Determination of aerodynamic performance and flow noise of the VILPE Air intake unit

FINAS
Finnish Accreditation Service
T001 (EN ISO/IEC 17025)

Requested by: SK Tuote Oy

VTT EXPERT SERVICES LTD

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Assignment	**Determination of aerodynamic performance and flow noise of the VILPE Air intake unit**
Sample	The customer delivered the VILPE Air intake unit, the specifications of which are in appendix 1. The sample was received 25.5.2016. Measurements were carried out 30.05.2016.
Test method	The measurements of the aerodynamic performance of the air terminal device were carried out according to standard EN 12238:2001 /1/. The measurements of the flow noise of the air terminal device were carried out according to standards ISO 5135:1997 /2/ and ISO 3741:2010 /3/. The flow noise was measured on the outdoor side of the air terminal device. Nominal diameter of the test duct was 160 mm. Air flow rates were measured according to ISO 5167-1:2003 and ISO 5167-2:2003 /4/ using orifice plates with corner tappings. FINAS Finnish Accreditation Service has accredited our laboratory (T001) to perform measurements according to standards EN 12238:2001, ISO 5135:1997, ISO 3741:2010, ISO 5167-1:2003 and ISO 5167-2:2003. Other measurements mentioned in this test report do not belong to the field of accreditation.

Results

Measurement results are presented in appendix 2.

The results are only valid for the tested item.

Reference

/1/ EN 12238:2001. Ventilation for buildings – Air terminal devices – Aerodynamic testing and rating for mixed flow application.

/2/ ISO 5135:1997 Acoustics - Determination of sound power levels of noise from air terminal devices, air terminal units, dampers and valves by measurement in a reverberation room.

/3/ ISO 3741:2010. Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods reverberation test rooms.

/4/ ISO 5167-1:2003. Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full. Part 1: General principles and requirements.

ISO 5167-2:2003. Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full. Part 2: Orifice plates.

