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Environment Agency

Date: 5 July 2021

To whom it may concern

2018 Property Flood Resilience (PFR) Framework – Floodgate Door Barrier

I am writing to confirm that the Environment Agency has reviewed the test results and supporting documentation for the Floodgate Door Barrier. I am pleased to confirm that this product meets the specification of the 2018 PFR Framework and is therefore approved for use on schemes delivered via this Framework.

The Environment Agency's 2018 PFR Framework sets out the specification for flood resilience products. Lot 2 Schedule 1 Clause 4.2 states that barriers shall be tested to "BSi PAS 1188-2014 or evidenced that they meet this recognised industry standard".

The Floodgate Door Barrier does not hold PAS 1188-1-2014 certification however evidence, set out below, has been submitted to the Environment Agency that this system has been independently tested.

- BRE test report ref P111823-1000: 12 September 2018. Documentation of independent testing carried out at Aquobex Flood Tank on 13 August 2018.
- Floodgate deployment guide and User manual - Manual no: 11-20.

This evidence has been reviewed. All aspects of PAS 1188-1-2014 testing requirements have been carried out. Measured leakage is within the allowable leakage rate of PAS1188. It is noted that the order of testing was changed. We anticipate that this would prevent achievement of the standards set out in PAS1188. We have concluded that the change in order does not materially affect the operation of the barrier.

I confirm that the results of the testing carried out on the Floodgate Door Barrier is in accordance with the specification set out in Lot 2 Schedule 1 Clause 4.2 of the 2018 PFR Framework.

Kind Regards

Vikki McCausland
PFR Technical Lead - Asset Standards and Engineering

Annex A: Variation of testing - Floodgate Door Barrier

~~Kitemark~~ testing requirements - PAS1188:2014

Test	Duration	Water depth
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	18 Hours	600 mm (DMWD)
Wave Leakage Test	30 Minutes	440 mm
Current Leakage Test	1 Hour	540 mm
It is a requirement to remove the test specimen and reinstall, at this stage of the test.		
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	18 Hours	600 mm (DMWD)
Wave Leakage Test	30 Minutes	440 mm
Current Leakage Test	1 Hour	540 mm
It is a requirement to remove the test specimen and reinstall, at this stage of the test		
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	48 Hours	600 mm (DMWD)

Actual testing - agreed between Floodgate Ltd and Aquobex Ltd

Test	Duration	Water depth
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
Wave Leakage Test	30 Minutes	440 mm
Static Head Leakage Test	18 Hours	600 mm (DMWD)
Wave Leakage Test	30 Minutes	440 mm
Static Head Leakage Test	1 Hour	400 mm (2/3 DMWD)
	1 Hour	200 mm (1/3 DMWD)
The test specimen was removed and reinstalled, as required by PAS 1188-1:2014		
Current Leakage Test	1 Hour	540 mm
Current Leakage Test	1 Hour	540 mm
Static Head Leakage Test	18 Hours	600 mm (DMWD)
The test specimen was removed and reinstalled, as required by PAS 1188-1:2014		
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	48 Hours	600 mm (DMWD)

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BRE Test Report

Flood Protection Testing to PAS 1188-1:2014 on a Floodgate Door Barrier

Prepared for:	Floodgate Ltd
Date:	12 September 2018
Report Number:	P111823-1000 Issue: 1

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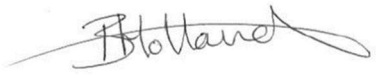
Date 12 September 2018

Signature 

Authorised by

Name Dr Paul Blackmore

Position Associate Director, Fire and Building Technology Group

Date 12 September 2018

Signature

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Executive Summary

Tests have been carried out on a Floodgate Door Barrier to meet the criteria of BSI Standard PAS 1188-1:2014.

Based on the test results the following conclusions can be drawn:

- The results from these tests show that the Floodgate Door Barrier as installed and tested had a maximum leakage rate of 50mL/metre/hr.
- The Floodgate Door Barrier has a leakage rate well below the PAS 1188-1:2014 allowable leakage rate of 500mL/metre/hr for a flood resistant barrier.
- The Floodgate Door Barrier therefore meets the requirements of PAS 1188-1:2014.

The Floodgate Door Barrier tested was the largest in the range and is therefore expected to be the worst case with respect to water leakage. The fabrication and design of the Floodgate Door Barriers is the same throughout the range, therefore it is expected that the result of the tests on the largest specimen will be applicable to smaller Floodgate Door Barriers in the same range.

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1 Introduction

At the request of John Alexander, Managing Director of Aquobex Ltd, Building 69, Building Research Establishment, Bucknalls Lane, Garston, Watford, WD25 9XX, BRE issued project P111832 on the 30th May 2018. The work described within the proposal is to provide an expert witness at each critical stage of testing and measurement of a flood protection test according to PAS 1188-1:2014 conducted by Aquobex Ltd. The Floodgate Barrier was tested on week commencing 13th August 2018 in the Aquobex Flood Tank in Building 69, BRE.

The report describes the test conducted and the result obtained.

2 Description of the Flood Barrier

The test specimen is designated for use as a demountable flood protection door barrier. The specimen is composed of a steel frame fabricated from 25.4 mm steel box section. Figure 1 shows the back face of the specimen, exposing the steel frame, installed within the flood tank. The jack installed in the middle of the specimen is intended to increase the width to create a tight fit in an aperture.

