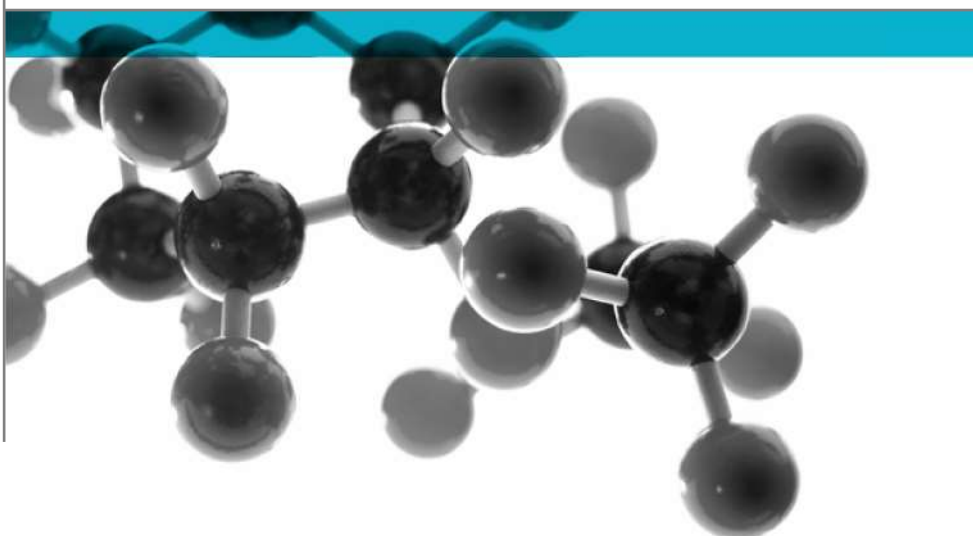


# BS EN ISO 10140-2:2010



## Test of: Louver Panel

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

A Report To:  
HVC Supplies  
Stourbridge  
West Midlands  
DY8 4EG

Document Reference:  
WYC391798/01

Date: 05/12/2017

Copy: 1

Issue No.: 1

Page 1

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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	Louver Ref.	Test Result ( $R_w$ ( $C;C_{tr}$ ))
1	AL150SM - Single Layer	Louver Panel	AL150SM - Single Layer	11 (0;-2) dB
2	AL150SM - Single Layer	Louver Panel	AL150SM - Double Layer	20 (-1;-5) dB
3	AL300SM - Single Layer	Louver Panel	AL300 - Single Layer	18 (-1;-4) dB
4	AL300SM - Single Layer	Louver Panel	AL300 - Double layer	25 (-1;-6) dB

## 1 Introduction

The test specimens were supplied by the sponsor and delivered to EXOVA on 15 November 2017. The specimens were installed into a timber stud partition within the test chamber by Exova.

### Test Details

The specimens were 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 15 November 2017.

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

<b>Product Name</b>	AL Series
<b>Product Type</b>	Louver Panel
<b>Material Type</b>	Aluminium
<b>Overall Dimensions</b>	990mm wide x 1090mm high <i>See technical specification for specimen depths</i>
<b>Variations between Tests</b>	4 tests were conducted on this product with variations in: <ul style="list-style-type: none"> <li>Louver Ref.</li> </ul> <p>Refer to Summary of Results &amp; Test Data Sheets in Appendix 1 for details of the variations.</p>

**AL150SM**

	Material/type/size (mm)
<b>Size</b>	991 wide x 1090 high
<b>Depth</b>	150
<b>Blade description</b>	Galvanised steel 0.9 thick, folded
<b>Insulation spec</b>	Rockwool RW3 75 thick
<b>Perforated plate spec</b>	0.7 thick pre-galvanised, 3Ø 8mm pitch, 32.65% open area

\* As stated by sponsor, not checked by laboratory

**AL300SM**

	Material/type/size (mm)
<b>Size</b>	991 wide x 1090 high
<b>Depth</b>	300
<b>Blade description</b>	Galvanised steel 0.9 thick, folded
<b>Insulation spec</b>	Rockwool RW3 75 thick
<b>Perforated plate spec</b>	0.7 thick pre-galvanised, 3Ø 8mm pitch, 32.65% open area

\* 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<sub>tr</sub>, 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<sub>w</sub> 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  $\pm 0.01$  Mbar ( $\pm 1$  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. EXOVA 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 EXOVA.
- Any recommendations are specific to the assignment and the sponsor.
- Extracts from the report are not permitted.

## 5 Authorisation

	Issued by:	Authorised by:
<b>Signature:</b>		
<b>Name:</b>	James Bacchus	Lee Grant-Riach
<b>Title:</b>	Acoustic Technician	Senior Technical Officer
<b>Date of Issue</b>	5 <sup>th</sup> December 2017	

## Appendix 1 – Summary of Results & Test Data Sheets (4 Pages)

<b>Product Name</b>	AL series
<b>Product Type</b>	Louver Panel

<b>Data Sheet Ref.</b>	<b>Variations</b>		<b>Test Result</b> <b><math>R_w (C;C_{tr})</math></b>
WYC391798/01/P001	Louver Ref.	AL150SM - Single Layer	11 (0;-2) dB
WYC391798/01/P002	Louver Ref.	AL150SM - Double Layer	20 (-1;-5) dB
WYC391798/01/P003	Louver Ref.	AL300 - Single Layer	18 (-1;-4) dB
WYC391798/01/P004	Louver Ref.	AL300 - Double layer	25 (-1;-6) dB





Laboratory measurement to  
BS EN ISO 10140-2 -  
Airborne Sound Insulation of



1762

Sponsor:	HVC Supplies
Product Name/Desc.	AL Series
Product Type	Louver Panel
Material Type	Aluminium
Variations:	
Louver Ref.	AL150SM - Single Layer

