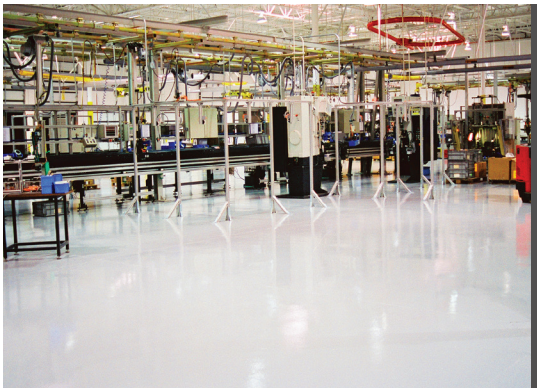
LiquaTile 1184

100% Solids AHC Epoxy Topcoat
Technical Data Sheet (TDS)



- 100% solids epoxy coating
- High Build Epoxy Coating for steel and concrete
- Extraordinary color fastness for long term aesthetics (UVR Hardener)
- Semi-ceramic technology for added wear and impact resistance
- Meets LEED EQ 4.2 (Independent Laboratory Validation)
- Meets requirements for FDA & USDA inspected facilities

Advanced Hybrid Cycloaliphatic (AHC): AHC technology offers increased physical characteristics (strength, chemical resistance, durability), with those properties remaining stable over time. Standard technologies diminish rapidly over time. Choose UVR technology for 'Best in Class' resistance to yellowing over time.

PRODUCT DESCRIPTION

LiquaTile 1184 is a 100% solids, two-component, semi-ceramic, AHC (Advanced Hybrid Cycloaliphatic) epoxy coating which exhibits excellent wear and chemical resistance on steel and concrete. The coating's uses include coating of concrete and steel surfaces including floors, walls, and structural steel. LiquaTile 1184 is available in other formulations. The standard formulation utilizes UVR Hardener for the best in class UV resistance and color retention.

STORAGE

Keep well sealed containers in a cool, dry place. Avoid contact with sources of extreme hot or cold temperatures as well as direct sunlight. Containers should be stored at 40°F to 95°F. Shelf life is one (1) year if exposed to the above conditions.

SAFETY

Prior to commencing work, carefully read and follow all SDS (formerly MSDS), Technical Data Sheets, and any instruction manuals for products and equipment used during installation. Following the safety regulations of jobsite, local, state, and federal authorities is the responsibility of the installation company, general contractor, and/or facility owner.

DISCLAIMER

This document does not purport to address all applicability and safety concerns, if any, associated with its use. It is the responsibility of the user to determine applicability of the information and products, and to establish appropriate safety practices.

SPECIFYING CONSIDERATIONS

Specifying LiquaTile 1184 is recommended when...

- more value and performance than industry standard products is required.
- a higher performing epoxy coating is required or desired. LiquaTile 1184's AHC and semi-ceramic technology gives it better wear, impact, and chemical resistance than standard epoxies.
- longer life is desired. AHC technology means the coating's properties will be long lasting, not rapidly degrading over time.
- longer retention of appearance is required. LiquaTile 1184 with UVR hardener will retain its appearance substantially longer than other general purpose coatings because of its AHC and semi-ceramic technology.
- better color retention is required. While no epoxy is non-yellowing, LiquaTile 1184 with UVR Hardener has best in class color stability as compared to other epoxy coatings. If aesthetics is an issue, we do not recommend its use in direct sunlight.
- better chemical resistance is required. LiquaTile 1184's AHC technology gives it greater chemical resistance than normal epoxy coatings. Contact Wolverine Coatings Corporation (WCC) for recommendations for areas subject to aggressive chemical exposure.
- When good slip-restance is required. Although LiquaTile 1184's surface is smooth, it has 50% better slip-restance than typical coatings in it class.

Specifying LiquaTile 1184 is NOT recommended when...

