



# Guide to Weather Performance Testing of Windows & Doors

Weather performance testing is a means of assessing the product's ability to achieve specific requirements in areas such as air permeability, water tightness and resistance to wind load



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## 1 What is performance testing?

Weather performance testing is a means of assessing the products ability to achieve specific requirements as set out in British Standards and/or European Standards.

Weather testing includes

- Air Permeability
- Water tightness
- Resistance to Wind Load

## 2 Why carry out weather performance testing?

Successfully passing a recognised test with a nationally accredited United Kingdom Accreditation Service (UKAS) or an equivalent European national accreditation test facility will give your product credibility and your company a distinct advantage when competing against a company without the same test evidence. Testing is viewed as proof of your products performance. Any test evidence used to confirm weather performance should be carefully checked to ensure that it demonstrates compliance, that it is adequate and that it applies to the intended use.

Testing will help to assess, improve and develop the performance and quality of your product.

Testing opens up the opportunity to join product schemes such as the Wood Window Alliance (WWA) and the Timber Window Accreditation scheme (TWA). Being part of these promotion schemes proves your company's commitment to producing quality products and fulfill the requirements of your customers.

## 3 What are the relevant standards for weather tightness?

- BS6375 Part 1 is the classification for weather tightness and guidance on selection and specification.
- BS EN 14351-1 is the harmonized European Standard for windows & external doorsets.

BS6375 provides guidance specifically on the appropriate performance levels required for the UK market for air permeability, watertightness and wind pressure.

Where CE marking is required then this must be declared against the appropriate part of BS EN 14351. However, not all the characteristics listed in BS EN 14351 are required for CE marking and of those that are required, only those that are mandated in the UK need be declared. The UK does not currently require a declaration for weather performance test data so a declaration of NPD (No Performance Determined) is possible.

## 4 How do I decide what performance level is required?

A product's performance should suit the location it is intended to be used in. For new developments, the performance level should be specified by the architect or designer. When supplying replacement windows & doors to private dwellings then the manufacturer should consider the exposure category and wind loading that is suitable for the location.

Exposure is dependent on the following factors

- i. Basic wind speed at sea level of the location in the United Kingdom.
- ii. Site terrain category (A to F). This is determined from the distance from the coast and whether the property is in open country or more than 0.5km in to town.
- iii. The design height of the window. Ground floor windows will have less exposure than 1<sup>st</sup> or 2<sup>nd</sup> floor windows. BS6375-1 covers an overall design height of up to 15 metres.
- iv. The altitude of the property above sea level.
- v. Topographical (orographical factor) position i.e. whether the property is located on nominally flat terrain through to steep terrain with an average slope greater than 1/5.
- vi. Dormer factor. If the window is a dormer then wind turbulence can cause wind to speed-up, which increases the wind loads in this vicinity.
- vii. Funneling factor. Where the walls of two buildings face each other and the gap between them is less than either the building width or twice the building height then the windows & doors on the facing walls can experience increased pressure and exposure.

There is no obligation on specifiers to use a particular performance level. However, over specifying or selecting a more severe performance level than is required for the conditions can incur a cost penalty out of proportion to the performance advantages.

The method for calculating wind load and selecting exposure category is defined in BS6375-1 Annex A.

## 5 Air Permeability Test

The air permeability, air leakage or air tightness is the measure of the ability of a window or door to resist the uncontrolled flow of air (in or out). Air permeability is important for the energy efficiency of the overall building as cool air will need to be heated and sometimes any loss or gain of air is often felt as draughts. It is also a requirement of the Building Regulations in all regions of the UK that new homes are assessed for overall air leakage. High levels of air permeability can contribute adversely to this performance.

For the purposes of testing, any controlled ventilation devices (including letter plates) can be taped over unless there is a requirement to determine air flow through these. The test is in accordance with BS EN 1026 and conducted with both positive and negative pressures.

Classification for UK windows and doors ranges, is in accordance with BS EN 12207 and ranges from Class 0 (no test) to Class 2 which has a maximum test pressure of 300 Pa. However, windows and doors can be classified to higher performance levels up to Class 4.

## 6 Watertightness Test

The objective of the test is to determine the watertightness of the windows and doors by applying a steady water spray test to the product and applying air pressure to the product which is increased every 5 minutes.

