



SUITE 17, 808 FOREST ROAD, PEAKHURST 2210
P. 02 9046 3800 ACOUSTICS@DAYDESIGN.COM.AU WWW.DAYDESIGN.COM.AU

Airius (Oceania) Pty Ltd
PO Box 6282
Alexandria NSW 2015

24 June, 2015

Refer: 5703-1.2L

Attention: Mr John Brodie

Email: johnbrodie@airius.com.au

AIRIUS AIR PEAR THERMAL EQUALISER SOUND POWER LEVEL COMPARISONS

We are pleased to advise that we have reviewed the acoustical data for Airius Air Pear Thermal Equaliser Models A-10, A-15 and A25.

1.0 AIRIUS FANS A-10, A-15 AND A-25

The Airius fans circulate air to evenly distribute air throughout a large space. The fans are designed to hang from the ceiling and distribute air from heights as follows:

- A-10 – 2.5 to 3.5 metres
- A-15 – 3.5 to 5.5 metres
- A-25 – 5.5 to 8 metres

Tested noise data for the Airius Air Pear Thermal Equalisers have been provided by the manufacturer. The datasheets for the three fans are attached as Appendix A. The calculated sound power levels from linear third octave band sound pressure levels is tabulated as follows:

Table 1 Airius Fans

Fan	Sound Power Level (dBA)	RPM
A-25	58	1450
A-15	44	1230
A-10	38	980



• AIRCRAFT, ROAD TRAFFIC AND TRAIN NOISE CONTROL
• ARCHITECTURAL ACOUSTICS • INDUSTRIAL NOISE AND VIBRATION CONTROL
• ENVIRONMENTAL NOISE IMPACT INVESTIGATION AND CONTROL
• OCCUPATIONAL NOISE INVESTIGATION • QUIET PRODUCT DEVELOPMENT



SOUND POWER LEVEL COMPARISONS**2.0 AUSTRALIAN STANDARD AS2107:2000****2.1 Recommended Internal Noise Levels**

Australian Standard AS 2107:2000 *Recommended design sound levels and reverberation times for building interiors* recommend the following internal noise levels for offices and libraries:

Table 2 Recommended Internal Noise Levels

Type of occupancy/activity	Recommended design sound level, L _{Aeq} , dB(A)	
	Satisfactory	Maximum
Office Buildings -		
Board and conference rooms	30	40
Cafeterias	45	50
Call centres	40	45
Computer rooms	45	50
Corridors and lobbies	45	50
Design offices	40	45
Draughting offices	40	50
General office areas	40	45
Private offices	35	40
Public spaces	40	50
Reception areas	40	45
Rest rooms and tea rooms	40	45
Toilets	50	55
Undercover car parks	55	65
Libraries -		
Administrative office spaces	40	45
Reading areas	40	45
Stack areas	45	50
Workshop areas	45	55



SOUND POWER LEVEL COMPARISONS**2.2 Sound Pressure Levels of Fans**

Given the sound power levels in Table 1 above, the following sound pressure levels are calculated at distances outlined in the Table below:

Table 3 Sound Pressure Level of Fans

Fan	Sound Pressure Level from Discharge (dBA)				
	1 metre	2 metres	3 metres	4 metres	5 metres
A-25	50	44	40	38	36
A-15	36	30	26	24	22
A-10	30	24	20	18	16

The above calculated sound pressure levels all appear to be suitable for use in offices and libraries when compared against the recommended internal noise levels provided in Australian Standard AS2107:2000, provided suitable distance from the fan is maintained.

We recommend that the installation of the fans be assessed on a case by case basis as the acoustic environment and installation may change depending on the use of the space.

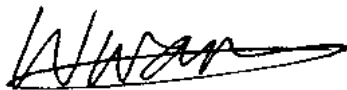


SOUND POWER LEVEL COMPARISONS**3.0 CONCLUSION**

Day Design was engaged to investigate the sound power levels of fans from Airius.

The sound pressure levels of the Airius fans have been determined at various distances for comparison against Australian Standard 2107:2000 *Recommended design sound levels and reverberation times for building interiors* to determine suitability.

We recommend that the installation of the fans be assessed on a case by case basis as the acoustic environment may change depending on the use of the space.



William Wang, BE (Mechatronics), MIEAust, MAAS

Senior Acoustical Engineer

for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.



The undersigned hereby certifies that this Report has been checked and approved in accordance with our Quality Management System.



