

TECHNICAL INFORMATION SHEET

Wind Driven Rain Index

Because rainfall varies considerably across the UK and the Channel Islands it is not always easy to determine what is or what is not a suitable rendered façade finish. Render is one of the preferred choices and is used in particularly exposed locations due to its durability against the elements. There may be other factors that determine the choice such as suitably available local materials or perhaps it is because it is considered a cost-effective method of protecting a building. That aside, it is often the case that properties are commonly rendered in the most vulnerable locations such as the Channel Islands, South West and West coasts of Wales and Scotland generally as render provides an enhanced protection against the elements and in particular wind driven rain.

It must also be remembered that current building standards and building warranty providers e.g. NHBC, Premier Guarantee, LABC etc, requirements generally relate to cavity and not solid walls and fair faced masonry that has mortar joints (which are the weak link). Thus, in NHBC guidance it states the “50mm residual cavity has been a long-standing requirement and stems from the days when non-insulated cavities in masonry walls were only 50mm wide. This enabled the bricklayer to produce a clean cavity as he was able to strike off the excess mortar on the cavity face and prevent it falling and potentially blocking the cavity. The 50mm cavity also permitted a degree of tolerance in wall tie drip positioning and cavity tray and dpc detailing. That principle still applies today, even for partial fill. It is just as important that the insulation is not damaged or dislodged by the bricklayer’s trowel when striking off the cavity face of the outer leaf and that the detailing mentioned above has a reasonable chance of success. NHBC still considers that this cannot be achieved if the residual cavity is 25mm and it would almost certainly lead to water ingress and dampness.”

The assumption is that solid walls leak but this is not true. Mainland Europe builds wholly with solid masonry and suffers few issues. It needs to be recognised that the biggest area of failure in solid masonry is not through leakages through the wall but at the window and door openings. Therefore, it is extremely important to create robust detailing to accommodate this – generally rebated windows and applying special weatherproof sealant around the openings. (Parex can provide recommendations for this if required).

For calculating what is suitable for modern construction and in particular single skin construction, the Wind Driven Rain Index, is one of several factors that is now used to define what surface finish / construction material can be used. A good quality polymer enhanced render is an extremely efficient way to protect the façade against the elements.

Rainfall is largely unaffected by local features but conversely local features such as the spacing of trees, buildings and whether the ground is flat or steeply rising, affects the wind speed significantly and thus the amount of exposure the prevailing features are submitted to. A good rule of thumb to use is the ‘line of sight’. Therefore, if a wall is facing the sea or there is an elevated building which has nothing blocking the ‘line of sight’ or a building at the end of a long estate road, for example are all more likely to suffer the highest rate of exposure.

BS 8104:1992 allows for these different orientations, wind speeds and annual average rainfall values and gives recommendations for two methods of assessing exposure of walls to wind-driven rain, namely the local spell index method and the local annual index method. The local spell index method should be used

when assessing the resistance of a wall to rain penetration. The local annual index is intended for use when considering the average moisture content of exposed building material or when assessing durability, the effects of the weather on the appearance of materials and components and the likely growth of mosses and lichens. The standard does however state “It should be emphasised that neither index is precise enough to enable fine distinctions between degrees of exposure to be made. Hence the user should always take account of local knowledge and experience”. It also states, “This code of practice represents a code of good practice and therefore takes the form of recommendations”.

In BS13914 – 1 – 2005, it states;

“Rendering substantially enhances the rain resistance of single leaf and cavity walls, however, the durability of the render will depend on the correct choice of mix, thickness and number of coats and the correct detailing”. In addition, “Durability of the rendering will also be dependent upon the type of background, the type of rendering, mix proportions and the method of application”.

In Clause 6.5 it also suggests; “Wherever possible, whatever the conditions of exposure, advantage should be taken of architectural features which protect the rendering. Such protective features become more important as conditions become more severe. Adequate overhangs and drips will reduce the risk of frost damage.

The primary importance is the local spell index for exposure to wind driven rain and is classed under four categories of exposure headings, Sheltered, Moderate, Severe, and Very Severe and are detailed below via a table and map. The information provided are guidance figures and are not absolute because there are other factors involved and takes into consideration local knowledge and experience too.

Category of Exposure to local wind driven rain	
Category of Exposure	Calculated Quantity of Wind Driven Rain L/m ² per spell (A)
1. Sheltered	Less than 33
2. Moderate	33 to less than 56.5
3. Severe	56.5 to less than 100
4. Very Severe	not less than 100
A) Maximum wall spell index calculated using the local spell index method specified in BS 8104.	

