ProPERLA Lotus Effect Façade Coating and Masonry Crème and Emperor Paint Lotus Effect Façade Coating and Masonry Crème

Product Performance Verification Report

ENERGY SAVING TRUST

PRODUCT PERFORMANCE VERIFICATION REPORT

Client: proPERLA UK Ltd
Address: Unit 37, Peel Industrial Estate, Bury, Lancashire, BL9 0LU

This report constitutes an evaluation of the performance of the products:

proPERLA Masonry Crème
proPERLA Lotus Effect Façade Coating
Emperor Paint Masonry Crème
Emperor Paint Lotus Effect Façade Coating

hereinafter referred to as **the Products.**

Distributed by the sole UK distributor:

proPERLA UK Ltd, Unit 37, Peel Industrial Estate, Bury, Lancashire, BL9 0LU hereinafter referred to as **proPERLA.**

The Energy Saving Trust, 30 North Colonnade, London, E14 5GP, hereinafter referred to as **EST**, author the report**.**

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1. Background

The Energy Saving Trust (EST) is the UK's leading independent and impartial organisation in the domestic energy sector. Our internationally renowned services are underpinned by the very best evidence, research and evaluation, and delivered by highly skilled and experienced specialists in the field.

We have an outstanding record of accomplishment for delivery, whether leading programmes on behalf of UK wide governments, the European Commission or working alongside businesses.

EST offers a range of services relating to the evaluation and verification of the performance of energy efficiency and renewable technology. EST Product Verification is a bespoke service, designed to assist businesses in communicating the energy and performance benefits of their products. The process involves the independent verification of a product's performance characteristics followed by the development of factual, informative, consumer-facing claims for use in promotional marketing materials.

EST carried out a desk evaluation of the Products' waterproofing behaviour and impact on thermal performance based on evidence supplied by proPERLA.

proPERLA requested product performance verification from EST on the basis of the evidence submitted that the Products:

- prevent ingress of moisture into masonry and reduce the moisture content of that masonry
- are 'breathable', not affecting the vapour permeability of the masonry they are applied to
- improve thermal and energy performance of buildings, and reduce running costs

This report represents the outcomes this independent of the development of consumer-facing claims, based on the verification findings, for use in marketing materials, with relevant supporting caveats.

2. Product Description

proPERLA Masonry Crème and proPERLA Lotus Effect Façade Coating are external wall waterproofing products distributed by proPERLA. The Products claim to enhance water resistance and energy performance by creating a breathable water-repellent barrier on the masonry surface. It is asserted that increased moisture levels of masonry wall directly correlates to a lower thermal transmittance.

It is important to note that proPERLA Lotus Effect Façade Coating was tested on top of the proPERLA Exterior Façade Primer. Primer was not used for the Masonry Crème.

proPERLA provided EST with a supporting letter of confirmation that proPERLA additionally markets the above proPERLA products under the brand Emperor Paint with no material or compositional change to the Products. Therefore, Emperor Paint Masonry Crème is considered equal to proPERLA Masonry Crème and Emperor Paint Lotus Effect Façade Coating considered equal to proPERLA Lotus Effect Façade Coating for the purposes of this report.

3. Supporting evidence and product performance

proPERLA supplied a range of laboratory test reports in support of the claims. The documents provided and reviewed are as follows:

1. Test report 183288 (QT-51318/1/GMB)/Ref. 1 testing proPERLA Masonry Crème in accordance with ETAG 034:2012. Test conducted by Lucideon Limited, Queens Road, Penkhull, Stoke-on-Trent, Staffordshire, ST4 7LQ
2. SOIL RHO by LabFerrer test report September 2014

3.1 Evidence A

Test report reference:	183288/Ref.1
Dated:	12 November 2018
Laboratory name:	Lucideon Ltd
Laboratory address:	Queens Road, Penkhull Stoke-on-Trent, Staffordshire ST4 7LQ
Laboratory accreditation and date:	ISO 17025:2005 (UKAS No.0013) 19 December 2018
Test standard(s):	Clause 5.4.6 of ETAG 034:2012 Clause 6.4.6 of ETAG 034:2012 ISO 7783:2011 PR 27:1998 ETAG 004:2011

Clause 5.4.6 Hygrothermal behaviour of ETAG 034:2012

This test is typically an optional procedure for testing in accordance with the full ETAG 034:2012 guideline covering kits for vertical exterior wall claddings consisting of an external cladding. It is an optional test for kits known or suspected of being sensitive to hygrothermal variation.