- area is subject to high moisture vapor transmission. Contact WCC in this situation.
- LiquaTile 1184 will come into contact with harsh chemicals. LiquaTile 1184 has very good chemical resistance, but is not designed for extreme resistance. Contact WCC for a recommendation from our ChemShield line of coatings.
- LiquaTile 1184 will receive direct sunlight when color retention is required. LiquaTile 1184 has best in class color retention compared to normal epoxy coatings, but as with all epoxies, it is not non-yellowing. Consider specifying one of our non-yellowing coatings such as EnduraShield 2254.

SPECIFYING CONSIDERATIONS (CONT.)

Product Advantages

- LiquaTile 1184 has much better physical properties than typical epoxy coatings on the market. Significant properties include better wear, impact, and chemical resistance. Its color retention is also much better than other epoxy coatings.
- LiquaTile 1184 will retain its physical properties longer, rather than degrade rapidly like other epoxy coatings on the market.

OTHER PRODUCTS FOR SIMILAR USE

Moisture Vapor Transmission Concerns	Consider specifying BondTite 1503. Contact Wolverine Coatings Corporation in this situation.
Crystal Clear Sealer	LiquaTile 1184 is only available pigmented. Consider specifying BondTite 1115 100% solids epoxy coating. For areas exposed to sunlight and/or chemicals, consider specifying EnduraShield 2254 Urethane or HybriShield 2401 Polycarbonate coating.
High Chemical Exposure	Contact Wolverine Coatings Corporation for assistance.
Very High Wear Exposure	Consider specifying LiquaTile 1143 full ceramic coating for the ultimate in wear resistance

SOLID (CURED) PHASE PHYSICAL DATA

PROPERTY	VALUE	TEST METHOD (If applicable)
Finish	High Gloss	ASTM D523
Color	Pigmented	ASTM D2244
Flexural Modulus (Stiffness)	N/T	ASTM D790
Flexural Strength	3128 psi	ASTM D790 - 10
Compressive Strength	10,190 psi	ASTM D695 - 10
Elongation	1.2%	ASTM D638 - 10
Coefficient of Friction	1.53 dry / 1.20 wet	ASTM D2047
Hardness (7 Days)	42 (Shore A) (24 hr.)	ASTM D2240
Abrasion Resistance (Taber)	84.8 mg (CS-17, 1000gm, 1000 cycles)	ASTM D4060
Bond Strength (Concrete)	>1000 psi (Concrete fails)	ASTM D4541
Impact Resistance (in./lbs.)	N/T (Direct & Indirect, Zero Failure)	ASTM D5420

Chemical Resistance
I - Immersion/Continuous Service
C - Secondary Containment (72 Hr)
S - Splash/Spill
N - Not Recommended

Xylene	S	Sodium hydroxide, 10%	S
1,1,1 Trichloroethane	S	Sodium hydroxide, 50%	S
MEK	S	Battery acid	S
Methanol	S	Sulfuric acid, 10%	S
Ethyl alcohol	S	Sulfuric acid, 70%	S
Skydrol	S	Hydrochloric acid, 10%	S
Sodium Hydroxide, 10%	S	Vinegar (5% Acetic acid)	S

LiquaTile 1184 has better chemical resistance than most coatings in its class, but in aggressive enviorments there may be a better choice to resist particular chemicals. Consult Wolverine Coatings Corporation for specific recommendations when chemicals are present.

EXPLAINING THE TESTS AND THEIR RELEVANCE

ASTM D523 Gloss is a measurement of the 'perceptible shininess' of a substrate. It is measured using a special tool called a Gloss Meter that calculates the value of specular reflectance measured in GU (Gloss Units). A Gloss Meter shines light on the substrate at a specific angle (typically 20˚, 60˚, or 85˚) and then measures that light on the opposite side at the same angle (specular reflectance). When the emitted light is diffracted the reflected path changes angle and is not returned to the other side which will yield a lower GU number. The more light is reflected to the observer at the same angle the higher the gloss reading in GU (gloss units) and the more 'perceptible shininess' the human will see. The perception of gloss is dependent on the smoothness of the substrate to be coated, the thickness of the applied coating, and the final smoothness of the coated surface. While there is not a specific standard for naming gloss levels the following is a good general guideline: Flat (1–9 GU), Low Sheen (10–25 GU), Eggshell (26–40 GU), Semi Gloss (41–69 GU), Gloss (70–89 GU), High Gloss (>89 GU).

