



TEST REPORT 39-17652/2/H

Product: Outdoor Air/Water Heat pump - split

Type designation: Tivano split 12 kW

Customer: LARS Andrzej Szymański
ul. Świerkowa 14
64-320 Niepruszewo
POLAND
Company ID No.: 008271431

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

Report issue date: 2025-01-14

Distribution list: 1x copy to the SZÚ, s.p.
1x copy to the Customer

I. Description of product tested

The Heat pump **Tivano split 12 kW** supplied by the company LARS Andrzej Szymański is structurally adapted to operate in air/water system. Device is divided to the outdoor unit **TIVANO-12KW**, placed outside on a pedestal and an indoor unit **HYDRONIC-12KW**. Outdoor and indoor units are connected by copper piping and electrical wires. Refrigerant R32 is used with charge 3.1kg. Power supply is a one-phase. Heat pump is able to work in heating and cooling mode. Heat pump is working with variable flow rate.

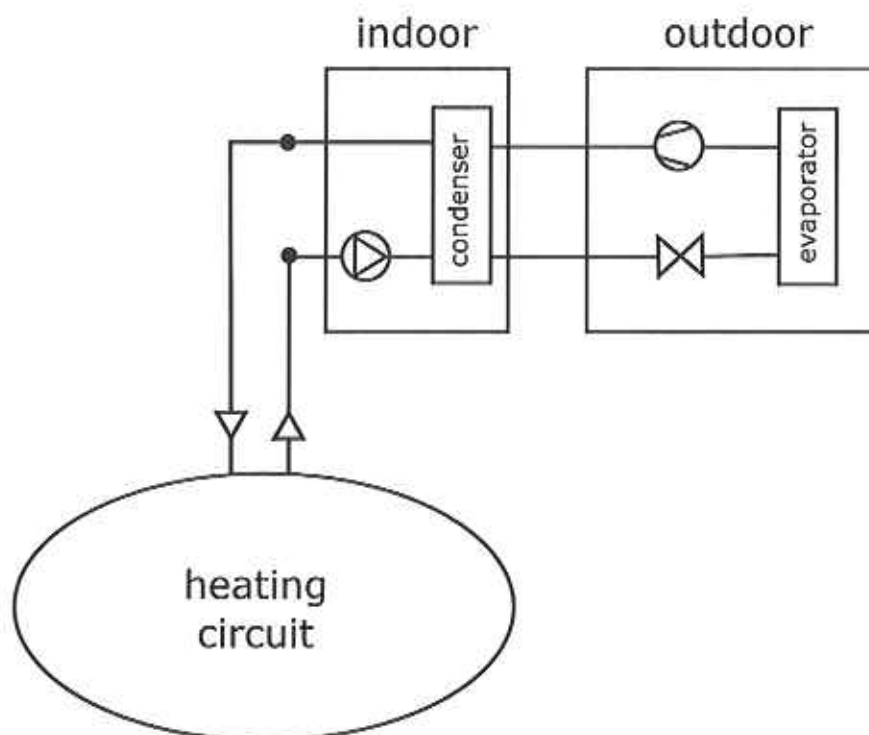
Main components of the outdoor unit **TIVANO-12KW**:

- Serial number SFF0WDNBMFK064000411
- Cuboid shape with dimensions 930 × 390 × 800 mm (W × D × H)
- Frame and casing made of varnished steel sheets
- Evaporator 3 rows:
 - I-shaped evaporator, 1 row, dimensions 580 × 20 × 770 mm (W × D × H), spacing 1.6 mm
 - L-shaped evaporator, 2 rows, dimensions 970 × 20 × 770 mm (W × D × H), spacing 1.6 mm
- Plate condenser GCHV Fin-tube-type
- Compressor GMCC EKTF310D43UMT
- Refrigerant R32 (3.1kg)
- Oil separator Heran
- Expansion valve Sanhua TS620C21
- 4-way reversing valve Dunan DSF-9AG
- Suction accumulator Dongguan Qingxin'an Refrigerator Fittings Co., Ltd
- Refrigerant accumulator
- Axial fan Ø550 mm Langdi
- Fan motor Lifeng
- Temperature sensor
- Refrigerant pipes

Main components of the indoor unit **HYDRONIC-12KW**:

- Serial number SFFRSDN8MFM086000481
- Cuboid shape with dimensions 490 × 340 × 910 mm (W × D × H)
- Frame and casing made of varnished steel
- Electric backup heater
- Circulation pump SHIMGE
- 3-way valve
- Expansion tank
- Display
- Control unit Lytran
- Regulation
- Temperature sensor
- Software GCHV
- Flow switch