The substrate walls are made of masonry (clay, concrete or stone), concrete (cast on site or as prefabricated panels), timber or metal frame. Insulation material is defined in accordance with an EN standard or an ETA. One wall construction type with one masonry substrate was used – a single leaf brick wall made from Wienerberger Sunset Red multi bricks.

The Products were applied to a stabilised masonry substrate before undergoing 80 heat – rain cycles and 5 heat – cold cycles and observed at regular intervals throughout the process.

This procedure provided substrates exposed to an accelerated ageing process, then used for subsequent testing.

Clause 6.4.6 Hygrothermal behaviour of ETAG 034:2012

To satisfy the requirements of this clause, the samples subjected to the accelerated ageing process shall not show any of the following defects during or at the end of testing:

- Deterioration such as cracking or delamination of the classing element that allows water penetration to the insulation
- Detachment of the cladding element
- Irreversible deformation

ISO 7783:2011

This International Standard specifies a method for determining the water-vapour transmission properties of coatings of paints, varnishes and related products.

The water-vapour transmission rate is not necessarily a linear function of film thickness, temperature or relative-humidity difference. A determination carried out under one set of conditions will not necessarily be comparable with one carried out under other conditions. Therefore, it is essential that the conditions of test are chosen to be as close as possible to the conditions of use.

The Products were applied to brick wall constructed in the testing facility. Samples from the accelerated ageing process and “un-aged” samples were then tested for water vapour permeability. One wall construction type with one building material was used – a single leaf brick wall made from Wienerberger Sunset Red multi bricks.

PR 27:1998 Water Absorption Masonry Bricks
Having passed ISO 7783:2011, the same samples were then tested for water absorption following an in-house designed procedure PR 27:1998 Water Absorption Masonry Bricks. Each sample was sealed on four sides, leaving only the front face exposed. The front face was then subject to water immersion until the sample weight was stabilised. The time taken to reach stabilisation was not recorded. An uncoated sample acted as a control.

ETAG 004:2011 External Thermal Insulation Composite Systems with Rendering
This guideline deals with External Thermal Insulation Composite Systems (ETICS) with rendering intended for use as external thermal insulation to the walls of buildings. The walls are made of masonry (bricks, blocks, stones ...) or concrete (cast on site or as prefabricated panels).
The ETICS are designed to give the wall to which they are applied satisfactory thermal insulation. They should provide a minimal thermal resistance in excess of 1 m^2.K/W. The ETICS can be used on new or existing (retrofit) vertical walls. They can also be used on horizontal or inclined surfaces which are not exposed to precipitation. The ETICS are non load-bearing construction elements. They do not contribute directly to the stability of the wall on which they are installed. The ETICS are not intended to ensure the airtightness of the building structure.

3.2 Evidence B

Test report reference:	n/a
Dated:	September 2014
Laboratory name:	SOILRHO, Lab-Ferrer, S.L.
Laboratory address:	Ferran el Catolic, 3 25200 CERVERA
Laboratory accreditation and date:	None
Test standard(s):	ISO 15148:2002

ISO 15148:2002
This European Standard specifies a method for determining, by partial immersion with no temperature gradient, the short-term liquid water absorption coefficient. It is intended to assess the rate of absorption of water, by capillary action from continuous or driving rain during on site storage or

construction, by insulating and other materials, which are normally protected. The method is suitable for renders or coatings tested in conjunction with the substrate on which they are normally mounted. The Products were applied to samples of Concrete, Clay Brick and Render Mortar and were tested against samples without application.

4. Evidence Review

This section summarises the findings from the evidence submitted and their relevance in supporting the claims made by proPERLA about the Products.

