WOLVERINE COATINGS corporation

LiquaTile 1172

100% Solids Epoxy Coating
Technical Data Sheet (TDS)

ALS

Meets the Requirements of NSF/ANSI/CAN 61, 372, & 600

Certified to US & Canadian NSF/ANSI Standard 61, NSF/ANSI Standard 372, & NSF/ANSI 600

100% Solids Epoxy
Zero VOC, Very Low Odor

Return to Service in 16 Hours at 77°F / 50% RH
No forced curing or specialized equipment required

Innovative Formulation
Minimizes Use of Benzyl Alcohol

Easy Application
May be applied with Brush, Roller, or Airless Spray

Certified
- Tanks 50 gallons and above
- Pipes 16 inches and above
- No Lead

PRODUCT DESCRIPTION

LiquaTile 1172 is a 100% solids epoxy coating that is Water Quality Certified to US and Canadian NSF/ANSI Standard 61: Drinking Water System Components – Health Effects. LiquaTile 1172 also meets the extraction requirements of NSF/ANSI 600. In addition, LiquaTile 1172 meets NSF/ANSI Standard 372: Drinking Water Systems Components – Lead Content for use as a protective barrier on properly prepared steel and concrete storage tanks with volume greater than 50 gallons and pipes 16" or larger.

LiquaTile 1172 is available in the following variations:

- LiquaTile 1172-012 - Sag resistant to 12 mils
- LiquaTile 1172-020 - Sag resistant to 20 mils
- LiquaTile 1172-030 - Sag resistant to 30 mils
- LiquaTile 1172-060 - Sag resistant to 60 mils
- LiquaTile 1172-125 - Sag resistant to 125 mils

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.

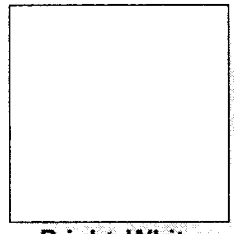
DISCLAIMER

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 1172 is recommended when...	• very low odor is required. • a zero VOC coating is required. • very high wear resistance and abrasion resistance is required. • fast return to service period is required.
Specifying LiquaTile 1172 is NOT recommended when...	• area is subject to high moisture vapor transmission through the substrate. Consult WCC in this situation. • when color stability in sunlight is required. LiquaTile 1172 will yellow and chalk under direct sunlight. Although this will not affect the physical properties of the coating, it will affect it's appearance.
Comparison with Standard Products of the Industry	• LiquaTile 1172 has innovative 100% solids technology. No solvents or the accompanying coating porosity to worry about. • Unlike most coatings in the direct water contact category, LiquaTile 1172 has passed the very stringent 50 gallon minimum test. This means you can be assured of a very sanitary lining where chemical leaching is not an issue. • LiquaTile 1172 is formulated with extremely low levels of benzyl alcohol and does not contain any BGE (Butyl Glycidyl Ether). • LiquaTile 1172 does not require forced curing or other specialized equipment to attain its high performance. • LiquaTile 1172 does not require expensive plural component spray equipment for application. • LiquaTile 1172 is self priming on properly prepared steel substrates

NSF CERTIFIED COLORS



Bright White

WH1A

Sold By:
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SOLID (CURED) PHASE PHYSICAL DATA

The data presented on this data sheet is based on LiquaTile 1172-020. Some physical property differences can be expected with other variations of LiquaTile 1172.

PROPERTY			TEST METHOD
Certified Colors	Silver Gray (GY1D) Sky Blue (BU1A), Bright White (WH1A)		ASTM D2244
Gloss	High		ASTM D523
Abrasion Resistance	84mg loss (CS-17, 1000gm, 1000 cycles)		ASTM D4060
Elongation	9%		ASTM D638
Pull Off Adhesion to Concrete	Concrete Fails		ASTM D4541
Pull Off Adhesion to Steel	1,078 psi		ASTM D4541
Hardness (Shore D @ 7 days)	79		ASTM D2240
Water Vapor Permeability	0.08 perm-in		ASTM E96-13
Tensile Strength	2,110 psi		ASTM D638
Flexural Strength	12,000 psi		ASTM D790
Modulus of Elasticity	920,000 psi		ASTM D695
Certified Max. H_20 Use Temperature	23°C		
Certified Surface Area/Water Volume	108.4 cm2/L		
Certified Minimum Tank Size	50 gallons (No Maximum)		
Certified Minimum Pipe Diameter	16" (No Maximum)		
Certified Applied System (DFT)	Max Dry Film Thickness:	9** - 125 mils	
	Number of Coats:	Max 2 coats	
	System Thickness:	18 mils - 125 mils	