ASTM D790 Flexural Modulus measures the stiffness (ratio of stress to strain) of a cured coating. Higher modulus yields a stiffer coating that will transmit stresses and strains more directly through the coating surface to the bond line. Low modulus materials will insulate the bond line much like flexible building foundations utilized in earthquake prone areas protect the rigid building from damage caused by movement. See also Flexural Strength.

ASTM D790 Flexural Strength is measured using a 3 point (or sometimes even a 4 point) bend test. The test defines the amount of stress applied to a material at the point that it moves from a bend to a break (ruptures). The stress (3 point test) is defined as , where is the force applied at the fracture point, is the distance (length) between the support spans, is the width of the specimen, and is the thickness of the specimen. Flexural Strength was not able to be determined on BondTite 1101. An independent laboratory confirmed that this material is highly flexible even at high thicknesses (1/2 inch) and even after being aged. Since the material would never break even at multiple thicknesses and configurations a value could not be determined (even in 15 tests). See also Flexural Modulus.

ASTM D695 Compressive properties include modulus of elasticity, yield stress, deformation beyond yield point, and compressive strength (unless the material merely flattens but does not fracture). A sample is placed between two plates that are compressed together at a uniform rate. The maximum load at the break point is recorded as well as stress/strain data. When a material does not break the numbers are highly subjective.

ASTM D638 Elongation is the measure of the ability of a material to stretch. Higher elongation combined with high flexural strength allows a coating to take more punishment from movement without failure. Primers with low elongation are more brittle and can break underneath your coatings system and will eventually result in peeling.

ASTM D2047 Static Coefficiency of Friction is measured in a lab using a machine with a 3" x 3" testing surface known as a James Machine. It is only used for testing dry surfaces, as wet surface testing results come out skewed due to the sensor pads' tendency to hydroplane. It this test, three separate test panels are individually tested with four readings per panel, each panel rotating 90 degrees between each reading to provide a fresh surface and to cancel any directional effects. The panel is placed on the test table in a firm position with the retaining bar. The test material is placed into the strut yoke, at which the entire assembly is then lowered into contact with the test panel. With the hand wheel and recording pen released, the test table is moved forward at a rate of 60 in/min, until the test material slips and the vertical column drops. From the recording pen and chart, the static coefficient of friction is read at the point at which the horizontal curve made on the chart changes to a vertical line. The strut is then lifted and the test table returned to its original position. The test panel is then rotated 90 degrees, the test material sanded, and the steps repeated.

ASTM D2240 Hardness describes the ability of a material to resist indentation. Hardness is measured using a Durometer which employs a needle that is impressed into the coating. The farther the needle impregnates the coating the lower the measured hardness. Many people mistakenly associate hardness with abrasion (or wear) resistance. While hardness can increase wear resistance of some materials it can also decrease it when a coating is so hard that it becomes brittle (like glass, a very hard but brittle material).

ASTM D2244 Color is measured using a Spectrophotometer that mathematically defines a color as a point in a three dimensional space. This is defined using a CIELAB set of values. CIELAB uses three plots representing "L" (lightness/darkness), "a" (redness/greenness), and "b" (yellowness/blueness) values. The difference between two measured colors can be described using ΔE (pronounced delta E) where $\Delta E = \sqrt{\Delta L^2 + \Delta a^2 + \Delta b^2}$.

ASTM D4060 Taber Abrasion is a test to determine a coating's resistance to wear. Resistance to abrasion is defined as the ability of a material to withstand mechanical action (rubbing, scraping, or erosion). A coated test panel is allowed to cure (dry) and then weighed. The panel is placed on the Taber Abraser. A 1000 gram load is placed on each grinding wheel on the machine and then the wheels are allowed to rest on the coating surface. The machine turns the test panel for 1000 cycles as the grinding wheels abrade the coating. The wheels are resurfaced at the beginning of each test and after 500 cycles. After 1000 cycles the test panel is weighed and the difference between the starting weight and the final weight is recorded. Many companies skew their test results by varying the test parameters. Sometimes you will see only 500 cycles instead of 1000. Many times the weight on the wheels is diminished. Or, a less abrasive wheel is used. For this test to be valid there must be 1000g weights, 1000 cycles, and CS-17 grade wheels must be used.

