Field Evaluation of Roof Sheathing Surface Treatments

Asphalt Shingle Sloped Roofing Research Study - Phase 2

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BC Housing

1701 – 4555 Kingsway

Burnaby, British Columbia V5H 4V8

Canada

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Appendices

1 Background

The research presented in this report builds on the several attic moisture research projects that have concurrently been performed in BC since 2011 by RDH Building Science Inc., BC Housing, the Roofing Contractor's Association of BC, Morrison Hershfield, FPInnovations, and the British Columbia Institute of Technology. This report outlines the methodology and findings from field evaluation of the efficacy of several surface-applied mould resistant treatments for the underside of roof sheathing.

1.1 Previous Testing

Based on initial laboratory testing completed by FPInnovations, outlined in their report "Assessing Remedial Treatments for Mouldy Sheathing in Ventilated Attics in Coastal Climates", published by BC Housing in March 2017, RDH identified nine possible surface-applied treatments or treatment combinations that could be used to remove and/or prevent visible fungal growth on plywood sheathing. The purpose of this research was to apply these nine surface treatments in field settings and evaluate their effectiveness both in removing existing visible fungal growth and preventing new growth from occurring on the underside of roof sheathing.

2 Methodology

2.1 Surface Treatments

Further to the research by RDH presented in the report titled "Asphalt Shingle Sloped Roofing Research Study – Phase 1", the new surface treatments were applied to the same ventilated roof assemblies used in the study. A photo of one of the roof assemblies is shown in Figure 2.1.

Figure 2.1 Overview of one of the two sloped roof test huts used in this study, placed on the Vancouver test area roof (former RDH office).

The roof test hut roof assembly represents an experimental attic set-up with no air leakage or heat loss into the attic and unrestricted ventilation from the outdoors. Detailed investigations and testing of many attics have shown that the traditional wetting mechanisms do not account for the observed fungal growth on the underside of the roof sheathing in the Lower Mainland. Mould-related problems have been found to occur in the absence of rainwater ingress and despite relatively airtight ceilings and adequate ventilation i.e. on roofs constructed to meet current building code and standard roofing requirements. Other causes such as night sky cooling condensation and inward vapour drive can still cause visible fungal growth in the studied coastal region. The variables of air leakage and restricted ventilation have been eliminated in this study to isolate the wetting phenomena and provide better consistency in the sheathing moisture loads.

The 3:12 and 4:12 slope roof test huts constructed as part of the previous research were used in this round of testing. These huts were located on top of the former RDH Vancouver office and measure 6 feet wide by 6 feet long. They were constructed using 1/2" Douglas Fir plywood sheathing, 2x4 wood framing, and dark-coloured three-tab shingles with standard BC Building Code minimum asphalt impregnated #15 roofing paper underlay. The roof test huts were arranged such that one side of the roof slope faces north and one side faces south to account for the impact of solar and night sky radiation. The different orientations influence how the roof heats up and dries or cools down and becomes wetter.

Since these huts were constructed in September 2012 and the surface treatments assessed in this study were applied in October/November 2014, the roof sheathing had already developed visible fungal growth. Each treatment was applied to sanded and existing sheathing surfaces of the north and south facing slopes of each hut. This was done to test how each treatment would perform when applied to new clean plywood surfaces and to existing plywood surfaces, most with visible fungal growth. The treatments were applied in eight sets; one for each roof slope, orientation, and surface type combination (see Table 2.2). Figure 2.2 shows the sanded and existing plywood test areas on the 3:12 roof prior to treatment application.

Figure 2.2 The sanded surface (left) and the existing unsanded surface (right) on the underside of the 3:12 North roof sheathing prior to treatment

Six unique mould-resistant surface treatments were tested. Four surface treatments were provided by FPInnovations and two commercial/retail products were tested. Table 2.1 outlines the products used in this testing. The four products from FPInnovations were named with generic indicators because their formulations were based on a mix of several

commercially available and industrial products and chemicals. Refer to the March 2017 FPInnovations report "Assessing Remedial Treatments for Mouldy Sheathing in Ventilated Attics in Coastal Climates", published by BC Housing for more information on these products.

TABLE 2.1 SURFACE TREATMENT PRODUCTS

Product Name	Description
Product "D"	Unpigmented mould resistant experimental formulation from FPInnovations.
Product "K"	Unpigmented mould resistant experimental formulation from FPInnovations.
Product "FP"	Unpigmented mould resistant experimental formulation from FPInnovations.
Product "SS"	Early formulation of an industrial moisture and mould-resistant coating from Sansin Corporation, blue-pigmented, provided by FPInnovations.
Kilz® Premium (Kilz)	Retail white water-based interior/exterior primer, sealer, and stain blocker.
P-7570-D	Industrial moisture and mould-resistant coating from Sansin Corporation, purple-pigmented, made available by Sansin as part of testing and development

The exact formulation and product data for each of the surface treatments provided by FPInnovations was not available as part of this field testing, and only generic names were provided. The various products were intended to be further tested and optimized using this field testing as part of their development. As such, no product data sheets were available for these products. As separate tests, a topcoat of Kilz Premium paint was applied to each one of these treatments except for P-7570-D. The product data sheets available at the time of the testing are included in Appendix A.