For detailed technical specification, please refer to Section 2 of the report

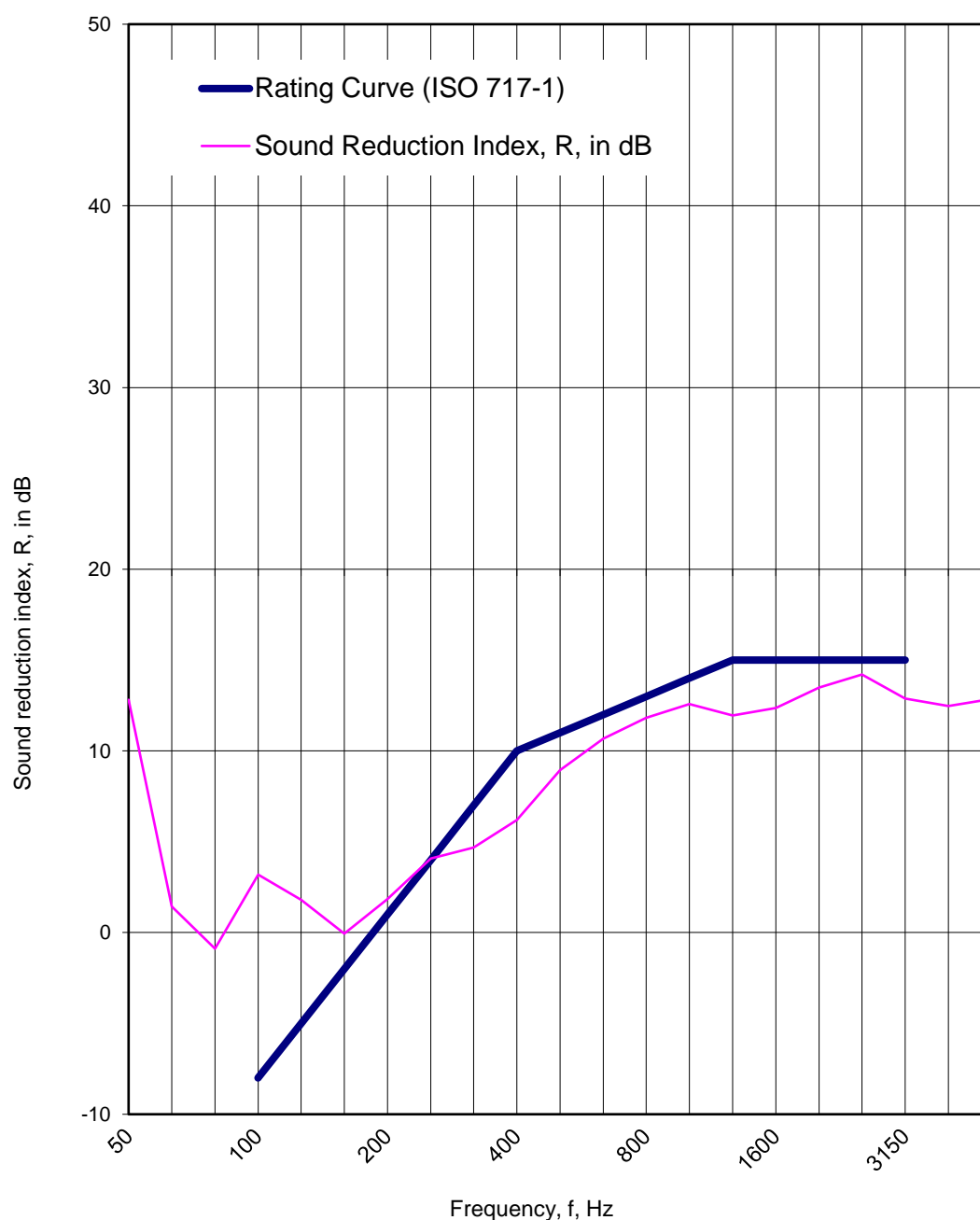
Data sheet Ref. WYC391798/01/P001

Date of Test: 15/11/2017

Source Room Volume:	82.40 m <sup>3</sup>
Receive Room Volume:	69.60 m <sup>3</sup>
Specimen Installed By:	Exova
Area of Specimen (S):	1.00 m <sup>2</sup>
Temp. in Test Rooms:	<u>Sour.</u> 17.3 <u>Rec.</u> 17.6 °C
Static Pressure:	100870.0    100890.0 Pa
Humidity in Test Rooms:	75.4    71.9 %

f, Hz	R, dB
50 <sup>+</sup>	12.8
63 <sup>+</sup>	1.4
80 <sup>+</sup>	-0.9
100	3.2
125	1.8
160	0.0
200	1.8
250	4.1
315	4.7
400	6.2
500	9.0
630	10.7
800	11.8
1000	12.6
1250	12.0
1600	12.4
2000	13.5
2500	14.2
3150	12.9
4000	12.5
5000	12.9
AAD	-22.2

Frequency range for rating in accordance with ISO 717-1



$R_w = 11$  dB  
 $R_w + C = 11$  dB  
 $R_w + C_{tr} = 9$  dB

$C_{(50-3150)} = 0$  dB     $C_{tr(50-3150)} = -3$  dB  
 $C_{(50-5000)} = 0$  dB     $C_{tr(50-5000)} = -3$  dB  
 $C_{(100-5000)} = 0$  dB     $C_{tr(100-5000)} = -2$  dB

Lee Grant-Riach  
Senior 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: HVC Supplies  
Report Ref: WYC391798/01



Laboratory measurement to  
BS EN ISO 10140-2 -  
Airborne Sound Insulation of



1762

Sponsor:	HVC Supplies
Product Name/Desc.	AL Series
Product Type	Louver Panel
Material Type	Aluminium
Variations:	
Louver Ref.	AL150SM - Double Layer