Figure 1 Floodgate product installed within flood tank (back face)

Covering the frame are two neoprene rubber jackets – an inner skirt with a blue nylon face and an outer cover made from black, smooth skin neoprene. The dimensions of the product as tested are 1280 mm x 680 mm (the closed size of the product is 1175 mm, however it was expanded to 1280 mm for the purposes of the tests).

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3 Test Procedure

The tests were conducted in accordance with PAS 1188-1:2014 Flood protection products – Specification. Part 1: Building aperture products. The standard is applicable to flood protection products intended for use in the temporary sealing of building apertures and entrances to properties, including boards and flood doors, in the event of static flood water rising up to a level between 540 mm and 840 mm above aperture threshold level, except where they are designed to completely cover or replace small apertures, such as air-bricks or air vents. The product is tested in three different scenarios expected to happen in real life flooding. This includes hydrostatic loading, wave loading and current loading.

It is specified in PAS 1188-1:2014 that the designated maximum water depth (DMWD) must not be less than 540 mm and not more than 840 mm. In this case, the DMWD was specified to be 600 mm. Table B.1 in PAS 1188-1:2014 specifies the relevant wave and current testing depths corresponding with the selected DMWD. These are specified in Table 1. The test procedure is specified in Clause B.5 of PAS 1188-1:2014 giving steps in how the test shall be carried out. See Table 1.

Test	Duration	Water depth
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	18 Hours	600 mm (DMWD)
Wave Leakage Test	30 Minutes	440 mm
Current Leakage Test	1 Hour	540 mm
It is a requirement to remove the test specimen and reinstall, at this stage of the test.		
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	18 Hours	600 mm (DMWD)
Wave Leakage Test	30 Minutes	440 mm
Current Leakage Test	1 Hour	540 mm
It is a requirement to remove the test specimen and reinstall, at this stage of the test		
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	48 Hours	600 mm (DMWD)

Table 1 Order of tests specified in PAS 1188-1:2014

In this case, it was discussed and agreed between Simon Evans of Floodgate Ltd and Nick Ward of Aquobex Ltd to rearrange the order of testing due to staff availability. The test was conducted in the order shown in Table 2.

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Test	Duration	Water depth
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
Wave Leakage Test	30 Minutes	440 mm
Static Head Leakage Test	18 Hours	600 mm (DMWD)
Wave Leakage Test	30 Minutes	440 mm
Static Head Leakage Test	1 Hour	400 mm (2/3 DMWD)
	1 Hour	200 mm (1/3 DMWD)
The test specimen was removed and reinstalled, as required by PAS 1188-1:2014		
Current Leakage Test	1 Hour	540 mm
Current Leakage Test	1 Hour	540 mm
Static Head Leakage Test	18 Hours	600 mm (DMWD)
The test specimen was removed and reinstalled, as required by PAS 1188-1:2014		
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)
	1 Hour	400 mm (2/3 DMWD)
	48 Hours	600 mm (DMWD)

Table 2 Order of tests agreed by Simon Evans of Floodgate Ltd and Nick Ward of Aquobex Ltd

The allowable leakage rate for any of the individual test measurements shall not exceed 500 mL/h/m of aperture width. Therefore, the allowable leakage will be 640 mL/h.

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Figure 2 Static load test at 200 mm

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Figure 3 Static load test at 600 mm

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Figure 4 Set up of current test

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4 Test Results

The test results are shown in Table 3.

Test	Duration	Water depth		Measured Leakage
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)		0 ml
	1 Hour	400 mm (2/3 DMWD)		0 ml
Wave Leakage Test	30 Minutes	440 mm		0 ml
Static Head Leakage Test	18 Hours	600 mm (DMWD)	Recorded Leakage Rate at First Hour:	0 ml
			Recorded Leakage Rate at Last Hour:	50 ml
Wave Leakage Test	30 Minutes	440 mm		0 ml
Static Head Leakage Test	1 Hour	400 mm (2/3 DMWD)		0 ml
	1 Hour	200 mm (1/3 DMWD)		0 ml
The test specimen was removed and reinstalled, as required by PAS 1188-1:2014				
Current Leakage Test	1 Hour	540 mm		0 ml
Current Leakage Test	1 Hour	540 mm		0 ml
Static Head Leakage Test	18 Hours	600 mm (DMWD)	Recorded Leakage Rate at First Hour:	0 ml
			Recorded Leakage Rate at Last Hour:	0 ml
The test specimen was removed and reinstalled, as required by PAS 1188-1:2014				
Static Head Leakage Test	1 Hour	200 mm (1/3 DMWD)		0 ml
	1 Hour	400 mm (2/3 DMWD)		0 ml
	48 Hours	600 mm (DMWD)	Recorded Leakage Rate at First Hour:	0 ml
			Recorded Leakage Rate at Last Hour:	5 ml

Table 3 Measured water leakage throughout test procedure

The measured leakage throughout the test sequence was within the criteria set by PAS 1188-1:2014.

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5 Conclusion

Based on the test results the following conclusion can be drawn:

- The results from these tests show that the Floodgate Door Barrier as installed and tested had a maximum leakage rate of 50mL/metre/hr.
- The Floodgate Door Barrier has a leakage rate well below the PAS 1188-1:2014 allowable leakage rate of 500mL/metre/hr for a flood resistant barrier.
- The Floodgate Door Barrier therefore meets the requirements of PAS 1188-1:2014.

The Floodgate Door Barrier tested was the largest in the range and is therefore expected to be the worst case with respect to water leakage. The fabrication and design of the Floodgate Door Barriers is the same throughout the range, therefore it is expected that the result of the tests on the largest specimen will be applicable to smaller Floodgate Door Barriers in the same range.

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Report Ends