The nine surface treatments evaluated are outlined in Table 2.2 below.

TABLE 2.2 SURFACE TREATMENT COMBINATIONS AND TEST ARRANGEMENTS

Coating Type	Test Surfaces	Total Test Duration
D	3:12 S existing 3:12 S sanded 3:12 N existing 3:12 N sanded 4:12 S existing 4:12 S sanded 4:12 N existing 4:12 N sanded	November 2014 to January 2018 (approx. 38 Months)
K		
FP		
SS		
D + Kilz Premium		
K + Kilz Premium		
FP + Kilz Premium		
SS + Kilz Premium		
P-7570-D		

Figure 2.3 shows the typical arrangement of the nine treatments applied to the underside of the 4:12 North sanded roof sheathing on the roof test hut.

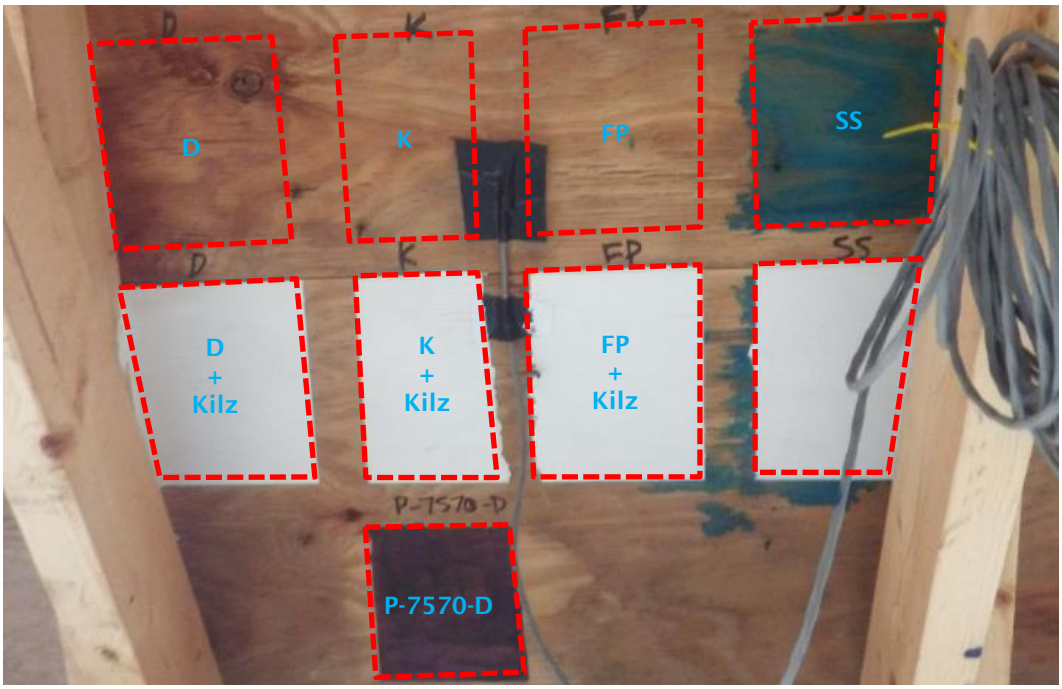

Figure 2.3 Example surface biocide treatment on the underside of the roof sheathing

As shown in Figure 2.3, the second row of D, K, FP, and SS treatments have a topcoat of the Kilz Premium paint. This is the typical arrangement for all roof surface coating combinations.

2.2 Visual Assessment

All the treatments were applied between October 20 and November 12, 2014. The test duration was from November 2014 to January 2018. The treatments were regularly reviewed for fungal growth visible to the naked eye for a period of just over three years. Visible fungal growth on each treatment was characterized as either **not visible**, **light**, **moderate**, or **significant** fungal growth. Table 2.3 below shows examples and short descriptions of each of these categories.

TABLE 2.3 VISIBLE FUNGAL GROWTH CATEGORIZATION CRITERIA

Not Visible	Light	Moderate	Significant
			
No visible fungal growth – clear surface conditions – with no spots or discolouration related to the wood surface texture.	Light visible fungal growth – mould growth over less than 10% of the test area.	Moderate visible fungal growth – mould growth over between 10% to 50% of the test area.	Significant visible fungal growth – mould growth over great than 50% of the test area.