Date: 24/6/15

Attachments:

- Appendix A – Airius Fans A-10SP, A-15SP, A-25SP Datasheets
- Appendix B – Airius Test Data



MODEL 10 DIMENSIONS



MODEL 10 PROPERTIES

UNIT SIZE	Standard	
	Weight:	4.1 kgs
	Height to Rim:	410 mm
	Total Height:	560 mm
Diameter:		330 mm

MOTOR	230V	
	Watts* @ 50 htz:	12
	RPM* @ 50 htz:	980
	L/S* @ 50 htz (m3/hr):	150 (540)
	AMPS* @ 50 htz:	.06

*Motor data provided by motor manufacturer and is subject to change at anytime

COVERAGE

- Floor area = 46m²
- Diameter = 7.5m
- Ceiling Height = 2.5m - 3.5m

MOTOR

- Single Phase
- Shaded pole single speed fan motor
- 980 rpm @ 50htz

OPERATING TEMPERATURES

- Min start temp (approx.) = -10° C
- Min running temp = -20° C
- Shut off = 110° C
- Reset = 90° C

NOISE LEVELS*

- Sound Power Level 38 dB(A)
- Sound Pressure Level @ 1 Mts 30 dB(A)
- Sound Pressure Level @ 2 Mts 24 dB(A)

Note: A typical free field environment over a reflecting plane.

* All acoustic testing undertaken at the EBM- Papst Acoustic Laboratories in Connecticut USA during August 2014

Please contact Airius for full Noise Testing Report

INGRESS PROTECTION

- IP55 Rated

COLOUR

- Cool gray 2C - Off white as standard
- Can be tailor painted to your colour specifications

ACCESSORIES & OPTIONS

- Airius suspended ceiling kit - Allows model 10 Airius unit to be mounted in a suspended ceiling grid
- Airius Transformer type speed controller 1 and 5 Amp available. 0-100% in 5 steps
- Airius speed control - TRIAC speed control to adjust top end RPM
- PHI kit - Photohydroionization - Advanced oxidation technology - Used to mitigate air contaminants

WARRANTY

- 5 years full manufacturers replacement from date of despatch. Subsequent 5 year 'half new price' rebuild cover

MODEL 10 PLACEMENT

PREPARATION

- Install electrical circuit(s) and outlet(s) in accordance with national and local electric codes
- Outlets should generally be mounted vertically unless a "twist/locking" type is being used
- Wall switch may be installed in circuit to disable power and prevent electrical hazards when servicing
- Confirm electrical continuity of Airius unit on the ground before permanently mounting in the ceiling

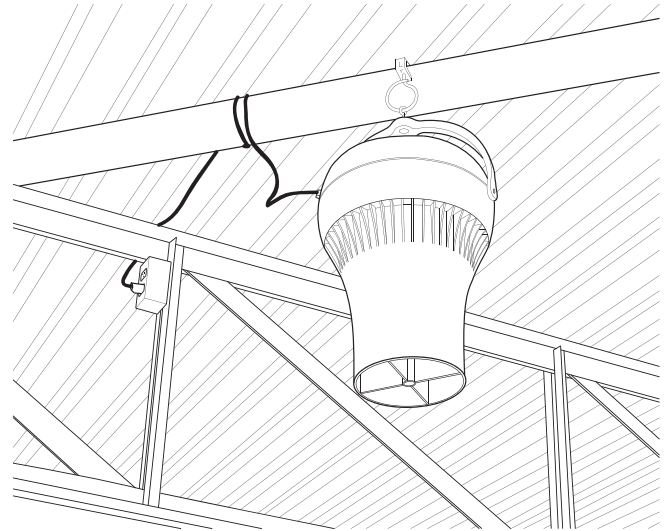
INSTALLATION

- Hang vertically as high in the ceiling as possible
Typically 300 – 450 mm from the roof deck to intake
- The Airius unit performs best when air column from the nozzle is unimpeded to the floor
- Use professionally installed hardware, capable of supporting a minimum of five times the weight
- Hardware to hang the unit includes but is not restricted to: Hooks, chains, cables, carabiners, bridle rings, beam clamps and bolts
- Density of the placement is directly related to the effectiveness, performance and savings
- Mount out of reach from people and animals
- Floor plans, mezzanines, office locations, machinery, people placement, plumbing, lighting, duct work, electrical systems, natural light/air systems, cranes, doors, windows, ventilation and fire suppression systems are all factors in properly locating the Airius system within the ceiling

NOTE:- Air Pears must not be installed directly to structure if they are to be angled. In this case a small length of cable or wire must be used between the handle and the structure to reduce compound twisting torque on the handle.

