TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Construction Prague
Akreditovaná zkušební laboratoř, Autorizovaná osoba, Notifikovaná osoba, Oznámený subjekt, Subjekt pro technické posuzování, Certifikační orgán, Inspekční orgán / Accredited Testing Laboratory, Authorised Body, Notified Body, Technical Assessment Body, Certification Body, Inspection Body.
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L 1018.3

Testing Laboratory No. 1018.3
accredited by the Czech Accreditation Institute
in accordance with ČSN EN ISO/IEC 17025:2018

TEST REPORT

No. 040-067544

on test - determination of sound absorption to ČSN EN ISO 354:2003

Customer:	DROMEAS S.A. Papapanagiotou
Address:	Industrial Area of Serres, Serres 62121, Greece
Company ID:	09410476
Manufacturer:	DROMEAS S.A. Papapanagiotou
Address:	Industrial Area of Serres, Serres 62121, Greece
Test sample:	**Partition Flexi 1200 x 1700H blue fabric EU** **Partition Flexi 1600 x 650H blue fabric EU**
Order:	Z040210224

Number of test report pages including the cover page: 6

Number of annexes/pages: 3/4

Prepared by:

Ing. Pavel Rubáš, Ph.D.
Test Engineer – Specialist

Approved by:

Ing. Pavel Bartoš
Deputy Head of the testing laboratory

Copy No.: 1
Number of copies: 3

Teplice, 21 May 2021

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Testing laboratory stamp No. 1018.3

Declaration: **1)** The test results presented in this report only relate to the tested object and do not replace any other documents.
2) This report may not be reproduced in any form other than in its entirety without the written consent of the testing laboratory.
3) The laboratory bears no responsibility for the result if it may have been affected by the information provided by the client.

1. Sample data

Sample No:	VZ040211047
Sample:	Partition Flexi 1200 x 1700H blue fabric EU, number of installed elements 4 pieces Sample conditioned for more than 24 hours in the laboratory.
Purchase order:	14052021 from 14/05/2021
Date of delivery:	12/05/2021
Sampling site:	The sample was delivered by the client to the Teplice testing laboratory
Sampling method:	Samples were taken by employees of TZÚS Praha, s. p. - Teplice branch from the delivered package
Sample preparation method:	ČSN EN ISO 354 Acoustics - Measurement of sound absorption in a reverberation room The measured structures or components for realization were supplied by the manufacturer. The sample was visually inspected upon acceptance and its type checked according to the specification. The sample composition was found to correspond to the submitted description. Assembly was performed by the personnel of TZUS, s. p. – Teplice branch. Data on sample composition were taken from the specification provided by the manufacturer. The weights and other parameters are for information, control, and documentation purposes only.

The test results apply to the sample as received.

Sample No:	VZ040211046
Sample:	Partition Flexi 1600 x 650H blue fabric EU, number of installed elements 4 pieces Sample conditioned for more than 24 hours in the laboratory.
Purchase order:	14052021 from 14/05/2021
Date of delivery:	12/05/2021
Sampling site:	The sample was delivered by the client to the Teplice testing laboratory
Sampling method:	Samples were taken by employees of TZÚS Praha, s. p. - Teplice branch from the delivered package
Sample preparation method:	ČSN EN ISO 354 Acoustics - Measurement of sound absorption in a reverberation room The measured structures or components for realization were supplied by the manufacturer. The sample was visually inspected upon acceptance and its type checked according to the specification. The sample composition was found to correspond to the submitted description. Assembly was performed by the personnel of TZUS, s. p. – Teplice branch. Data on sample composition were taken from the specification provided by the manufacturer. The weights and other parameters are for information, control, and documentation purposes only.

The test results apply to the sample as received.

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2. Testing methods

Identification of the test method		Test method name
ČSN EN ISO 354:2003	Acoustics - Measurement of sound absorption in a reverberation room	Determination of sound absorption

Supplementation, deviations or exclusions from the standard procedure or application of non-standard methods: not applied

Other related standards:

ČSN EN ISO 11654:1998	Acoustics - Sound absorbers for use in buildings - Rating of sound absorption
VDI 3755:2015-01	Sound insulation and absorption
ČSN EN ISO 12999-2:2021	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: Sound absorption

3. Test results

Tests performed on: 20/05/2021 and 21/05/2021
Test location: Teplice testing laboratory
DOSO reverberation chamber
Tests performed by: Pavel Rubáš, Ph.D. (Test Engineer – specialist)
Bc. Marie Hartlichová (Test Engineer)

The details of the testing conditions and of the testing equipment used are given in the test records. The instrumentation and gauges are validated and calibrated as specified in the Teplice testing laboratory validation / calibration schedule.

