AB 207

DEPARTMENT LABORATORY OF FIRE ALARM SYSTEMS AND FIRE AUTOMATION – BA

SCIENTIFIC AND RESEARCH CENTRE FOR FIRE PROTECTION – National Research Institute

CNBOP-PIB

ul. Nadwiślańska 213, 05-420 Józefów k. Otwocka,
Phone No's: operator: +48 22 769 32 00 FAX: +48 22 769 33 56
office: +48 22 769 33 00
www.cnbop.pl e-mail: cnbop@cnbop.pl

Research work

TEST REPORT No. 1354/BA/18, Number of pages 29

CUSTOMER Name and contact information	Queen (Xiamen) Electronic Co. Ltd. No. 3 Factory Building. No. 333 Tong Fu Road, Tongan Industrial Zone, Xiamen City, Fujian Province People's Republic of China
DESCRIPTION AND IDENTIFICATION OF TESTED PRODUCT SAMPLE	The voice alarm loudspeaker type: CVS 301 CVS 301-BK CVS 401 CVS 401-BK CVS 601 CVS 601-BK CVS 801 CVS 801-BK

Report copy no.	1

CENTRUM NAUKOWO-BADAWCZE im. Józefa Tuliszkowskiego PAŃSTWOWY INSTYTUT BADAWCZY OCHRONY PRZECIWPOŻAROWEJ

Józefów, May 24th, 2019

TABLE OF CONTENTS

1. FORMAL BASIS FOR TESTING

Order letter of November 19th, 2018, contract no. 1354/BA/18 dated November 26th, 2018.

2. TESTED PRODUCT SAMPLES

2.1. Name of product, type, dimensions and other markings

The voice alarm loudspeakers type CVS 301, CVS 401, CVS 601, CVS 801 have marking label as shown on below drafts:

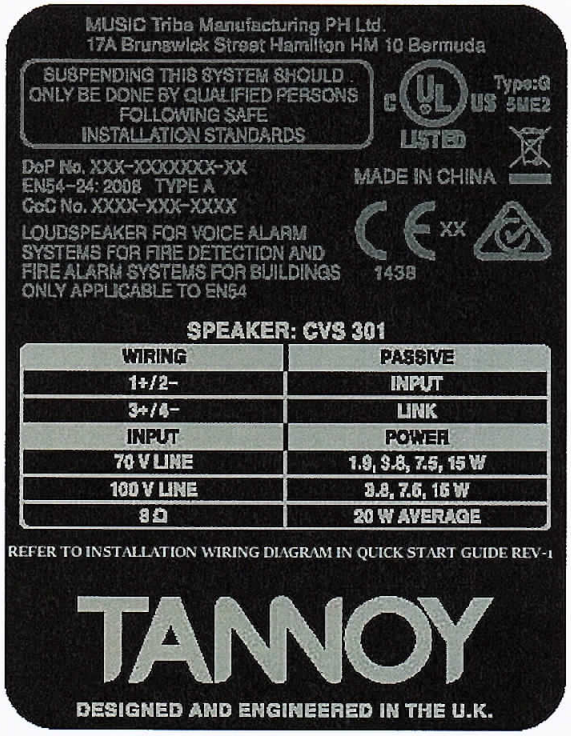


Fig. 1. The label of a loudspeaker type CVS 301

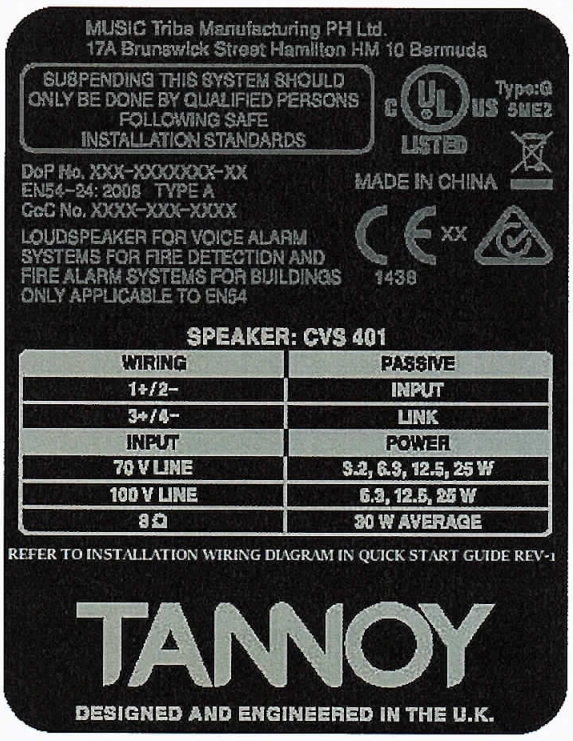


Fig. 2. The label of a loudspeaker type CVS 401

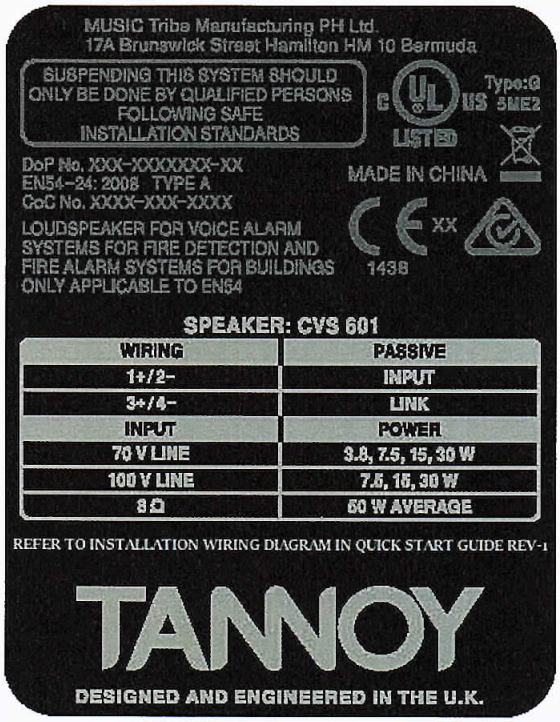


Fig. 3. The label of a loudspeaker type CVS 601

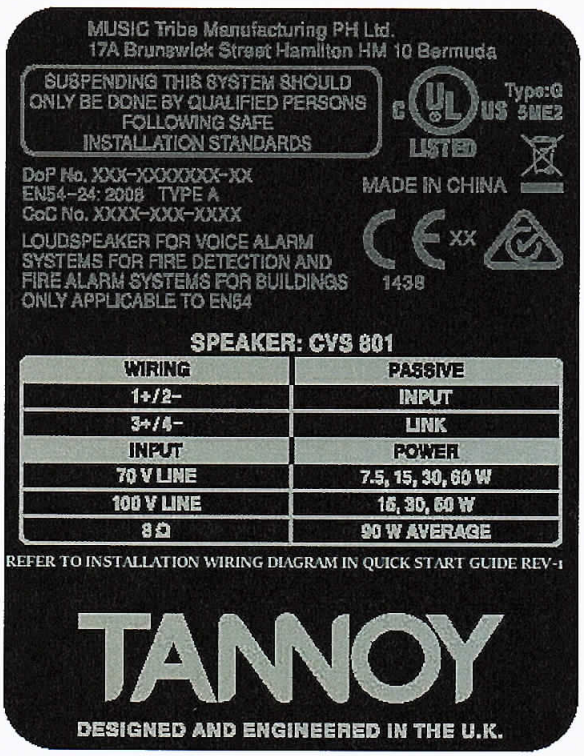


Fig. 4. The label of a loudspeaker type CVS 801

2.2. General technical description of the product

The ceiling loudspeakers type CVS 301, CVS 301-BK, CVS 401, CVS 401-BK, CVS 601, CVS 601-BK, CVS 801, CVS 801-BK are dedicated to use in voice alarm systems and can be mounted inside the buildings.

Loudspeakers type CVS 301 have enclosures made of artificial material, aluminum and steel. Every loudspeaker consists of driver, transformer, plastic connection terminal.

Loudspeakers type CVS 401 have enclosures made of artificial material, aluminum and steel. Every loudspeaker consists of medium and high range drivers, transformer, plastic connection terminal, crossover type 81-CVS401-C.

Loudspeakers type CVS 601 have enclosures made of artificial material, aluminum and steel. Every loudspeaker consists of medium and high range drivers, transformer, plastic connection terminal, crossover type 81-CVS601-C.

Loudspeakers type CVS 801 have enclosures made of artificial material, aluminum and steel. Every loudspeaker consists of medium and high range drivers, transformer, plastic connection terminal, crossover type 81-CVS401-C.

The loudspeakers are manufactured in white colour of the front panel (CVS 301, CVS 401, CVS 601, CVS 801) and black colour (CVS 301-BK, CVS 401-BK, CVS 601-BK, CVS 801-BK)

The CVS 301, CVS 401, CVS 601, CVS 801 loudspeakers parameter card:

Type of information	Technical details declared by producers/customer and verified by the Laboratory
Type of loudspeaker	Ceiling
The loudspeaker has got „fire dome" enclosure (Yes/No)	Yes
Mounting method to the wall or to the ceiling	Mounted to the suspended ceilings by use of squeeze clamps.
Type of dedicated equalizer	N/A
Type of transformer	70-48502108-C – CVS 301 70-48502408-C1 – CVS 401 70-48502408-C – CVS 601 70-66702808-C – CVS 801
Rated noise power [W]	15 – CVS 301 25 – CVS 401 30 – CVS 601 60 – CVS 801
Rated noise power for 100V line, transformer tapping options [W]	15/7,5/3,8 – CVS 301 25/12,5/6,3 – CVS 401 30/15/7,5 – CVS 601 60/30/15 – CVS 801
Rated noise power for another lines, transformer tapping options [W]	15/7,5/3,8/1,9 (70V) – CVS 301 25/12,5/6,3/3,2 (70V) – CVS 401 30/15/7,5/3,8 (70V) – CVS 601 60/30/15/7,5 (70V) – CVS 801
Rated impedance [Ω] for each transformer tapping options	333/666/1333/2666 – CVS 301 200/400/800/1600 – CVS 401 163/333/666/1333 – CVS 601 82/166/333/666 – CVS 801
Loudspeaker rated impedance [Ω]	8
Sensitivity [dB]	73 – CVS 301 72 – CVS 401 78 – CVS 601 78 – CVS 801
Maximum sound pressure level (rated noise power / 4m), [dB]	86 – CVS 301 87 – CVS 401 95 – CVS 601 98 – CVS 801
Coverage angle 500 Hz [°]	180 – CVS 301 180 – CVS 401 180 – CVS 601 180 – CVS 801

Type of information	Technical details declared by producers/customer and verified by the Laboratory
Coverage angle 1 kHz [°]	180 – CVS 301 175 – CVS 401 165 – CVS 601 160 – CVS 801
Coverage angle 2 kHz [°]	165 – CVS 301 160 – CVS 401 140 – CVS 601 124 – CVS 801
Coverage angle 4 kHz [°]	166 – CVS 301 80 – CVS 401 80 – CVS 601 55 – CVS 801
Rated noise voltage [V]	70/100
Type of a terminal block (material, quantity of terminals)	Plastic connection terminal
Type of fuse (overload, thermal), range of work temperatures [°C]	Not applicable
Type of entry holes for conductors or cables	Metal cable gland
Quantity of entry holes for cables	1
Min. and max. cross-sectional of the connected conductors [mm^2]	0,8 ÷ 2,5
Working temperature, climatic category [°C]	From -10 to +55
Environmental type (A or B)	A
Enclosure protection degree (IP)	21C
Dimensions (max. diameter x max. depth) of the loudspeaker with an enclosure [mm]	Ø200 x 169 – CVS 301 Ø200 x 188 – CVS 401 Ø253 x 246 – CVS 601 Ø304 x 250 – CVS 801
Diameter of the diaphragm (max. diameter) [mm]	Ø70 – CVS 301 Ø90 – CVS 401 Ø145 – CVS 601 Ø178 – CVS 801
Dimensions of the magnetic gap (diameter x depth)	Ø65x12 – CVS 301 Ø70x15 – CVS 401 Ø85x15 – CVS 601 Ø90x17 – CVS 801
Weight [kg]	1,80 – CVS 301 2,15 – CVS 401 3,10 – CVS 601 4,73 – CVS 801
Colour	White – CVS 301. CVS 401, CVS 601, CVS 801 Black – CVS 301-BK, CVS 401-BK, CVS 601-BK, CVS 801-BK
Enclosure material (e.g.: ABS, steel- type and sign)	Artificial material, aluminum, steel
Mark(s) and code(s) (for example, a serial number or batch code), by which the manufacturer can identify at least, the date or batch. Where any marking on the device uses symbols or abbreviations not in common use then these shall be explained	The date and place of production are possible to identify by bar code placed on the product.