Scheme:



Photodocumentation:



Heat pump **TIVANO-12KW** – outdoor unit
– Front view –



Heat pump **TIVANO-12KW** – outdoor unit
– Back view –



Heat pump TIVANO-12KW – outdoor unit
– Compressor label –



Heat pump TIVANO-12KW – outdoor unit
– Label –



Heat pump TIVANO-12KW – outdoor unit
– Without cover –



Heat pump HYDRONIC-12KW – indoor unit
– Label –



Heat pump **HYDRONIC-12KW** – indoor unit
– With cover –



Heat pump **HYDRONIC-12KW** – indoor unit
– Without cover –

II. Sample tested

SZÚ reg. no.	Product name	Date of submission
1212.24.39716.001	Tivano split 12 kW	2024-03-20
1212.24.39717.001		2024-03-20

The visual inspection, tests and verification were carried out by Ing. Ondrej Bilkovič at the test station of SZÚ, s.p.

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	022416/12/E1
2.	Digital watt meter	MaR01/EM01
3.	Flow meter Krohne Optiflux	022416/13/F1 022416/13/F2 022416/13/F3
4.	Barometer	022370/7
5.	Differential pressure gauge	022416/13/P2 022416/13/P3
6.	Thermometers	022416/13/T1
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

IV. Methods, results of tests and verifications

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. 8-18	+
2.	Acoustic measurements – Sound power level	Art. 8	ČSN EN 12102-1:2023	Page No. 7-18	+

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

+ Requirement fulfilled	0Not applicable
- Requirement not fulfilled	xNot evaluated

Note:

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.

If a statement of conformity is provided, the decision rule pursuant to ILAC-G8:09/2019, Art. 4.2.1 – binary statement for the simple acceptance rule shall apply.

Test objective:	Heating and cooling equipment
Exact name of the test procedure:	2.136* - Measurement of noise characteristics
Test method:	ČSN EN 12102-1:2023; ČSN ISO 9614-2:1997
Sample tested:	Air/Water Heat pump Tivano split 12 kW
Measuring equipment used:	see Chapter III
Place of test:	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	[%]	± 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)