Note the surface treatments D, K, and FP are non-pigmented and transparent, while the others are opaque or pigmented, making it difficult to observe whether any existing visible fungal growth was eliminated beneath them upon application. The application of Kilz Premium was considered to have fully covered the existing visible mould. The darker-coloured SS and P-7570-D treatments also made it more difficult to determine whether new visible fungal growth was occurring on the coatings.

2.2.1 Vittanen's Mould Index

Vittanen's Mould Index (Mould Index, MI) is a method of indexing relative humidity conditions by the related potential mould growth. The calculation method was developed at the VTT Technical Research Centre of Finland Ltd, and uses relative humidity and temperature conditions to determine the numerical Mould Index value. While this calculation is generally used to predict mould growth potential on wood (see the Phase 1 report for detailed analysis and predicative calculations for mould growth on the roof test huts used in this testing), the mould measurement scale developed for this index provides a good basis for comparison to visual observations in field testing.

Table 2.4 below includes a description of the potential mould growth associated with each MI level, and the related visual observation categories used in this testing.

TABLE 2.4 VTT MOULD INDEX/RDH OBSERVATIONS DESCRIPTIONS

Mould Index	Description	RDH Observations
0	No mould growth	**not visible**
1	Small amounts of mould on surface (microscopic)	
2	Several local mould growth colonies (microscopic)	
3	<10% visible mould growth on surface	**light**
4	10 – 50% coverage of visible mould growth on surface	**moderate**
5	>50% visible mould growth on surface	**significant**
6	Heavy and tight mould growth, up to 100% coverage	

Note that only the roof test hut application of the surface treatments was completed for this phase of the field testing, and no sloped attic roofs of existing buildings were tested. The limitation to roof test hut testing was due to the lack of formal product certification for residential or commercial use in Canada for the various surface treatments tested, except for Kilz Premium. In addition, apart from confidential proprietary product information for each surface coating held by FPInnovations and Sansin at the time of the testing, no formal technical literature was available to use as information for potential building owners/occupants as part of the attempts to coordinate test buildings to include in this study.

2.3 Sensor Monitoring

Temperature, moisture content, and relative humidity measurements were used to measure the environmental and wetting conditions that the plywood sheathing was subjected to. This monitoring was used to verify that conditions for fungal growth were present throughout the testing period.

Wood moisture contents below 20% are generally considered safe from fungal growth or wood-decay, whereas moisture contents above approximately 28% (fiber saturation) are considered at risk (Wang & Morris, 2011). Moisture contents between 20% and 28% are considered cautionary, and fungal growth and wood decay can continue if present. The relative humidity (RH) of the air adjacent to the wood is another factor to consider. Sustained high RH levels (typically above 80% RH) for extended periods can lead to surface fungal growth even if high moisture content levels are not present.

Moisture content sensors installed in Phase 1 of this study on each of the north and south facing interior sheathing surfaces of the 3:12 roof test hut were used in this study. The sensors were placed near the centre of the sheathing panels to eliminate edge effects and readings from the sensors were recorded using wireless dataloggers. Temperature and relative humidity measurements were recorded by a portable weather station installed beside the roof test huts. Moisture content data was only collected for the first year of the study due to sensor limitations. Based on the results to date, and the results from Phase 1 of this study, the trends are assumed to continue for the remainder of the test period for all test areas. For more information regarding the sensors and monitoring, refer to the report for Phase 1 of this study, "Asphalt Shingle Sloped Roofing Research Study – Phase 1", published by BC Housing.

3 Results

3.1 Sensor Monitoring

The moisture content of the sheathing for the 3:12 hut is shown in Figure 3.1 for the first year of the study. The ambient temperature and relative humidity during the study is shown in Figure 3.2.