4.1 Evidence A

Water vapour permeability
Following *BS EN ISO 7783:2011 Paints and varnishes. Determination of water-vapour transmission properties. Cup method*.[1]

The results demonstrate water vapour resistance of the treated brick wall sections are similar to that of the untreated brick wall, both at time of application and after undergoing the accelerated weathering process. The resistance of the section newly treated with proPERLA Masonry Crème did show a slightly higher resistance to the untreated section (2.87 versus 2.47 MNs/g) but this difference is not significant.

Water absorption
Following *Lucideon In House Testing PR 27:1998 Water Absorption Masonry Bricks*.

The results demonstrate that sections of treated brick wall absorbed less water than sections of untreated brick wall, when immersed fully in freestanding water. The samples were left in water until their weight stabilised. The length of time required for weight stabilisation has not been reported. The untreated sample reached a stable moisture content of 11.12% whereas the Masonry Crème and Lotus Effect Façade Coating treated samples achieved stable moisture contents of 0.41% and 0.74% respectively.

Thermal performance
Following *Clause 5.4.6 and Clause 6.4.6 of ETAG 034:2012 Guideline for European Technical Approval of Kits for External Wall Claddings*

Thermal conductance of the treated and untreated wall sections was not measured. However, measurements of temperature at various points in the wall sections during some stage of the hygrothermal treatment showed an average temperature differential from internal to external wall surface that was around 5 degrees lower for the treated sections than for the untreated section. This is indicative of a reduction in thermal conductance but is not sufficient to calculate the level of change. No attempt was made to measure the temperature difference during likely domestic heating circumstances.

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[1] N.B. Since this test was performed, BS EN ISO 7783:2018 has superseded this procedure; however, the previous standard still demonstrates evidence in support of the claims. Therefore, EST have accepted the results to the 2011 standard.

4.2 Evidence B

Thermal performance
Following *ISO 15148:2002 Hygrothermal performance of building materials and products – Determination of water absorption coefficient by partial immersion*.[2]

Thermal conductance of the treated and untreated samples was measured in accordance with ASTM D5334-08.

The results demonstrate that treated masonry materials absorbed less water than untreated masonry materials, when immersed in freestanding water. The results are provided below:

	% Weight change pre-treatment	% Weight change post-treatment
Concrete	34.25	7.20
Clay brick	82.06	56.42
Render mortar	5.05	3.21

For all material types, there was a decrease in the weight of water absorbed by each material when treated with the Products. Therefore, this evidence supports the claim that The Products can inhibit the absorption of water into the masonry material, which could maintain lower levels of moisture content in walls.

[2] N.B. Since this test was performed, this procedure has been amended to ISO 15148:2002/Amd 1:2016, but amendments have not superseded the original standard. Therefore, EST have accepted the results to the 2002 standard without amendments.

5. Review of quality assurance documentation

A Quality Management System certified against ISO9001:2015 controls the manufacture of the Products.
This has been confirmed by submission of Quality Management System Certificate number KO543165 – I356353, dated 25.03.19 and valid until 22.03.22.

Quality Management Standard	ISO 9001:2015
Certificate Number	KO543165 – I356353
Date of Issue	25/03/2019
Date of Expiry	22/03/2022
Accrediting Body	KIWA Inspecta A/S, Denmark
Manufacturing Site	Beco Treat ApS, Nebelvej 15, 8700, Horsens, Denmark

The accrediting body for the certificate is KIWA Inspecta A/S in Denmark, and covers the Quality Management System implemented by Beco Treat ApS (Nebelvej 15, 8700, Horsens) who manufacture the products subsequently sold under the proPERLA name.

The Quality Manual overseeing the Quality Management System has also been reviewed.

Beco Treat ApS manufacture in France and at Emalux in Germany. These manufacturing sites are working in line with the certified Quality Management System, an arrangement controlled by internal audits that focus on:

1) Checking quality of incoming raw materials, including tests for bacteria.
2) Ensuring the products are mixed according to the specifications
3) A process for taking samples from each production batch and stored for 5 years
4) Putting tracking numbers that are marked on each container, so that product distribution is traceable.