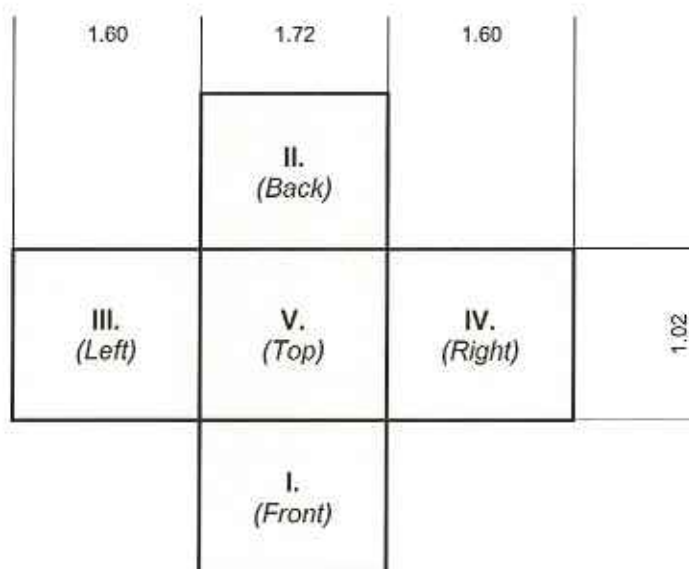
a) Measurement surface

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

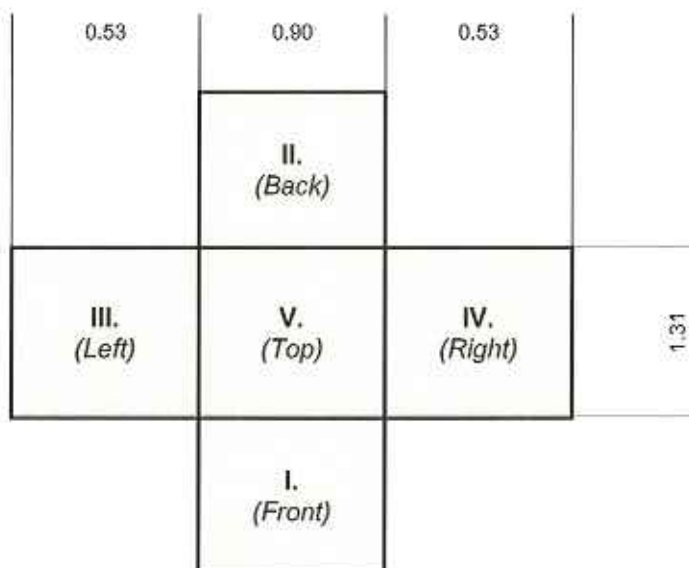
Test Sample: Air/Water Heat pump Tivano split 12 kW			For outdoor unit	For indoor unit
Distance from the test sample	d	[m]	0.30	0.20
Height of measurement surface	h	[m]	1.60	0.53
Width of measurement surface	w	[m]	1.72	0.90
Depth of measurement surface	l	[m]	1.02	1.31
Total measurement surface area	S	[m ²]	10.52	3.52
Minimal measuring time per surface	t_M	[s]	90.00	90.00

Sketch of measurement surface (not to scale):

Air/Water Heat pump **TIVANO-12KW**
 – Outdoor unit –



Air/Water Heat pump **HYDRONIC-12KW**
 – Indoor unit –



b) Acoustic environment

The device under test was placed inside a climate chamber (dimensions shown below). 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 $5+10^\circ$. Care was taken to ensure low air flow at the measurement surface by adjusting the measurement distance and positions.

Climate-acoustic chamber (corresponds to free field over a reflecting plane)			For outdoor unit	For indoor unit
Width of testing room	l_1	[m]	6.00	2.60
Length of testing room	l_2	[m]	4.00	2.80
Height of testing room	l_3	[m]	2.30	2.40

c) Measured and calculated data – General overview:

Test sample			Air/Water Heat pump TIVANO-12KW Outdoor unit	Air/Water Heat pump HYDRONIC-12KW Indoor unit
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			30 Hz	
Fan speed settings			680 rpm	
Date of testing (YYYY-MM-DD)			2024-12-18	
Reference air temperature	t_{amb}	[°C]	7.0	19.4
Relative humidity of air	RH	[%]	86.6	46.6
Ambient pressure	p_{amb}	[hPa]	992.4	992.4
Overall sound power level (linear)	L_W	[dB]	67.2 ± 1.5	50.3 ± 1.5
Overall A-weighted sound power level	L_{WA}	[dB(A)]	62.3 ± 1.5	40.9 ± 1.5
Accuracy class			Engineering (grade 2)	

* 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 Tivano split 12 kW Outdoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm	Engineering (Grade 2)
--	---------------------------------

f_m [Hz]	Criterion 1			Criterion 2		Criterion 3		All criteria passed?	L_W [dB]	L_{WA} [dB(A)]	U [dB]	Evaluation
	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)} - L_{W(2)} \leq 5$						
125	23.9	3.9	YES	0.0	YES	YES	YES	YES	59.5	44.2	± 3.0	c
250	24.7	4.4	YES	0.0	YES	YES	YES	YES	62.8	53.4	± 2.0	c
500	25.1	3.2	YES	0.0	YES	YES	YES	YES	62.4	59.2	± 1.5	passed
1000	18.6	3.1	YES	0.0	YES	YES	YES	YES	57.2	56.9	± 1.5	passed
2000	18.8	2.8	YES	0.0	YES	YES	YES	YES	50.0	51.2	± 1.5	passed
4000	18.8	3.2	YES	0.0	YES	YES	YES	YES	43.3	44.3	± 1.5	c
8000 ^{*)}	19.1	4.0	YES	0.0	YES	YES	YES	YES	40.8	40.7	± 2.5	c
Total									67.2	62.3	± 1.5	

^{*)} Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.

Legend:

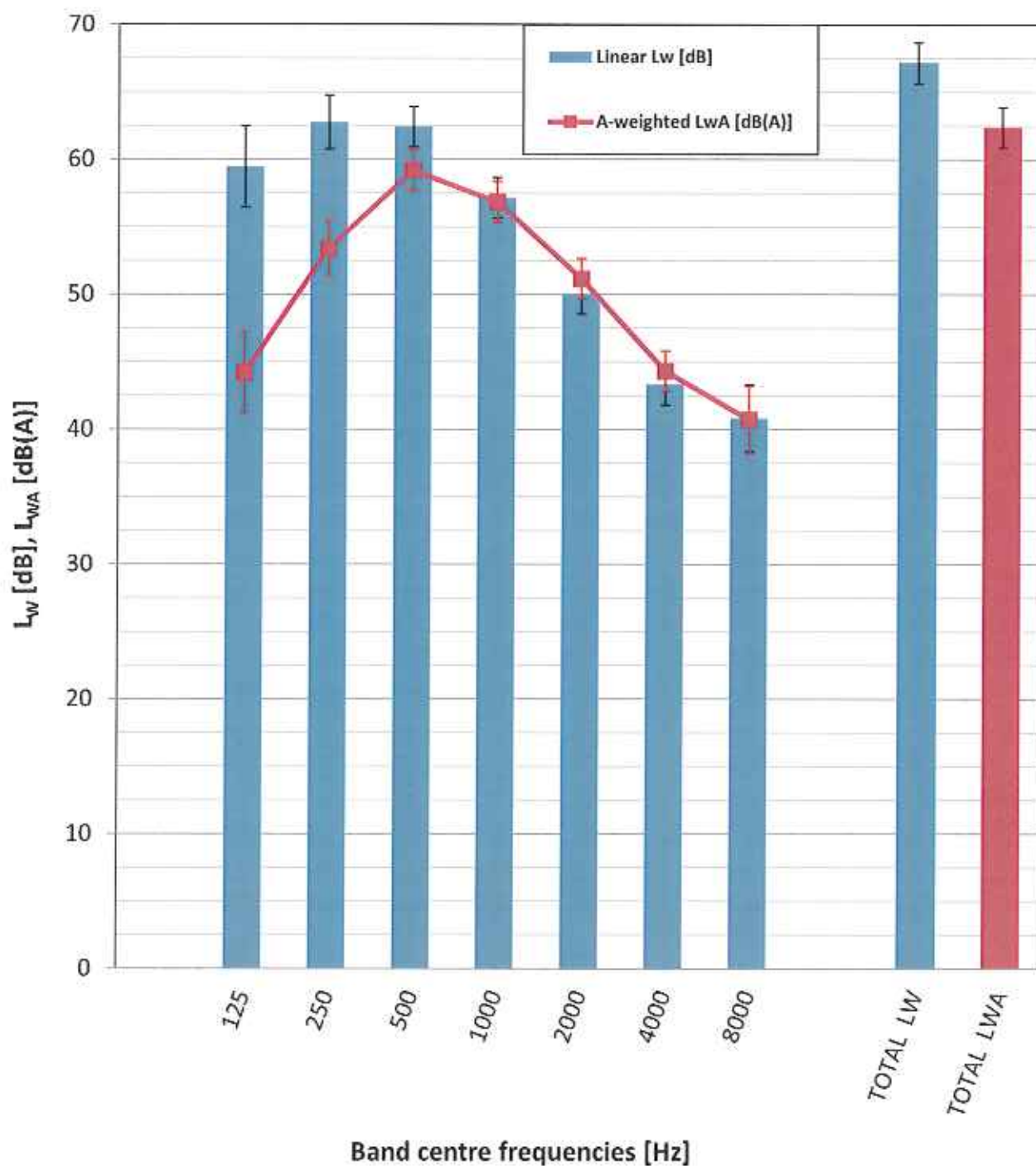
passed	Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA} . Required accuracy class is fulfilled in this band.
not passed	Frequency bands with this description are significant for the calculation of A-weighted total sound power level 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 Tivano split 12 kW

Outdoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm

Engineering
(Grade 2)