ASTM D4541 Bond Strength is a measure of the force required to pull a coating off of a substrate. Many epoxy primers will have higher bond strength to concrete than the tensile strength of the concrete. This means that the concrete will break before the primer can disbond (break). However, the deeper the primer is allowed to penetrate, the more force it will take to break the concrete since the concrete must break further beneath the surface.

LIQUID PHASE PHYSICAL DATA

PROPERTY		TEST METHOD (If applicable)
Mix Ratio (Integral)	2:1(Volume) * Certain colors may require more than 1 color pack (Part C) or additional coats	N/A
Viscosity (mixed)	3000 cps @ 77°F (Thixatropic)	ASTM D2196
Flash Point	Part A >200°F / Part B >7200°F	Setaflash

Cure Schedule (ASTM D5895) Gel Time (ASTM D2471) LiquaTile 1184 UVR (Standard Cure)	Temp./Humid.	GelTime	Tack Free	Re-Coat Time	Light Duty	Full Cure
	50°F/50% RH	170-190 min.	15-20 hours	21-48 hours	18-22 hours	42-48 hours
	77°F/ 50% RH	90-110 min.	6-8 hours	12-24 hours	9-12 hours	14-24 hours
	95°F / 50% RH	50-80 min.	5-7 hours	10-24 hours	7-10 hours	12-24 hours

Packaging (Shipping Weight lbs.)	3Q - 3/4 gal unit – 1/2 gal Pt. A / Qt. Pt. B 3G - 3 gal unit – 2 gal Pt. A / 1 gal Pt. B / 1 pint Pt. C
Shipping	Part A: DOT Regulated Resin Compound, Class 55 Part B: DOT Regulated Resin Compound, Class 55 Part C: DOT Regualted Resin Compound, Class 55

EXPLAINING THE TESTS AND THEIR RELEVANCE

ASTM D2196 Viscosity is the measurement of the resistance of a liquid to flow. The viscosity profile of the liquid is a factor in the proper installation of the liquid applied coating. The higher the viscosity the thicker the material will be. Viscosity can be affected by temperature, shear stress, or shear rate. The viscosity profile of a material can be classified as Newtonian, Thixotropic, Rheopectic, Pseudoplastic, or Dilatant.

- A Newtonian liquid (like water) would have the same viscosity no matter how much shear force or shear time (from mixing) is exerted on it.
- A Thixotropic material would decrease in viscosity as shear stress is applied to it over time. Once the material is allowed to rest the viscosity increases to its original resting state. Thixotropic fluids require time and shear to thin.
- Rheopectic fluids are the opposite of Thixotropic fluids. The longer shear is maintained on the liquid the higher the viscosity will rise. Rheopectic fluids require time and shear to thicken.
- Pseudoplastics are kind of like thixotropic liquids in that they get thinner when shear is applied. However, Pseudoplastic liquids thin and recover much faster and in more relation to the stress that is applied. Pseudoplastic liquids are more dependant on the force applied instead of the amount of time that the force is applied.
- Dilatant Fluids are the opposite of Pseudoplastic fluids in that they get thicker as more stress is applied. However, like Pseudoplastics the amount of force applied is the driving factor on thickening instead of the amount of time.

ASTM D5895 The drying (cure) time of a coating can be measured by a Drying Time Recorder where a weighted Teflon stylus is dragged through the coating over time. The 4 stages of dry time (A=Set to Touch, B=Tack-Free Time, C= Dry-Hard Time, and D=Dry-Through Time) are then measured using a template that shows those times in hours.

INSTALLATION

SURFACE PREPARATION

Bond strength is directly dependent upon the preparation, strength, and conditions of the substrate. Concrete surfaces should be clean, porous, and textured. Consult WCC TIB: Preparing Concrete to Receive Coatings or Linings. An appropriate primer, typically BondTite 1101, should be used, particularly on uncoated concrete. Steel surfaces should be blasted near white and protected from rusting prior to application. Substrate must be between 40°F and 95°F and at least 5°F above the dew point during installation and cure. Moisture vapor transmission will likely cause coating failure. Always prepare the substrate to receive a coating according to published good painting practices and according to Wolverine Coatings guidelines. Always consult Wolverine Coatings Corporation for other substrates and for specific recommendations for your project.