Testing is carried out as per BS EN 1027 and is considered completed/failed when water has penetrated the specimen and there is an onset of leakage. The time and maximum pressure achieved before failure is recorded and classified in accordance with BS EN 12208. Leakage is defined as being any appearance of uncontrolled water (other than condensation) on the inner face of any part of the product.

Classification for exposure category in BS6375 (Table 1) ranges from Class 0 (no test) to Class 7A for windows (max. test pressure of 300 Pa) and Class 3A for doorsets (max. test pressure of 100 Pa).

*Note: Retention of water within the product is not defined as leakage*

## 7 Resistance to Wind Test

The resistance to window load test includes a deflection test, a repeated pressure test and operational test, an air permeability test and finally a safety test. The three tests are defined as follows:

- P1 applied to measure the deflections of parts of the test specimen.
- P2 pulsating pressure applied for 50 cycles to assess performance under repeated wind conditions
- P3 applied to assess the safety of the test specimen under extreme conditions.

The Air Permeability Test is repeated after the Wind Load Test to assess the damage that may have occurred during this test.

Both positive and negative pressure is required for the test.

For the purposes of the test (P1), the deflection of any deforming member is limited to  $L/150$ . Therefore, a door 2 metres high can deflect up to 13.3mm

## 8 What do I need to consider before testing?

Test for the worst-case scenario to cover a product range. This could be the largest test specimen that will fit in the test laboratory's rigs (check sizes with the lab first!) or, perhaps, the largest size product that you wish to offer to supply. If this passes, then product standards usually allow for test results to apply to smaller items within the same design range.

Stormproof windows and flush casement windows may achieve similar test results. Therefore, consideration could be given to testing just one type/style. The addition of a head drip above the top rail can improve watertightness test as jets are directed at an angle to the top opening joint.

BS6375-1 allows for entrance doors to have a lower test level than windows. While a doorset may pass the test it may still fail in service if subjected to extreme weather conditions. Consider testing doors to a higher specification than shown in the standard.

All products should be fully finished with appropriate surface coating. Use end grain sealers and follow the surface coating manufacturers advice and guidelines.

Care needs to be taken with the selection and installation of weatherseals. This applies especially to where they join/about at corners and to ensuring they are not stretched. Weatherseals should have sufficient compression to maintain a good seal while still allowing for ease of opening. The design of the profile should locate the weatherseal out of the wetted area of the frame otherwise wind pressure can 'pump' any water in contact with the seal through the joint.

The profile of the window or door components should allow for a suitable relief grooves to reduce the amount of pressure subjected on the seals. Profiles should also allow for sufficient drainage and reduce the likelihood of water being trapped by surface tension. This consideration is also important for drained and vented glazing systems which should have sufficient drainage gaps to prevent water being held near the seals of the glass unit holding as a result of surface tension.

On the day of the test send a joiner to the test laboratory to be on hand with spare ironmongery, beads, insulated glass units, glazing gaskets and weatherseals. Some adjustment may be allowed during the test. Attending the test will also help with feedback on the products performance in the test.

While it is not a requirement for weather testing, consideration should be given to fitting toughened and/or laminated insulated glass units into the product under test. If a unit should break during testing, then one replacement is allowed.

Many laboratories are able to carry out other tests such as acoustic, cyclic, thermal, security and fire etc. Speak to the test centre prior to making a booking to discuss what other standards could be tested with the sample(s) submitted. Note - P3 test (resistance to wind) is a destructive test.

Cost of testing (weather performance) can start from around £750 + VAT but will vary and increase depending on overall size, shape and the tests to be carried out.