OPERATION

- Designed to operate 24 hours-a-day, 7 days-a-week to maintain thermal equalization/humidity equalization
- Use optional speed control to fine tune RPM if needed



MAINTENANCE

- Frequency of cleaning will vary by application and environment
- You may clean the plastic housing with a damp warm cloth, using mild household detergents
- Do not use petroleum products, thinners or solvents to clean any part of the Airius unit
- If the Airius unit fails, contact manufacturer

MATERIALS & PROPERTIES

- Constructed from recyclable materials
- The outer shell, stator and fan blades are fire rated 5VA materials
- Power cord is a 3 wire 1.02 mm diameter 300VAC rated electrical cord - CE/EU compliance rated as HO5VV
- Single phase, shaded pole, single speed, axial motor
- Motor is thermally protected. Shutoff is at 110°C & reset is at 90°C
- 0 – 38 dB(A) Sound Power Level @ 50 htz
- No lubrication required. Bearings are sealed



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MODEL 15 DIMENSIONS



MODEL 15 PROPERTIES

UNIT SIZE	Standard	
	Weight:	4.1 kgs
	Height to Rim:	410 mm
	Total Height:	560 mm
	Diameter:	330 mm

MOTOR	230V	
	Watts* @ 50 htz:	15
	RPM* @ 50 htz:	1230
	L/S* @ 50 htz (m3/hr):	191 (690)
	AMPS* @ 50 htz:	.06

*Motor data provided by motor manufacturer and is subject to change at anytime

COVERAGE

- Floor area = 74m²
- Diameter = 9.7m
- Ceiling Height = 4m - 5m

MOTOR

- Single Phase
- Shaded pole single speed fan motor
- 1230 rpm @ 50htz

OPERATING TEMPERATURES

- Min start temp (approx.) = - 10° C
- Min running temp = - 20° C
- Shut off = 110° C
- Reset = 90° C

NOISE LEVELS*

- Sound Power Level 44 dB(A)
- Sound Pressure Level @ 1 Mts 36 dB(A)
- Sound Pressure Level @ 2 Mts 30 dB(A)

Note: A typical free field environment over a reflecting plane.

* All acoustic testing undertaken at the EBM- Papst Acoustic Laboratories in Connecticut USA during August 2014

Please contact Airius for full Noise Testing Report

INGRESS PROTECTION

- IP55 Rated

COLOUR

- Cool gray 2C - Off white as standard
- Can be tailor painted to your colour specifications

ACCESSORIES & OPTIONS

- Airius suspended ceiling kit - Allows model 15 Airius unit to be mounted in a suspended ceiling grid
- Airius Transformer type speed controller 1 and 5 Amp available. 0-100% in 5 steps
- Airius speed control - TRIAC speed control to adjust top end RPM
- PHI kit - Photohydroionization - Advanced oxidation technology - Used to mitigate air contaminants

WARRANTY

- 5 years full manufacturers replacement from date of despatch. Subsequent 5 year 'half new price' rebuild cover

MODEL 15 PLACEMENT

PREPARATION

- Install electrical circuit(s) and outlet(s) in accordance with national and local electric codes
- Outlets should generally be mounted vertically unless a "twist/locking" type is being used
- Wall switch may be installed in circuit to disable power and prevent electrical hazards when servicing
- Confirm electrical continuity of Airius unit on the ground before permanently mounting in the ceiling