6. Conclusions and verification of performance claims

Moisture has an adverse effect on thermal performance of walls. Moisture typically travels through walls in two ways:

1. As water vapour from inside, due to the high concentration of water vapour created in the home.
2. As liquid water from outside, due to exterior weather conditions.

Water ingress can increase heat loss through walls, with the amount of heat loss dependent on wall construction, physical characteristics, background moisture content and the amount and frequency of ingress.

Preventing water ingress by applying a super hydrophobic exterior coating can therefore reduce heat loss through certain wall constructions. To function effectively, these coatings need to be sufficiently vapour permeable to allow water vapour to pass through the wall. This helps prevent build up of moisture in the wall.

proPERLA have provided independent test data in support of the performance claims of the Products. EST can verify three claims outlined below, based on the evidence submitted.

All statements are correct as of June 2019 and valid for 12 months, subject to the terms and conditions of the *Energy Saving Trust Verification Licence Agreement*.

Please follow application guidelines.

Water resistance

Claim

The Products can inhibit the absorption of water into brick, which could help prevent high moisture levels in brick walls.

Caveat

The extent of which the Products could maintain lower levels of moisture content in walls will be determined by wall material construction, physical characteristics and the pre-existing water content.

Explanation

The masonry substrates tested were Wienerberger Sunset Red multi bricks. The Products satisfy the requirements of *Lucideon In House Testing PR 27:1998 Water Absorption Masonry Bricks,* as per the results of *Evidence 3.1*. The tests reviewed water absorption by immersion. The test report determined that the Products prevent 93.4 – 96.3% water absorption compared to an uncoated wall, in both aged and non-aged substrate.

Water Vapour Permeability

Claim

Water vapour permeability of the building material is not impacted by the application of the Products.

Caveat
Testing on a brick wall substrate indicated that the Products did not significantly increase the risk of condensation on the interior.

Explanation
The Products were tested in line with the requirements of *ISO 7783:2011 Paints and varnishes. Determination of water-vapour transmission properties. Cup method*, as per the results of *Evidence 3.2.* The test reports determined that the water vapour resistance of the treated wall sections was similar to that of the untreated wall, both at time of application and after undergoing the accelerated weathering process. The resistance of the section newly treated with Masonry Crème did show a slightly higher resistance to the untreated section (2.87 versus 2.47 MNs/g) but this difference is not significant.

Heat loss

Claim

To follow on from the water resistance claim:
This could help reduce heat loss in many wall constructions, leading to lower heating requirements.

Or as a stand-alone claim:
The Products can inhibit the absorption of water into brick, which could help reduce heat loss in many wall constructions, leading to lower heating requirements.

Caveat
The extent of which the Products could achieve a reduction in heat loss via the walls will be determined by wall material construction, physical characteristics, exposure and other factors influencing water content. It may be further impacted by the heating requirements of the building.

Explanation
Appendix 1 provides a literature overview, documenting various evidence in support that moisture has an adverse effect of the thermal performance of walls.
The Products were tested in line with the requirements of *ISO 15418:2002 Hygrothermal performance of building materials and products – Determination of water absorption coefficient by partial immersion*, as per the results of *Evidence 3.2*. The test report determined that application of the Products reduces the thermal conductivity of the subject when applied to Concrete, Clay Brick and Render Mortar versus these samples without any application.

The Products were tested in line with the requirements of *ETAG 034:2012 2012 Guideline for European Technical Approval of Kits for External Wall Claddings* and *ETAG 004:2011: External Thermal Insulation Composite (ETICS),* as per the results of *Evidence 3.1*. The test report determined that application of the Products results in a 6 °C temperature differential between the treated and untreated sections of the wall. Thermal imaging of the samples further illustrated the result.

The Products were tested in line with the requirements of *ETAG 004:2011: External Thermal Insulation Composite (ETICS),* as per the results of *Evidence 3.1.*

The results of the laboratory testing are supportive that the Products will reduce water ingress into masonry walls with minimal effect to the water vapour permeability of the materials.