## 9 Where can I get windows & doors tested?

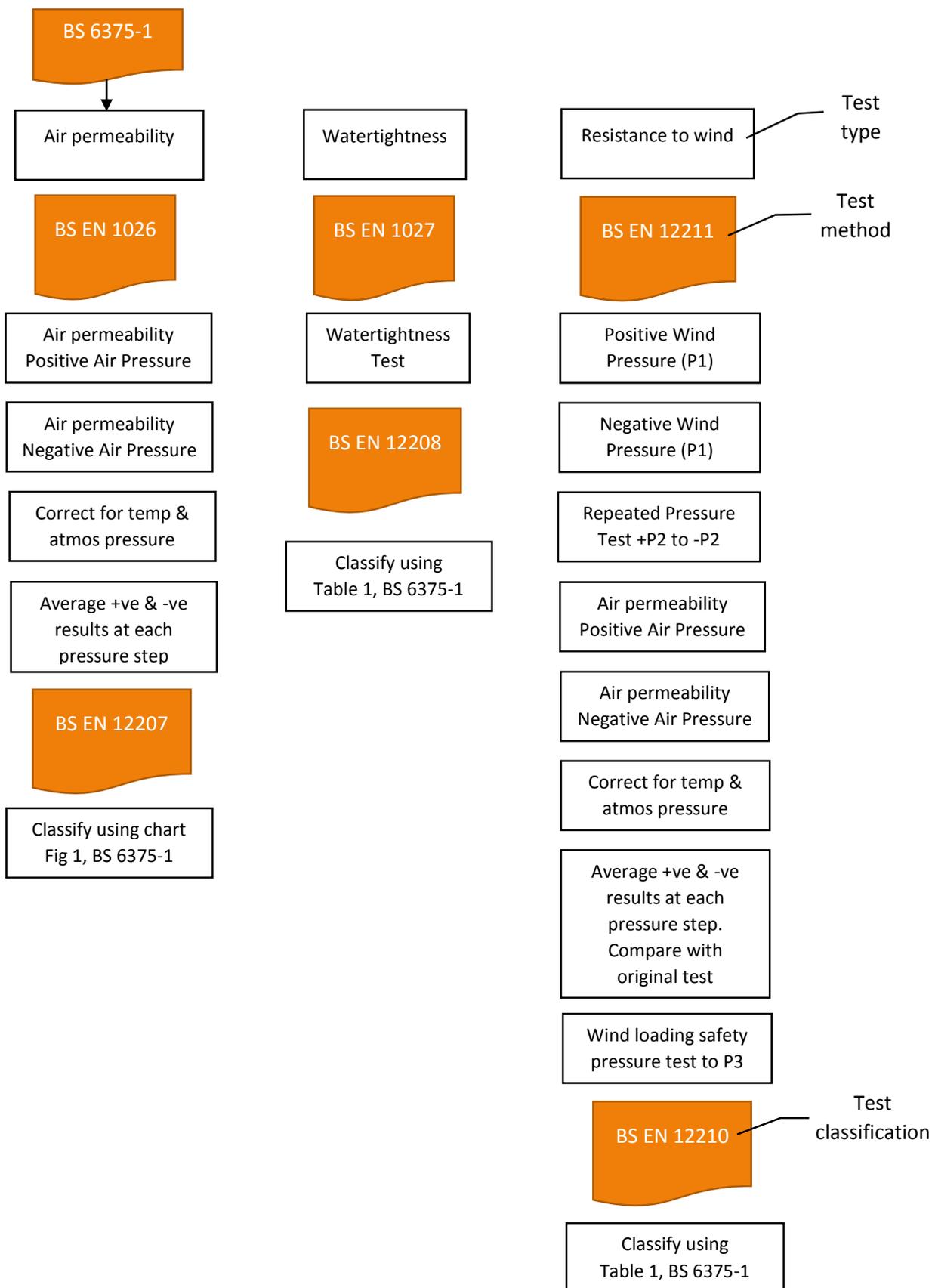
The following UKAS test laboratories are able to provide evidence and certification. Other laboratories (not listed) may also be used if there able to providing they can provide equivalent test evidence

Organisation	UKAS Ref	Web Site	Contact
BBA (British Board of Agrément)*	0357	bbacerts.co.uk	01923 665300
Winkhaus (UK) Ltd	1989	winkhaus.com/en-gb/	01536 316000
ERA Products Ltd	4052	erahomesecurity.com	01922 490 050
Build Check Ltd	4044	buildcheck.co.uk	01494 452713
VINCI Technology Centre UK Ltd	0057	technology-centre.co.uk	01525 859050
Wintech Engineering Ltd	2223	wintechtesting.com	01952 586580
BRE Global Ltd	0578	bre.co.uk/breglobal	0333 321 8811
Exova UK Ltd Trading As Exova Warrington Fire	0621	exova.com	0330 2220321
Exova UK Ltd Trading As Exova Warrington Fire and Exova	1762	exova.com	0330 2220321
BSI Assurance UK Ltd	0135	bsigroup.com/en-GB	0345 080 9000
ASSA ABLOY	2526	assaabloy.co.uk/en/local/uk	01902 366911
Fullex Locks Ltd (Testing Services)**	2259	fullex-locks.com/testing-services/	01384 401 312