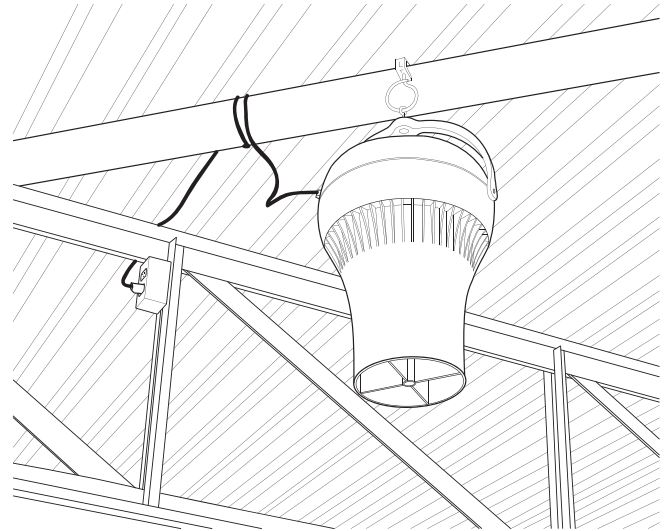
INSTALLATION

- Hang vertically as high in the ceiling as possible
Typically 300 – 450 mm from the roof deck to intake
- The Airius unit performs best when air column from the nozzle is unimpeded to the floor
- Use professionally installed hardware, capable of supporting a minimum of five times the weight
- Hardware to hang the unit includes but is not restricted to: Hooks, chains, cables, carabiners, bridle rings, beam clamps and bolts
- Density of the placement is directly related to the effectiveness, performance and savings
- Mount out of reach from people and animals
- Floor plans, mezzanines, office locations, machinery, people placement, plumbing, lighting, duct work, electrical systems, natural light/air systems, cranes, doors, windows, ventilation and fire suppression systems are all factors in properly locating the Airius system within the ceiling

NOTE:- Air Pears must not be installed directly to structure if they are to be angled. In this case a small length of cable or wire must be used between the handle and the structure to reduce compound twisting torque on the handle.

OPERATION

- Designed to operate 24 hours-a-day, 7 days-a-week to maintain thermal equalization/humidity equalization
- Use optional speed control to fine tune RPM if needed



MAINTENANCE

- Frequency of cleaning will vary by application and environment
- You may clean the plastic housing with a damp warm cloth, using mild household detergents
- Do not use petroleum products, thinners or solvents to clean any part of the Airius unit
- If the Airius unit fails, contact manufacturer

MATERIALS & PROPERTIES

- Constructed from recyclable materials
- The outer shell, stator and fan blades are fire rated 5VA materials
- Power cord is a 3 wire 1.02 mm diameter 300VAC rated electrical cord - CE/EU compliance rated as HO5VV
- Single phase, shaded pole, single speed, axial motor
- Motor is thermally protected. Shutoff is at 110°C & reset is at 90°C
- Sound Power Level 44 dB(A) at 50 htz
- No lubrication required. Bearings are sealed



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MODEL 25 DIMENSIONS



MODEL 25 PROPERTIES

UNIT SIZE	Standard
Weight:	4.1 kgs
Height to Rim:	410 mm
Total Height:	560 mm
Diameter:	330 mm

MOTOR	230V
Watts* @ 50 htz:	31
RPM* @ 50 htz:	1450
L/S* @ 50 htz (m3/hr):	216 (780)
AMPS* @ 50 htz:	.13

*Motor data provided by motor manufacturer and is subject to change at anytime

COVERAGE

- Floor area = 111m²
- Diameter = 12m
- Ceiling Height = 5.5m - 8m

MOTOR

- Single Phase
- Shaded pole single speed fan motor
- 1450 rpm @ 50hz

OPERATING TEMPERATURES

- Min start temp (approx.) = - 10° C
- Min running temp = - 20° C
- Shut off = 110° C
- Reset = 90° C

NOISE LEVELS

- Sound Power Level 58 dB(A)
- Sound Pressure Level @ 1 Mts 50 dB(A)
- Sound Pressure Level @ 2 Mts 44 dB(A)

Note: A typical free field environment over a reflecting plane.

* All acoustic testing undertaken at the EBM- Papst Acoustic Laboratories in Connecticut USA during August 2014

Please contact Airius for full Noise Testing Report

INGRESS PROTECTION

- IP55 Rated

COLOUR

- Cool gray 2C - Off white as standard
- Can be tailor painted to your colour specifications

ACCESSORIES & OPTIONS

- Airius suspended ceiling kit - Allows model 15 Airius unit to be mounted in a suspended ceiling grid
- Airius Transformer type speed controller 1 and 5 Amp available. 0-100% in 5 steps
- Airius speed control - TRIAC speed control to adjust top end RPM
- PHI kit - Photohydroionization - Advanced oxidation technology - Used to mitigate air contaminants

WARRANTY

- 5 years full manufacturers replacement from date of despatch. Subsequent 5 year 'half new price' rebuild cover

MODEL 25 PLACEMENT

PREPARATION

- Install electrical circuit(s) and outlet(s) in accordance with national and local electric codes
- Outlets should generally be mounted vertically unless a "twist/locking" type is being used
- Wall switch may be installed in circuit to disable power and prevent electrical hazards when servicing
- Confirm electrical continuity of Airius unit on the ground before permanently mounting in the ceiling

