



**Strojírenský zkušební ústav, s.p.**  
**(Engineering Test Institute, Public Enterprise)**  
**Hudcova 424/56b, Medlánky, 621 00 Brno, Česká republika**  
Testing Laboratory 1045.1 accredited by the CAI pursuant to ČSN EN ISO/IEC 17025:2018

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Page 1 / 14



## **TEST REPORT**

### **39-17652/H**

**Product:** Outdoor Air/Water Heat pump

**Type designation:** Montivi-8kW

**Customer:** LARS Andrzej Szymański  
ul. Świerkowa 14  
64-320 Niepruszewo  
POLAND

**Manufacturer:** LARS Andrzej Szymański  
ul. Świerkowa 14  
64-320 Niepruszewo  
POLAND

**Report issue date:** 2024-10-14

**Distribution list:** 1 copy to the Customer  
1 copy to the Engineering Test Institute

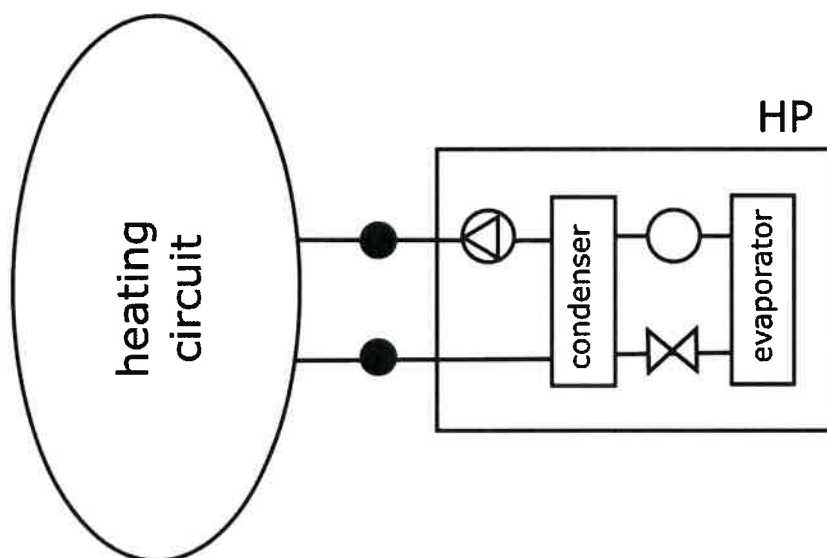
## I. Description of product tested

The Heat pump **Montivi-8kW** supplied by the company **LARS Andrzej Szymański** is structurally adapted to operate in air/water system. Device is designed as monobloc placed outdoor and indoor display. Refrigerant R32 is used with charge 1.6 kg. Power supply is a three-phase. Heat pump is able to work in heating as well as cooling mode. Heat pump is working with variable flow rate.

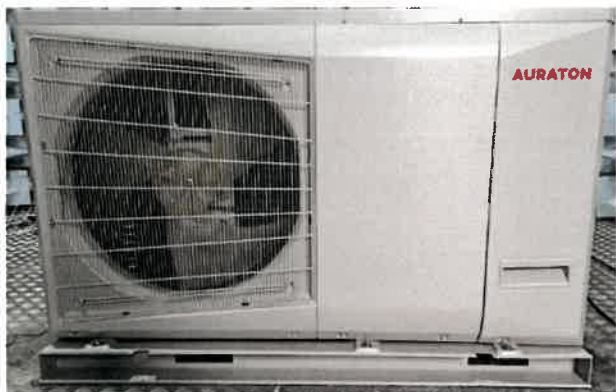
Main components of the outdoor unit **Montivi-8kW**:

- Serial number SFF0WDNBTU0026000211
- Cubic-shaped with dimensions 1350 × 400 × 880 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- L-shaped evaporator, 2 rows, dimensions 1040 × 45 × 750 mm (W × D × H), spacing 1.6 mm
- Plate condenser, dimensions 135 × 120 × 360 mm (W × D × H) including insulation
- Compressor GMCC EKTF310D43UMT
- Refrigerant R32 (1.6 kg)
- Electric expansion valve Sanhua
- 4-way reversing valve Sanhua SHF-7H-35UP-P
- Refrigerant accumulator Dongguan Qingxin'an Refrigeration Fittings Co. Ltd, type 801601200044
- Axial fan ø50 cm Jiangmen LT Motor Co. Ltd
- Circulation pump Shimge APM25-9-130 PWM1
- Pressure sensors
- Temperature sensors
- Refrigerant pipes
- Air vent
- Remote display
- Software