VIEW OF TESTED PRODUCT

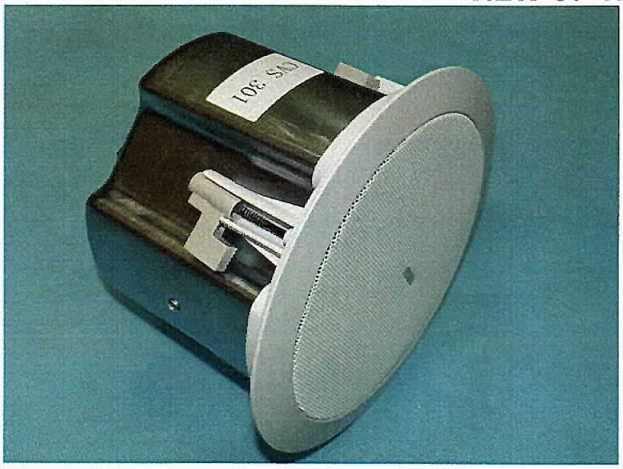


Fig. 5. The view of a loudspeaker type CVS 301

Fig. 6. The rear view of a loudspeaker type CVS 301

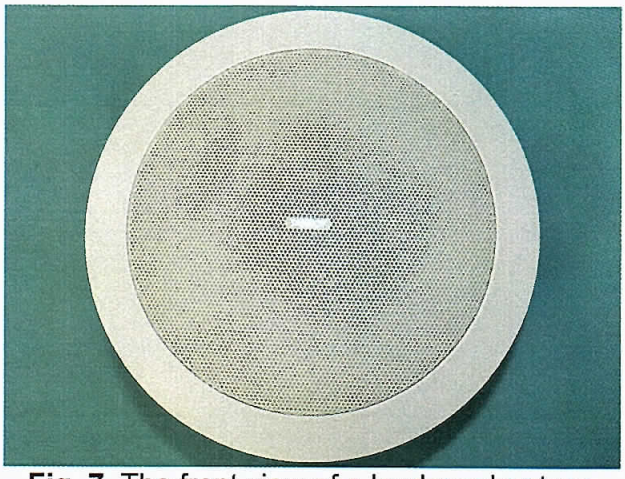


Fig. 7. The front view of a loudspeaker type CVS 301

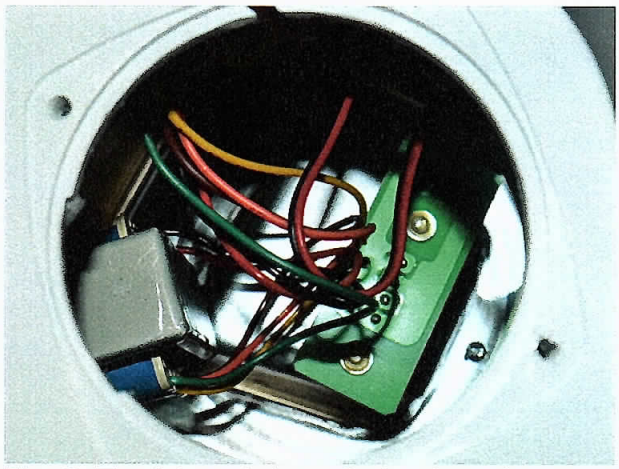


Fig. 8. The internal view of a loudspeaker type CVS 301

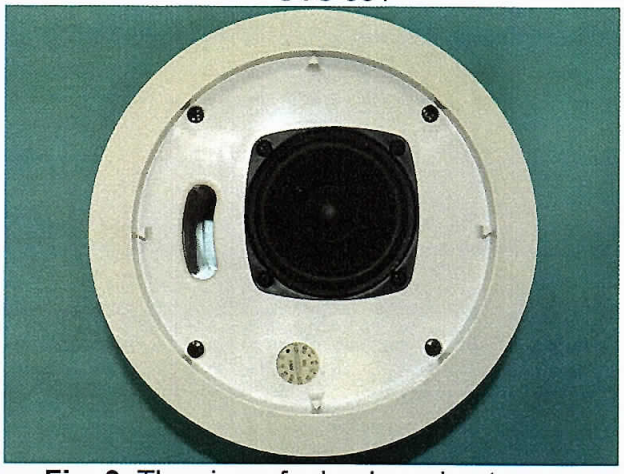


Fig. 9. The view of a loudspeaker type CVS 301 without the front grill

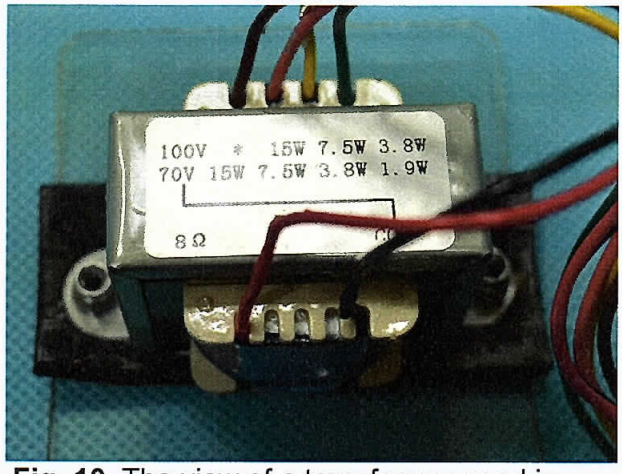


Fig. 10. The view of a transformer used in loudspeakers type CVS 301

Fig. 11. The view of a loudspeaker type CVS 401

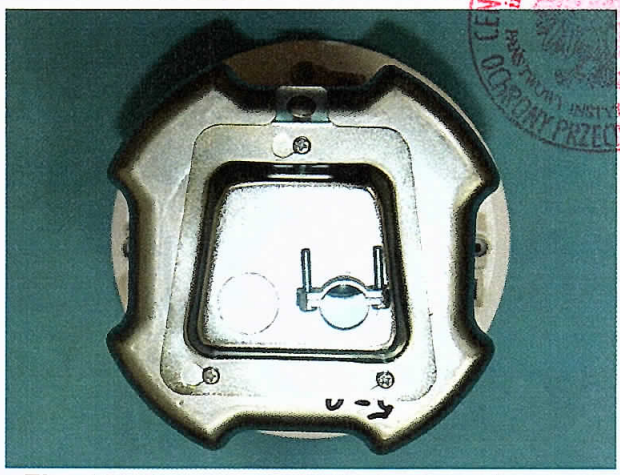


Fig. 12. The rear view of a loudspeaker type CVS 401

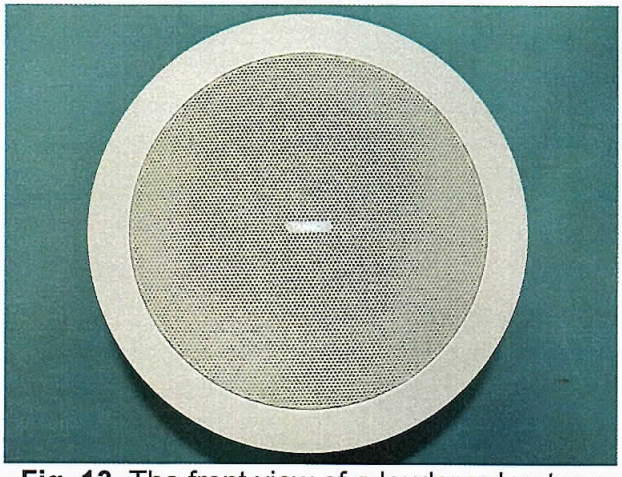


Fig. 13. The front view of a loudspeaker type CVS 401

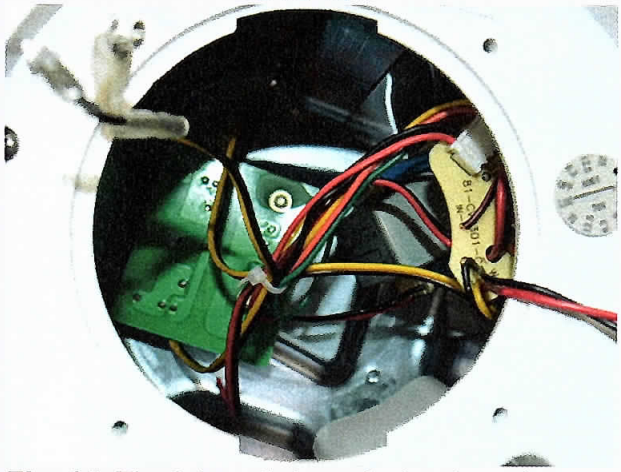


Fig. 14. The internal view of a loudspeaker type CVS 401

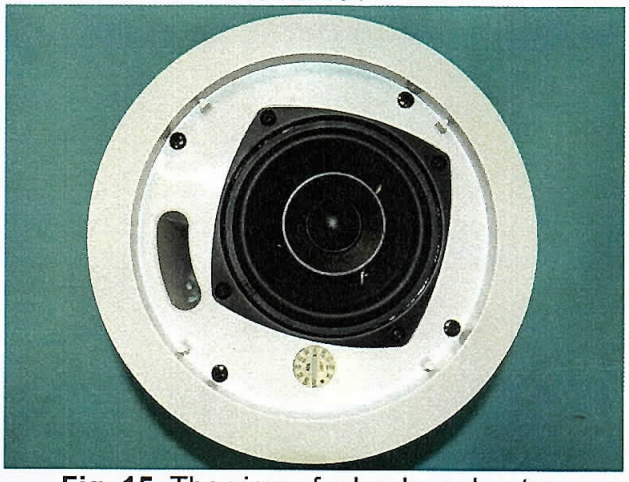


Fig. 15. The view of a loudspeaker type CVS 401 without the front grill

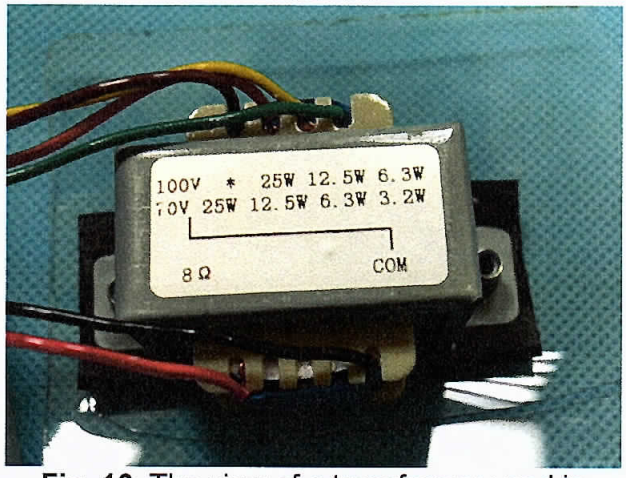


Fig. 16. The view of a transformer used in a loudspeaker type CVS 401

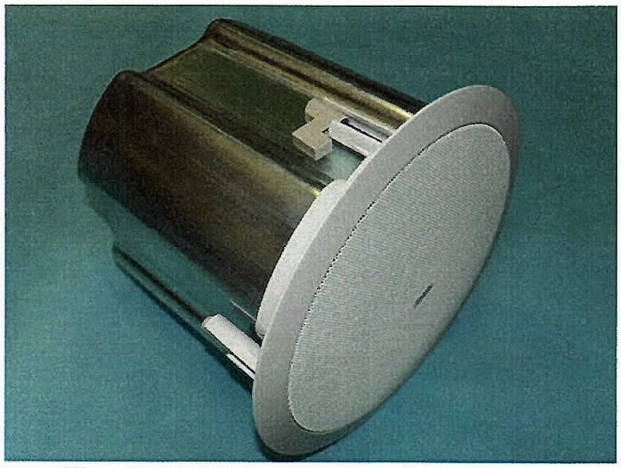


Fig. 17. The view of a loudspeaker type CVS 601

Fig. 18. The rear view of a loudspeaker type CVS 601