INSTALLATION (CONTINUED)

MIXING

Consult WCC TIB: Mixing Guide. Review "Liquid Phase Physical Data" for mix ratios, pot life, re-coat window, etc. Pre-mix the Resin (Part A). While under agitation, slowly add the ColorMeld (Part C) into the Resin container. Use a stir stick or paint paddle to empty entire ColorMeld container into the Resin. Mix for 2-3 minutes, or until ColorMeld is thoroughly incorporated in the Resin (Part A). Pre-mix the Hardener (Part B). Slowly add the Hardener (Part B) into the Pigmented Resin container (Part A +C), taking care to keep material off the side of the bucket. Slowly begin mixing material with a low speed drill and mixing paddle. Slightly increase speed and mix for 3-4 minutes, being careful to avoid whipping air in the material. Make sure to occasionally scrape around the mixing container's walls and edges with a stir stick or spatula to ensure all material has been incorporated and mixed.

APPLICATION

Consult WCC TIB Guide for Applying Resinous Coatings with squeegee and roller. Material may be applied by the squeegee and backroll method. Use high quality, lint free, solvent resistant roller covers. Use throw away chip brushes for cutting in edges. Avoid puddles and missed spots.

RE-COAT

Consult WCC TIB: Guide for Over-Coating Existing Coatings. Material may be re-coated as soon as it can be walked on without damage. Sanding may be required if coating gets too hard to accept another coat. Consult "Re-coat Time" in "Liquid Phase Physical Data" for guidelines. Be advised that project conditions (including air temperature, substrate temperature, and relative humidity) will influence the "Re-coat Time".

CLEANING AND MAINTENANCE

Consult WCC TIB: Cleaning and Maintenance

GENERAL LIMITATIONS

- Do not apply over a wet surface.
- Epoxies have limited ultraviolet resistance which may cause them to chalk, lose gloss, and / or discolor over time.
- Touchup or repair of an existing coating is never aesthetically perfect.
- Depending on mix design and curing / drying conditions, minimum age of concrete prior to application is 28 days.

SAFETY

For your safety, all required personal protection equipment should be used when operating machinery or handling chemicals. Concrete dust is a source of silica particles and other hazardous materials that can cause silicosis and other illnesses. Proper safety equipment and methods are the responsibility of the installation company, general contractor, and/or facility owner.

WARRANTY

Wolverine Coatings Corporation warrants its products to be free from defects in material and workmanship. Wolverine Coatings Corporation's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Wolverine Coatings option, to either replacement of products not conforming to this Warranty or credit to the Buyer's account in the invoiced amount of the nonconforming products. Any claim under this warranty must be made by the Buyer to Wolverine Coatings in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the ship date, whichever is earlier. Buyer's failure to notify Wolverine Coatings of such nonconformance as required herein shall bar Buyer from recovery under this warranty.

Wolverine Coatings makes no other warranties about the product. No other warranties, whether expressed, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply.

Any recommendation or suggestion relating to the use of the products made by Wolverine Coatings, whether in its technical literature, or in response to specific inquiry or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for the Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedure of use, or extrapolation of data may cause unsatisfactory results.

LIMITATION OF LIABILITY

Wolverine Coatings Corporation's liability on any claims based upon Wolverine Coatings Corporation's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or parts thereof which give rise to the claim. In no event shall Wolverine Coatings Corporation be liable for consequential or incidental damages.

LITERATURE REVISION - TDS: LiquaTile 1184 - Rev. 231211

Published literature is subject to change without notice. Wolverine Coatings Corporation is constantly engaged in the testing of existing formulations, the development of new innovative technologies, and the evaluation of the latest practices. The latest literature should always be consulted at www.wolverinecoatings.com.

WOLVERINE COATINGS corporation

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