Espoo 3.6.2016

Mikko Nyman
Product Manager

Tapio Paananen
Technical Expert

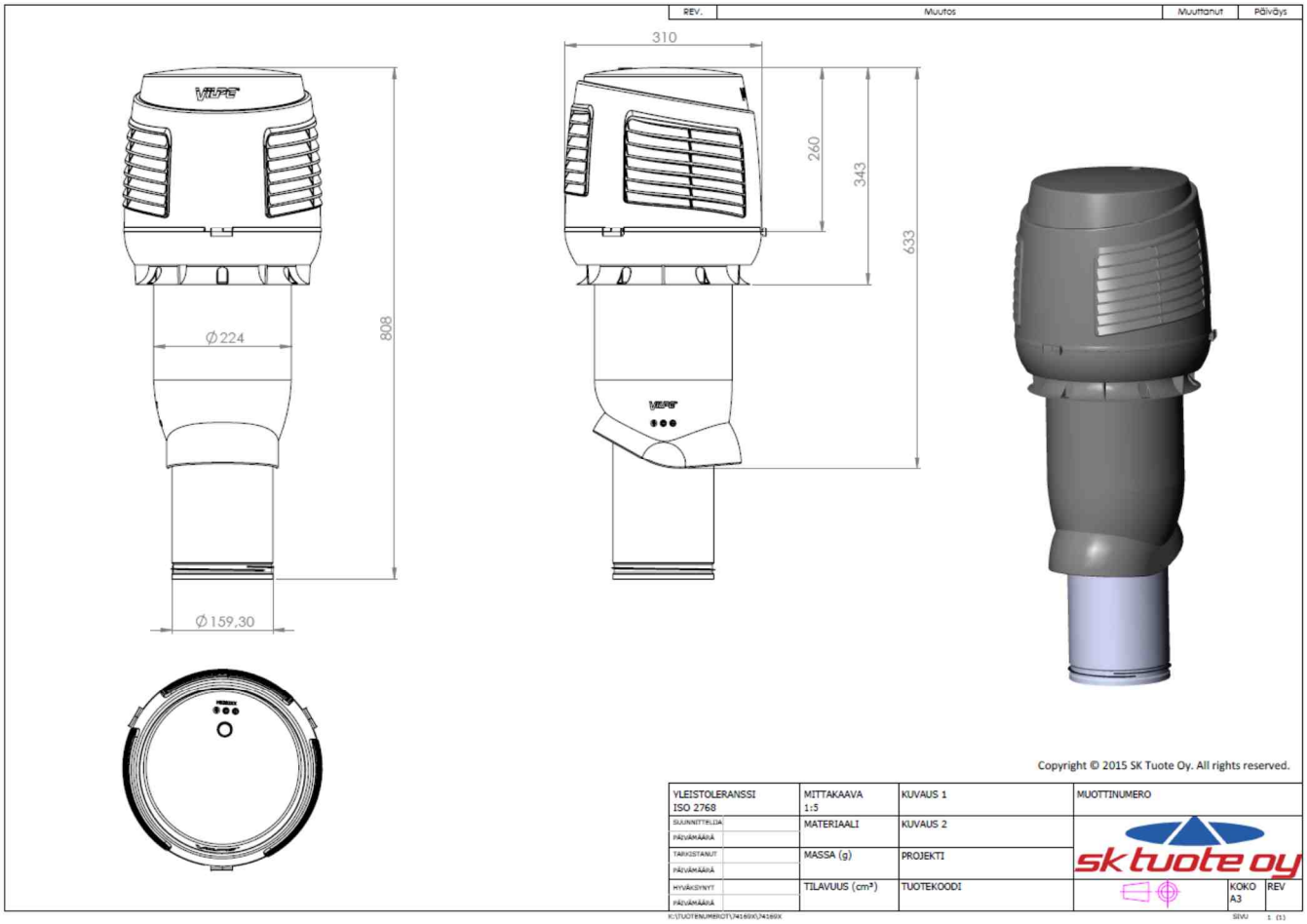
Appendices 2

Distribution

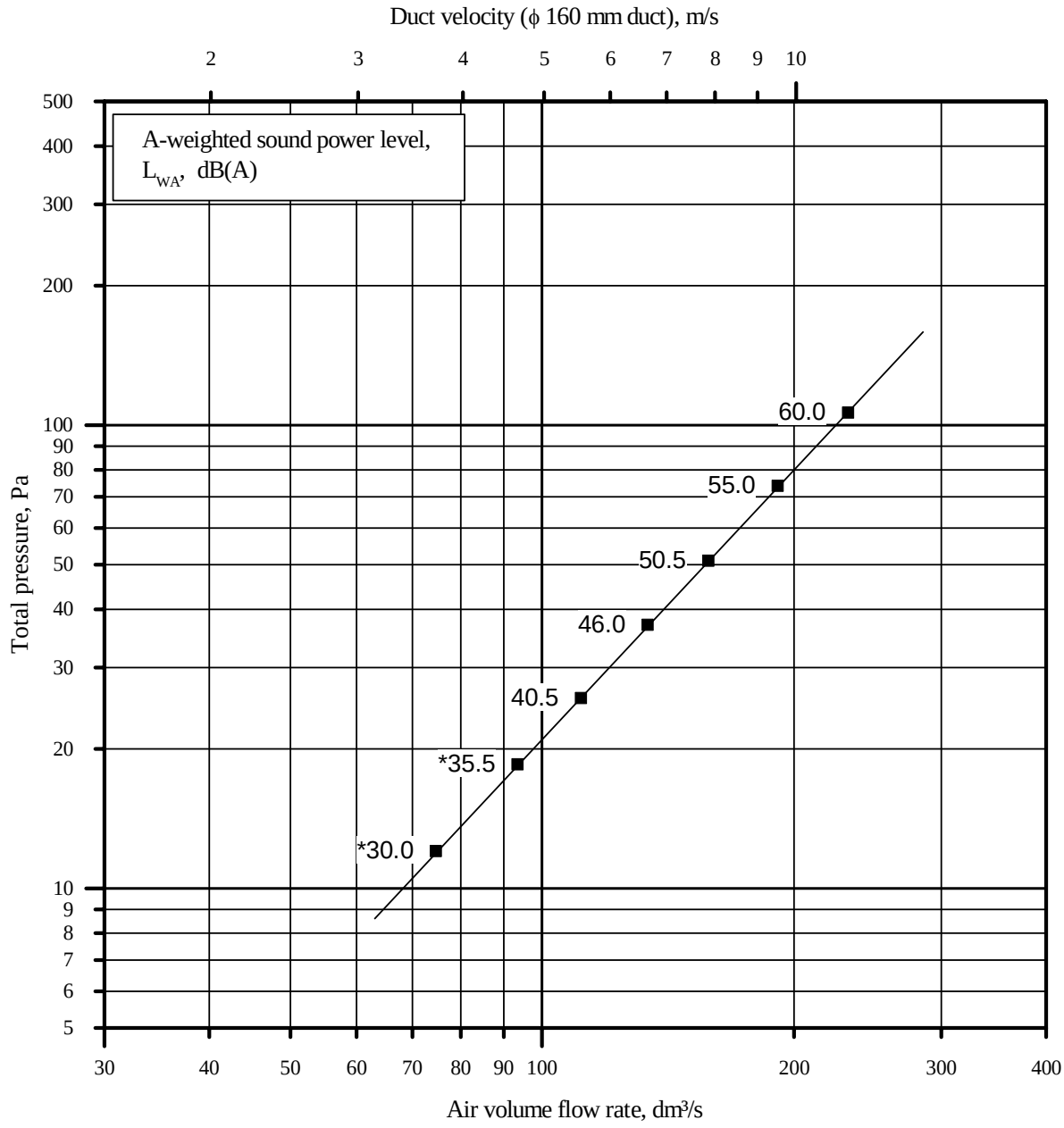
Customer	Original
Archive	Original

Device: VILPE Air intake unit

DESCRIPTION OF THE SAMPLE



Device: VILPE Air intake unit (Ø 160 mm duct)
Performance of the device
Aerodynamic and flow noise properties
EN 12238:2001
ISO 5135:1997
Air density: 1.20 kg/m³