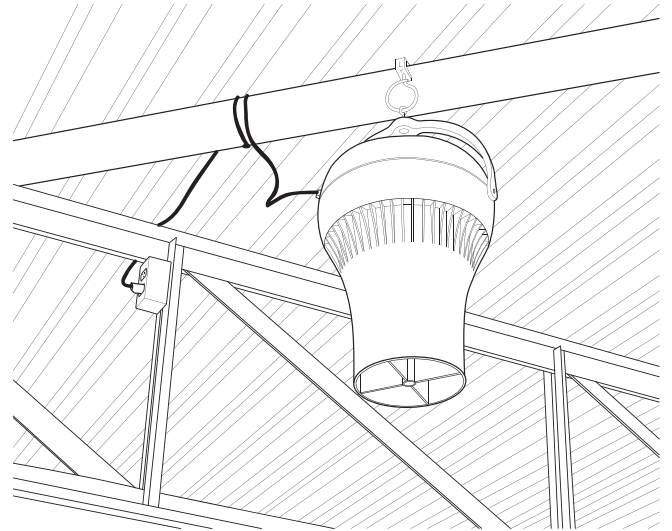
INSTALLATION

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OPERATION

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MATERIALS & PROPERTIES

- Constructed from recyclable materials
- The outer shell, stator and fan blades are fire rated 5VA materials
- Power cord is a 3 wire 1.02 mm diameter 300VAC rated electrical cord - CE/EU compliance rated as HO5VV
- Single phase, shaded pole, single speed, axial motor
- Motor is thermally protected. Shutoff is at 110°C & reset is at 90°C
- 0 - 58 dB(A) Sound Power Level @ 50 htz
- No lubrication required. Bearings are sealed



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Airius Air Pear Fans Updated Acoustic Test Results 29.10.14

The fans were all tested at the Ebm-papst Farmington, CT,USA facility: 100 Hyde Rd, Farmington, CT 06032 during August 2014.

The chamber is built to AMCA standards. All noise levels are measured in conformity to DIN 45635 and ISO 3744/3745 according to precision class 2 and specified A-weighted. Sound pressure level is measured 1 meter from the exhaust side of the fan. The sound power level is measured using 10 microphones distributed over the exhaust side of the fan. **NOTES** • The "A" weighing is not always just related to the overall sound level. In our sound power test the dBA readings covered the complete frequency range, including the overall result.

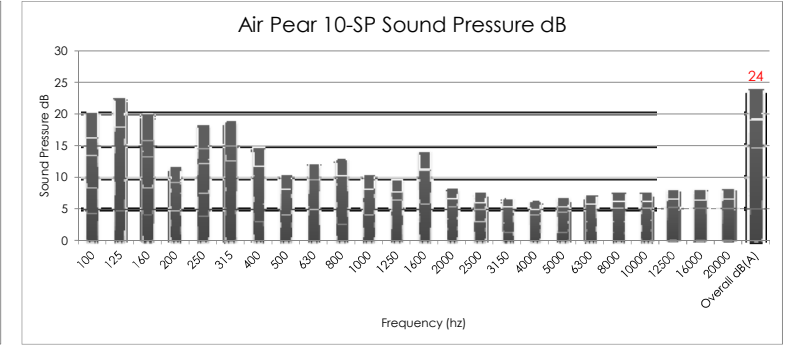
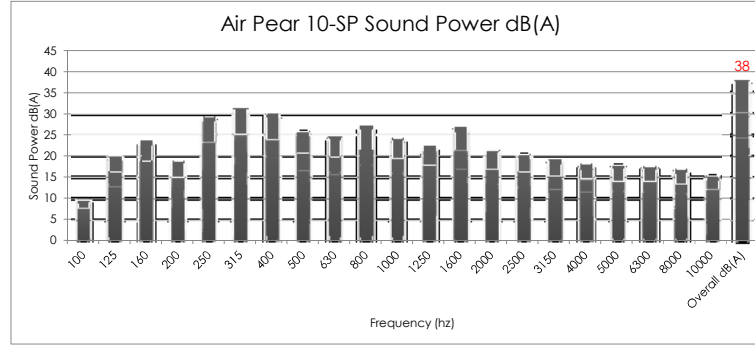
• For the sound pressure test the dBA only was for the overall result and the frequency range was not "A" weighted.