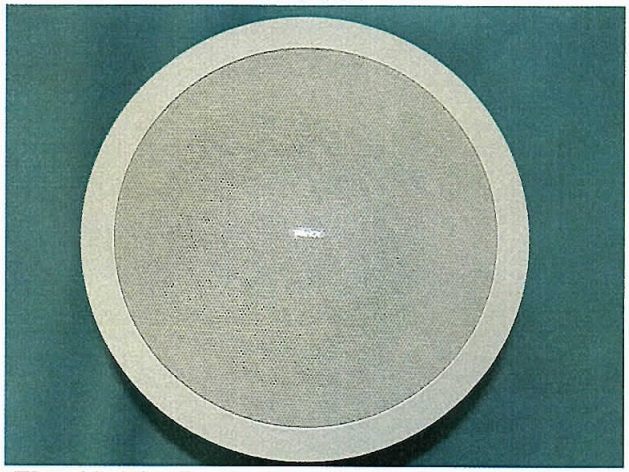


Fig. 19. The front view of a loudspeaker type CVS 601

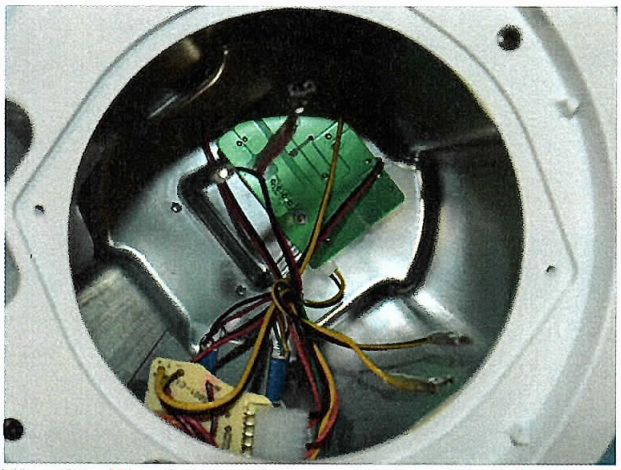


Fig. 20. The internal view of a loudspeaker type CVS 601

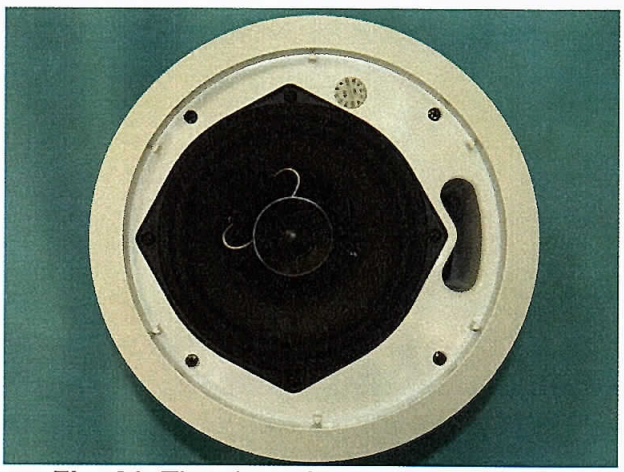


Fig. 21. The view of a loudspeaker type CVS 601 without the front grill

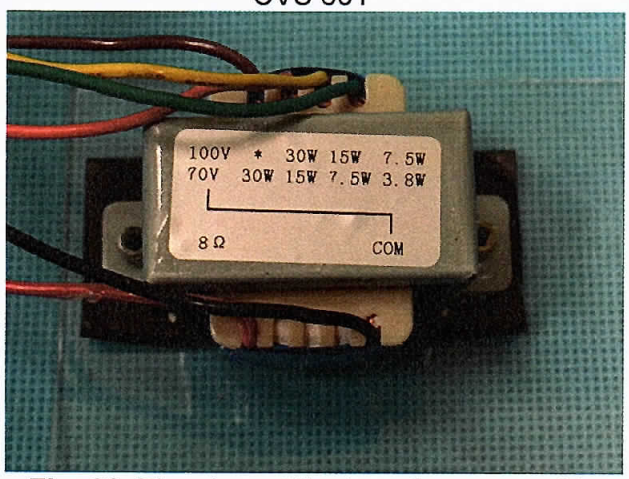


Fig. 22. The view of the transformer used in a loudspeaker type CVS 601

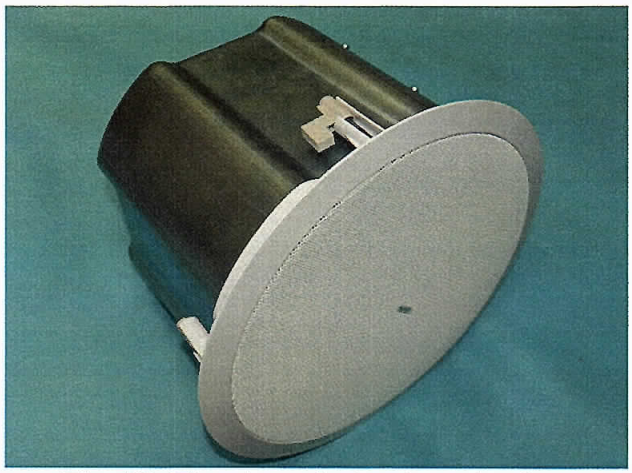


Fig. 23. The view of a loudspeaker type CVS 801

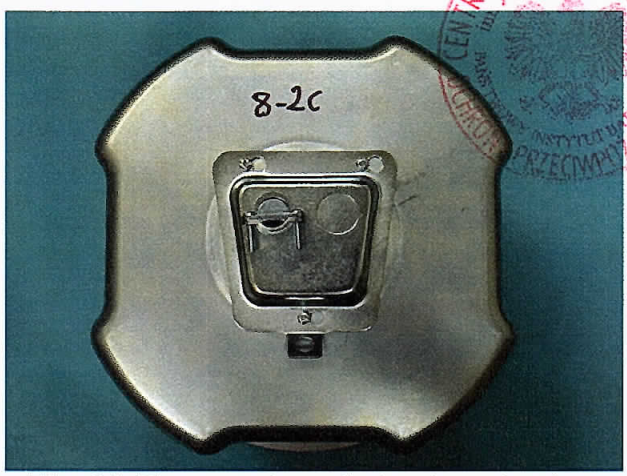


Fig. 24. The rear view of a loudspeaker type CVS 801

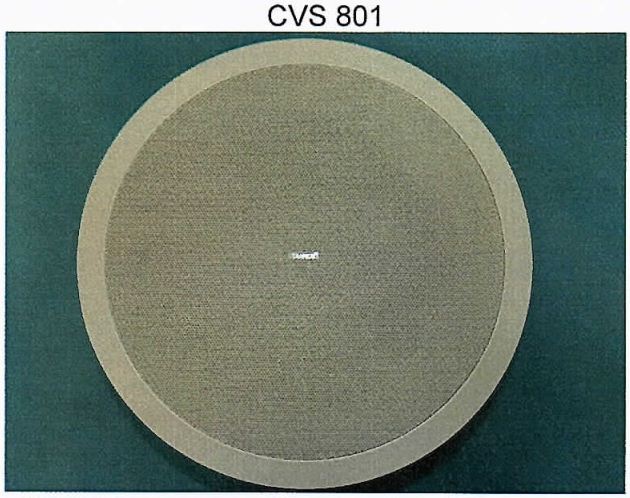


Fig. 25. The front view of a loudspeaker type CVS 801

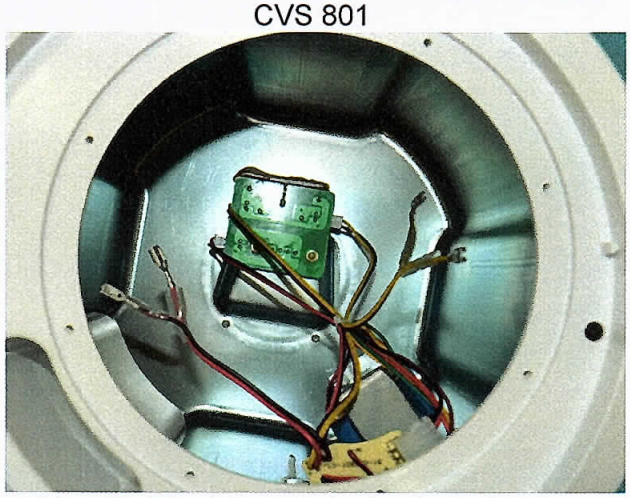


Fig. 26. The internal of a loudspeaker type CVS 801

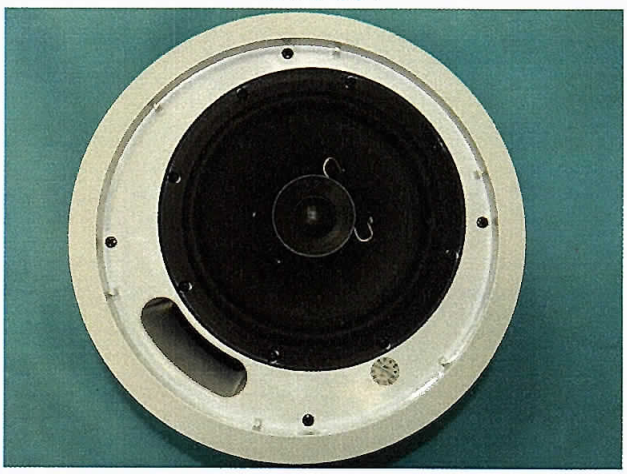


Fig. 27. The view of a loudspeaker type CVS 801 without the front grill

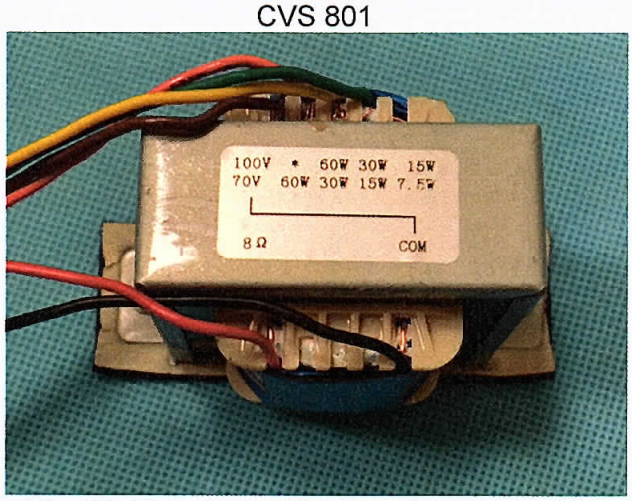


Fig. 28. The view of the transformer used in a loudspeaker type CVS 801

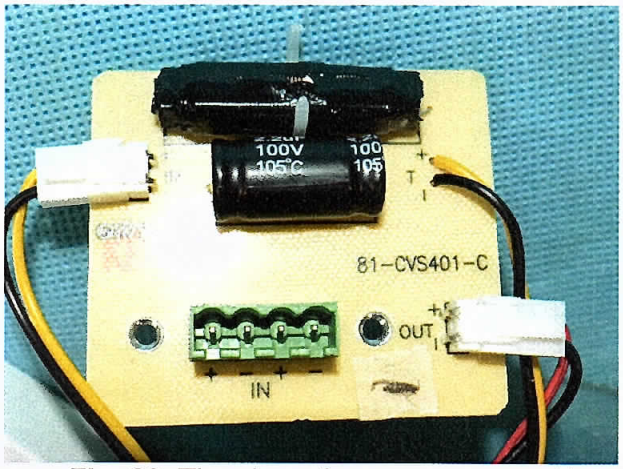


Fig. 29. The view of a crossover used in a loudspeaker type CVS 401

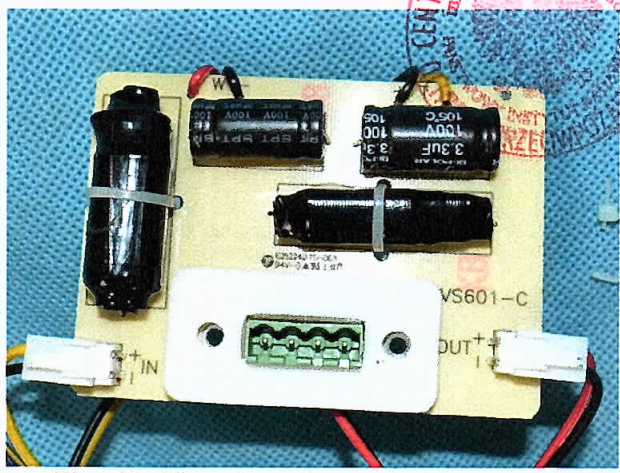


Fig. 30. The view of a crossover used in a loudspeaker type CVS 601

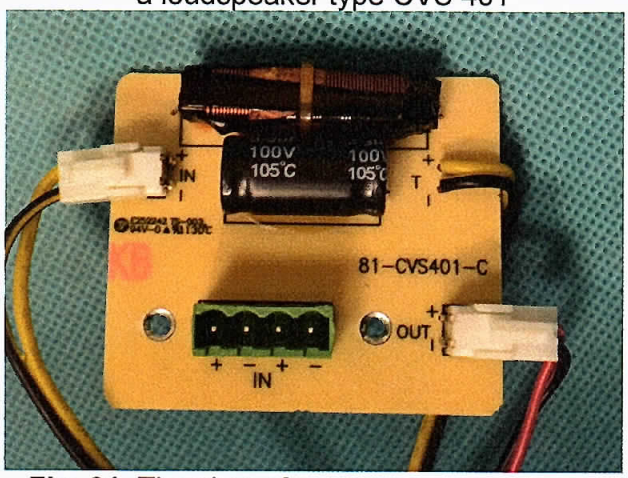