It follows that, in certain cases, treating walls with the Products could lower heat loss through the walls.

However, it should be noted that no situational testing results were available, explicitly demonstrating that the application of the Products improves the thermal performance of walls when applied to an actual dwelling with typical UK domestic heating requirements.

APPENDIX A: MOISTURE CONTENT AND THERMAL PERFORMANCE OF SOLID WALLS – LITERATURE REVIEW

Overview

This literature review explores the existing research and evidence around how the moisture content of walls/substrates affects their thermal performance. The review investigates the common sources of moisture in walls and looks at the impacts of external coatings.

Key conclusions:

- It is well documented that **moisture has an adverse effect on thermal performance** of walls.
- **Uninsulated solid wall properties have poor thermal performance**; almost a third of the UK housing stock is comprised of this property type.
- Although the effects of **moisture are accounted for in technical design guidance,** findings from field trials show that **solid walls have a lower heat loss rate** than predicted.
- **Local climate and the exposure or protection of the walls affects their thermal performance**. Driving rain is particularly prevalent across the North and West coasts of Britain.
- **Thermal performance is affected by physical properties** of the wall. These include the substrate material, mortar material, and wall construction type.

Glossary of Terms

Thermal Transmittance (U-value) A measure of how effective a material is an insulator (W/m^2K). The lower the U-value is, the better the material is at stopping heat flow.

Thermal Conductivity (λ – value): The property of a material to conduct heat (W/mK). The lower the thermal conductivity is, the better the material is as a heat insulator.

Moisture affects the thermal performance of walls

Increased moisture content within masonry can increase heat loss through a wall[3].

Measurements of damp masonry have shown that heat loss is significantly higher than when it is dry. A test on London Bricks by the University of Portsmouth have shown that with 15% moisture content the U-value of the brick was approximately 1.4 $W/m^2.K$, compared to 0.6 $W/m^2.K$ at 0% moisture content[4]. This represents a heat loss reduction of over 50% (though this is not representative of real world situations, as 0% moisture content is not achievable in buildings). The laboratory tests found that waterproofing treatments resulted in different amounts of heat loss, depending on the substrate they were applied to.

Similarly, the School of the Built Environment and Engineering at Leeds Metropolitan University found a general correlation between wall moisture content and U-value. The experiment measured the U-values and moisture contents of the brick walls in a UK solid brick wall property. Moisture readings were grouped into dry (below 20% wall moisture content), medium (20-70%) and wet (70%). The study found that dry walls wall generally had lower U-values and that walls that had over 20% moisture content were less thermally efficient[5].

> *"The amount of moisture present in the fabric of a building has long been recognised as an important factor in influencing a U-value, and interpretation of a measured U-value is often accompanied by a measurement of moisture content"*
>
> *– Building Research Establishment*

[3] Solid wall heat losses and the potential for energy saving: Literature review. BRE, 2014

[4] Energy saving from water repellents. Rirsch, E. and Zhang, Z. University of Portsmouth.2012

[5] Comparison of moisture survey and U-values for a UK 220mm solid brick wall. Melanie B Smith. School of the Built Environment and Engineering, Leeds Metropolitan University

Moisture is accounted for in the technical guidance

The moisture levels of walls and its effect on thermal performance is accounted for in technical guidance, such as the CIBSE Environmental Design guide[6], the premier technical/reference source for designers and installers of building services. The CIBSE guide provides standard moisture contents for masonry and recommends thermal conductivity values for both ‘exposed’ and ‘protected’ bricks.
The CIBSE Environmental Design Guide states a typical moisture content of 5% for ‘exposed’ brickwork and a typical moisture content of 1% for ‘protected’ brickwork, as shown in

Table 3.2 ‘Standard’ moisture contents for masonry

Material	Moisture content	
	Protected	Exposed
Brick (fired clay)	1% (by volume)	5% (by volume)
Brick (calcium silicate)	1% (by volume)	5% (by volume)
Dense aggregate concrete	3% (by volume)	5% (by volume)
Blast furnace slag concrete	3% (by weight)	5% (by weight)
Pumice aggregate concrete	3% (by weight)	5% (by weight)
Other lightweight aggregate concrete	3% (by weight)	5% (by weight)
Autoclaved aerated concrete	3% (by weight)	5% (by weight)