3.1 Data declared by manufacturer

see Annex 3

VZ040211047, Partition Flexi 1200 x 1700H blue fabric EU

Dimensions : 1200X1700H
Weight of one board: 19 kg
Composition : Fabric+ foam 15 mm + chipboard 8 mm + foam 15 mm + fabric
Usage : Dividers

VZ040211046, Partition Flexi 1600 x 650H blue fabric EU

Dimensions : 1600X650H
Weight of one board: 10,5 kg
Composition : Fabric+ foam 15 mm + chipboard 8 mm + foam 15 mm + fabric
Usage : Dividers

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3.2 Technical specification of the test

Measurement was done in an anechoic chamber according to ČSN EN ISO 354. Measurement is done by omnidirectional impact of the sound waves on the sample and is based on measurement of the reverberation time of the empty chamber and the chamber containing the tested sample. The difference in measurements is used to specify the equivalent absorption area of the sample and the sound absorption coefficient α_s. The measurement was done in one third octave bands from 100 to 5000 Hz.

At the customer's request, a J-type mounting was used. This mounting is used to determine the total sound absorption per unit of rectangular parts of the absorbing parts or partitions. Absorbent parts were mounted so that the edge rested on the surface to prevent gap between samples and the floor. There was no air gap between the edge of the samples and the surface of the room. The installed floor surface was between 10 m2 to 15 m^2. The absorbing samples were installed in two parallel rows (2 elements in two rows = a total of 4 elements). There were no air gaps between the individual boards in one row. The shortest distance from any absorbing part to the room surface other than the surface touched by the plates was at least 1 m. The samples were surrounded by an immobile enclosure. Two walls of the reverberation room were used as part of the enclosure. For the height of the enclosure, the design a) in the manner of a well was chosen: the height of the enclosure was the same as the height of the absorbing elements. To measure an empty reverberation room, the enclosure was not removed from the room. In addition, the provisions of § 6.2.2.3 of the same standard have been observed, in particular the samples in the reverberation chamber have been adjust to the arrangement so that they have been at least 2 meters apart.

The results of the test are the values of sound absorption coefficient α_{si} in one third octave bands from 100 to 5000 Hz. The main result of testing that is objectively related to the tested structure is the main result of testing that is objectively related to the tested structure **is the single digit variable of the weighted sound absorption** α_w.

The average reverberation time in the reverberant chamber is determined by measurement with a test sample installed and without a test sample. The equivalent absorption area A_1, in square metres, of an empty reverberant chamber is calculated using the formula:

$$A_1 = \frac{55{,}3V}{cT_1} - 4Vm_1$$

Where

- V is the volume of the empty reverberant chamber in cubic metres;
- c speed of sound transmission in the air in metres per second (for the usual laboratory temperatures in the range t = 15 °C to 30 °C, the value is calculated as c = 331+ 0.6t (m/s);
- T_1 reverberation time, in seconds, of an empty reverberant chamber;
- m_1 attenuation coefficient in air, in m^{-1}, calculated according to ISO 9613-1 with respect to the climatic conditions that existed in the empty reverberant chamber during measurement.

The value of m_1 can be calculated from the damping factor α, which is used in ISO 9613-1, according to the formula:

$$m = \frac{\alpha}{10 \lg(e)}$$

The equivalent absorption area A2, in square metres, of the reverberant chamber containing a test sample is calculated using the formula:

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$$A_2 = \frac{55{,}3V}{cT_2} - 4Vm_2$$

Where

V and c have the same meaning as in the previous paragraph;

T_2 reverberation time, in seconds, of the reverberant chamber after the test sample has been placed;

m_2 attenuation coefficient in air, in m^{-1}, calculated according to ISO 9613-1 with respect to the climatic conditions that existed in the reverberant chamber including the sample.