Scheme:



Photodocumentation:



Heat pump **Montivi-8kW** – outdoor unit  
– Front view –



Heat pump **Montivi-8kW** – outdoor unit  
– Back view –



Heat pump **Montivi-8kW** – outdoor unit  
– Compressor label –



Heat pump **Montivi-8kW** – outdoor unit  
– Label –

## II. Sample tested

SZU reg. no.	Product name	Date of submission
1212.24.39715.001	Montivi-8kW	2024-03-20

The visual inspection, tests and verification were carried out by Ing. Ondrej Bilkovič at the test station of SZU. The tests were performed using measuring and testing equipment with valid calibration.

## III. Measuring and test equipment:

No.	Description	Inventory number
1.	Electrical energy meter	E2.1
2.	Digital watt meter	1.2.2 ENERGIE ANALYZATOR_2
3.	Flow meter Krohne Optiflux	8.1.2 TECH_K2_V_DN15 8.1.3 TECH_K2_V_DN25
4.	Barometer	2.4 MAR18_1_PB
5.	Differential pressure gauge	3.2 MAR18_2_dP
6.	Thermometers	3.4 MAR18_T
7.	Thermo-hydro meter 608-H1	117043
8.	Tape measure	ME 475
9.	Multi-analyser SINUS SoundBook MK2	000-000-000-875/1
10.	Microphone pair G.R.A.S. 40 AK, wind deflector	000-000-000-875/2
11.	Calibrator G.R.A.S. 42AG	000-000-000-875/3

No.	Test objective	Requirement	Method of test	Documentation	Test evaluation/ verification *
1.	Calculation of sound power level	Art. 9	ČSN ISO 9614-2:1997	Page No. 7-13	+
2.	Acoustic measurements – Sound power level	Art. 8	ČSN EN 12102-1:2023	Page No. 6-13	+

\*) **Evaluation / statement of conformity:**

+ ..... Requirement fulfilled	0 .....Not applicable
-..... Requirement not fulfilled	x .....Not evaluated

The stated extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient  $k=2$ , corresponding to the coverage certainty of 95% as regards standard classification.

<b>Test objective:</b>	Heating and cooling equipment
<b>Exact name of the test procedure:</b>	<b>2.136*</b> - Measurement of noise characteristics
<b>Test method:</b>	<b>ČSN EN 12102-1:2023; ČSN ISO 9614-2:1997</b>
<b>Sample tested:</b>	Air/Water Heat pump <b>Montivi-8kW</b>
<b>Measuring equipment used:</b>	see Chapter III
<b>Place of test:</b>	Engineering Test Institute, Hudcova 424/56b, 621 00 Brno, CZ

**Measurement uncertainty:**

Measured quantity	Unit	Uncertainty of measurement	Evaluation
Liquid			
- temperature difference (dT)	[K]	$\pm 0.15 \text{ K}$	fulfilled
- temperature inlet/outlet	[°C]	$\pm 0.15 \text{ K}$	fulfilled
- volume flow	[m³/s]	$\pm 1 \%$	fulfilled
- static pressure difference	[kPa]	$\pm 1 \text{ kPa}$ ( $\Delta p \leq 20 \text{ kPa}$ ) or $\pm 5 \%$ ( $\Delta p > 20 \text{ kPa}$ )	fulfilled
Air			
- dry bulb temperature	[°C]	$\pm 0.2 \text{ K}$	fulfilled
- wet bulb temperature	[°C]	$\pm 0.4 \text{ K}$	fulfilled
- volume flow	[m³/s]	$\pm 5 \%$	not applied
- static pressure difference	[Pa]	$\pm 5 \text{ Pa}$ ( $\Delta p \leq 100 \text{ Pa}$ ) or $\pm 5 \%$ ( $\Delta p > 100 \text{ Pa}$ )	not applied
Refrigerant			
- pressure at compressor outlet	[kPa]	$\pm 1 \%$	not applied
- temperature	[°C]	$\pm 0.5 \text{ K}$	not applied
Concentration (in volume)			
- heat transfer medium	[%]	$\pm 2$	not applied
Electrical quantities			
- electric power	[W]	$\pm 1 \%$	fulfilled
- voltage	[V]	$\pm 0.5 \%$	fulfilled
- current	[A]	$\pm 0.5 \%$	fulfilled
- electric energy	[kWh]	$\pm 1 \%$	not applied
Compressor rotational speed	[min⁻¹]	$\pm 0.5 \%$	not applied
The heating or cooling capacities measured on the liquid side shall be determined within a maximum uncertainty of 5 % independent of the individual uncertainties of measurement including the uncertainties on the properties of fluids.			fulfilled