A-10-SP-STD-120-W Sound Power

Frequency (hz)	Power [dB(A)]
100	10
125	20.33
160	23.68
200	18.82
250	29.22
315	31.41
400	30.2
500	25.92
630	24.75
800	27.24
1000	24.5
1250	22.5
1600	26.85
2000	21.49
2500	20.53
3150	19.3
4000	18.23
5000	17.93
6300	17.74
8000	17.06
10000	15.46
Overall dB(A)	38.11

A-10-SP-STD-120-W Sound Pressure

Frequency	Pressure (dB)
100	20.2
125	22.6
160	20
200	11.7
250	18.3
315	18.9
400	14.8
500	10.4
630	12.3
800	13
1000	10.4
1250	9.85
1600	14.2
2000	8.32
2500	7.74
3150	6.89
4000	6.46
5000	6.98
6300	7.43
8000	7.81
10000	7.81
12500	7.97
16000	8.1
20000	8.26
Overall dB(A)	23.9

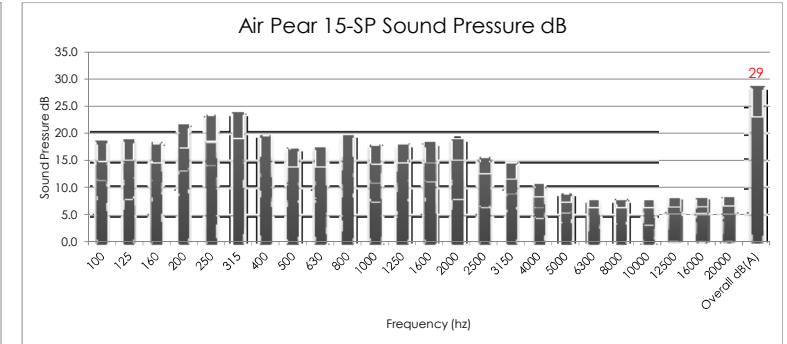
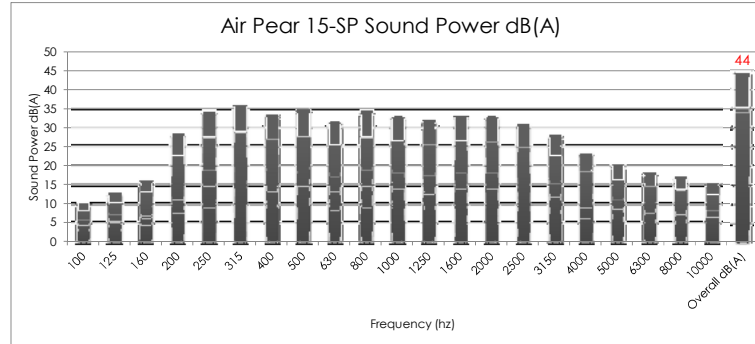


A-15-SP-STD-120-W Sound Power

Frequency (hz)	Power [dB(A)]
100	10.57
125	13.1
160	16.36
200	28.51
250	34.47
315	36.08
400	33.78
500	34.75
630	31.66
800	34.53
1000	33.09
1250	32.11
1600	33.3
2000	33.1
2500	31.07
3150	28.19
4000	23.47
5000	20.5
6300	18.35
8000	17.24
10000	15.51
Overall	44.41

A-15-SP-STD-120-W Sound Pressure

Frequency	Pressure (dB)
100	18.7
125	19.0
160	18.3
200	21.6
250	23.2
315	23.9
400	19.8
500	17.3
630	17.5
800	19.8
1000	18.0
1250	18.2
1600	18.4
2000	19.1
2500	15.7
3150	14.8
4000	10.7
5000	9.2
6300	8.1
8000	8.0
10000	7.9
12500	8.0
16000	8.2
20000	8.3
Overall dB(A)	28.8



A-25-SP-STD-120-W Sound Power

Frequency (hz)	Power [dB(A)]
100	16.54
125	27.02
160	28.71
200	31.67
250	46.25
315	53.21
400	45.27
500	50.28
630	44.79
800	46.64
1000	46.25
1250	44.46
1600	43.64
2000	42.37
2500	40.53
3150	39.72
4000	38.31
5000	36.1
6300	31.65
8000	25.72
10000	19.26
Overall	57.89

A-25-SP-STD-120-W Sound Pressure

Frequency (hz)	Pressure (dB)
100	22.6
125	31.8
160	29.6
200	25.6
250	35.0
315	47.6
400	36.0
500	31.1
630	32.1
800	34.2
1000	32.7
1250	32.7
1600	31.1
2000	30.8
2500	28.4
3150	28.2
4000	27.3
5000	26.4
6300	23.1
8000	18.1
10000	13.6
12500	10.2
16000	8.7
20000	8.4
Overall dB(A)	44.6

