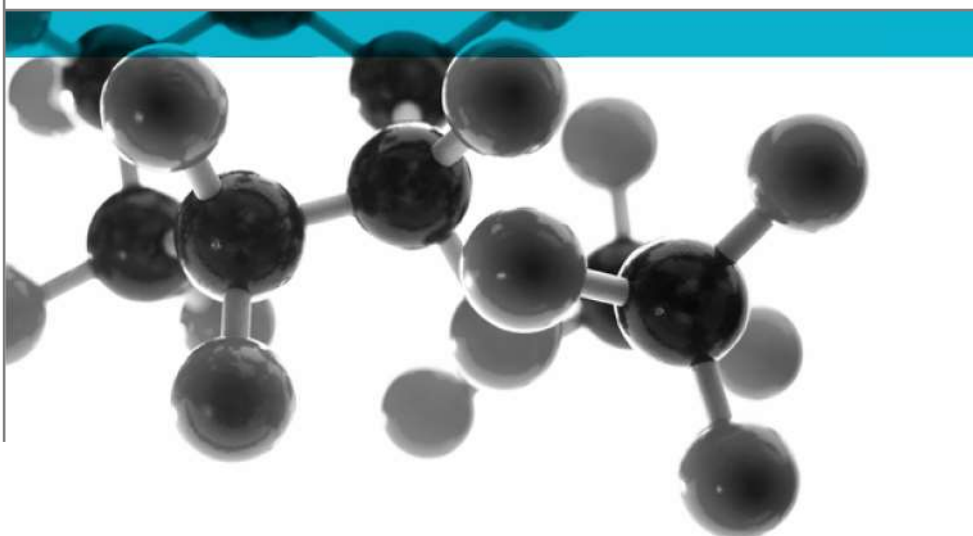


BS EN ISO 10140-2:2010



Test of: Multi-light Optima casement window

Acoustics - Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation

A Report To:
Epwin Group PLC
Stafford Park 6
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WYC40555/03

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Summary of Performance

The following performance was achieved from the specimens tested. Full details of the testing and specimen construction are described in the report.

Test No.	Product Name	Product Type	Test Result (R_w (C;C _{tr}))
1	P22 Optima	Multi-light casement window	39 (-2;-5) dB

1 Introduction

The test specimen was supplied by the sponsor and delivered to Warringtonfire on 14 October 2018. The specimen was installed into a timber stud partition within the test chamber by the sponsor.

Test Details

The specimen was tested to BS EN ISO 10140-2:2010 Acoustics - Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation

Testing was conducted at Exova, Chiltern House, Stocking Lane, Hughenden Valley, Buckinghamshire. HP14 4ND on the 16 October 2018.

For details of the testing, please see Section 3, Methodology.

Supporting Construction Description

The partition consisted of two wall leaves separated by a 400mm air gap. Each wall leaf was constructed of nominal 45mm x 90mm softwood studs at 600mm centres with three layers of 15mm plasterboard on each face. The stud wall cavities were filled with 100mm thick Rockwool insulation.

2 Test Specimen Details

Product Name	P22 Optima
Product Type	Multi-light casement window
Material Type	PVC-U
Overall Dimensions	1230mm wide x 1480mm high x 70mm deep
Casement Dimensions	580mm wide x 1421mm high x 70mm deep

Casement

	Material/type	Dimensions (mm)
Stiles	Profile 22 PVC-U profile (Ref. QS 30)*	70 x 75
Top rail	Profile 22 PVC-U profile (Ref. QS 30)*	70 x 75
Bottom rail	Profile 22 PVC-U profile (Ref. QS 30)*	70 x 75
Reinforcement	4mm thick "box section" (Ref. QX 30 RCM)* To hinge jamb only	20.5 x 32.5
Rebate	Single type	17 x 20
Joints	Mitred and welded	-

* As stated by sponsor, not checked by laboratory

Window Frame

	Material/type	Dimensions (mm)
Rails	Profile 22 PVC-U profile (Ref. QS 02)*	70 x 60
Stiles	Profile 22 PVC-U profile (Ref. QS 02)*	70 x 60
Mullion	Profile 22 PVC-U profile (Ref. QS 11)* "Z" profile	70 x 66
Mullion Reinforcement	3.5mm Steel "box section" (Ref. QX10 RCM)*	32.5 x 11.5
Rebate	Single type	50 x 18
Joints	Mitred and welded	-