**Note:**

Comment to abbreviated marking: e.g. A7/W55

A (air) 7 (input source air temperature in °C) / W (water), 55 (output heating water temperature in °C)

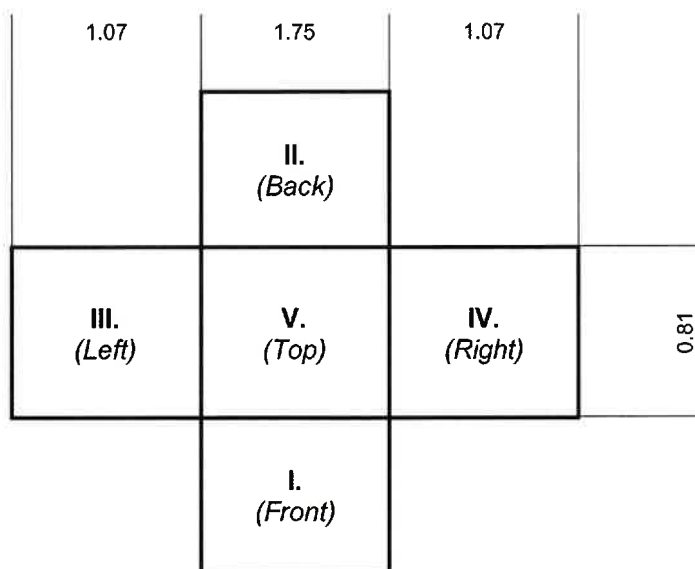
### a) Measurement surface

Tested samples were surrounded by a cuboid-shaped measurement surface set at the distance  $d$  [m].

<b>Test Sample: Air/Water Heat pump Montivi-8kW</b>			
Distance from the test sample	$d$	[m]	0.20
Height of measurement surface	$h$	[m]	1.07
Width of measurement surface	$w$	[m]	1.75
Depth of measurement surface	$l$	[m]	0.81
Total measurement surface area	$S$	[m <sup>2</sup> ]	6.90
Minimal measuring time per surface	$t_M$	[s]	90.00

Sketch of measurement surface (not to scale):

Air/Water Heat pump **Montivi-8kW**  
– Outdoor unit –



## b) Acoustic environment

The device under test was placed inside a climate chamber (dimensions shown below). The chamber was acoustically treated to be compliant with ČSN EN ISO 3745:2012 requirements for hemi-anechoic chambers. The background noise was stable with the main noise source being the air conditioning of the climate chamber which was set to lower power or momentarily turned off for sufficient signal to noise ratio. The device under test was placed in a position offset from the middle of the chamber, at a sufficient distance from the surrounding walls, and was rotated by about  $5 \pm 10^\circ$ . Care was taken to ensure low air flow at the measurement surface by adjusting the measurement distance and positions.