The equivalent absorption area A, in square metres, is calculated using the formula:

$$A_T = A_2 - A_1 = 55{,}3V\left(\frac{1}{c_2T_2} - \frac{1}{c_1T_1}\right) - 4V\left(m_2 - m_1\right)$$

Where

c_1 is the speed of sound propagation in air at temperature t_1;

c_2 is the speed of sound propagation in air at temperature t_2;

A_1, V, T_1, m_1, A_2, T_2 and m_2 have the same meanings as in the preceding paragraphs.

The sound absorption coefficient α of the sample is calculated using the formula:

$$\alpha_s = \frac{A_T}{S}$$

Where

A_T is the equivalent absorption area A, in square metres

S is the number of installed elements (4 pc)

3.3 Instruments and gauges used

Norsonic type 118 – Integration sound-level meter of accuracy 1 complying with EC 60651, 60804, 61672-1, and 61260, primary memory for 2,500,000 pieces of data. Serial number 32127, 8012-OL-10114-20, valid till: 08/03/2022

Norsonic type 118 – Integration sound-level meter of accuracy 1 complying with EC 60651, 60804, 61672-1, and 61260, primary memory for 2,500,000 pieces of data. Serial number 31991, 8012-OL-10112-20, valid till: 08/03/2022

Microphone Norsonic type 1225 and pre-amp type 1205, serial No. 92003, test sheet No. test sheet: 8012-OL-10115-20, valid till: 08/03/2022

Microphone Norsonic type 1225 and pre-amp type 1205, serial No. 72839, test sheet No. test sheet: 8012-OL-10113-20, valid till: 08/03/2022

Norsonic acoustic calibrator, type 1251, serial No.: 31612. This meter complies with the requirements of IEC 942, 8012-KL-10116-20, valid till: 08/03/2022

Combined thermometer, moisture meter and barometer Testo 622, serial No. 39507662/506, registration No. 431, Calibration data sheets: temperature No. 0778/16 valid till 29 February 2021, relative humidity No. 2016/3832 valid till 26 September 2021, atmospheric pressure No. 0395/2016 valid till 15 February 2021

Sound field excitation set, Norsonic hemisphere, type 250 (120 dB)

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3.4 Determination of sound absorption, α_w according to ČSN EN ISO 354: 2003 and ČSN EN ISO 11654:1998

Performance	Units of measure	Class	Calculated value	
			Weighted sound absorption coefficient α_w Verbal description VDI 3755:2015-01	Extended measurement uncertainty
Determination of the weighted sound absorption coefficient, α_w VZ040211047 Partition Flexi 1200 x 1700H blue fabric EU, number of installed elements 4 pieces	---	C	0.75 (MH) high absorptive	± 0.07
Determination of the weighted sound absorption coefficient, α_w VZ040211046 Partition Flexi 1600 x 650H blue fabric EU, number of installed elements 4 pieces	---	C	0.70 (MH) high absorptive	± 0.07

The stated expanded measurement uncertainty is the product of the standard measurement uncertainty and the expansion coefficient k=2, which corresponds to about 95% coverage probability for normal distribution. The expanded measurement uncertainty was determined pursuant to ČSN EN ISO 12999-2:2021.

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END OF REPORT

Sound absorption coefficient according to ČSN EN ISO 11654

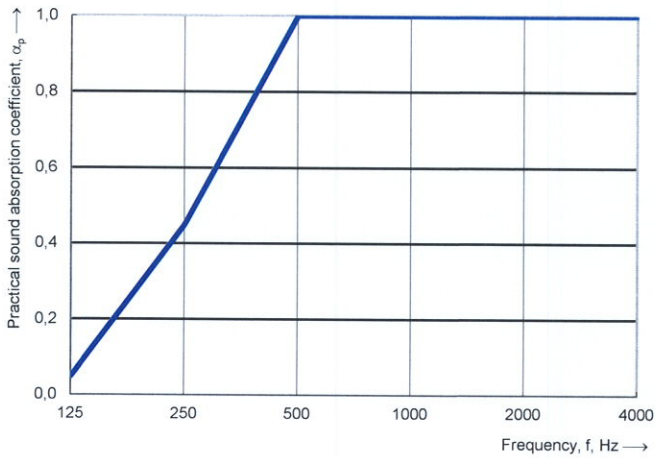
Measurement of sound absorption coefficient in a reverberation room