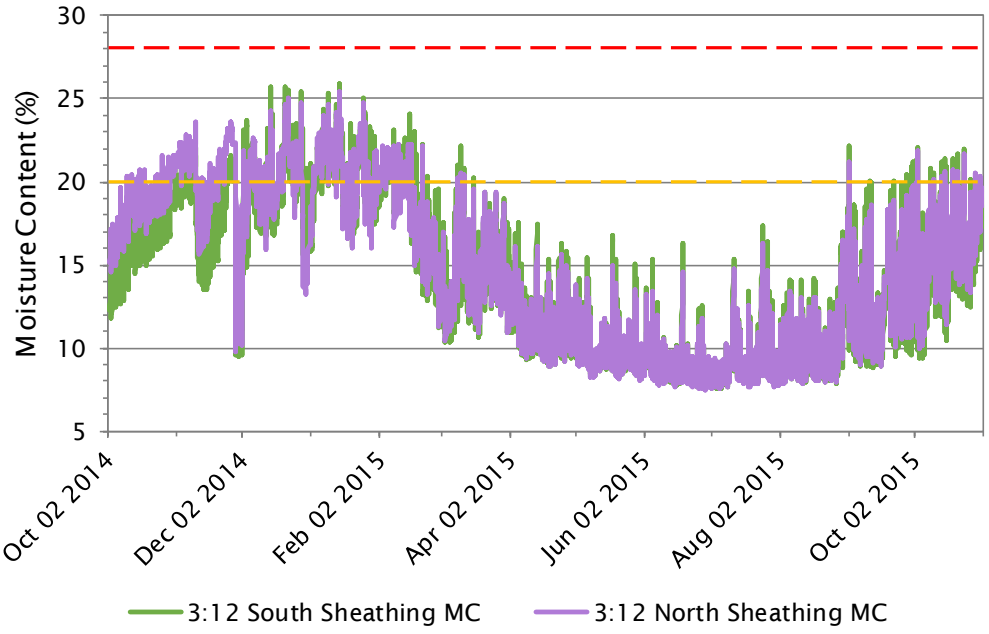

Figure 3.1 Moisture content of the interior surface of the sheathing for the 3:12 roof.

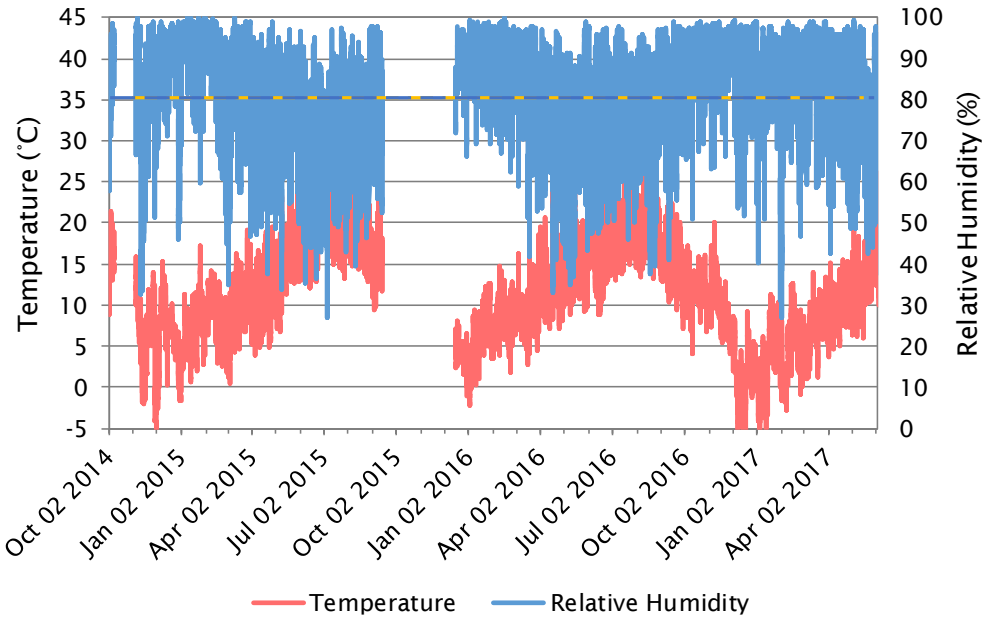

Figure 3.2 Temperature and relative humidity of the ambient air during the study.

The moisture content of the sheathing was observed to be consistently at or above cautionary levels for fungal contamination (above 20%) during the winter period. During the summer months, the moisture content was lower at around 10%. The ambient relative humidity for much of the test period was above 80%.

The moisture content, relative humidity, and temperature trends observed during the studied period are consistent with trends observed during Phase 1 of this study; there is a potential for fungal growth on wood components exposed to the outdoor ambient conditions, even without physical wetting from rain or air leakage condensation.

3.2 Visual Assessment

Table 3.1 to Table 3.5 present the results of the visual assessment of the roof sheathing during the test period. Note that only results from the visual assessments during the winter or early spring season are presented, since the conditions most conducive to visible fungal growth on untreated wood occur during these periods.