<b>Climate-acoustic chamber</b> <i>(corresponds to free field over a reflecting plane)</i>			
Width of testing room	$l_1$	[m]	3.75
Length of testing room	$l_2$	[m]	4.50
Height of testing room	$l_3$	[m]	4.25



**c) Measured and calculated data – General overview:**

Test sample			Air/Water Heat pump <b>Montivi-8kW</b>
The measured values are in accordance with ČSN EN 12102-1:2023			YES
The measured values are in accordance with ČSN EN ISO 9614-2:1997			YES
Operation mode			Heating
Specification of the assessment condition			A7/W55*
Type of HP capacity regulation			Inverter
Compressor speed settings			16 Hz
Fan speed settings			330 rpm
Date of testing (YYYY-MM-DD)			2024-07-23
Reference air temperature	$t_{amb}$	[°C]	7.0
Relative humidity of air	$RH$	[%]	86.7
Ambient pressure	$p_{amb}$	[hPa]	986.8
Overall sound power level (linear)	$L_W$	[dB]	70.5 ± 1.5
<b>Overall A-weighted sound power level</b>	<b><math>L_{WA}</math></b>	<b>[dB(A)]</b>	<b>60.7 ± 1.5</b>
<b>Accuracy class</b>			<b>Engineering (grade 2)</b>

<sup>\*)</sup> Comment to abbreviated marking: i.e. A7/W55  
A (water), 7 (input source liquid temperature in °C) / W (water), 55 (outlet heating water temperature in °C)

**1A) Measurement results – octave bands**

Air/Water Heat pump <b>Montivi-8kW</b> Outdoor unit at A7/W55; Compressor at 16 Hz; Fan at 330 rpm								<b>Engineering (Grade 2)</b>			
$f_m$ [Hz]	<b>Criterion 1</b>			<b>Criterion 2</b>		<b>Criterion 3</b>	<b>All criteria passed?</b>	$L_w$ [dB]	$L_{WA}$ [dB(A)]	$U$ [dB]	<b>Evaluation</b>
	$L_d$	$F_{pl}$	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{w(1)} - L_{w(2)} \leq 5$					
125	27.9	1.8	YES	0.0	YES	YES	YES	62.1	45.7	$\pm 3.0$	c
<b>250</b>	<b>27.7</b>	<b>3.3</b>	<b>YES</b>	<b>0.0</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>65.5</b>	<b>58.3</b>	<b><math>\pm 2.0</math></b>	<b>passed</b>
500	28.5	2.6	YES	0.0	YES	YES	YES	60.0	55.9	$\pm 1.5$	passed
1000	21.7	3.4	YES	0.0	YES	YES	YES	46.5	46.3	$\pm 1.5$	c
2000	22.6	3.2	YES	0.0	YES	YES	YES	39.4	40.4	$\pm 1.5$	c
4000	20.9	3.7	YES	0.0	YES	YES	YES	34.3	35.2	$\pm 1.5$	c
8000 <sup>*)</sup>	20.8	5.1	YES	0.0	YES	YES	YES	29.7	29.6	$\pm 2.5$	c
<b>Total</b>								<b>70.5</b>	<b>60.7</b>	<b><math>\pm 1.5</math></b>	