* As stated by sponsor, not checked by laboratory

Hardware

	Make/type	Size (mm)	Fixing details (dimensions in mm)
Hinges	2No. 12" Securistyle Defender Hinges (Ref. E60026)*	310 length	3No. 4.3 x 22 screws into frame 3No. 4 x 27 screws into casement
Locking mechanism	SAC espagnolette (Ref. E50005)*	1000 length	8No. 4.5 x 25 screws
Shootbolts	2No. SAC shootvault kit 4 (pair) (Ref. E50017)*	100 x 62 (L-shape)	3No. 4 x 25 screws
Keeps	3No. SAC EK 23G espagnolette keep (Ref. E50023)*	50 x 33	2No. 4 x 25 screws
Shootbolt keeps	2No. SAC shootvault keep (Ref. E50024)* and S3-90 shootvault keep steel plate (Ref. E50025)*	32 x 36	2No. 4 x 25 screws
Handles	SAC Handle (Ref. E8006)*	135 lever length	2No. M5 x 45 machine screws

* As stated by sponsor, not checked by laboratory

Perimeter Sealing Details

	Make/type	Size (mm)	Location
Casement Edges	Co-extruded with profile	10 wide	On rebate upstand
Frame reveal	Co-extruded with profile	10 wide	On rebate upstand
Mullion	Co-extruded with profile	10 wide	On rebate upstand
Seal continuity	Uninterrupted by hardware	-	-

* As stated by sponsor, not checked by laboratory

Glazing

		Make/type/size (mm)	Location (dimensions in mm)
Glass type and configuration		4mm glass / 18mm TruPlas spacer / 6.8mm glass	-
Overall size	Opening	445 wide x 1298 high	-
	Fixed	567 wide x 1390 high	-
Sight size	Opening	412 wide x 1265 high	-
	Fixed	536 wide x 1357 high	-
Beading		Epwin QS50*	Internally beaded
Bead fixing		Clipped onto profile	-
Packers		Plastic packers	In all corners
Gaskets		Co-extruded with casement/frame profile	Between rebate upstand and glass
		Co-extruded with bead profile	Between bead and glass

* As stated by sponsor, not checked by laboratory

3 Methodology

Airborne Sound Insulation Test

- The loudspeakers were placed in the corners of the source room
- The sound level meter was calibrated prior to testing.
- 5 measurements were taken in the source room, at fixed positions.
- 5 measurements were taken in the receive room at fixed positions.
- Background measurements were taking at each third octave frequency between 50Hz and 5000Hz.
- 6 Reverberation measurements were taken in the receive room, in accordance with BS EN ISO 3382-2:2008 interrupted, engineering method.
- Calculations, including C & C_{tr}, were carried out in accordance with BS EN ISO 717-1
- The sound reduction index was calculated using the following formula from BS EN ISO 10140-2:2010:

$$R_w = L1 - L2 + 10\log\left(\frac{S}{A}\right) \text{ dB}$$

Where:

L1 is the logarithmic average of the source room measurements

L2 is the logarithmic average of the receive room measurements

S is the area of the test specimen

A is the equivalent absorption area, where $A = \frac{0.16V}{T}$

Where:

V = The volume of the receive room

T = the reverberation time measured in seconds

1. Logarithmic average of 5 Measurements (L1 & L2)
2. Deduction of L1s from L2s
3. Area of test specimen (S) divided by equivalent sound absorption area (A)
4. Weighted Final Result R_w dB

Test Equipment

Equipment	Equipment reference number
Bruel & Kjaer Sound Level Meter (Type 2270)	ACT-009
Bruel & Kjaer Microphones (Type 4189)	ACT-010 & ACT-016
Bruel & Kjaer Calibrator (Type 4231)	ACT-011
Amplifiers	ACT-007 & ACT-049
Noise Generators	ACT-008 & ACT-009
Loudspeakers (EV ZX1-90PA)	ACT-006, ACT-021, ACT-022
Graphic Equaliser (DBX Dual Channel)	ACT-023

4 Parameters & Limitations

Parameters

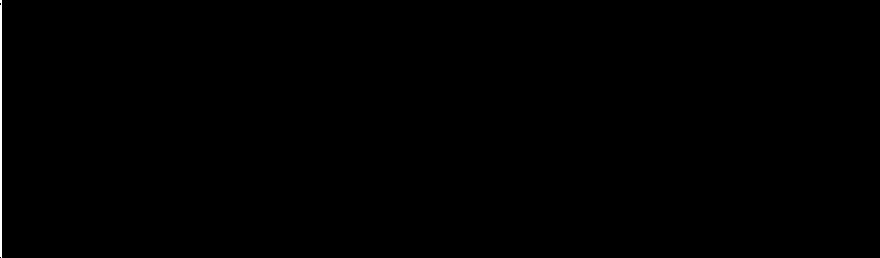
The test fulfilled all criteria required of ISO 10140-2, including:

- Sound level meter (microphone) was located as required
- Sound sources (loudspeakers) were located as required
- Reverberation Time readings were greater than 20dB but not so large that the observed decay cannot be represented by a straight line.
- Background noise measurements were 10dB below L2 measurements.
- Temperature was reported to within $\pm 0.1^{\circ}\text{C}$
- Barometric pressure was reported to within ± 0.01 Mbar (± 1 Pa)
- Humidity was reported to within $\pm 1\%$
- Frequencies 50Hz, 63Hz and 80Hz are outside of our UKAS accreditation, and are for reference only. These frequencies do not affect the over R_w figure.
- $R'_{\max}$ of the test chambers was measured to be 65dB
- The test chambers are two cuboid rooms 5.49m wide and a ceiling height of 2.58m, volumes of chambers for testing are reported with the individual test data

Limitations

- The results only relate to the behaviour of the specimen submitted for test, as described in the Technical Specification (Section 2), and under the particular conditions of test.
- The results are not intended to be the sole criteria for assessing the acoustic performance of the element in use nor do they necessarily reflect the actual behaviour once installed on site.
- The specification and interpretation of test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. WARRINGTONFIRE will be able to offer a review of the procedures adopted for a particular test to ensure that they are consistent with current practices.
- The results are solely for use by the sponsor and the stated purpose.
- The sponsor cannot rely on information provided without consent from WARRINGTONFIRE.
- Any recommendations are specific to the assignment and the sponsor.
- Extracts from the report are not permitted.

5 Authorisation

	Issued by:	Authorised by:
Signature:		
Name:	Martin Durham	Lee Grant-Riach
Title:	Laboratory Manager	Lead Technical officer
Date of Issue	6 th December 2018	

Appendix 1 – Result & Test Data Sheet (1 Page)

Product Name	P22 Optima	
Product Type	Multi-light casement window	
Data Sheet Ref.	Variations	Test Result $R_w (C; C_{tr})$
WYC405550/03/P004	None	39 (-2;-5) dB

Sponsor:	Epwin Group PLC
Product Name	P22 Optima
Product Type	Multi-light casement window
Material Type	PVC-U
	None
For detailed technical specification, please refer to Section 2 of the report	

Data sheet Ref. WYC405550/03/P004

Date of Test: 16/10/2018

Source Room Volume: 82.40 m³

Receive Room Volume: 69.60 m³

Specimen Installed By: Client

Area of Specimen (S): 1.80 m²

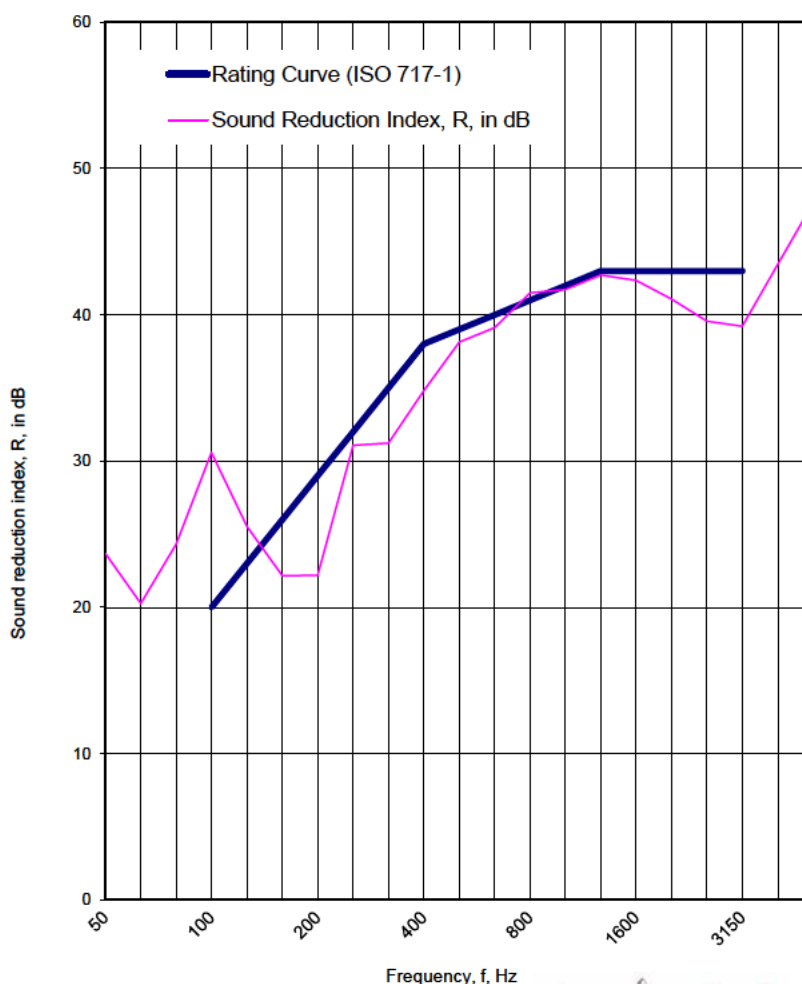
	<u>Sour.</u>	<u>Rec.</u>	
Temp. in Test Rooms:	21.3	21.5	°C