TABLE 3.1 Visual Assessment of Sheathing Immediately Before Treatment

October/November 2014		3: 12 Existing		3:12 Sanded		4:12 Existing		4:12 Sanded	
		S	N	S	N	S	N	S	N
Treatment Area	D								
	K								
	FP								
	SS								
	D + Kilz								
	K + Kilz								
	FP + Kilz								
	SS + Kilz								
	P-7570-D								

not visible, MI **0-2** | light, MI **3** | moderate, MI **4** | significant, MI **5-6**

TABLE 3.2 Visual Assessment of Surface Treatments as of December 2014 (1 Month After Application)

December 2014		3: 12 Existing		3:12 Sanded		4:12 Existing		4:12 Sanded	
		S	N	S	N	S	N	S	N
Treatment	D								
	K								
	FP								
	SS								
	D + Kilz								
	K + Kilz								
	FP + Kilz								
	SS + Kilz								
	P-7570-D								

not visible, MI **0-2** light, MI **3** moderate, MI **4** significant, MI **5-6**

TABLE 3.3 Visual Assessment of Surface Treatments as of March 2015 (5 Months After Application)

March 2015		3: 12 Existing		3:12 Sanded		4:12 Existing		4:12 Sanded	
		S	N	S	N	S	N	S	N
Treatment	D								
	K								
	FP								
	SS								
	D + Kilz								
	K + Kilz								
	FP + Kilz								
	SS + Kilz								
	P-7570-D								

not visible, MI **0-2** light, MI **3** moderate, MI **4** significant, MI **5-6**

TABLE 3.4 Visual Assessment of Surface Treatments as of May 2015 (31 Months After Application)

May 2017		3: 12 Existing		3:12 Sanded		4:12 Existing		4:12 Sanded	
		S	N	S	N	S	N	S	N
Treatment	D								
	K								
	FP								
	SS								
	D + Kilz								
	K + Kilz								
	FP + Kilz								
	SS + Kilz								
	P-7570-D								

not visible, MI **0-2** light, MI **3** moderate, MI **4** significant, MI **5-6**

TABLE 3.5 Visual Assessment of Surface Treatments as of January 2018 (38 Months After Application)

January 2018		3: 12 Existing		3:12 Sanded		4:12 Existing		4:12 Sanded	
		S	N	S	N	S	N	S	N
Treatment	D								
	K								
	FP								
	SS								
	D + Kilz								
	K + Kilz								
	FP + Kilz								
	SS + Kilz								
	P-7570-D								

not visible, MI **0-2** light, MI **3** moderate, MI **4** significant, MI **5-6**

As shown in Table 3.1 and Table 3.2, the initial application of the treatments SS, Kilz and P-7570-D effectively removed or covered the appearance of fungal growth on the existing sheathing surfaces. The treatments D, K, and FP appeared to have lessened or removed the appearance of fungal growth in some cases.

Visual assessment at March 2015 and May 2017 found areas with the D, K, and FP treatments continuing to show light to moderate fungal growth. All other treatment areas did not show any signs of visible fungal growth. Significant fungal growth was observed at the K coating in May 2017. In January 2018, the last visual assessment, the K treatment area was found to have moderate to significant visible fungal growth at most test areas. The K + Kilz was also found to have light to moderate visible fungal growth at many of the test areas.

Throughout the entire test period, no visible signs of fungal growth were observed at the SS, D + Kilz, SS + Kilz, or P-7570-D treatment areas. The coloured coatings SS and P-7570-D effectively removed the appearance of visible fungal growth and prevented new fungal growth. When combined with a top coat of Kilz, coating D also removed the appearance of visible fungal growth and prevented new fungal growth. The transparent treatment D and FP alone provided some improvements to the appearance of the wood, with the D treatment only resulting in some areas with light visible fungal growth. The FP treatment resulted in some areas of light and moderate fungal growth.

The K and K + Kilz treatment both resulted in moderate to significant visible fungal growth at the sheathing surface and did not appear to provide effective protection during the test period.

Based on a visual review of the roof sheathing surfaces, the roof slope, orientation, and sheathing surface (sanded/existing) did not appear to have any significant impact on pattern or occurrences of visible fungal growth on the treatments.

It should be noted that throughout the test period, significant visible fungal growth was observed on the plywood areas not covered with the treatments. See Figure 3.3.

Figure 3.3 3:12 N existing roof as observed at January 2018

4 Conclusions & Recommendations

Nine surface treatments were tested on the underside of plywood sheathing in ventilated roof test huts located in the Lower Mainland. After more than three years, many of the tested surface treatments significantly inhibited visible mould growth on the sheathing surface, despite the surrounding areas being covered in mould in most cases.

Treatments SS, D + Kilz, SS + Kilz and P-7570-D were most effective in preventing visible fungal growth from occurring on the sheathing during the test period.

Visible fungal growth was generally observed on the following surface treatments, regardless of sheathing surface prep:

- K – moderate to significant visible fungal growth
- K + Kilz – light to moderate visible fungal growth
- D, FP, FP + Kilz – light visible fungal growth after three years

Interestingly, the initial findings from the Phase 1 study showed that the standard Kilz paint alone was effective in preventing visible fungal growth on the sheathing, even after more than five years of exposure. The findings in this study may be the result of the new combination of the coatings or the different formulation in the Kilz Premium (versus standard Kilz) product used in this phase causing the treatment to be less effective.