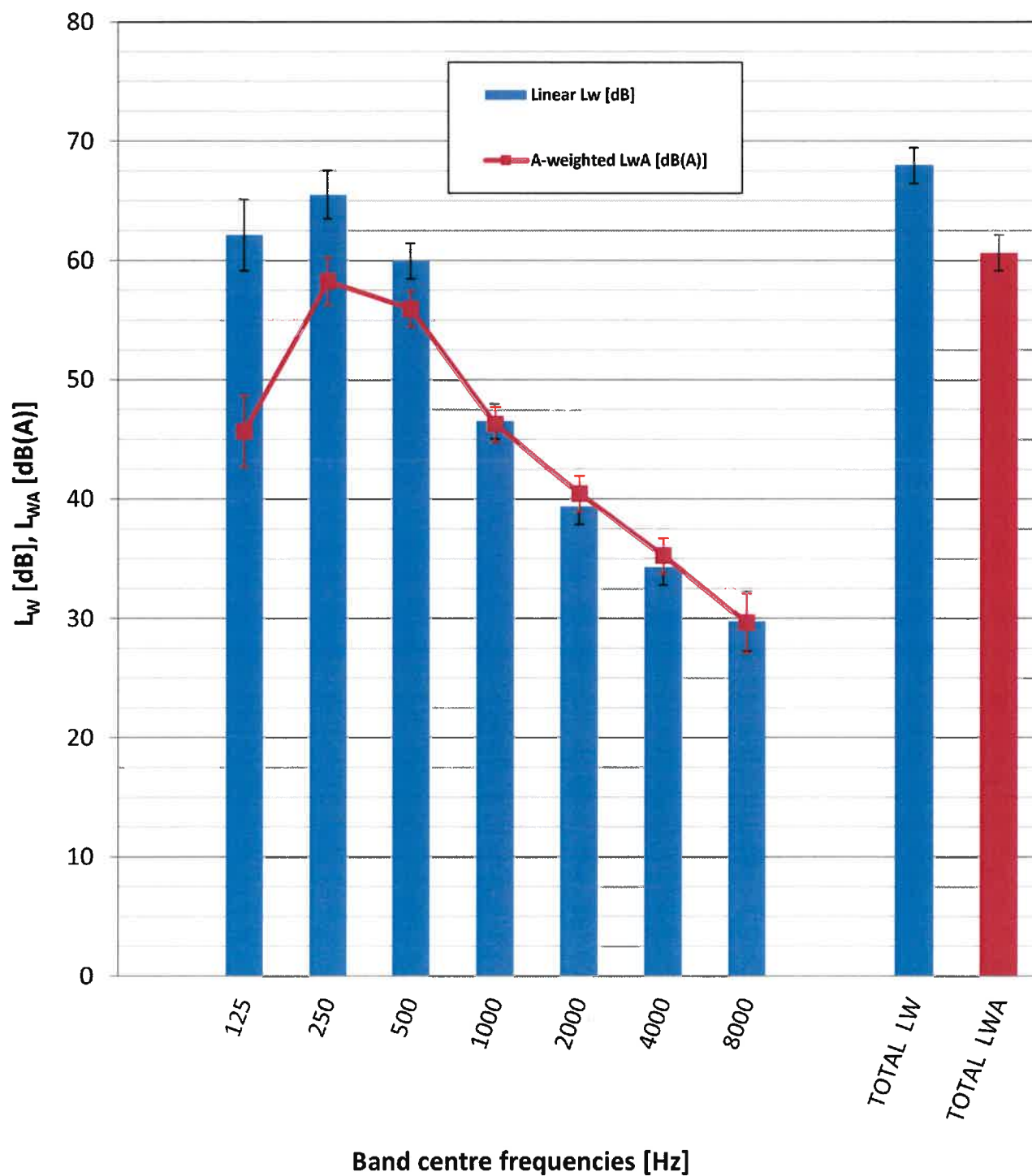
<sup>\*)</sup> Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.

**Legend:**

- passed* Frequency bands with this description are significant for the calculation of A-weighted total sound power level  $L_{WA}$ . Required accuracy class is fulfilled in this band.
- not passed* Frequency bands with this description are significant for the calculation of A-weighted total sound power level  $L_{WA}$ . Required accuracy class is not fulfilled in this band.
- c* Frequency bands with this description are not significant for the calculation of A-weighted total sound power level  $L_{WA}$ . These bands are evaluated in the calculation of  $L_{WA}$ .
- nc* Frequency bands with this description are not significant for the calculation of A-weighted total sound power level  $L_{WA}$ . These bands are not evaluated in the calculation of  $L_{WA}$ .

**Spectrum of Sound power level  $L_w$  – octave bands**

Air/Water Heat pump <b>Montivi-8kW</b> Outdoor unit at A7/W55; Compressor at 16 Hz; Fan at 330 rpm	<b>Engineering (Grade 2)</b>
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**1B) Measurement results – one-third octave bands**

