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CALIBRATION UKAS Laboratory 0789

Certificate of Calibration

Certificate number: U17744

Test object:	**Sound Level Meter, Type 1 (Precision)**
Manufacturer:	**Norsonic**
Type:	**118**
Serial no:	**31474**
Customer:	**Atkins Group Limited**
Address:	**Woodcote Grove, Floor 1C, Ashley Road, Epsom, Surrey. KT18 5BW.**
Contact Person:	**Adam Page.**

Method :
Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. The following items have been calibrated as set out in BS 7580 Part 1:1997

	Producer:	Type:	Serial No:	Certificate number
Microphone	GRAS	40AF	11038	17743
Calibrator*	Norsonic	1251	31009	08054
Preamplifier	Norsonic	1206	30626	Included

Additional items that also have been submitted for verification

Wind shield	Norsonic	Nor1451
Attenuator	None	
Extension cable	None	

These items have been taken into account wherever appropriate.

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	99.79 kPa	20.9 °C	40.8 %RH

Date received :	17/12/2014
Date of calibration:	13/01/2015
Date of issue:	14/01/2015

Engineer

Michael Tickner

Supervisor

Darren Batten Tech IOA

* The calibrator was complete with any required coupler for the microphone specified

Calibration Certificate

UKAS Laboratory Number 0789

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Method

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN 60651 and or BS EN 60804. The reference range, reference sound pressure level, primary indicator range, secondary indicator range, pulse range, linearity range and display range as specified by the manufacturer were used for the verification. The sound level meter was set to A weighting and adjusted to read correctly in response to the associated sound calibrator the reading was derived from the calibrator calibration certificate and manufacturer's instruction manuals. A measurement of the self noise of the sound level meter was then made using a dummy microphone having a capacitance of ±20% of the associated microphones self capacitance. The sound level meter was then tested, and its overall sensitivity adjusted, in accordance with Section 5 of BS 7580:Part 1:1997. The acoustic calibration at 1 kHz specified in sub-clause 5.6.1 of the standard was performed by application of a reference sound calibrator, whilst the tests at 125 Hz and 8k Hz (sub-clause 5.6.2) were performed by the electrostatic actuator method. At the end of the test, the associated sound calibrator was reapplied to the sound level meter and the meter reading was recorded and is noted below in the statements section.

Traceability :

The following measured values are traceable to the National Physical Laboratory, United Kingdom.
Sound Pressure Level, Voltage, Frequency, Barometric Pressure, Temperature & Relative Humidity

Measurement Results:

Indication at the calibration check frequency - BS7580 #5.4	Passed
Noise test - BS 7580 #5.5.2	Passed
Level Linearity Test - BS 7580, #5.5.3	Passed
Frequency weightings: A Network - BS 7580 #5.5.4	Passed
Frequency weightings: C Network - BS 7580 #5.5.4	Passed
Frequency weightings: Z Network - BS 7580 #5.5.4	Passed
Time weightings F and S - BS7580 #5.5.5	Passed
Peak response - BS7580 #5.5.6	Passed
RMS accuracy - BS7580 #5.5.7	Passed
Time weighting I - BS7580 #5.5.8	Passed
Integrating Test : Time averaging - BS7580 #5.5.9	Passed
Integrating Test : Pulse range - BS7580 #5.5.10	Passed
Integrating Test : Sound exposure level - BS 7580 #5.5.11	Passed
Overload SPL Test - BS 7580 #5.5.12	Passed
Overload Leq Test - BS 7580 #5.5.12	Passed
Acoustic tests - BS 7580 #5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 #5.5.4	Passed

Statements

The self-generated noise recorded in the test specified in § 5.5.2 was: 10.3 (Below MSD)dB(A), 10.4 (Below MSD)dB(C) and 17.2 (Below MSD)dB(Z).
The final response obtained using the associated calibrator was (§5.6.3): 113.9dB(A)
This reading should be used henceforth to set up the sound level meter for field use.
A stricter test than that specified in paragraphs 5.5.6 of BS7580:1997 has been used by verifying that the 10 ms reference pulse is also correct. The level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.1 dB.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The sound level meter in the configuration tested was found to comply with BS 7580:1997 part 1 for a type 1 device. The associated calibrator has been corrected for barometric pressure at the time of calibration in accordance with the relevant manufacturer's instructions

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Appendix C. Mechanical Plant Technical Data

C.1. Roof Chillers

VHA SERIE SOUND DATA

Global Chiller Sound Level Values*

Model	Sound pressure	Sound Power	Frequency octave band (Hz) measured in - dB							
	5 m	LW(A)	63	125	250	500	1000	2000	4000	8000
VHA 427 01 SP	67		84	87	84	84	85	83	80	75

(*)
All datas for Overal values expressed in dB measured in the A Scale
All sound data are refered to the max load conditions with 35 °C ambient
Sound Pressure Levels are calculated in accordance to ISO 3744

ATTENTION: Sound pressure data are declared and valid for a "FREE FIELD CONDITION ONLY", Installations close to a reflective wall will increase sound level stated in the datasheet (generaly 3 dB for each side added)

PRELIMINARY TECHNICAL DATA			
MODELL		**VHA 427 01 SP**	
Design data :			
Total Cooling Capacity	kW	234.0	
Inlet Water Temperature	°C	12	
Outlet Water Temperature	°C	6	
Design Ambient Temperature	°C	35	
Refrigerant Circuits	n°	2	
Evaporator Fouling Factor	m2K/W	0.000044	
Power circuit voltage	V/Hz/Ph	400/3/50	
Refrigerant	Type	**R410A**	
Chiller performance :			
E.E.R.	coeff.	2.79	
Ethyl. Glycol	%	0.00	
Flowrate	m3/h	33.43	
Pressure Drop	KPa	52	
Compressors :			
Type	Type	scroll	
N° of Compressors	n°	2	2
Nominal Power Input (each)	kW	21.9	16.7
Running Current (each)	A	40.5	28.6
Max Current (each)	A	72	62
Starting Current (each)(soft starter)	A	320	260
Condenser coil :			
Type	Type	finned coil	
Pipe material	Type	copper	
Fins material	Type	alluminium	
Condenser AC Fan :			
Fans Diameter	mm	900	
Fans Quantity	n°	2	
Total Fans Airflow	m3/h	52000.00	
Total Fans Motor Power Input	kW	6.60	
Total Fans Circuit Amperes	A	12.60	
Evaporator :			
Evaporator Quantity	n°	1	
Type	Type	shell & tube	
Chiller Connections	"	2 x 2"½	
Electrical data :			
Total Power Input	kW	83.8	
Total Running Current	A	150.8	
Total Max Current	A	280.6	
Total Starting Current	A	430.3	
Physical Data :			
Length without electrical cabinet	mm	3200	
Width	mm	1500	
Height	mm	2525	
Approx Weight	Kg	2295	
Sound Data :			
sound pressure	dB(A) - 5m	67	