Client:	DROMEAS S.A. Papapanagiotou, Industrial Area of Serres, Serres 62121	Date of test:	20.5.2021
Description:	DROMEAS S.A. Papapanagiotou, Industrial Area of Serres, Serres 62121		

Object: VZ040211047, Partition Flexi 1200 x 1700H Blue Fabric EU

		Empty reverberation room:		Reverberation room with object:	
Surface area:	4,00 m2	Relative humidity:	60,5 %	Relative humidity:	60,2 %
Reverberation room volume:	206,2 m3	Temperature:	15,0 °C	Temperature:	15,0 °C
		Barometric Pressure:	993 kPa	Barometric Pressure:	993 kPa

Frequency f [Hz]	α_p
125	0,05
250	0,45
500	1,00
1000	1,00
2000	1,00
4000	1,00



Weighted sound absorption coefficient according to ISO 11654

α_w = 0,75 (MH)

No. of test report: Annex No. 1 to Report No. 040-67544

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Sound absorption coefficient according to ČSN EN ISO 11654

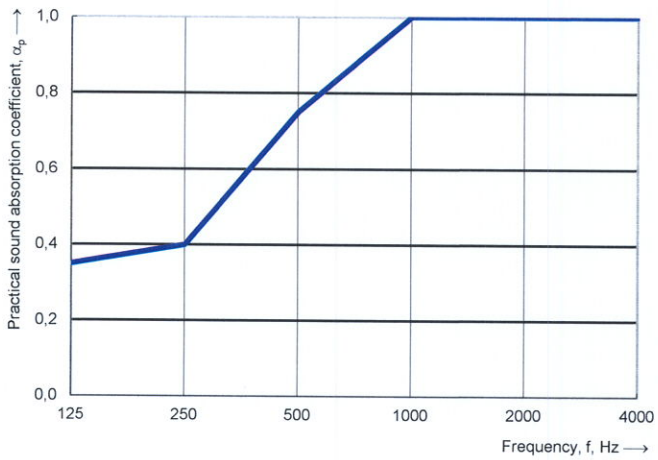
Measurement of sound absorption coefficient in a reverberation room

Client:	DROMEAS S.A. Papapanagiotou, Industrial Area of Serres, Serres 62121	Date of test:	21.05.2021
Description:	DROMEAS S.A. Papapanagiotou, Industrial Area of Serres, Serres 62121		

Object: VZ040211046, Partition Flexi 1600x650H Blue Fabric EU

		Empty reverberation room:		Reverberation room with object:	
Surface area:	4,00 m2	Relative humidity:	65,8 %	Relative humidity:	66,2 %
Reverberation room volume:	206,2 m3	Temperature:	15,0 °C	Temperature:	15,0 °C
		Barometric Pressure:	986 kPa	Barometric Pressure:	986 kPa

Frequency f [Hz]	α_p
125	0,35
250	0,40
500	0,75
1000	1,00
2000	1,00
4000	1,00



Weighted sound absorption coefficient according to ISO 11654

α_w = 0,70 (MH)