Air/Water Heat pump <b>Montivi-8kW</b> Outdoor unit at A7/W55; Compressor at 16 Hz; Fan at 330 rpm	<b>Engineering (Grade 2)</b>
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$f_m$	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	$L_w$	$L_{WA}$	$U$	Evaluation
[Hz]	$L_d$	$F_{pl}$	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{w(1)} - L_{w(2)} \leq 5$		[dB]	[dB(A)]	[dB]	
100	30.1	2.7	YES	0.0	YES	YES	YES	56.2	37.1	$\pm 3.0$	c
125	27.9	1.8	YES	0.0	YES	YES	YES	60.5	44.4	$\pm 3.0$	c
160	27.9	3.7	YES	0.0	YES	YES	YES	49.8	36.4	$\pm 3.0$	c
200	27.8	3.0	YES	0.0	YES	YES	YES	51.6	40.7	$\pm 2.0$	c
250	27.7	3.3	YES	0.0	YES	YES	YES	60.2	51.6	$\pm 2.0$	passed
315	28.0	2.9	YES	0.0	YES	YES	YES	63.7	57.1	$\pm 2.0$	passed
400	28.4	2.7	YES	0.0	YES	YES	YES	58.1	53.3	$\pm 1.5$	passed
500	28.5	2.6	YES	0.0	YES	YES	YES	54.2	51.0	$\pm 1.5$	passed
630	28.4	2.9	YES	0.0	YES	YES	YES	49.2	47.3	$\pm 1.5$	passed
800	21.1	3.1	YES	0.0	YES	YES	YES	44.0	43.2	$\pm 1.5$	c
1000	21.7	3.4	YES	0.0	YES	YES	YES	40.3	40.3	$\pm 1.5$	c
1250	21.3	3.4	YES	0.0	YES	YES	YES	39.8	40.4	$\pm 1.5$	c
1600	21.0	3.4	YES	0.0	YES	YES	YES	37.8	38.8	$\pm 1.5$	c
2000	22.6	3.2	YES	0.0	YES	YES	YES	33.1	34.3	$\pm 1.5$	c
2500	21.1	3.8	YES	0.0	YES	YES	YES	27.8	29.1	$\pm 1.5$	c
3150	20.8	3.5	YES	0.0	YES	YES	YES	29.2	30.4	$\pm 1.5$	c
4000	20.9	3.7	YES	0.0	YES	YES	YES	30.7	31.7	$\pm 1.5$	c
5000	20.6	3.8	YES	0.0	YES	YES	YES	28.2	28.7	$\pm 1.5$	c
6300	20.8	5.1	YES	0.0	YES	YES	YES	25.0	24.9	$\pm 2.5$	c
<b>Total</b>								<b>70.5</b>	<b>60.7</b>	<b><math>\pm 1.5</math></b>	