Note: % (by volume) = % (by weight) × density/1000

Table 1. Please note that this is much lower than the moisture contents found in the experiment by Leeds Metropolitan University detailed above. The difference in moisture content is reflected in the thermal conductivity values stated by the guide. A thermal conductivity of 0.77 W/m·K is stated for ‘exposed’ bricks and 0.56 W/m·K is stated for ‘protected’ bricks. This indicated that protected masonry has lower heat loss.
This difference in thermal conductivity can have a significant influence on the U-value of a typical nine-inch solid wall. For instance, a typical exposed solid wall might be expected, using current calculation methods, to have a U-value in the region of 2.1 W/m²K, but if the same wall was considered ‘protected’ its U-value would be expected to drop to around 1.8 W/m²K. This represents a 14% decrease in thermal transmittance.

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Autoclaved aerated concrete	3% (by weight)	5% (by weight)

Note: % (by volume) = % (by weight) × density/1000

Table 1: Standard masonry moisture contents, CIBSE Guide A: Environmental Design

[6] CIBSE Guide A: Environmental Design

Moisture primarily comes from outside

Lstiburek and Carmody[7] outline the four primary mechanisms of moisture transfer in buildings. These are air movement, vapour diffusion, liquid flow and capillary suction.

The first two mechanisms: air movement and vapour diffusion, deal with moisture as water vapour in the air. In cold climates, such as the UK, where the building is heated relative to the colder outside temperature, the natural movement of moisture in the air is from the building interior to exterior.

The final two mechanisms: liquid flow and capillary suction, deal with liquid water. They are the most significant factors in the wetting of building fabrics, and usually occur as water penetration by rainwater or groundwater. These mechanisms are particularly prevalent across the North and West coasts of Britain, exposed to the most severe driving rain[8], represented by the green shades in Figure 1.

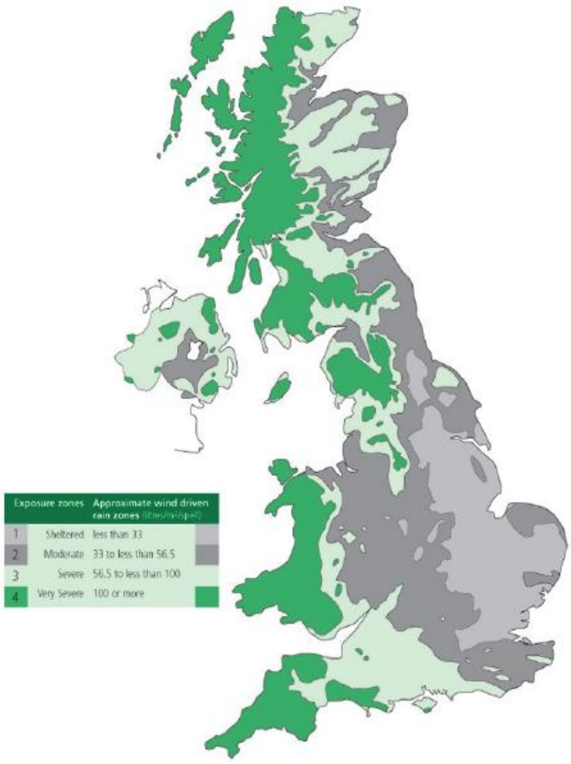

Figure 1: UK Exposure Zones

The primary source of moisture in walls typically comes from rain penetrating the exterior surface through the mortar joints.

BRE Centre for Sustainable Design of the Built Environment in the Welsh School of Architecture at Cardiff University conducted a field trial investigating the effects of insulation on solid walls[9]. The trial monitored five buildings with thick stone walls before and after the application of various types of insulation. The main findings of this trial were that the primary source of moisture in the walls was from rain penetrating the exterior surface, and the main route for water through the wall was provided by the mortar joints between the stones.