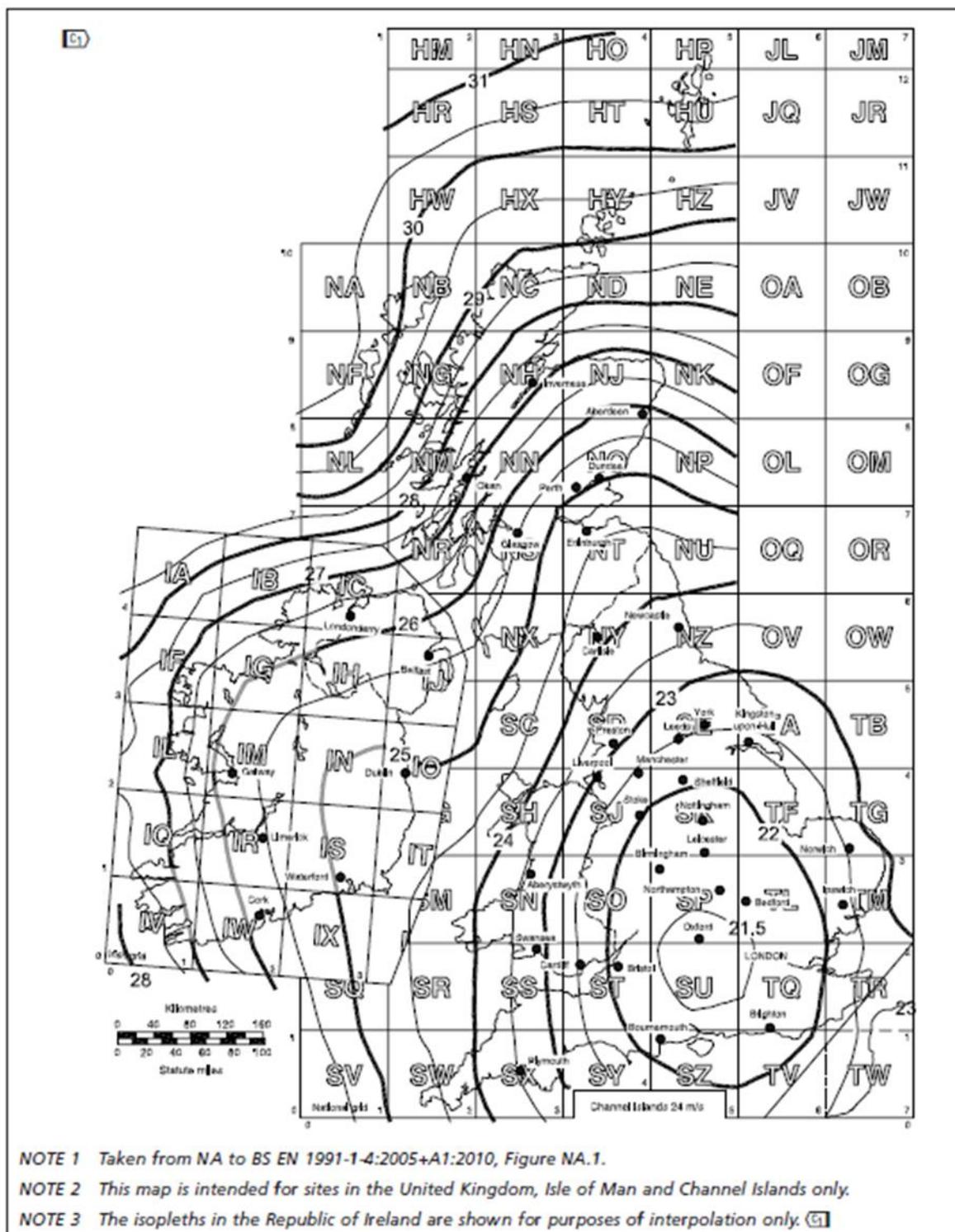
\*BWF Member

\*\* Not accredited with weather testing

## 10 Flow Chart of Sequence of Test



## 11 Basic Wind Speed



Note: Whilst every effort has been made to ensure the accuracy of advice given, the BWF cannot accept liability for loss or damage arising from the use of the information supplied in this publication.