**Legend:**

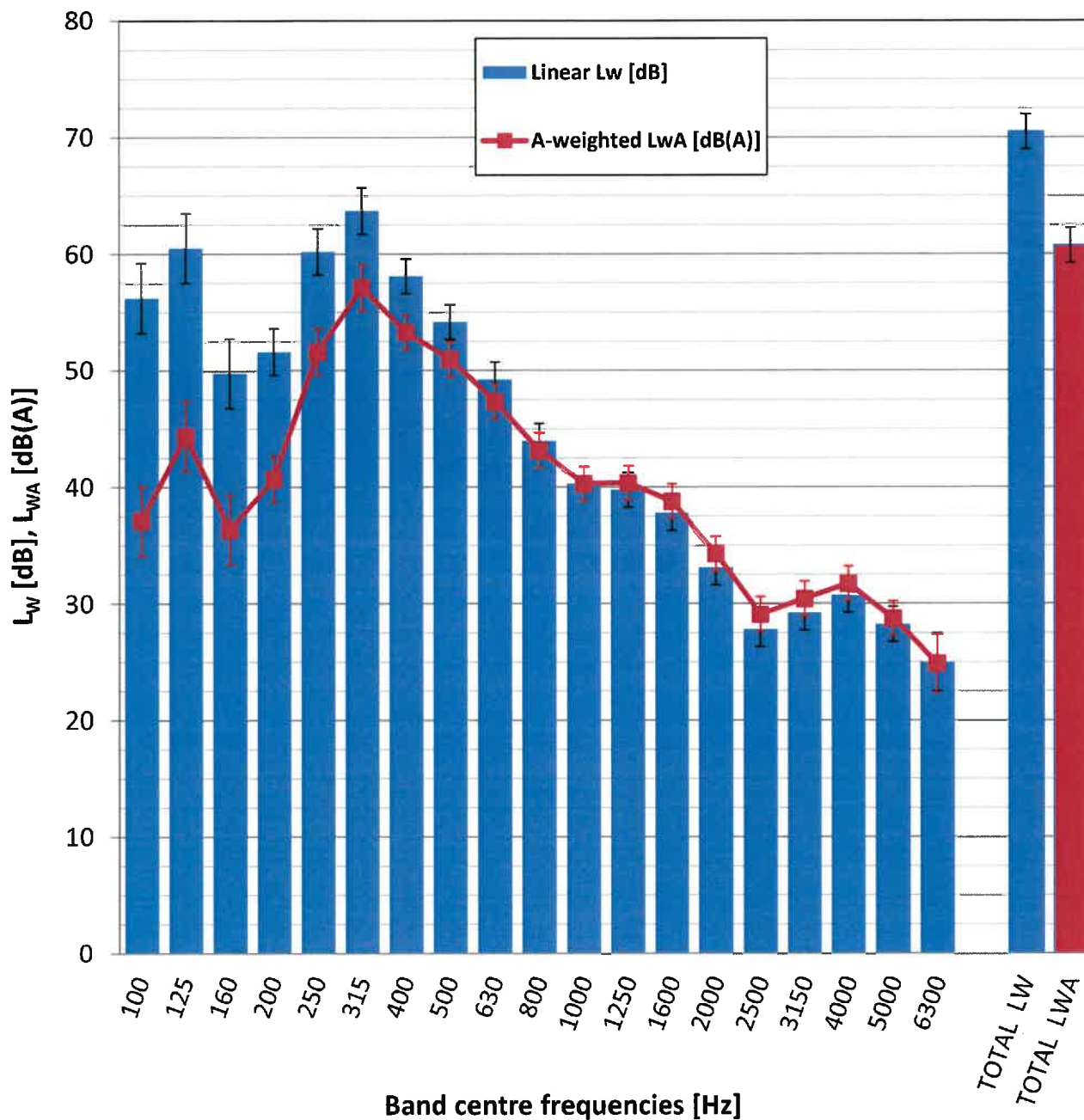
- passed* Frequency bands with this description are significant for the calculation of A-weighted total sound power level  $L_{WA}$ . Required accuracy class is fulfilled in this band.
- not passed* Frequency bands with this description are significant for the calculation of A-weighted total sound power level  $L_{WA}$ . Required accuracy class is not fulfilled in this band.
- c* Frequency bands with this description are not significant for the calculation of A-weighted total sound power level  $L_{WA}$ . These bands are evaluated in the calculation of  $L_{WA}$ .
- nc* Frequency bands with this description are not significant for the calculation of A-weighted total sound power level  $L_{WA}$ . These bands are not evaluated in the calculation of  $L_{WA}$ .

**Spectrum of Sound power level  $L_w$  – one-third octave bands**

Air/Water Heat pump **Montivi-8kW**

Outdoor unit at A7/W55; Compressor at 16 Hz; Fan at 330 rpm

**Engineering  
(Grade 2)**



Tested by: Ing. Ondrej Bilkovič

Date: 2024-10-14

Signed:

Reviewed and approved by: Ing. Antonín Kolbábek, Ph.D.

Date: 2024-10-14

Signed:

**V. A list of referenced documents**

- Order of 2024-03-18 (Order reg. no. B-81819, received on 2024-03-18)
- Contract B-81819/39
  
- ČSN EN 12102-1:2023 - Air conditioners, liquid chilling packages, heat pumps, process chillers and dehumidifiers with electrically driven compressors - Determination of the sound power level - Part 1: Air conditioners, liquid chilling packages, heat pumps for space heating and cooling, dehumidifiers and process chillers
- ČSN ISO 9614-2:1997 - Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning
  
- ČSN EN 14511-2:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 2: Test conditions
- ČSN EN 14511-3:2024 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 3: Test methods
- ČSN EN 14511-4:2023 - Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 4: Requirements
- ČSN EN 14825:2023 - Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling - Testing and rating at part load conditions and calculation of seasonal performance
  
- Background of the SZU task no. 39-17652
- Record measurement file 39-17652-H.zip

Test Report compiled by: **Ing. Ondřej Bilkovič**  
Test engineer



Test Report approved by: **Ing. Antonín Kolbábek, Ph.D.**  
Hydraulic and Pressure Equipment Manager

– End of Test Report –