Fig. 31. The view of a crossover used in a loudspeaker type CVS 801

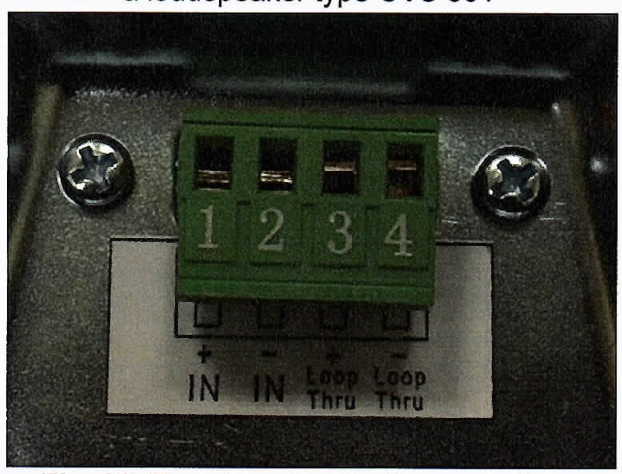


Fig. 32. The view of a plastic connection terminal used in loudspeakers CVS series

Note: The colours on the pictures can be different than in reality.

2.3. Procedure of sampling/receipt and storage of test items

The customer provided for the examination samples of the products from the serial production. The samples underwent the routine quality control at the manufacturer. The samples were chosen by a representative of the certification department. Products were delivered by the manufacturer in a transport container from the factory. The samples of products were kept in an allocated magazine, in a room temperature and normal humidity.

The loudspeakers type CVS 301 (4 pcs.), CVS 401 (4 pcs.), CVS 601 (4 pcs.), CVS 801 (4 pcs) were delivered to the Laboratory on November 26th, 2018.

Because of negative results of frequency response test for loudspeakers type CVS 301 and negative test result of rated noise power test for loudspeakers type CVS 401, CVS 601 and CVS 801 the manufacturer has delivered to the Laboratory new samples form prototype production in quantity CVS 401 (2 pcs.), CVS 601 (2 pcs.), CVS 801 (2 pcs.). The new samples were delivered on April 4th, 2019.