Monitoring of the roof test huts showed that the moisture content of the sheathing and the ambient relative humidity were conducive to fungal growth at the surface of the sheathing. This was further verified by significant visible fungal growth observed in areas of the sheathing not covered with a treatment.

Roof sheathing mould resistant surface treatments are a potential solution to the problem of mould growth on ventilated sloped attic roofs. The treatments can be used both to remove the appearance of mould growth and prevent it from re-occurring. Furthermore, based on the ventilated sloped attic roof research completed to date, it would be desirable to have an effective mould resistant surface treatment applied to new wood sheathing used in ventilated attics, to prevent initiation and growth entirely.

This testing showed that under high-ventilation attic conditions, with no impact from air leakage or water ingress, several of the treatments reduced or removed the appearance of fungal growth, and significantly inhibited new visible fungal growth at the underside of the sheathing, while others were less effective in removing or preventing visible fungal growth.

The darker coatings SS and P-7570-D alone may be preferred in this application, since they effectively mask the appearance of existing mould, and did not appear to allow new mould growth. When combined coating D and SS, the opaque white Kilz Premium product was also effective throughout the test period.

While the appearance of the natural wood look from the transparent coatings may be desired, none of the transparent coatings tested consistently prevented surface mould growth from occurring.

Further to this field testing, additional testing is recommended for surface treatments on existing in-situ ventilated sloped attic roofs, to assess the effectiveness of surface treatments on roof sheathing that is potentially subject to additional moisture loads from interior air leakage, and reduced ventilation rates.

5 References

FPInnovations., (2017), Assessing Remedial Treatments for Mouldy Sheathing in Ventilated Attics in Coastal Climates, BC Housing Research Centre, Vancouver, British Columbia.

Morrison Hershfield, (2014), Attic Ventilation and Moisture Research Study – Final Report, BC Housing Research Centre, Vancouver, British Columbia.

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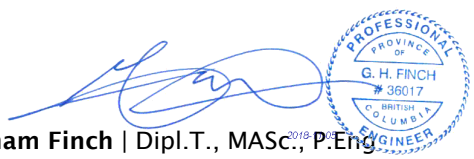
Viitanen, H., Ojanen, T., (2007), Improved Model to Predict Mold Growth in Building Materials, Proceedings of the ASHRAE Buildings X Conference, Clearwater Beach, Florida.

Wang, J., Morris, P. (2011), Decay initiation in plywood, OSB, and solid wood under fluctuating RH conditions. International research Group on Wood Protection, Section 2, Test Methodology and Assessment. 42 Annual Meeting, Queenstown, New Zealand.

Yours truly,



Graham Finch | Dipl.T., MASc., P.Eng.
Principal, Senior Building Science Specialist
gfinch@rdh.com
604 873 1181
RDH Building Science Inc.

James Higgins | AScT
Building Science Technologist
jhiggins@rdh.com
604 873 1181
RDH Building Science Inc.

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Appendix A

Surface Treatments Data Sheets

KILZ® PREMIUM INTERIOR / EXTERIOR WATER-BASED PRIMER

KILZ® Premium is a superior quality, fast drying, water-based primer, sealer and stainblocker that provides excellent adhesion and a mildew resistant coating. It's ideal for use in moisture-prone areas and blocks out most stains caused by water, tannin, ink, pencil, felt marker and grease. For use on interior and exterior surfaces. Topcoat with latex or oil-based paint.

AS OF 6/1/2011 COMPLIES OR IS CERTIFIED WITH:			
SCAQMD	Yes	MPI #	6
CARB	Yes	MPI X-GREEN	No
OTC	Yes	GREENGUARD	No
LADCO	Yes	GREEN SEAL™	No
AIM	Yes	CHPS	No
LEED®	Yes*	NAHB/ICC NGBS	No

**Product may help projects qualify for LEED credits. Please see www.usgbc.org/LEED for additional details.*

WHERE TO USE

Use on properly prepared interior and exterior surfaces, such as:

- Brick
- Painted Metal
- Properly Prepared Glossy Surfaces†
- Drywall
- Paneling
- Stucco
- Masonry
- Plaster
- Wood

FILL / MAX TINT

No. 13302C
946 ml – 15 ml**

No. 13341C
3.79 L – 60 ml**

No. 13300C
18.93 L – 300 ml**

***Tinting is not recommended for stainblocking applications.*

FINISH

85° = < 20.0

Sheen levels depend on porosity and various surface irregularities.