For detailed technical specification, please refer to Section 2 of the report

Data sheet Ref. WYC391798/01/P002

Date of Test: 15/11/2017

Source Room Volume: 82.40 m<sup>3</sup>

Receive Room Volume: 69.60 m<sup>3</sup>

Specimen Installed By: Exova

Area of Specimen (S): 1.00 m<sup>2</sup>

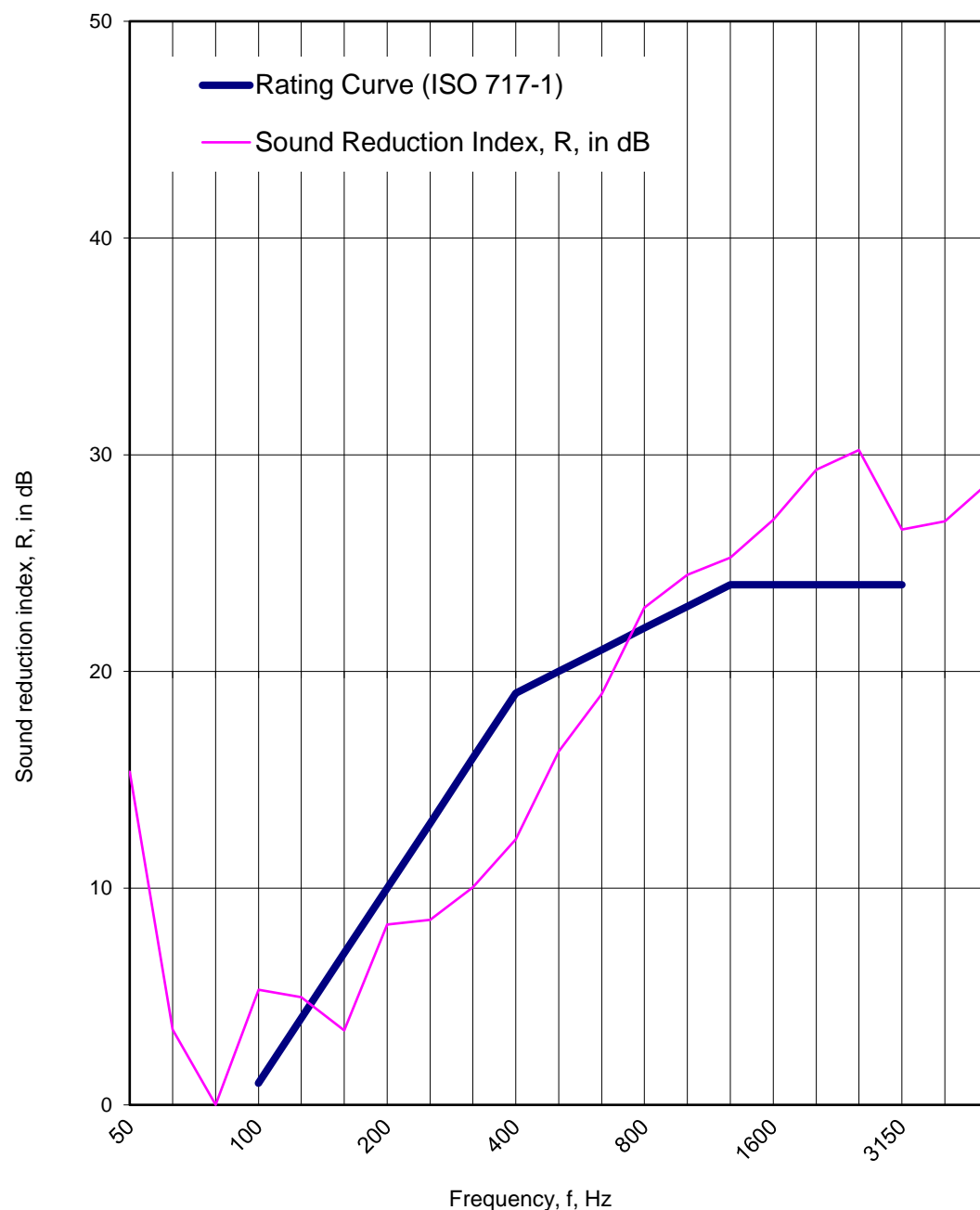
Temp. in Test Rooms: Sour. 17.3 Rec. 17.6 °C

Static Pressure: 100870.0 100890.0 Pa

Humidity in Test Rooms: 75.4 71.9 %

f, Hz	R, dB
50 <sup>+</sup>	15.4
63 <sup>+</sup>	3.5
80 <sup>+</sup>	0.0
100	5.3
125	5.0
160	3.4
200	8.3
250	8.5
315	10.0
400	12.3
500	16.3
630	19.0
800	22.9
1000	24.4
1250	25.3
1600	27.0
2000	29.3
2500	30.2
3150	26.6
4000	26.9
5000	28.7
AAD	-28.1

Frequency range for rating in accordance with ISO 717-1



$R_w = 20$  dB  
 $R_w + C = 19$  dB  
 $R_w + C_{tr} = 15$  dB

$C_{(50-3150)} = -1$  dB     $C_{tr(50-3150)} = -6$  dB  
 $C_{(50-5000)} = 0$  dB     $C_{tr(50-5000)} = -6$  dB  
 $C_{(100-5000)} = 0$  dB     $C_{tr(100-5000)} = -5$  dB

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Senior Technical Officer

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Report for: HVC Supplies  
Report Ref: WYC391798/01



Laboratory measurement to  
BS EN ISO 10140-2 -  
Airborne Sound Insulation of



1762

Sponsor:	HVC Supplies
Product Name/Desc.	AL Series
Product Type	Louver Panel
Material Type	Aluminium
Variations:	
Louver Ref.	AL300 - Single Layer

For detailed technical specification, please refer to Section 2 of the report

Data sheet Ref. WYC391798/01/P003

Date of Test: 15/11/2017

Source Room Volume: 82.40 m<sup>3</sup>

Receive Room Volume: 69.60 m<sup>3</sup>

Specimen Installed By: Exova

Area of Specimen (S): 1.00 m<sup>2</sup>

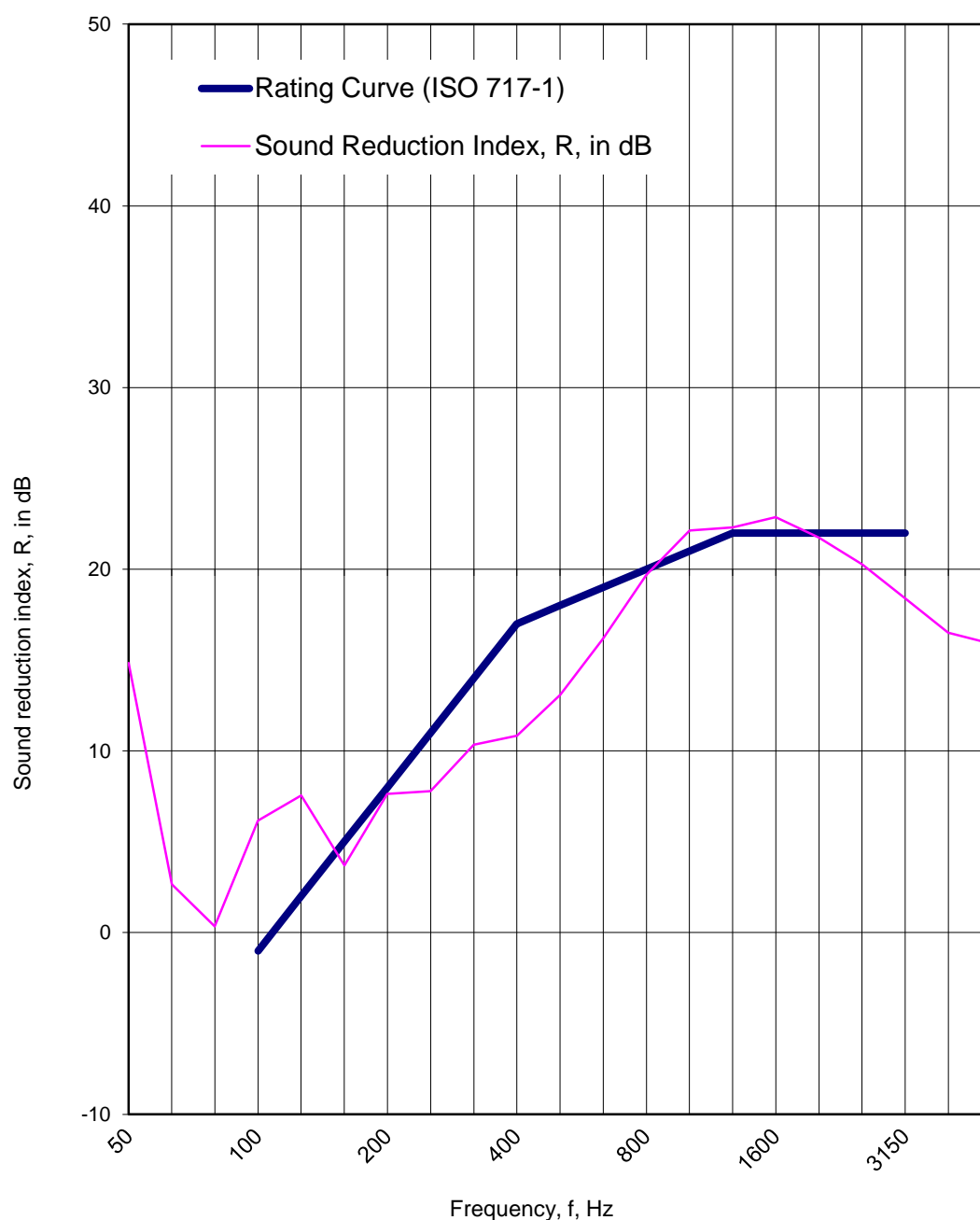
Temp. in Test Rooms: Sour. 17.3 Rec. 17.6 °C

