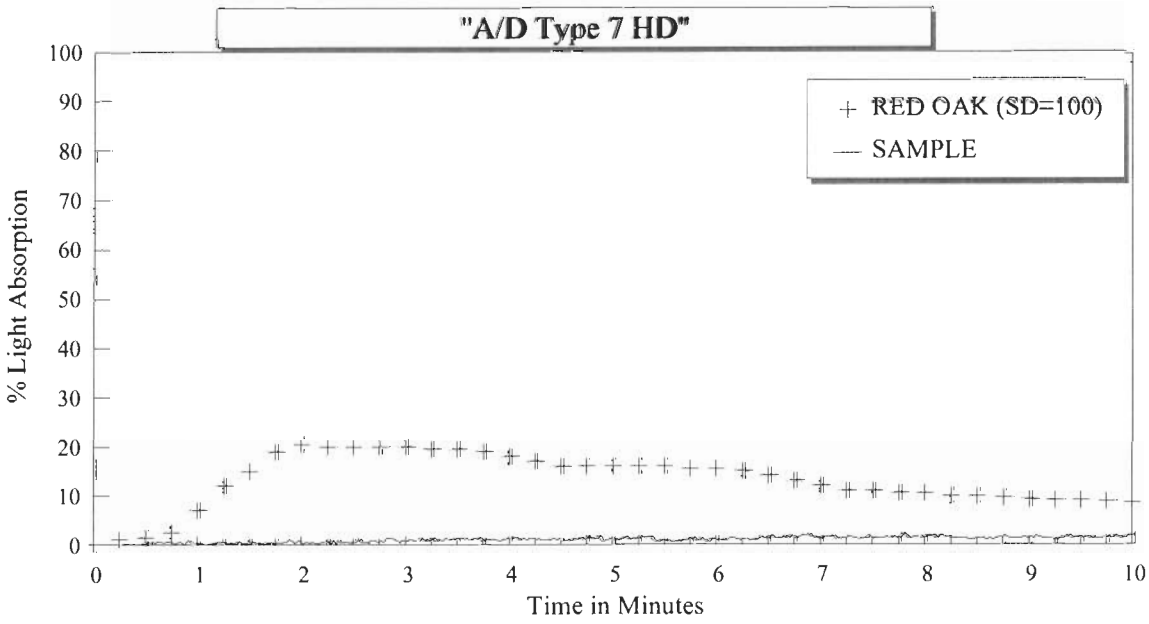
Richard J. Lederle,
Fire, Flammability & Explosivity.

Note: This report consists of 4 pages, including the cover page, that comprise the report "body". It should be considered incomplete all pages are not present.

FLAME SPREAD INDEX



SMOKE DEVELOPED



FSC1	SD
0	10

Cambridge
materials testing limited

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Mississauga, Ontario L5N 6B9
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www.cambridgematerials.com
ISO 17025 Accredited

Report For:	AD Fire Protection Systems 420 Tapscott Road, Unit #5, SCARBOROUGH, Ontario M1B 1Y4	**Laboratory #:**	**366888G-04**
		Report Date:	October 20th, 2004
		Received Date:	August 13th, 2004
	Phone: (416) 292-2361 Fax: (416) 298-5887	**Customer P.O.#:**	7688
Attention:	Stevo Miljatovich		
Specimen:	A/D Type 7 HD		

TEST REPORT

RE: TESTING OF A/D TYPE 7 HD FOR FUNGI RESISTANCE

On August 13th, 2004, CMTL received one (1) set of samples of A/D Type 7 HD for determination of fungi resistance.

The submitted samples were identified as:

Sample #1 - A/D Type 7 HD

The samples were tested for fungi resistance (ASTM G21) in accordance with applicable ASTM standards.

Testing was subcontracted to a testing laboratory within the City of Toronto.

The results of testing are attached hereto.

Cambridge Materials Testing Limited

Per _____ *QUALITY ASSURANCE*

Per _____ *TECHNICIAN*

Cambridge
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AD Fire Protection Systems Inc.
Laboratory #366888G-04

RESULTS OF TESTING

ASTM G21-92: Fungi Resistance of A/D Type 7 HD Applied to Structural Members

TEST FUNGI

Two brown-rot wood decayed fungi namely Gloephylluym Trabeum and Poria Placenta and a single white-rot Polyporus Versicolor fungus were chosen as three-selected test fungal species. They were sub-cultures from the laboratory.

MATERIALS

Twelve 2" x 2" test composite specimens were provided. As control, twelve red pine wood blocks about 2" x 2" x ½" were prepared by the machine shop. Four test specimens and four wood blocks were exposed to each fungi.

METHODOLOGY

Fungal resistance testing was carried out following ASTM G21 standard with modifications. The method consists of the following steps.