These findings are supported by English Heritage's research[10] that found that poor thermal performance tends to be in cases where the wall has been saturated by prolonged rain ingress. English Heritage highlight the need to keep buildings in a good state of repair.

It should be noted that the amount of moisture ingress is likely to be affected by the substrate and type of mortar, there will be differences between brick and stone due to their different porosities.

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[7] Lstiburek, J. & Carmody, J. (1991) Moisture Control Handbook: New, Low-rise, Residential Construction.
[8] BS EN 8104:1992 Code of practice for assessing exposure of walls to wind-driven rain.
[9] BRE Centre for Sustainable Design of the Built Environment in the Welsh School of Architecture at Cardiff University.
[10] Research into the Thermal Performance of Traditional Brick Walls. English Heritage, 2013.

Coated walls perform better than uncoated walls

Measurements taken by Historic Scotland Conservation Group on a garden bothy made of sandstone[14] found that internally coated walls had a better thermal performance than uncoated walls. The 600mm thick walls were finished with plaster on lath in nine locations, and one with dry lining. Resultant U-values ranged from 0.9 to 1.3W/m2.K. Measurement of the same wall without any finishes resulted in a U-value of 2.4W/m2K. The study determined that part of this differential was a result of changed moisture levels in the wall.

There have been similar findings from studies of external wall insulation. A field trial by BRE and Cardiff University[11] found that rain penetration and moisture content in the external wall diminished after external insulation was applied.

proPERLA provided supporting evidence indicating that exterior coatings can reduce moisture ingress. A comparative test of the Products applied to a wall constructed from Wienerberger Red Brick against an untreated section of the same wall. Following water spray testing on the exterior to simulate driving rain, the interior of the wall was demonstrably dryer that the untreated section of wall. Thermal imaging also showed that the wall was warmer on the inside.

The vapour permeability of exterior coatings is of importance. A non-permeable coating on the outside of a wall can trap moisture within the wall. To prevent deterioration of the substrate due to trapped water it is important to understand the moisture permeability of the wall with and without the coating[12].

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[11] BRE Centre for Sustainable Design of the Built Environment in the Welsh School of Architecture at Cardiff University
[12] Goossens, E. L. J., Van der Zanden, A. J. J., & Van der Spoel, W. H. (2004). The measurement of the moisture transfer properties of paint films using the cup method. Progress in organic coatings, 49(3), pp. 270-274

Variables that affect energy performance of coatings

Substrate

Moisture absorbency depends on the physical characteristics of the substrate. Tests by Portsmouth University have shown that the application of water repellent coatings has varying impact on the absorption of moisture by different substrates[13]. This means that the effectiveness of a water repellent coating in terms of its energy saving potential would also be dependent on the type of substrate to which the coating was applied. The thermal conductivity of bricks is largely affected by the physical characteristics of the brick. Lower density materials performed better in thermal testing[14]. However, lower density brick can also absorb more moisture and displayed higher wet thermal conductivity than dense bricks.

Wall construction type

The percentage reduction in the heat-loss through a wall achieved by applying a waterproof coating would vary depending on the initial thermal performance of the walls to which they are applied. As with insulation, when applied to a wall with a good thermal performance, the percentage reduction in heat loss will be smaller than when applied to a wall with poor thermal performance. Additionally, application of a layer of insulation is likely to impact on moisture penetration of the wall in some way, depending on the characteristics of the materials used and their location within the wall structure.

Existing moisture content of the wall

The extent to which a waterproof coating can help reduce energy loss will depend on the propensity of the wall to contain high levels of moisture in the first place. As mentioned formerly, the CIBSE Environmental Design guide indicates typical moisture content varies depending on whether the brickwork is protected or sheltered. Moisture content will also vary both seasonally and by location, which is likely to affect product performance.

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[13] Energy saving from water repellents. Rirsch, E. and Zhang, Z. University of Portsmouth.2012
[14] Research into the Thermal Performance of Traditional Brick Walls. English Heritage, 2013.