Static Pressure:	100440.0	100440.0	Pa
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Humidity in Test Rooms:	67.4	66.9	%
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f, Hz	R, dB
50*	23.7
63*	20.3
80*	24.3
100	30.6
125	25.5
160	22.2
200	22.2
250	31.1
315	31.2
400	34.8
500	38.1
630	39.1
800	41.5
1000	41.7
1250	42.7
1600	42.4
2000	41.1
2500	39.6
3150	39.2
4000	43.5
5000	47.7
AAD	-30.6

Frequency range for rating in accordance with ISO 717-1



$R_w = 39$ dB	$C_{(50-3150)} = -2$ dB	$C_{tr(50-3150)} = -6$ dB
$R_w+C = 37$ dB	$C_{(50-5000)} = -1$ dB	$C_{tr(50-5000)} = -6$ dB
$R_w+C_{tr} = 34$ dB	$C_{(100-5000)} = -1$ dB	$C_{tr(100-5000)} = -5$ dB

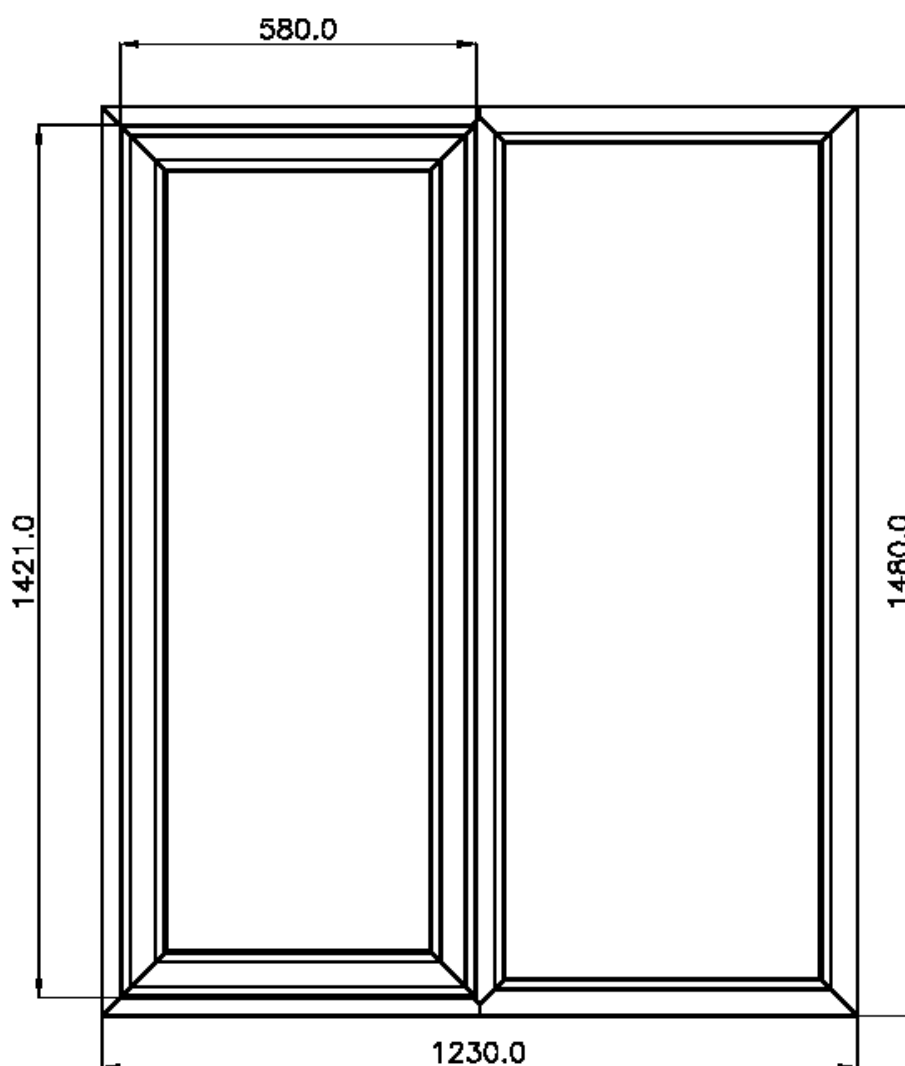
Lee Grant-Kiach
Lead Technical Officer

* indicates that the frequency is outside of our UKAS accreditation and is for information only

The legal validity of this report can only be claimed on presentation of the complete report

Report for: Epwin Group PLC
Report Ref: WYC405550/03

Appendix 2 – Sponsor Drawing



**OPTIMA CASEMENT
QS02 & QS30**