The list of documentation that identifies the product:

Description	Name	Date of delivery
The technical documentation for CVS 301, CVS 401, CVS 601, CVS 801 series voice alarm loudspeaker	1. Quick Start Guide	23.05.2019
	2. The drafts of marking labels	23.05.2019
	3. CVS transformers taps	24.05.2019
	4. CVS transformer specification	19.01.2019
	5. Expanded drawing of CVS 301	07.01.2019
	6. Expanded drawing of CVS 401	07.01.2019
	7. Expanded drawing of CVS 601	07.01.2019
	8. Expanded drawing of CVS 801	07.01.2019
	9. Description of changes done in the product after negative test results	16.04.2019
	10. Frequency response curves	10.01.2019

3. TEST AND TEST METHODS

3.1. Testing methods

The tests were conducted with the following standards:

PN-EN 54-24:2008	Fire detection and fire alarm systems – Part 24: Components of voice alarm systems – Loudspeakers
PN-EN 60068-2-1:2009	Environmental testing – Part 2-1: Tests. Test A: Cold
PN-EN 60068-2-2:2009	Environmental testing - Part 2: Tests. Tests B: Dry heat
PN-EN 60068-2-2:2002	Environmental testing - Part 2: Tests. Tests B: Dry heat
PN-EN 60068-2-6:2002	Environmental testing – Part 2-6: Tests. Test Fc: Vibration (sinusoidal)
PN-EN 60068-2-6:2008	Environmental testing – Part 2-6: Tests. Test Fc: Vibration (sinusoidal)