The BRE Report BR 262 provides a simplified procedure for assessing exposure to wind-driven rain for walls up to 12 m high. It is primarily intended for low rise domestic buildings, but may also be considered suitable for other categories of buildings of similar scale. This simplified guidance is based on a map that defines zones in which calculations, in accordance with BS 8104, predict similar exposure conditions. The zones are numbered 1 to 4 and correspond with categories defined in the above table.

Rain Penetration and Cavity Walls

Exposure zones	Approximate wind driven rain* (litres/m ² per spell)
Sheltered 1	Less than 33
Moderate 2	33 to less than 56.5
Severe 3	56.5 to less than 100
Very Severe 4	100 or more

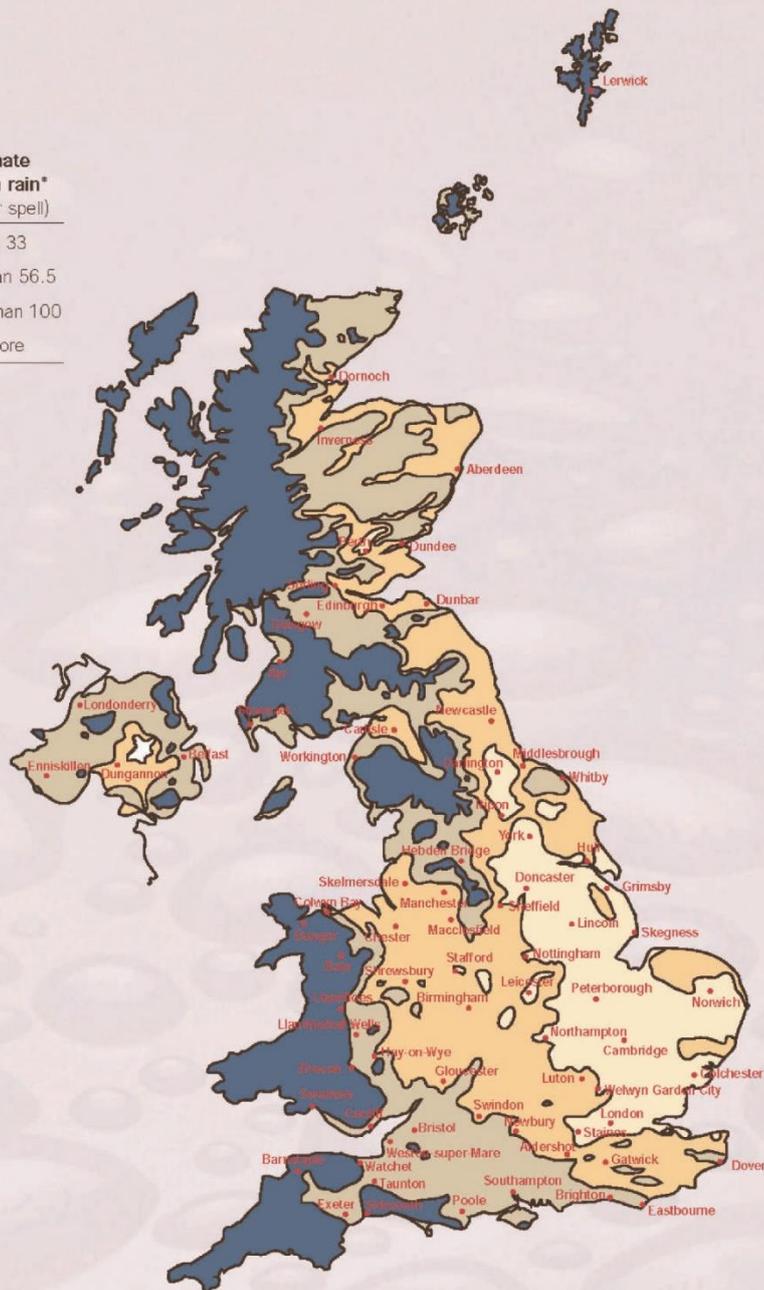
Key to Map

Note:

"Approximate wind driven rain" equates to "maximum wall spell index" derived from Figure 1 in BS 8104 : 1992 (Code of practice for assessing exposure of walls to wind driven rain.)

The wall spell index can be more accurately calculated from the large scale maps and correction factors given in BS 8104, then interpreted using the values in the key to the map (above) and table above.

Reproduced from the joint BRE/HMSO publication "Thermal insulation - Avoiding risks", 1994.



The calculations defining the mapped zones assume worst case conditions and so provide very conservative guidance.

Parex has several ETA's certifications for its various render systems together with a joint BBA with Siniat using their Weather Defence board, a joint BBA certification onto the Durisol single skin recycled timber wall units together with a BBA certificate for **Monorex GM***, **Monorex GF*** and **Monoblanco*** onto masonry substrates.