COMPOSITION

Vehicle: Acrylic Polymer
Weight Solids: 54.7% (+/-) 2%
Volume Solids: 40.5% (+/-) 2%
Weight / 3.79 L: 5.35 kg (+/-) 0.2
Viscosity: 95 - 105 KU

VOC: 95 g/L

The addition of colourants may add VOCs.

FLASHPOINT

N/A

COVERAGE RATE

Coverage: 28 - 37 m^2 per 3.79 L, depending on the surface texture, porosity and application method. Does not include the loss of material from spraying.

RECOMMENDED FILM THICKNESS

At 28 sq. meters per 3.79 L:
- Wet: 5.3 mils; Dry: 2.2 mils

At 37 sq. meters per 3.79 L:
- Wet: 4.0 mils; Dry: 1.6 mils

PREMIUM APPLICATION TOOLS

Airless Spray:
Tip: .015" - .021"
Filter: 60 mesh
PSI: Fluid pressure of 2,500 - 3,200

Roller:
Smooth Surfaces: 10 - 12 mm nap
Rough / Porous Surfaces: 12 - 14 mm nap

Brush: Nylon / Polyester Blend

SURFACE PREPARATION†

- The surface must be clean, free of dust, grease, wax, peeling paint, mold, mildew and wallpaper paste. If washing is necessary, use a non-soapy detergent or a TSP substitute. Rinse well and allow to dry.
- Peeling or Checked Paint: Scrape off loose paint and sand to a smooth surface. Sanding or removal of paint containing lead is hazardous.†
- Unpainted, exterior wood exposed to sun and/or moisture longer than 2-4 weeks must be cleaned and sanded before priming.
- Glossy Surfaces: For maximum adhesion, scuff sand the surface thoroughly before priming.†
- Mold or Mildew Covered Surfaces: Wash the area with a mildew remover, rinse with water and allow to dry before priming.
- Masonry, Brick, Stucco and Plaster: KILZ PREMIUM primer may be used on clean, dry, aged masonry surfaces. New masonry must be allowed to cure (dry) at least 30 days before applying KILZ PREMIUM primer.
- Fire Restoration: It is critical to clean smoke damaged surfaces thoroughly before priming. Primary Recommendation: KILZ COMPLETE®, KILZ ODOURLESS® or KILZ® ORIGINAL primers.

APPLICATION

- Eye protection is recommended.
- Apply as supplied using a brush, roller or sprayer.
- **Do not thin for stainblocking applications.** A small amount of water may be added for other spray applications.
- Only apply if surface, air and product temperatures are between 10°-32° C.
- Stir thoroughly before and occasionally during use.
- Prime the entire surface to ensure a uniform appearance of the topcoat.
- Stainblocking: After priming, test for stain bleed-through by applying the topcoat to a small section. If the stain bleeds through the topcoat, apply a second coat of primer and test again before topcoating the entire area. If bleeding continues, a longer dry time is needed before topcoating.
- Tinting: Not recommended for stainblocking applications. KILZ PREMIUM primer may be tinted with up to 60 ml of universal colourant per 3.79 L for non-stainblocking projects. Tinting to a lighter shade than the topcoat is recommended.

DRY TIME at 25° C, 50% RH:

- To Touch: 30 Minutes
- To Recoat / Topcoat: 1 Hour

Application at lower temperatures, high humidity or poor ventilation will affect dry time.

Masterchem Industries LLC

KILZ® PREMIUM INTERIOR / EXTERIOR WATER-BASED PRIMER

CLEAN UP & DISPOSAL

- Clean equipment and paint spatters with warm, soapy water.
- If spilled, contain material and remove with an inert absorbent. Dispose of contaminated absorbent, container and unused product in accordance with all current federal, state and local regulations.
- Do not dispose of this product down a drain.
- Please consider donating any unused product.
- For recycling or disposal information, contact your local household refuse collection service.

LIMITED WARRANTY

If this product is found to be defective upon inspection by its representative, Masterchem Industries LLC will, at its option, either furnish an equivalent amount of new product or refund the purchase price to the original consumer purchaser of this product upon proof of purchase. Masterchem Industries will not be liable for any representations or warranties made by any retail seller or applicator of this product. **This warranty excludes (1) labor or cost of labor for the removal of this product or any other product, the repair or replacement of substrates to which this product is applied or the application of replacement product and (2) any incidental or consequential damages.** *Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights and you may also have other rights which vary from state to state. This warranty is not transferable. To make a warranty claim, write to Technical Service, Masterchem Industries LLC, 3135 Old Highway M, Imperial, MO 63052-2834, or email Technical Service at techservice@masterchem.com.*

†WARNING! *If you scrape, sand or remove old paint, you may release lead dust. LEAD IS TOXIC. EXPOSURE TO LEAD DUST CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE. Wear a NIOSH-approved respirator to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead.*