PN-EN 60068-2-27:2009	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
PN-EN 60068-2-30:2008	Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)
PN-EN 60068-2-42:2004	Environmental testing - Part 2-42: Tests - Test Kc: Sulphur dioxide test for contacts and connections
PN-EN 60068-2-75:2000	Environmental testing – Test methods – Test Eh: Hammer tests
PN-EN 60068-2-78:2007	Environmental testing – Test methods – Test Cab. Damp heat, steady state
PN-EN 60529:2003	Specification for degrees of protection provided by enclosures (IP code)

The test program:

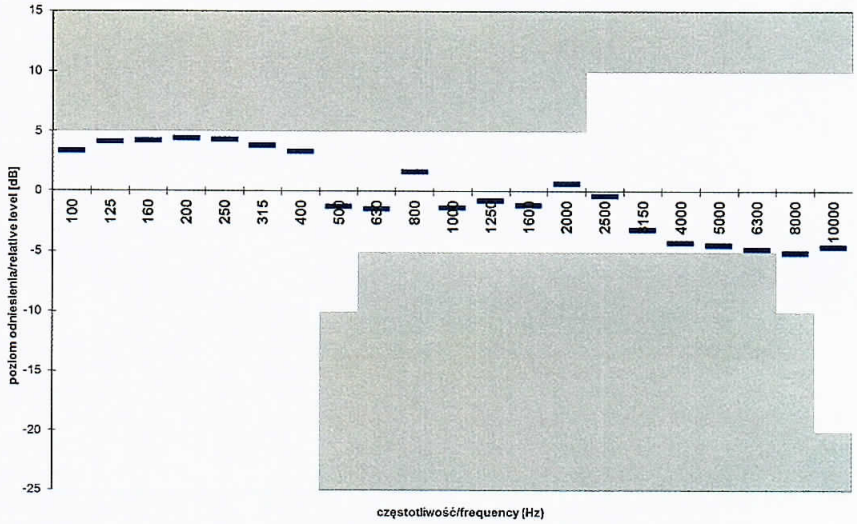
No.	Product characteristic tested	Test method according to PN-EN 54-24:2008
1.	Requirements	p.4
2.	Reproducibility (frequency response/sensitivity)	p. 5.2
3.	Rated impedance	p. 5.3
4.	Horizontal and vertical coverage angles	p. 5.4
5.	Maximum sound pressure level	p. 5.5
6.	Rated noise power – durability	p. 5.6
7.	Dry heat (operational)	p. 5.7
8.	Cold (operational)	p. 5.9
9.	Damp heat, cyclic (operational)	p. 5.10
10.	Damp heat, steady state (endurance)	p. 5.11
11.	SO_2 –corrosion (endurance)	p. 5.13
12.	Shock (operational)	p. 5.14
13.	Impact (operational)	p. 5.15
14.	Vibration sinusoidal (operational)	p. 5.16
15.	Vibration sinusoidal (endurance)	p. 5.17
16.	Enclosure protection	p. 5.18