*See Certified Applied System (DFT) under Liquid Phase Physical Data
**Two 9 mil coats must be applied for a minimum total thickness of 18 mils

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).

AASTM 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 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.

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.

EXPLAINING THE TESTS AND THEIR RELEVANCE (CONTINUED)

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.

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 D4060 Taber Abrasion is a test to determine a coating's resistance to abrasion. Resistance to abrasion is defined as the ability of a material to withstand mechanical action such as rubbing, scraping, or erosion. A coating is applied to a test panel, allowed to 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 sit on the coating surface. The machine turns the test panel for 1000 cycles as the grinding wheels abrade the coating. The grinding 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 deceive potential customers 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.

LIQUID PHASE PHYSICAL DATA

The data presented on this data sheet is based on LiquaTile 1172-020. Some physical property differences can be expected with other variations of LiquaTile 1172.

PROPERTY	VALUE				TEST METHOD (If applicable)	
Density (Mixed) @ 77°F	12.8 lbs/gal				ASTM D1475	
VOC Content (Mixed)	0 g/l				ASTM D3960	
Mix Ratio (Volume)	2A:1B				N/A	
Viscosity (mixed) @ 77°F	12,880 cps @ 50rpm				ASTM D2196	
Flash Point	Part A >200°F / Part B >200°F				Setaflash	
Cure Schedule (ASTM D5895) Gel Time (ASTM D2471) LiquaTile 1172 (Standard Cure)	**Temp./Humid.**	**GelTime**	**Tack Free**	**Re-Coat (Min.)**	**Re-Coat (Max.)**	**Full Cure**
	50°F / 50% RH	200 min.	13 hours	13 hours	4 days	48 hours
	77°F / 50% RH	120 min.	8 hours	8 hours	4 days	12 hours
	90°F / 50% RH	60 min.	2 hours	2 hours	3 days	9 hours
Induction Time	None					
Thinner	Not Recommended					
Certified Return to Service	16 Hours at 77°F / 50% RH					
Certified Applied System (DFT)	Max Dry Film Thickness:	9** - 125 mils				
	Number of Coats:	Max 2 coats				
	Minimum System Thickness:	18 mils				

*See Certified Applied System (DFT) under Solid Phase Physical Data
**Two 9 mil coats must be applied for a minimum total thickness of 18 mils

Recommended System	Brush & Roll Application 2 Coats @ 6-9 mils DFT	Spray Application 2 Coats @ 9-18 mils DFT
Theoretical Coverage	Mils	Square Feet Per Gallon
	1 Mil	1604 Ft^2/Gal
	9 Mil	178.2 Ft^2/Gal
	30 Mil	53.5 Ft^2/Gal
	60 Mil	26.7 Ft^2/Gal
	125 Mil	12.8 Ft^2/Gal
Shelf Life	1 Year (Unmixed and Unopened Containers)	

SHIPPING & PACKAGING INFORMATION

Packaging (Shipping Weight lbs.)	3 Quart Kit (3/4 Gallon Unit)	[redacted]
	Resin (Part A): 1/2 Gallon (6.8 lbs.) Hardener (Part B): Quart (3.1 lbs.)	Resin (Part A): 2 Gallons (27 lbs.) Hardener (Part B): 1 Gallon (12.25 lbs.)
Shipping	Part A: DOT Not Regulated, Class 55 Part B: UN3066, Paint Related Material, N.O.S., 8, III, CORROSIVE (CONTAINS DIETHYLENTRIAMINE 8), Class 55	

EXPLAINING THE TESTS AND THEIR RELEVANCE (CONTINUED)

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) was 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.