No. of test report: Annex No. 2 to Report No. 040-67544

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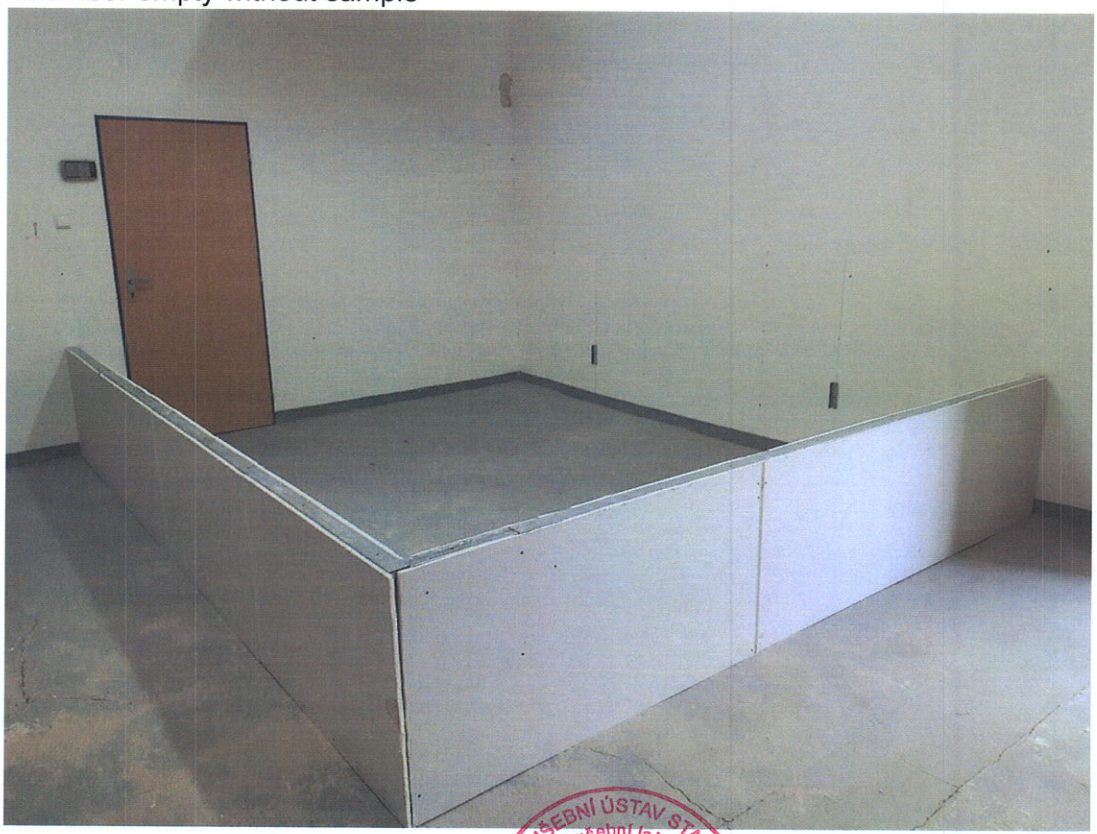
Annex 3 to Protocol No 040-067544