Static Pressure: 100870.0 100890.0 Pa

Humidity in Test Rooms: 75.4 71.9 %

f, Hz	R, dB
50 <sup>+</sup>	14.8
63 <sup>+</sup>	2.7
80 <sup>+</sup>	0.3
100	6.2
125	7.6
160	3.7
200	7.6
250	7.8
315	10.3
400	10.8
500	13.1
630	16.2
800	19.7
1000	22.1
1250	22.3
1600	22.9
2000	21.7
2500	20.3
3150	18.4
4000	16.5
5000	15.9
AAD	-28.3

Frequency range for rating in accordance with ISO 717-1



$R_w = 18$  dB  
 $R_w + C = 17$  dB  
 $R_w + C_{tr} = 14$  dB

$C_{(50-3150)} = -1$  dB     $C_{tr(50-3150)} = -5$  dB  
 $C_{(50-5000)} = -1$  dB     $C_{tr(50-5000)} = -5$  dB  
 $C_{(100-5000)} = -1$  dB     $C_{tr(100-5000)} = -4$  dB

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Senior Technical Officer

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Report for: HVC Supplies  
Report Ref: WYC391798/01



Laboratory measurement to  
BS EN ISO 10140-2 -  
Airborne Sound Insulation of



1762

Sponsor:	HVC Supplies
Product Name/Desc.	AL Series
Product Type	Louver Panel
Material Type	Aluminium
Variations:	
Louver Ref.	AL300 - Double layer

For detailed technical specification, please refer to Section 2 of the report

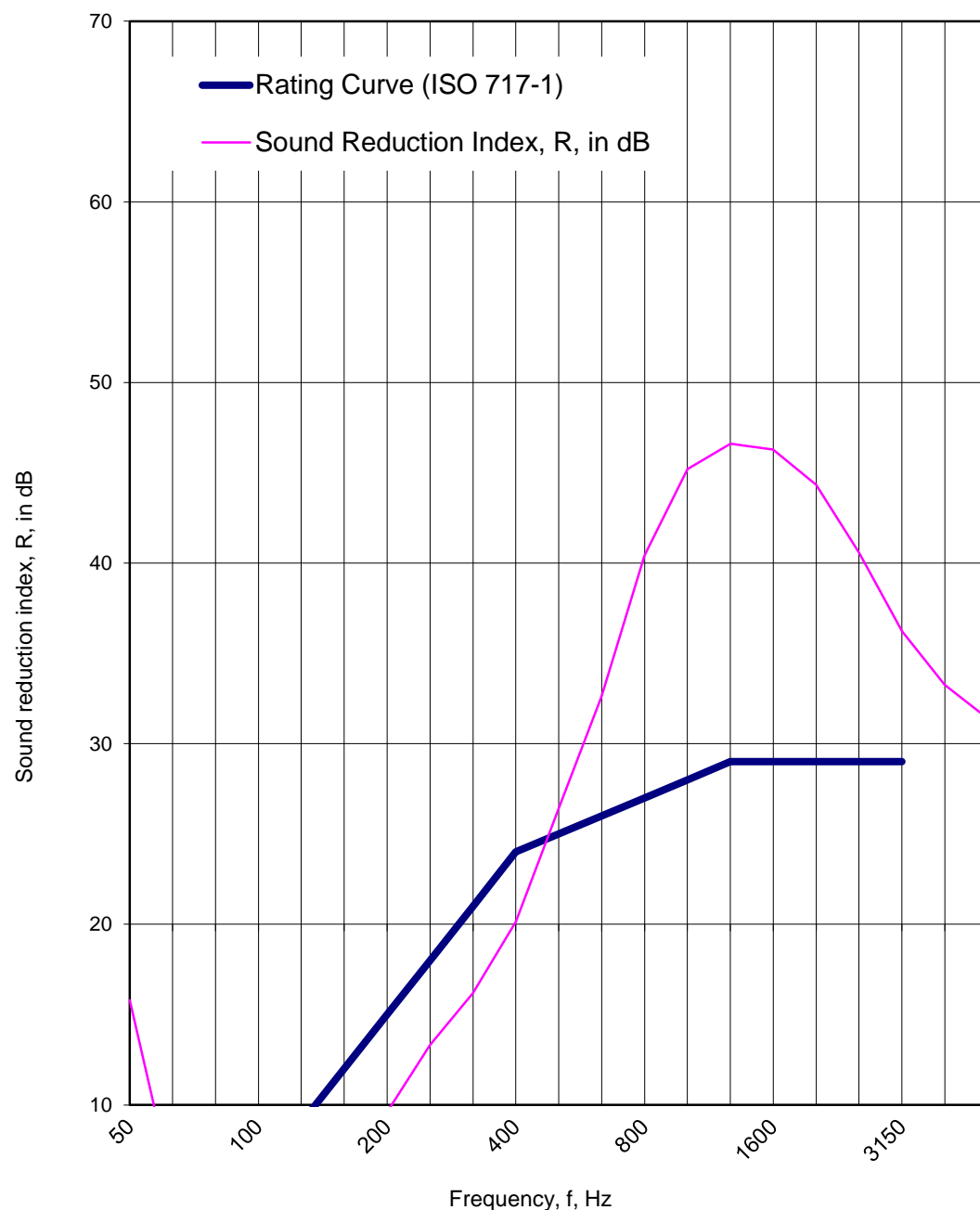
Data sheet Ref. WYC391798/01/P004

Date of Test: 15/11/2017

Source Room Volume:	82.40 m <sup>3</sup>
Receive Room Volume:	69.60 m <sup>3</sup>
Specimen Installed By:	Exova
Area of Specimen (S):	1.00 m <sup>2</sup>
Temp. in Test Rooms:	<u>Sour.</u> 17.3 <u>Rec.</u> 17.6 °C
Static Pressure:	100870.0    100890.0 Pa
Humidity in Test Rooms:	75.4    71.9 %

f, Hz	R, dB
50 <sup>+</sup>	15.8
63 <sup>+</sup>	5.5
80 <sup>+</sup>	3.9
100	8.6
125	6.9
160	5.9
200	9.6
250	13.3
315	16.2
400	20.1
500	26.4
630	32.6
800	40.4
1000	45.2
1250	46.6
1600	46.3
2000	44.3
2500	40.6
3150	36.2
4000	33.3
5000	31.4
AAD	-27.0