The ETA's are recognised European standards and covers render application onto a range of insulations application across all European countries. The BBA certifications are UK specific but are guidance documents not UK standards. They do offer some guidance for designers. However, all BBA's have a limitation of 75litres/m² applied, which equates to a 'Severe' rating only. Parex raised this point with the BBA that our and all other render manufacturers render certifications were all limited to 75litres/m². They deemed that because there was no British Standard guidance for Very Severe rating and therefore the rating on their certificates was the maximum they were able to give. No third-party certification body underwrites any project application either, this is carried out by underwriters for the likes of LABC, NHBC or Premier Guarantee.

The 'Very Severe' rating was not offered or conducted because;

1. There is currently not a defined test criterion to test to the 'Very Severe' level.
2. There is very minimal guidance under British Standards for single skin construction.

Solid wall construction 'Very Severe' rating is the required standard for all Channel Island, South West, most West coast and Scottish locations. Parex insulated render systems can be used for all External Wall Insulation retrofit applications across the UK if good robust window detailing and good application techniques are followed. (For certain warranty applications Parex offers a site inspection and sign off process). All Parex systems are also covered by an insurance backed guarantee subject to complying with Parex specification and sign off procedures.

As there are no recognised regulations, standards or tests in the UK to be able to gain very severe rating for renders. There has been discussion with the third-party accreditation bodies BBA, Lucideon and Windlass to see if there were any ways forward and currently it appears none of these organisations are able to assist. Despite testing conducted in France which shows the render systems meet the performance requirements, there is not a cross correlation of the French test that can be placed against a BS standard. In addition, the testing organisations are struggling to offer any test regime under a BS EN standard because there are no clear guidelines to follow.

Lucideon have been very pro-active on our behalf but advised they have struggled to find any test method other than BS 4315 rain penetration test and BS 8104 rain penetration measurement criteria which only relate to cavity wall construction.

In table 14, of BS8104 it does give reference to the BS EN13914-1 Code of Practice for External Rendering, which does indicate that additional render thickness will provide additional weather resistance performance.

As a major render manufacturer and through proven use across mainland Europe over many years, we know that using highly polymer modified specialist render systems as used in External Wall Insulation Systems or applying additional thickness of modified renders provides enhanced performance. This is clearly very important where solid wall construction is the standard construction in other parts of Europe and where cavity construction is generally unheard of. Because in mainland Europe solid wall construction is the primary build, rendered finishes has far higher certification requirements than in the UK. All Parex

façade renders meet these criteria's often with only a standard 15mm coat. This is the benefit of selecting a high-performance polymer enhanced render from a render manufacturer.

Approvals gained

The above information provides some insight into the problems that designers have when specifying the external finish for single skin construction. Because of these difficulties and lack of standards, Parex has worked closely with the insurance underwriters for both Premier Guarantee and the Local Authority Building Control (LABC) and for Scotland LABSS. With their own knowledge of render failures, they were looking for a solution they could offer to the market that provided robust solutions. They conducted extensive research of the Parex render systems and fully audited our procedures. Following this audit Parex has gained national approval status (subject to conditions) for Zone 4 'Very Severe' weather rating for its render systems with the LABC, LABSS and Premier Guarantee, with emphasis on providing specialist support for single skin applications to ensure longevity and robustness are maintained.

Enhanced weather performance

In addition, for highly exposed locations Parex offer a product called **Paraguard*** which is a clear liquid specially formulated with exceptional hydrophobic properties. The product provides additional weatherproofing performance, continues to allow the building to breathe but assists in keeping the substrate drier by enhancing the rain and moisture resistance penetration. **Paraguard*** also allows moisture inside the building to escape into the atmosphere in a controlled way.

Paraguard* is ideal for providing enhanced protection to facades or surfaces that are located near the coast, situated in highly exposed locations or where the wind driven index ratings are 'Severe' or 'Very Severe'.

The hydrophobic qualities also make the surface more resistant to mould, algae and mildew.

Additional support information

To assist designers and specifiers we also recommend that you refer to our other Technical Information Sheets for additional guidance and support.

- The importance of creating a good depth of render – permeability
- Parex Facade Renders
- Mineral render advice – Finishes, water content

*Subject to the product used, always refer to the product data sheet for full guidance on temperature and application guidance.

For additional information, project specific specifications or other Technical Information Sheets, please visit our web site link http://www.parex.co.uk/Render_Systems/Technical_Information_Sheets_and_FAQs

Or contact;

Parex Ltd

Holly Lane Industrial Estate

Atherstone

CV9 2QZ

Tel: 01827 711755

www.parex.co.uk