1. Soak test specimens and wood blocks in water for 5 days to ensure sufficient moisture inside the test specimens and wood blocks.
2. Autoclave test specimens and wood blocks at 250°F for 20 minutes.
3. Place the specimens and wood blocks in sterile jars containing solidified malt agar.
4. Inoculate the surface of the specimens and wood blocks with fungal cultures.
5. Expose inoculated specimens and wood blocks under the condition of favourable growth.
6. Examine and visually rate the growth of the fungi according to ASTM G21 as follows after the 4th week of exposure:

0	=	None	
1	=	Traces of Growth	(Less than 10%)
2	=	Light Growth	(10 to 30%)
3	=	Medium Growth	(30 to 60%)
4	=	Heavy Growth	(60% to Complete Coverage)

03-03

Cambridge
materials testing limited

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ISO 17025 Accredited

Report For:	AD Fire Protection Systems 420 Tapscott Road, Unit #5, SCARBOROUGH, Ontario M1B 1Y4	**Laboratory #:**	**366888A-04**
		Report Date:	September 16th, 2004
		Received Date:	August 13th, 2004
	Phone: (416) 292-2361 Fax: (416) 298-5887	**Customer P.O.#:**	7688
Attention:	Stevo Miljatovich		
Specimen:	A/D Type 7 HD		

TEST REPORT

RE: TESTING OF A/D TYPE 7 HD FOR DUROMETER HARDNESS

On August 13th, 2004, CMTL received one (1) sample of A/D Type 7 HD for determination of durometer hardness.

The submitted sample was identified as:

Sample #1 - A/D Type 7 HD

The sample was tested for durometer hardness (ASTM D2240-03) in accordance with applicable ASTM standards.

The results of testing are attached hereto.

Cambridge Materials Testing Limited

Per Steve Brown
QUALITY ASSURANCE

Per Derek Whild
TECHNICIAN

Cambridge
materials testing limited

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ISO 17025 Accredited

AD Fire Protection Systems Inc.
Laboratory #366888A-04

RESULTS OF TESTING

ASTM D2240-03: Durometer Hardness, Shore D of A/D Type 7HD Applied to Structural Members

	Durometer Hardness Shore D	Average
Sample #1 – A/D Type 7 HD	47, 36, 45, 37, 44, 37, 39, 41, 36, 45	41

The Type "D" Durometer, Model #307L was manufactured by ITM Instruments, calibrated on February 14th, 2003 and verified prior to measurements on September 3rd, 2004.

NOTE: The hardness results were determined by hand in a "shocking" movement.

Cambridge
materials testing limited

Product Development
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Mississauga, Ontario L5N 6B9
Tel: (905) 812-3856 Fax: (905) 812-3866
www.cambridgematerials.com
ISO 17025 Accredited

Report For:	AD Fire Protection Systems 420 Tapscott Road, Unit #5, SCARBOROUGH, Ontario M1B 1Y4	**Laboratory #:**	**366888B-04** (1 of 2)
		Report Date:	September 16th, 2004
		Received Date:	August 13th, 2004
	Phone: (416) 292-2361 Fax: (416) 298-5887	**Customer P.O.#:**	7688
Attention:	Stevo Miljatovich		
Specimen:	A/D Type 7 HD		

TEST REPORT

RE: TESTING OF A/D TYPE 7 HD FOR DENSITY BY DISPLACEMENT

On August 13th, 2004, CMTL received one (1) set of samples of A/D Type 7HD for determination of density by displacement.

The submitted samples were identified as:

Sample #1 - A/D Type 7 HD

The samples were tested for density (ASTM E605-93 (1996)) in accordance with applicable ASTM standards.

The results of testing are attached hereto.

Cambridge Materials Testing Limited

Per Steve Brown
QUALITY ASSURANCE

Per Derek Whild
TECHNICIAN

Cambridge
materials testing limited

Product Development
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Mississauga, Ontario L5N 6B9
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ISO 17025 Accredited

AD Fire Protection Systems Inc.
Laboratory #366888B-04

RESULTS OF TESTING

ASTM E605-93: Density by Displacement of A/D Type 7 HD Applied to Structural Members

The density of the A/D Type 7 HD was determined in accordance with ASTM E605-93, Sections 8.3.

Sample #1 – A/D Type 7 HD (2 Replicates)

Section 8.3 - Density by Displacement		Replicate #1	Replicate #2	Average
Weight of Dried Material	(g)	174	179	177
Volume of Sample Dried	(cm^3)	253	244	249
Density of Cementitious Material	(lbs/ft^3)	42.93	45.79	44.36

INTERNATIONAL LIVING FUTURE INSTITUTE℠

Declare℠

Southwest Type 7HD
Carboline Global, Inc.

Final Assembly: Louisa, Virginia, USA
Life Expectancy: Life of Structure Year(s)
End of Life Options: Landfill (100%)

Ingredients:

Unnamed Material: Cement Dust; Vermiculite; Calcium Carbonate; Calcium Oxide; Gypsum; Magnesium oxide (MgO); Quartz

Living Building Challenge Criteria: Compliant

I-13 Red List:

- ■ LBC Red List Free
- ☐ LBC Red List Approved
- ☐ Declared

% Disclosed: 100% at 100ppm
VOC Content: 0 g/L

I-10 Interior Performance: CDPH Standard Method v1.2-2017
I-14 Responsible Sourcing: Not Applicable

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