1B) Measurement results – one-third octave bands

Air/Water Heat pump Tivano split 12 kW Outdoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm								Engineering (Grade 2)			
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 _{+/-} ≤ 3	L _{w(1)} -L _{w(2)} ≤ 5		[dB]	[dB(A)]	[dB]	
100	23.3	4.6	YES	0.0	YES	YES	YES	54.2	35.1	± 3.0	c
125	23.9	3.9	YES	0.0	YES	YES	YES	54.1	38.0	± 3.0	c
160	24.2	3.3	YES	0.0	YES	YES	YES	55.7	42.3	± 3.0	c
200	24.4	4.2	YES	0.0	YES	YES	YES	61.0	50.1	± 2.0	passed
250	24.7	4.4	YES	0.0	YES	YES	YES	54.2	45.6	± 2.0	c
315	24.9	4.6	YES	0.0	YES	YES	YES	55.6	49.0	± 2.0	passed
400	25.1	3.2	YES	0.0	YES	YES	YES	58.6	53.8	± 1.5	passed
500	25.1	3.2	YES	0.0	YES	YES	YES	56.2	53.0	± 1.5	passed
630	24.8	4.4	YES	0.0	YES	YES	YES	57.8	55.9	± 1.5	passed
800	26.3	3.7	YES	0.0	YES	YES	YES	54.6	53.8	± 1.5	passed
1000	18.6	3.1	YES	0.0	YES	YES	YES	52.2	52.2	± 1.5	passed
1250	19.4	3.0	YES	0.0	YES	YES	YES	48.5	49.1	± 1.5	passed
1600	19.3	3.0	YES	0.0	YES	YES	YES	47.2	48.2	± 1.5	passed
2000	18.8	2.8	YES	0.0	YES	YES	YES	45.1	46.3	± 1.5	passed
2500	18.7	2.8	YES	0.0	YES	YES	YES	42.1	43.4	± 1.5	c
3150	18.8	2.9	YES	0.0	YES	YES	YES	40.2	41.4	± 1.5	c
4000	18.8	3.2	YES	0.0	YES	YES	YES	37.8	38.8	± 1.5	c
5000	18.7	3.5	YES	0.0	YES	NO	NO	37.1	37.6	± 1.5	nc
6300	19.1	4.0	YES	0.0	YES	YES	YES	36.0	35.9	± 2.5	c
Total								67.1	62.3	± 1.5	

Legend:

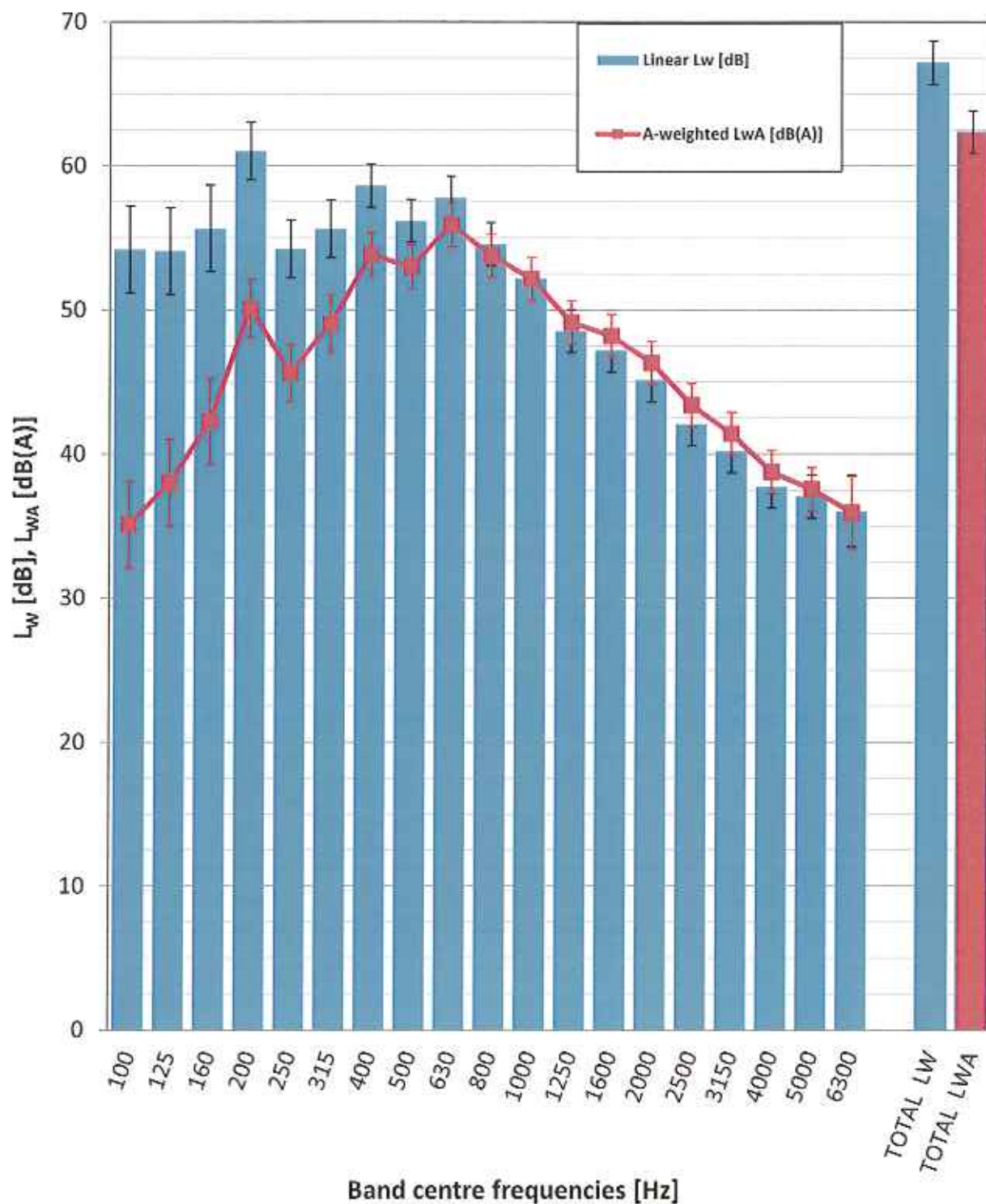
- passed* Frequency bands with this description are significant for the calculation of A-weighted total sound power level L_{WA} . Required accuracy class is fulfilled in this band.
- not passed* Frequency bands with this description are significant for the calculation of A-weighted total sound power 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 **Tivano split 12 kW**

Outdoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm

Engineering
(Grade 2)



2A) Measurement results – octave bands

Air/Water Heat pump Tivano split 12 kW Indoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm								Engineering (Grade 2)			
f_m [Hz]	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_w [dB]	L_{WA} [dB(A)]	U [dB]	Evaluation
	L_d	F_{pl}	$L_d > F_{pl}$	$F_{+/-}$	$F_{+/-} \leq 3$	$L_{W(1)} - L_{W(2)} \leq 5$					
125	17.3	2.4	YES	0.1	YES	YES	YES	47.9	32.0	± 3.0	passed
250	18.1	3.6	YES	0.0	YES	YES	YES	44.5	35.0	± 2.0	passed
500	18.8	3.3	YES	0.0	YES	YES	YES	41.5	37.5	± 1.5	passed
1000	18.6	4.3	YES	0.0	YES	YES	YES	32.4	31.9	± 1.5	passed
2000	18.8	3.9	YES	0.0	YES	YES	YES	25.9	27.1	± 1.5	c
4000	18.8	8.5	YES	0.0	YES	YES	YES	21.0	22.0	± 1.5	c
8000 ^{*)}	18.9	12.3	YES	3.0	YES	NO	NO	18.8	18.7	± 2.5	nc
Total								50.3	40.9	± 1.5	

^{*)} Due to the sound intensity method limitations, the frequency of 6300 Hz was measured only.

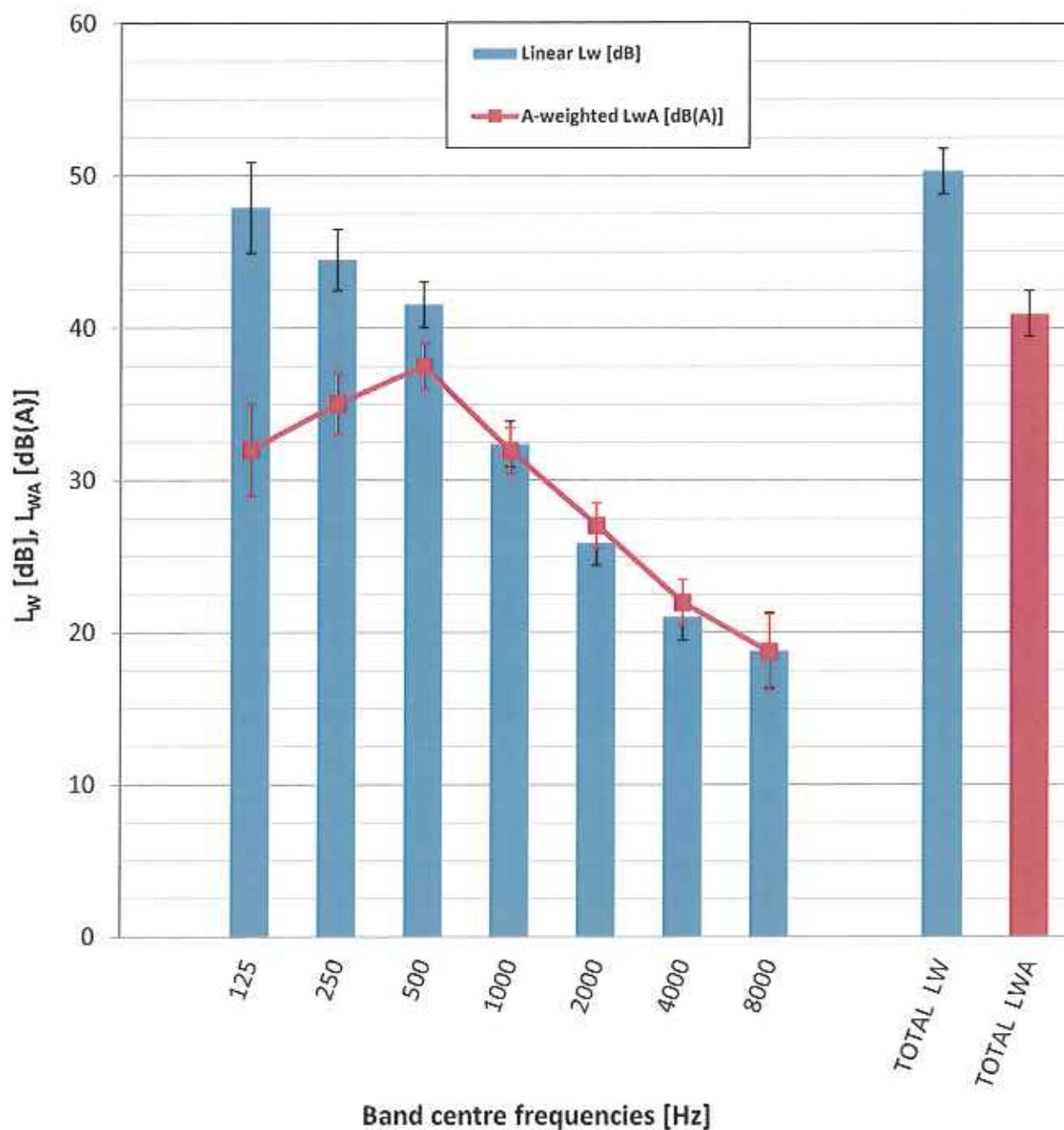
Legend:

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 **Tivano split 12 kW**
 Indoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm

Engineering
(Grade 2)



2B) Measurement results – one-third octave bands

Air/Water Heat pump Tivano split 12 kW Indoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm								Engineering (Grade 2)			
f_m [Hz]	Criterion 1			Criterion 2		Criterion 3	All criteria passed?	L_w [dB]	L_{WA} [dB(A)]	U [dB]	Evaluation
	L_d	F_{pl}	$L_d > F_{pl}$	$F_{1/3}$	$F_{1/3} \leq 3$	$L_{W(1)} - L_{W(2)} \leq 5$					
100	17.0	2.9	YES	0.4	YES	YES	YES	42.1	23.0	± 3.0	c
125	17.3	2.4	YES	0.1	YES	YES	YES	45.2	29.1	± 3.0	passed
160	17.6	2.5	YES	0.1	YES	YES	YES	41.0	27.6	± 3.0	passed
200	17.9	3.4	YES	0.0	YES	YES	YES	42.6	31.7	± 2.0	passed
250	18.1	3.6	YES	0.0	YES	YES	YES	37.5	28.9	± 2.0	passed
315	18.6	3.8	YES	0.0	YES	YES	YES	36.3	29.7	± 2.0	passed
400	18.8	3.1	YES	0.0	YES	YES	YES	39.7	34.9	± 1.5	passed
500	18.8	3.3	YES	0.0	YES	YES	YES	35.8	32.6	± 1.5	passed
630	19.3	3.5	YES	0.0	YES	YES	YES	30.3	28.4	± 1.5	passed
800	20.0	2.6	YES	0.0	YES	YES	YES	30.5	29.7	± 1.5	passed
1000	18.6	4.3	YES	0.0	YES	YES	YES	26.5	26.5	± 1.5	passed
1250	19.4	4.6	YES	0.0	YES	YES	YES	22.1	22.7	± 1.5	c
1600	19.3	5.0	YES	0.0	YES	YES	YES	21.4	22.4	± 1.5	c
2000	18.8	3.9	YES	0.0	YES	YES	YES	22.9	24.1	± 1.5	c
2500	19.0	6.6	YES	0.0	YES	NO	NO	17.7	19.0	± 1.5	nc
3150	18.8	7.4	YES	0.0	YES	NO	NO	17.3	18.5	± 1.5	nc
4000	18.8	8.5	YES	0.0	YES	YES	YES	16.6	17.6	± 1.5	c
5000	18.7	8.8	YES	0.0	YES	NO	NO	14.4	14.9	± 1.5	nc
6300	18.9	12.3	YES	3.0	YES	NO	NO	14.1	14.0	± 2.5	nc
Total								50.3	40.9	± 1.5	