Device: VILPE Air intake unit (Ø 160 mm duct)

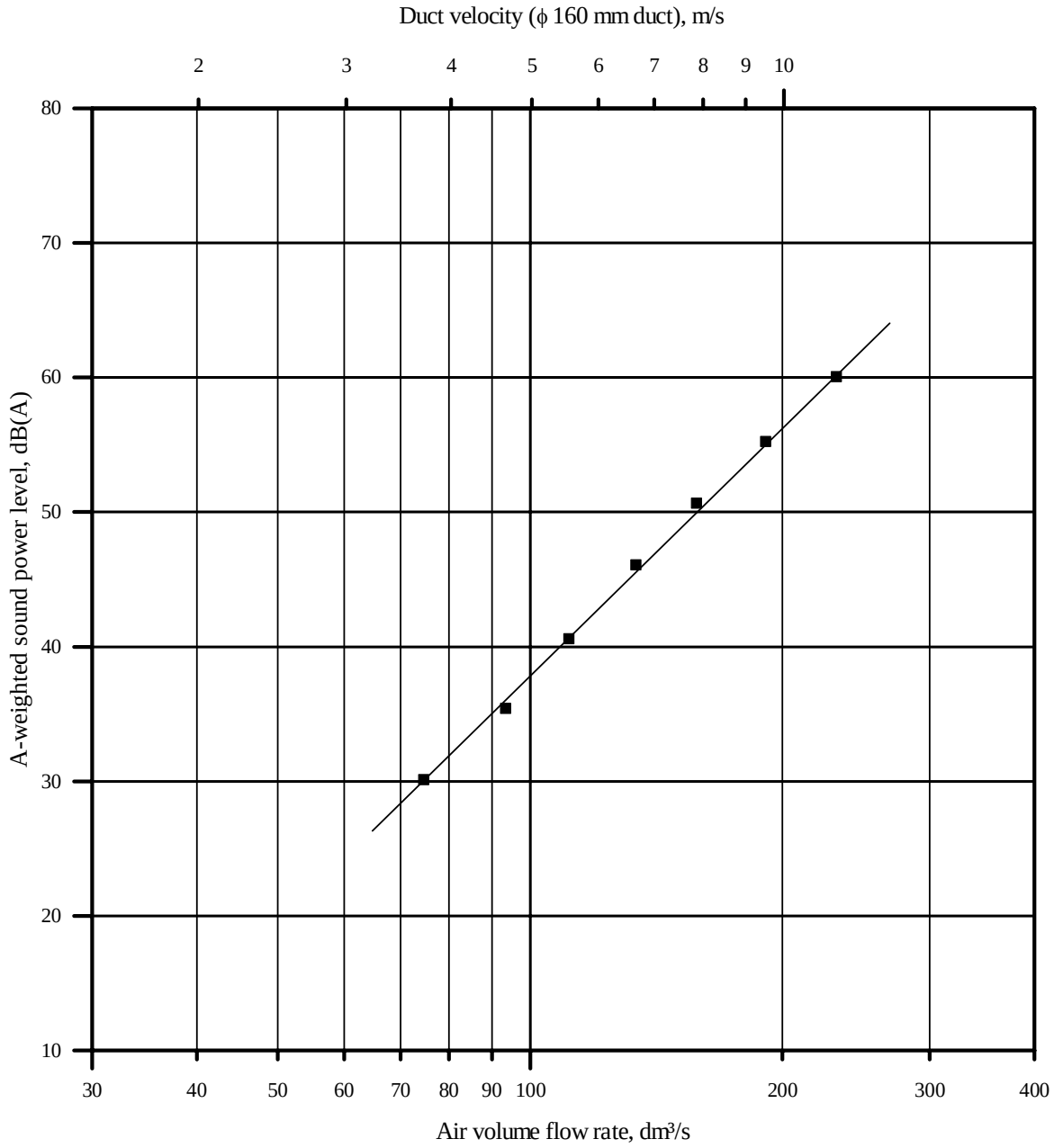
Performance of the device

A-weighted sound power level

EN 12238:2001

ISO 5135:1997

Air density: 1.20 kg/m³



Device: VILPE Air intake unit (Ø 160 mm duct)