Frequency range for rating in accordance with ISO 717-1



$R_w = 25$  dB  
 $R_w + C = 24$  dB  
 $R_w + C_{tr} = 19$  dB

$C_{(50-3150)} = -1$  dB     $C_{tr(50-3150)} = -8$  dB  
 $C_{(50-5000)} = 0$  dB     $C_{tr(50-5000)} = -8$  dB  
 $C_{(100-5000)} = 0$  dB     $C_{tr(100-5000)} = -6$  dB

Lee Grant-Riach  
Senior Technical Officer

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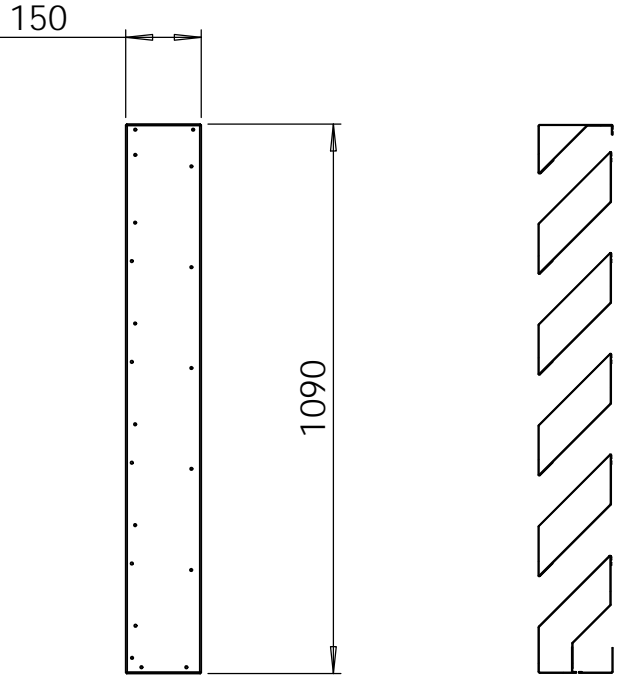
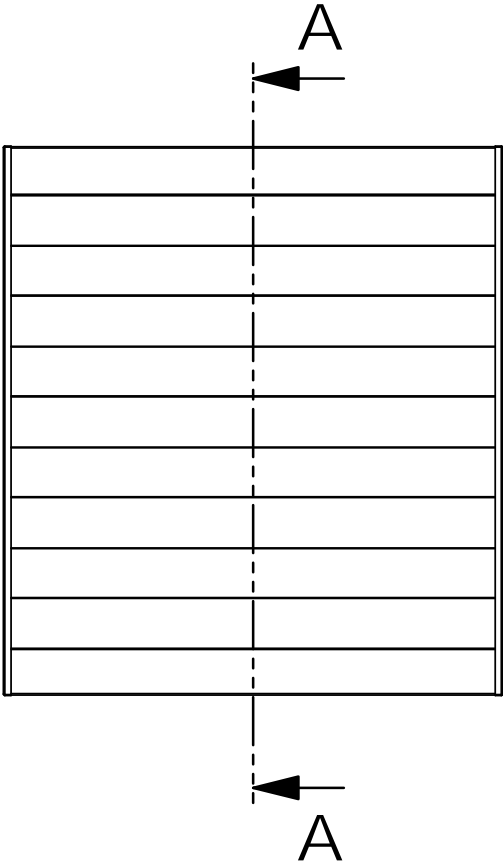
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Report Ref: WYC391798/01

**Appendix 2 – Sponsor Drawings (4 pages)**

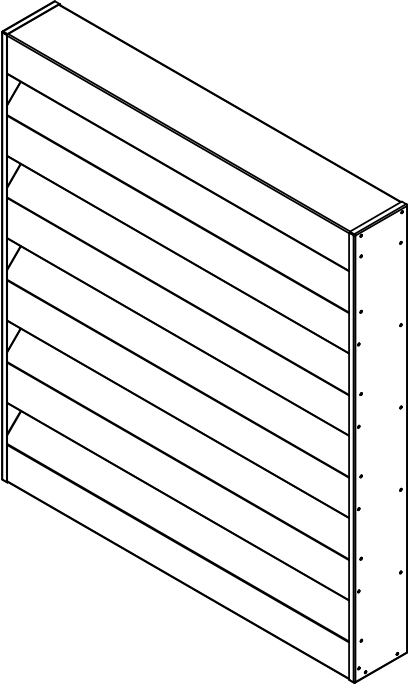
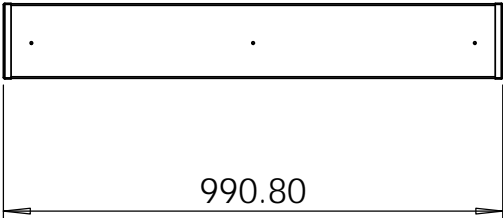
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2.	AL150SM - Double Layer
3.	AL300 - Single Layer
4.	AL300 - Double layer








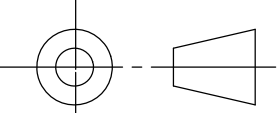
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Qty required:



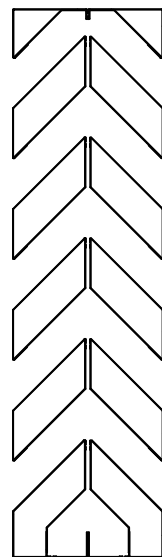
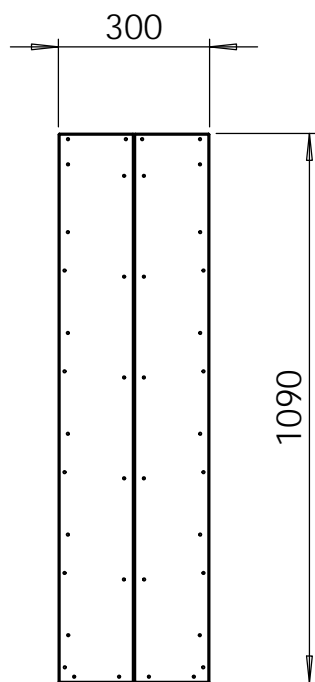
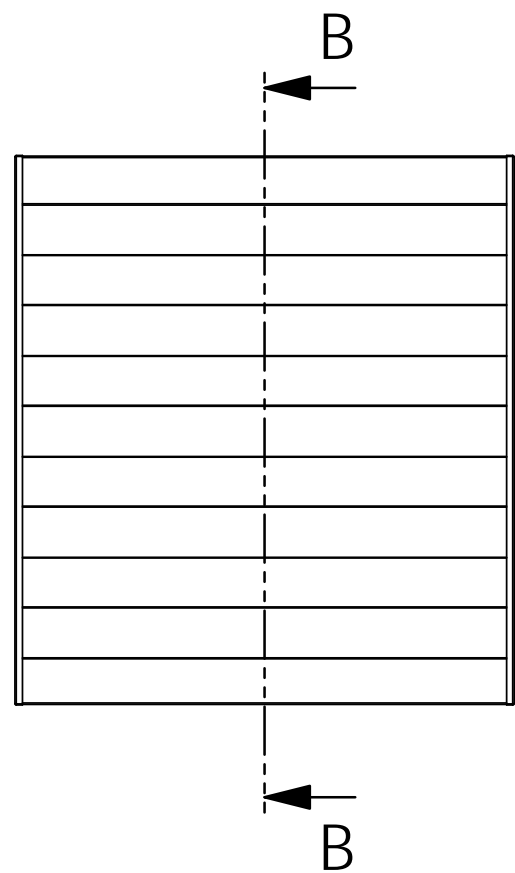
SECTION A-A  
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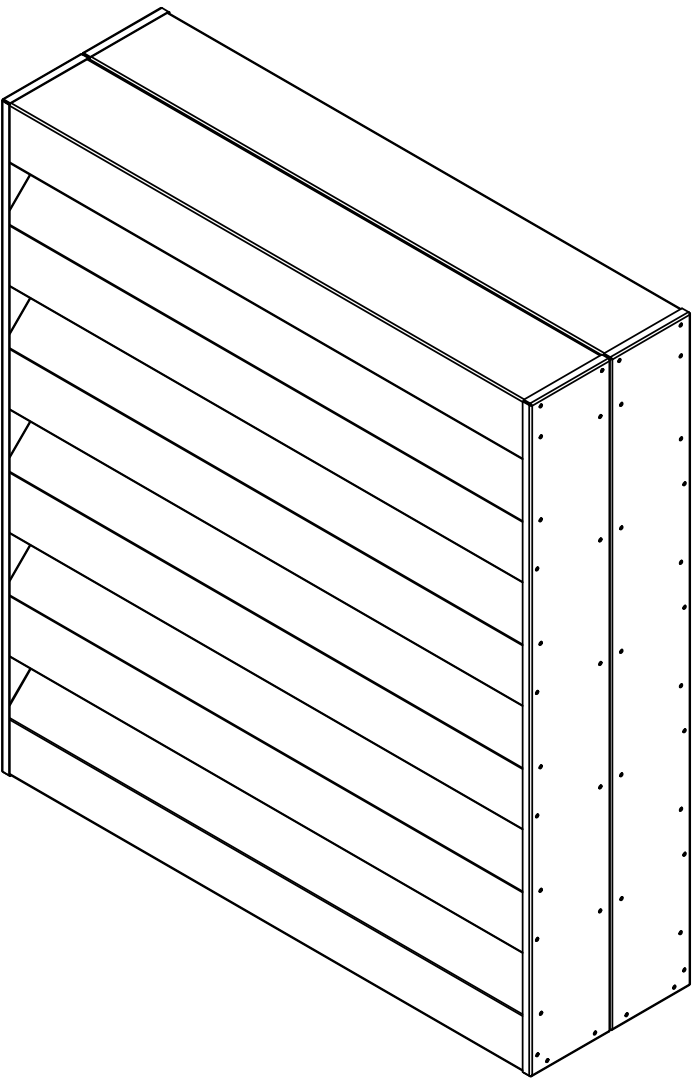
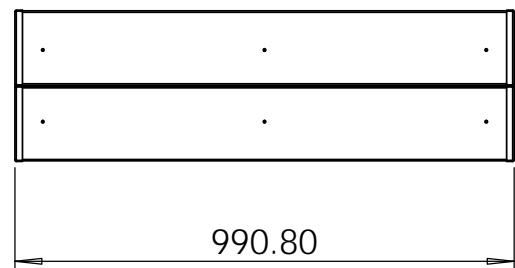
AL150SM - Single layer

<div><p><b>HVC</b></p><p>Incorporating</p><p><b>NEA</b></p></div> <div><p>HVC Supplies (Stourbridge) Ltd Jason House Amblecote West Midlands DY8 4EY United Kingdom</p><p>Tel: +44 (0)1384 376555 Fax: +44 (0)1384 392555 sales@h-v-c.com www.h-v-c.com</p></div> <div></div>	Customer:	Assembly name:	<div>Issue history:</div> <div></div>	<div>The predicted mass of this unit is shown in the title block.</div> <div>It is your responsibility to ensure that any fixings used to support this unit, and the structure to which it is fixed to are capable of supporting the load.</div> <div>Fixing holes where shown will be predrilled/preformed, however it is your responsibility to ensure that these are adequate for the application.</div> <div>Please ensure that any appropriate installation, operation and maintenance manuals are read, understood and acted upon. These are available via <a href="http://www.h-v-c.com/oandm">www.h-v-c.com/oandm</a></div> <div>Unless otherwise stated all lengths are in mm. Tolerance is to within <math>\pm 1.5</math>mm.</div> <div>This drawing contains confidential and proprietary information and shall not be reproduced, distributed or incorporated whole or in part without written permission from HVC Supplies (Stourbridge) Ltd.</div> <div>DO NOT SCALE</div>
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	Issue:			
	Drawn by:			
	Date created:			
	Drawing hierarchy:			
	Mass (predicted, kg)	Actuator model (If applicable):		



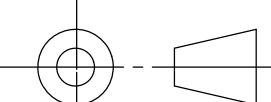

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Customer dwg no:
Qty required:



SECTION B-B  
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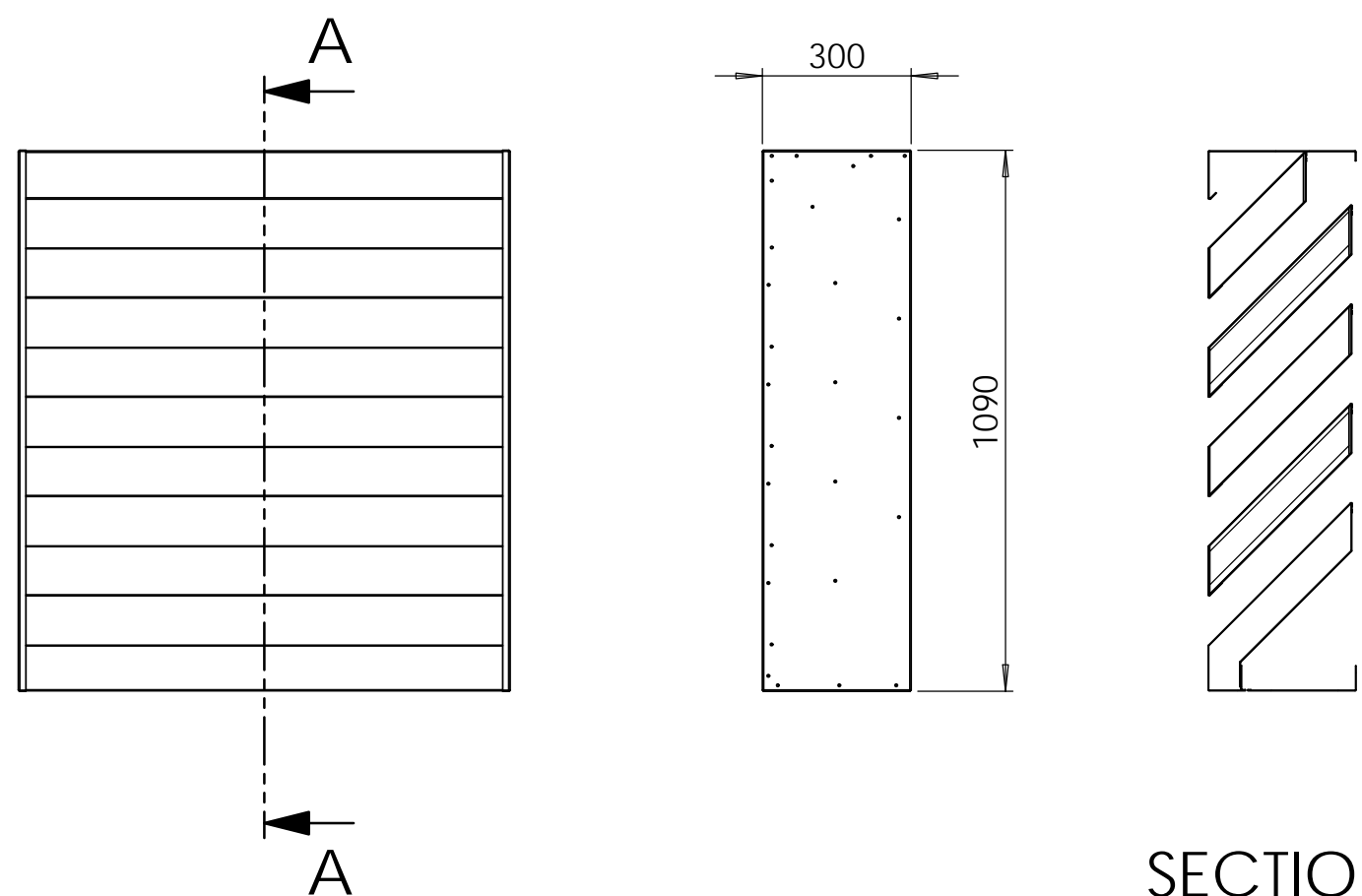


AL150SM - Double layer

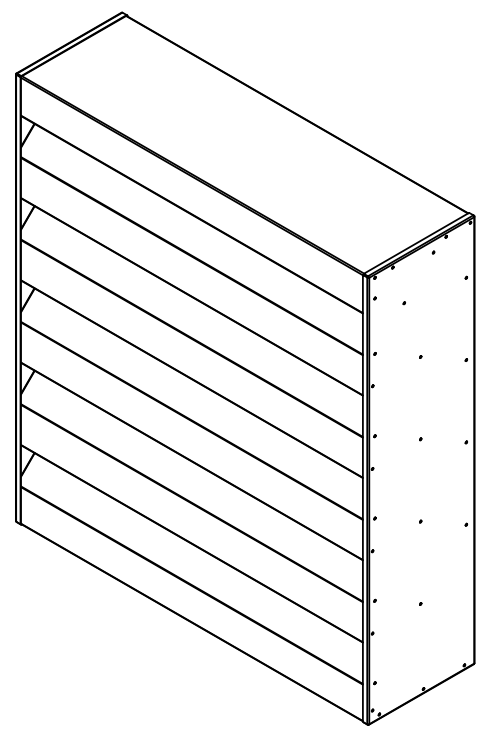
 <b>Incorporating</b> 	HVC Supplies (Stourbridge) Ltd Jason House Amblecote West Midlands DY8 4EY United Kingdom  Tel: +44 (0)1384 376555 Fax: +44 (0)1384 392555 sales@h-v-c.com www.h-v-c.com		Customer:		Assembly name:		<div>Issue history:</div> <div></div>	<p>The predicted mass of this unit is shown in the title block.</p> <p>It is your responsibility to ensure that any fixings used to support this unit, and the structure to which it is fixed to are capable of supporting the load.</p> <p>Fixing holes where shown will be predrilled/preformed, however it is your responsibility to ensure that these are adequate for the application.</p> <p>Please ensure that any appropriate installation, operation and maintenance manuals are read, understood and acted upon. These are available via <a href="http://www.h-v-c.com/oandm">www.h-v-c.com/oandm</a></p> <p>Unless otherwise stated all lengths are in mm. Tolerance is to within <math>\pm 1.5\text{mm}</math>.</p> <p>This drawing contains confidential and proprietary information and shall not be reproduced, distributed or incorporated whole or in part without written permission from HVC Supplies (Stourbridge) Ltd.</p> <p><b>DO NOT SCALE</b></p>
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		Mass (predicted, kg)						







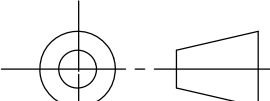
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Customer dwg no:
Qty required:



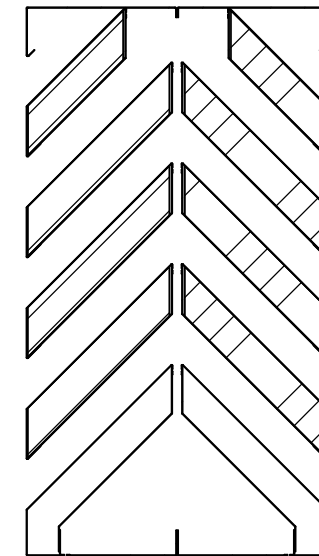
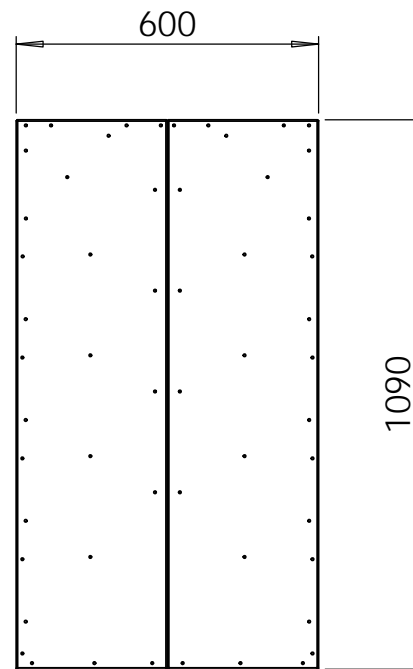
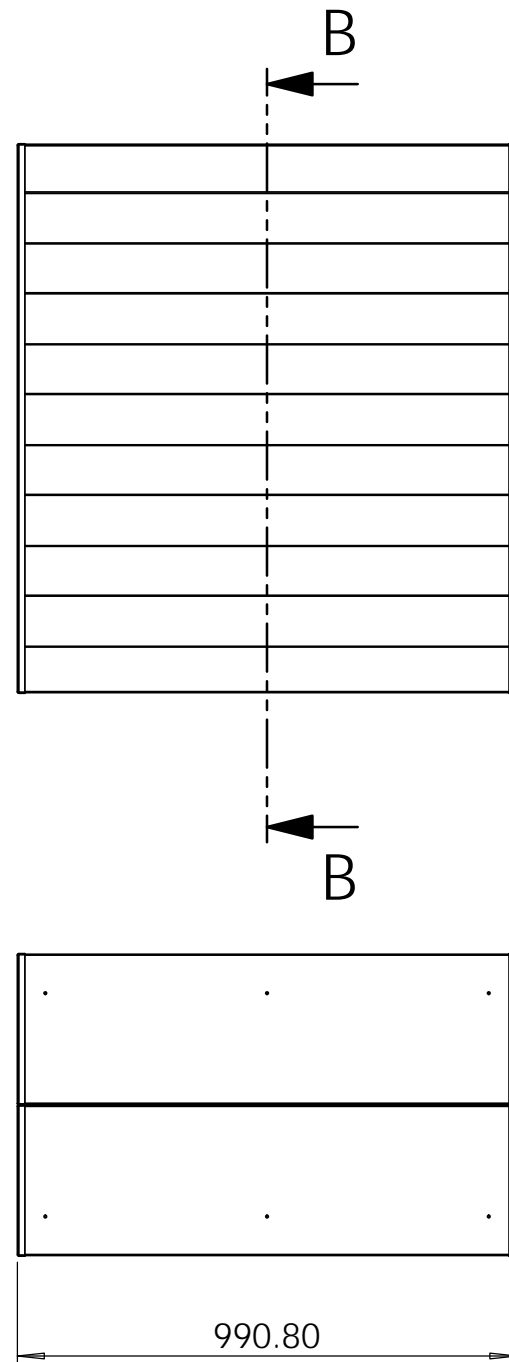
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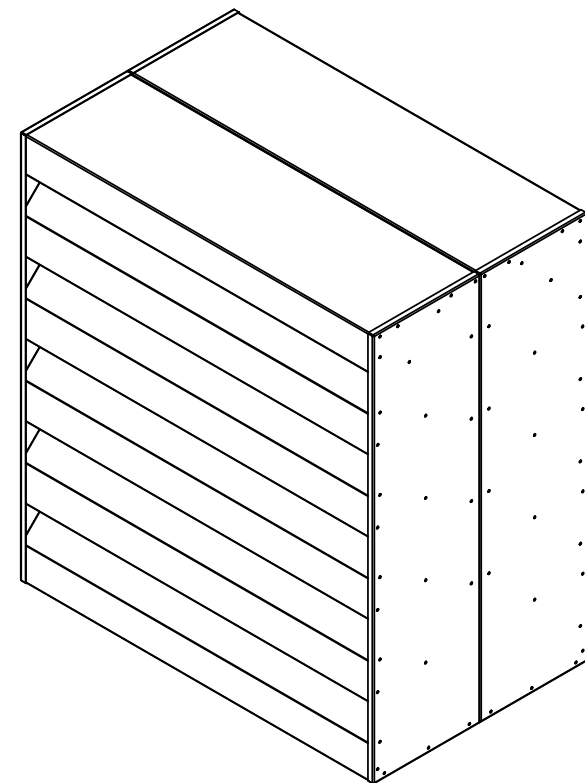
AL300 - Single layer

 <b>Incorporating</b>   	<b>HVC Supplies (Stourbridge) Ltd</b> Jason House Amblecote West Midlands DY8 4EY United Kingdom  Tel: +44 (0)1384 376555 Fax: +44 (0)1384 392555  sales@h-v-c.com www.h-v-c.com	<b>Customer:</b>	<b>Assembly name:</b>		<b>Issue history:</b>	<p>The predicted mass of this unit is shown in the title block.</p> <p>It is your responsibility to ensure that any fixings used to support this unit, and the structure to which it is fixed to are capable of supporting the load.</p> <p>Fixing holes where shown will be predrilled/preformed, however it is your responsibility to ensure that these are adequate for the application.</p> <p>Please ensure that any appropriate installation, operation and maintenance manuals are read, understood and acted upon. These are available via <a href="http://www.h-v-c.com/oandm">www.h-v-c.com/oandm</a></p> <p>Unless otherwise stated all lengths are in mm. Tolerance is to within <math>\pm 1.5</math>mm.</p> <p>This drawing contains confidential and proprietary information and shall not be reproduced, distributed or incorporated whole or in part without written permission from HVC Supplies (Stourbridge) Ltd.</p> <p><b>DO NOT SCALE</b></p>
	<b>Drawing number:</b>	<b>Product codes:</b>				
	<b>Issue:</b>					
	<b>Drawn by:</b>					
	<b>Date created:</b>					
<b>Drawing hierarchy:</b>						
<b>Mass (predicted, kg)</b>	<b>Actuator model (If applicable):</b>					





SECTION B-B  
SCALE 1 : 15



HVC job no:
Customer order no:
Customer dwg no:
Qty required:

AL300 - Double layer

 Incorporating 	HVC Supplies (Stourbridge) Ltd Jason House Amblecote West Midlands DY8 4EY United Kingdom Tel: +44 (0)1384 376555 Fax: +44 (0)1384 392555 sales@h-v-c.com www.h-v-c.com		Customer:		Assembly name:		Issue history:	<p>The predicted mass of this unit is shown in the title block.</p> <p>It is your responsibility to ensure that any fixings used to support this unit, and the structure to which it is fixed to are capable of supporting the load.</p> <p>Fixing holes where shown will be predrilled/preformed, however it is your responsibility to ensure that these are adequate for the application.</p> <p>Please ensure that any appropriate installation, operation and maintenance manuals are read, understood and acted upon. These are available via <a href="http://www.h-v-c.com/oandm">www.h-v-c.com/oandm</a></p> <p>Unless otherwise stated all lengths are in mm. Tolerance is to within <math>\pm 1.5</math>mm.</p> <p>This drawing contains confidential and proprietary information and shall not be reproduced, distributed or incorporated whole or in part without written permission from HVC Supplies (Stourbridge) Ltd.</p> <p><b>DO NOT SCALE</b></p>
	Drawing number:		Product codes:					
	Issue:							
	Drawn by:							
	Date created:							
		Drawing hierarchy:		Actuator model (If applicable):				
		Mass (predicted, kg)						