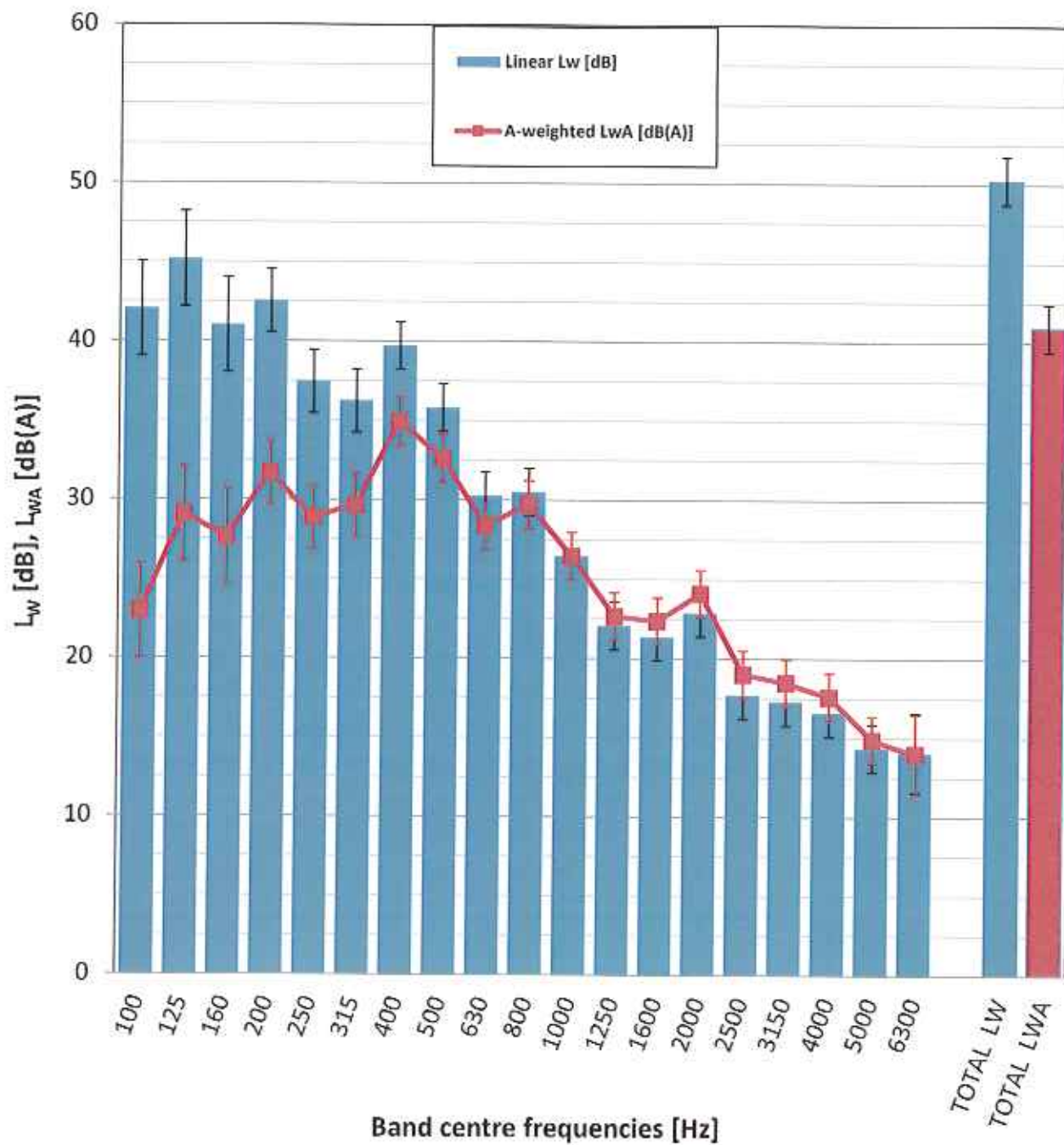
Legend:

<i>passed</i>	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.
<i>not passed</i>	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.
<i>c</i>	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} .
<i>nc</i>	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 Tivano split 12 kW
Indoor unit at A7/W55; Compressor at 30 Hz; Fan at 680 rpm

Engineering
(Grade 2)



Tested by: Ing. Ondrej Bilkovič

Date: 2025-01-14

Signed: 

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

Date: 2025-01-14

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 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 –