VZ040211046, Partition Flexi 1600 x 650H blue fabric EU

Chamber with sample installed

Chamber empty without sample



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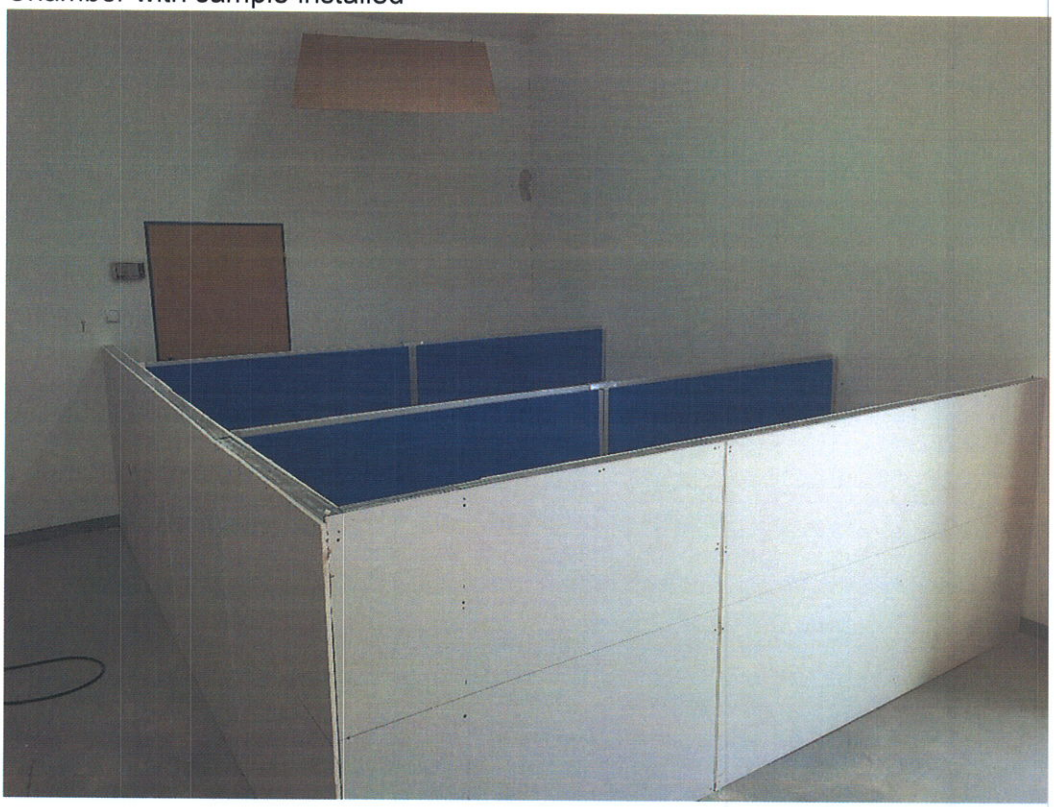
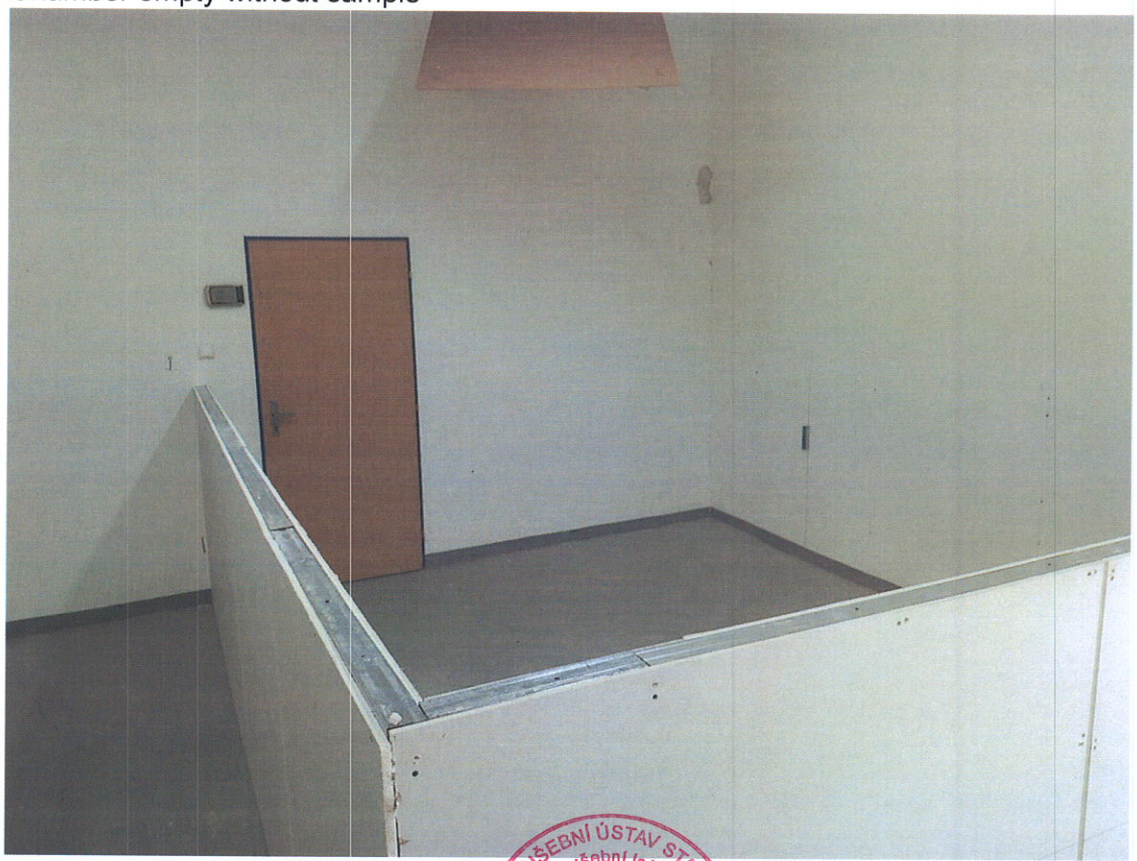
Annex 3 to Protocol No 040-067544

VZ040211047, Partition Flexi 1200 x 1700H blue fabric EU

Chamber with sample installed



Chamber empty without sample



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