ASTM D2471 This test method utilizes a machine to measure Gel Time by rotating a disposable spindle in 150grams (~110ml) of material until the gelation will not allow the spindle to turn.

INSTALLATION

SURFACE PREPARATION

Bond strength is directly dependent upon the preparation, strength, and condition of the substrate. All surfaces must be free of soluble salts. All surfaces to be coated shall be Waterjet Cleaned to a minimum AMPP Standard of SSPC-SP WJ4/NACE WJ4, "Light Cleaning", to remove soluble salts, loose non-adherent and other foreign surface matter. All ferrous metal shall be cleaned in accordance with AMPP SSPC-SP-5/NACE #1, "White Metal Blast Cleaning", for immersion services and AMPP SSPC-SP-6/ NACE #3, "Commercial Blast Cleaning", for non-immersion services to a surface profile of 3-4 mils. All non ferrous metal shall be cleaned in accordance with AMPP SSPC-SP-17, "Thorough Abrasive Blast Cleaning of Non-Ferrous Metal", to a surface profile of 3-4 mils. All new and existing concrete shall be cleaned in accordance with AMPP SSPC-SP-13/ NACE #6, "Surface Preparation of Concrete Class M-ABD Abrasive Blasting-Dry", to meet International Concrete Repair Institute No 310.2R ICRI Surface Profile Number listed in the chart below for the total mil thickness of the system.

Coating or Lining Thickness	ICRI Concrete Surface Profile Number
0 - 3 mils	CSP 1 - 3
4 - 10 mils	CSP 1 - 3
10 - 40 mils	CSP 3 - 5
50 mils - 1/8"	CSP 4 - 6
1/8" - 1"	CSP 5 - 9

Protect prepared steel from rusting prior to application. Upon completion of abrasive cleaning all spent media and concrete dust shall be vacuum cleaned from the concrete vessel. Substrate must be between 50°F and 90°F and at least 5°F above the dew point during installation and cure. Moisture vapor transmission from behind polymer coatings 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. For guidelines on concrete surface preparation, refer to WCC TIB: Preparing Concrete to Receive Coatings and Linings. Always consult Wolverine Coatings Corporation for other substrates, for specific recommendations for your project, and any question you may have.

MIXING

[redacted]. DO NOT THIN. Review "Liquid Phase Physical Data" for mix ratios, pot life, re-coat window, etc. Premix Part A and Part B before use. In a clean container, Pour Part B into Part A, taking care to keep uncured material off the side of the bucket. Slowly begin mixing material with a low speed drill and mixing paddle. Increase speed and mix for 3 minutes, being careful to avoid whipping air in the material. Use material immediately. For specific mixing guidelines, refer to WCC TIB: Mixing Guide.

APPLICATION

Material may be applied with a brush, phenolic core roller, or airless sprayer. For guidelines on application with brush or roller, refer to WCC TIB: Guide for Applying Polymer Coatings or Linings with a Squeegee, Roller, and Brush. The material may be sprayed with the following equipment or equivalent:

Manufacturer:	WIWA
Equipment Model:	64:1 Professional, DuoMix 230 & 333
Gun Model:	500D
Spray Tip:	523
Hose:	3/8", 50' length
Ambient Temperature:	72°F
Spraying Pressure:	3000 psi
Air Inlet Pressure:	45 psi

RE-COAT

Coating to be top coated should be thoroughly inspected for blush or other contaminants which can affect bonding. Coating should be sanded and cleaned if blush or other contamination is suspected or if the recoat window has been exceeded. Consult "Liquid Phase Physical Data" for recommendations. Jobsite and environmental considerations can affect properties, sometimes drastically. For guidelines, refer to WCC TIB: Guide for Over-Coating Existing Coatings.

PRODUCT 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 1172 - Rev. 240710

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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