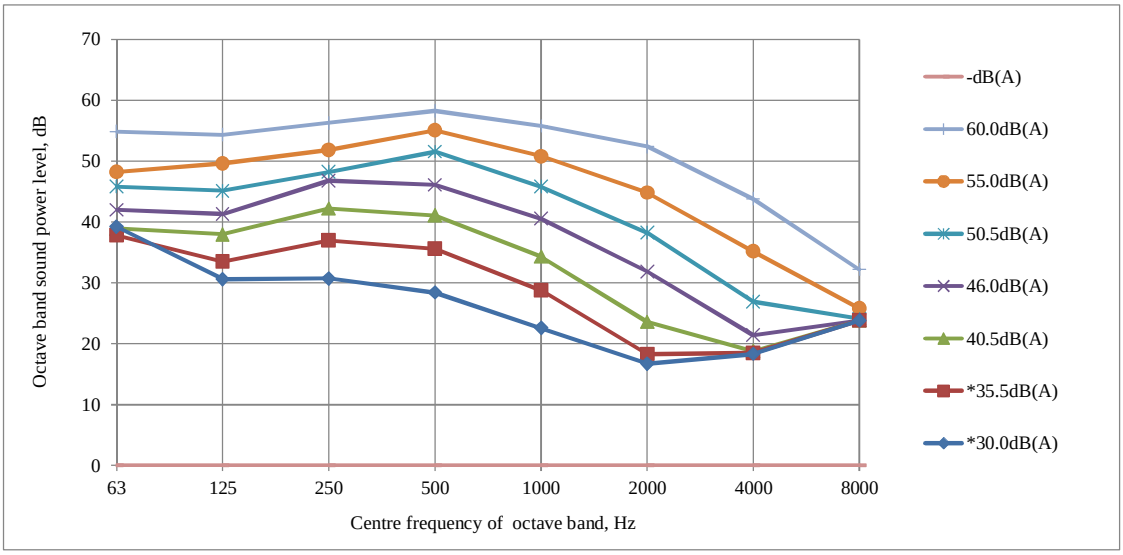
Performance of the device

Aerodynamic and flow noise properties

EN 12238:2001

ISO 5135:1997

Air density 1.20 kg/m³



Measured performance values

Symbol	Unit	1	2	3	4	5	6	7
q_{VD}	m^3/h	269	337	401	482	569	689	836
q_{VD}	dm^3/s	74,7	93,5	111,4	134	158	191	232
v	m/s	3,7	4,7	5,5	6,7	7,9	9,5	11,5
p_{tD}	Pa	12,0	18,5	25,7	37,1	50,9	73,9	106
p_{sD}	Pa	20,3	31,5	44,2	63,7	88,0	128	186
ζ_{tD}	-	1,45	1,43	1,40	1,40	1,37	1,36	1,33
ζ_{sD}	-	2,45	2,43	2,40	2,40	2,37	2,36	2,33
L_{W63}	dB	*39.0	*38.0	*39.0	*42.0	*46.0	*48.0	55.0
L_{W125}	dB	*30.5	*33.5	38.0	41.5	45.0	49.5	54.5
L_{W250}	dB	*30.5	37.0	42.0	47.0	48.0	52.0	56.5
L_{W500}	dB	*28.5	*35.5	41.0	46.0	51.5	55.0	58.0
L_{W1000}	dB	*22.5	*29.0	*34.5	40.5	46.0	51.0	56.0
L_{W2000}	dB	*16.5	*18.5	*23.5	32.0	38.0	45.0	52.5
L_{W4000}	dB	*18.5	*18.5	*19.0	*21.5	*27.0	35.0	44.0
L_{W8000}	dB	*24.0	*24.0	*24.0	*24.0	*24.0	*26.0	*32.0
L_W	dB	*40.5	*42.5	*46.5	51.0	55.0	59.0	63.5
L_{WA}	dB(A)	*30.0	*35.5	40.5	46.0	50.5	55.0	60.0

*) The background noise requirements of standard ISO 3741:2010 have not been met.

Data represent upper bounds to the sound power level of the noise source under test.

Symbols and units

q_{VD}	Air volume flow rate of the device, m^3/h or dm^3/s
v	Duct velocity of the device (Ø 160 mm duct), m/s
p_{tD}	Total pressure of the device, Pa
p_{sD}	Static pressure of the device, Pa
ζ_{tD}	Total pressure loss coefficient of the device, -
ζ_{sD}	Static pressure loss coefficient of the device, -
$L_{W63...8000}$	Octave band sound power level of the device, dB
L_W	Sound power level of the device, dB
L_{WA}	A-weighted sound power level of the device, dB(A)