WARNING: *This product contains chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.*

WARNING! IRRITANT! *HARMFUL OR FATAL IF SWALLOWED. CONTAINS ETHYLENE GLYCOL. Avoid contact with eyes. May cause eye, nose and throat irritation. Avoid breathing of dust, vapors or spray mist. Open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headache, or dizziness, or if air monitoring demonstrates vapor / mist levels are above applicable limits, wear an appropriate, properly fitted respirator (NIOSH / MSHA TC 23C or equivalent) during and after application. Follow respirator manufacturer's direction for respirator use. Close container after each use. Wash thoroughly after handling and before smoking and eating.*

FIRST AID

- *If swallowed, do not induce vomiting. Get medical attention immediately.*
- *If you experience difficulty in breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical attention immediately.*
- *In case of eye contact, flush eyes immediately with plenty of water for at least 15 minutes and get medical attention.*

KEEP FROM FREEZING

KEEP OUT OF REACH OF CHILDREN

DO NOT TAKE INTERNALLY

For MSDS or to consult with a technical service representative, call 1-866-PRIMER-1.

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SANSIN®

ENVIRO STAIN®

DESCRIPTION TRI-ARX: IN FIELD (P-7570D) is a high viscosity ultra low VOC ready to use protective coating for onsite application by hand to wood and wood composites. It is available in Blue and Purple. It is designed for application directly to wood and wood composite products to provide broad-spectrum protection against mould and offers excellent water resistance. It is formulated with a combination of proprietary resins and PMRA-registered active ingredients that provide broad spectrum protection against mold tested in accordance to AWPA E24-12 Standard.

APPLICATIONS

- Interior wood and wood composite surfaces.

PRODUCT BENEFITS

- Provides broad-spectrum protection against mould tested in accordance to AWPA E24-12 Standard.
- Good water repellency
- Ultra Low VOC
- Non flammable liquid
- Made in Canada

CHARACTERISTICS

- Form and Appearance..... Viscous Liquid
- Appearance on wood ...Semi Transparent Colour
- Gloss ..... Flat
- Odor .....Low
- Specific Gravity (g/cm3)..... 1.00-1.01
- pH..... 8.0 – 8.5
- Viscosity.....High Viscosity. 50 – 60sec Z#5
- Solvents.....Low
- Solid Content.....6.0% +/-0.5%
- Freezing Point..... -1°C (31°F)
- Cleanup.....Soap & Water
- Drying Time (To touch) @ 21°C and 50% relative humidity.....30 Minutes Max
- Longer drying time needed in high humidity or @ low temperature
- VOC (g/L)* < 5 g/L [as per US EPA Method 24]

* The solids are < 1 lb/Gal, therefore the actual VOC is reported as per Rule 1113.

PACKAGING

Available in drums – 205 L & Pails [5 US Gal].

PREPARATION

- Surface must be clean, free from dirt, dust, grease, wax and mold.

WORKING PROCEDURE

- Stir well before and during application to prevent settling. Mix periodically, every ½ hour when using.
- One coat of 6 mils wet minimum is recommended.
- Can be applied by brush, roller or spray. Apply a heavy coat and brush off the excess to achieve 6 mils wet.
- Brush out any puddles and runs if necessary
- Substrate and ambient temperatures should be between 10 C° and 30 C°. Do not attempt to coat frozen substrate.

APPLICATION METHODS

- Apply by hand using brush, roller or spray, brush off excess.

COVERAGE

Typical coverage is 200 – 270 sq ft/US Gal.

STORAGE

Shelf life when stored in ideal conditions is 1 year. Store at temperatures of between + 10°C and + 30°C (50°F and 86°F). Keep containers tightly closed.

SAFETY See Material Safety Data Sheet

WARNING TO USERS

Keep out of reach of children, if swallowed immediately drink two glasses of milk or warm water. Do not induce vomiting. Call physician immediately. Avoid contact with skin or eyes; flush with soap and water. Avoid breathing of vapor or mist.

The information contained in this document is given in good faith based on our current knowledge. The use of the product is beyond the control of The Sansin Corporation, and no guarantees, expressed or implied, are made as to the result to be obtained if not used in accordance with the published Directions for Use. The Sansin Corporation does not assume any legal responsibility for use or reliance on same. This information must on no account be used as a substitute for necessary field tests, which alone can ensure that the product is suitable for the expected use. Before using any product, read its label.

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Research Centre
1701 – 4555 Kingsway
Burnaby, BC V5H 4V8
Phone: 604 439 4135
Toll-free: 1 866 465 6873
Email: technicalresearch@bchousing.org
www.bchousing.org