3.2. Date of testing

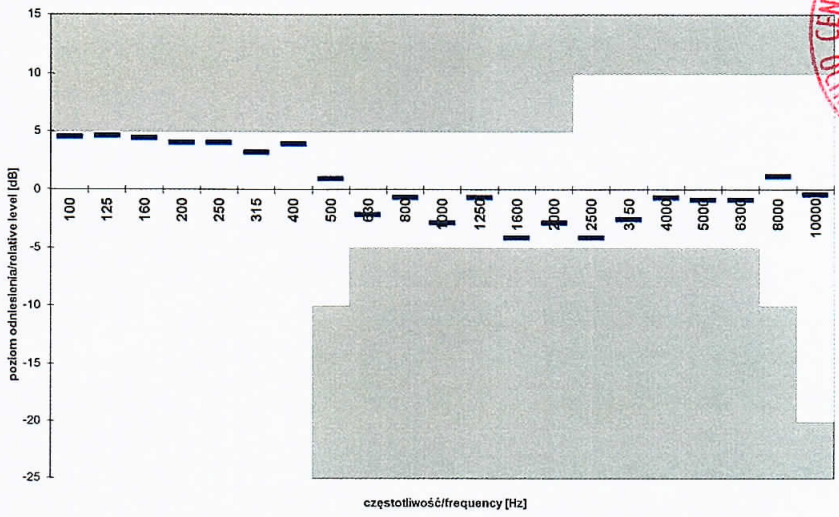
Tests commenced on January 10th, 2019, and ended on May 24th, 2019.

4. TEST RESULTS

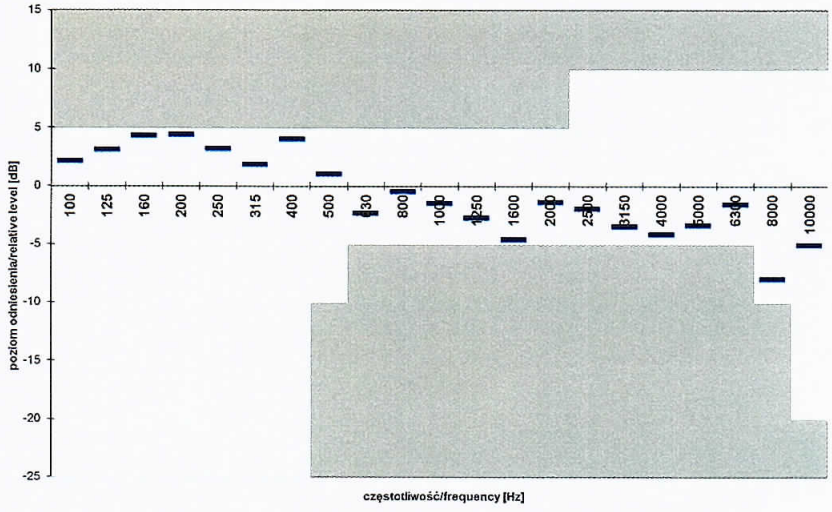
No.	Product characteristic tested	Test method according to PN-EN 54-24:2008	Test result
1.	Compliance	p.4.1	Positive
	Frequency response limits	p. 4.2	Positive
	The loudspeakers frequency response fits within the borders described in point 4.2 of EN 54-24:2008. More information in point 2 of this table.		
	Durability	p. 4.3	Positive
	The loudspeakers meet requirements of this point. More info in point 6 of this table.		
	Provision for external conductors	p. 4.4.1	Positive
	The loudspeakers have plastic connection terminal. Cables are clamped between metal surfaces without being damaged.		
	Materials	p. 4.4.2	Positive
	Tests of the enclosure material were made according EN 60695-11-20:1999+A1:2003 on samples delivered by the manufacturer on 04.04.2019, the material of enclosure of loudspeakers CVS series (black and white colour) was classified as 5VB. The test was made in Department Laboratory BW in CNBOP (accreditation no 1280), test protocols dated 13.05.2019.		
	Enclosure protection Type A: IP21C.	p. 4.4.3	Positive
	The degree of protection provided by the enclosure is IP21C. More info in point 16 of this table.		
	Access	p. 4.4.4	Positive
	Means are provided to limit access to the loudspeakers for people without special tools.		
	Marking	p. 4.5.1	Positive
	The loudspeakers are marked according requirements of point 4.5.1 of EN54-24:2008.		
	Information in the product data sheet	p. 4.5.2	Positive
	The manufacturer has delivered all required documentation.		
2.	Reproducibility (frequency response/sensitivity)	p. 5.2	Positive
	The frequency response curve fits within the limits shown in point 4.2 of EN 54-24:2008. The sound pressure levels in the 1/3 octave bands with centre frequencies from 500 Hz to 4 kHz are within ±4 dB of the manufacturer's specified curves. The sensitivity is greater than the values specified by the manufacturer.		



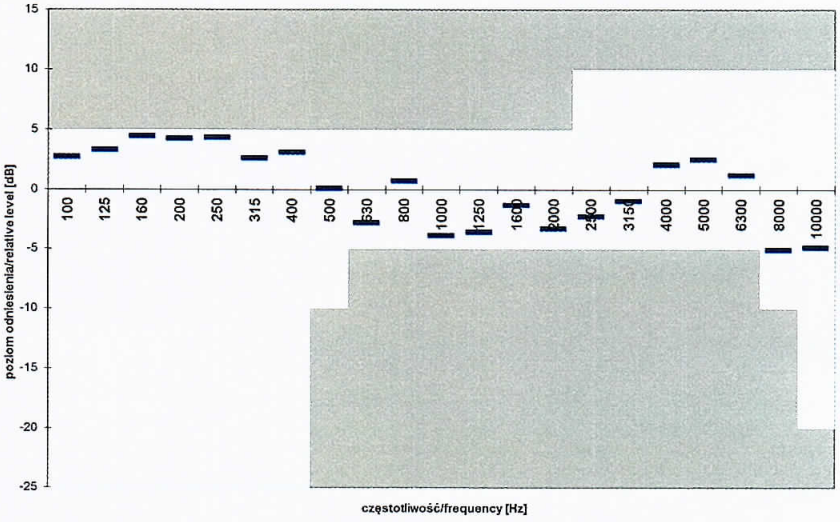
The frequency response of the loudspeaker type CVS 301



The frequency response of the loudspeaker type CVS 401



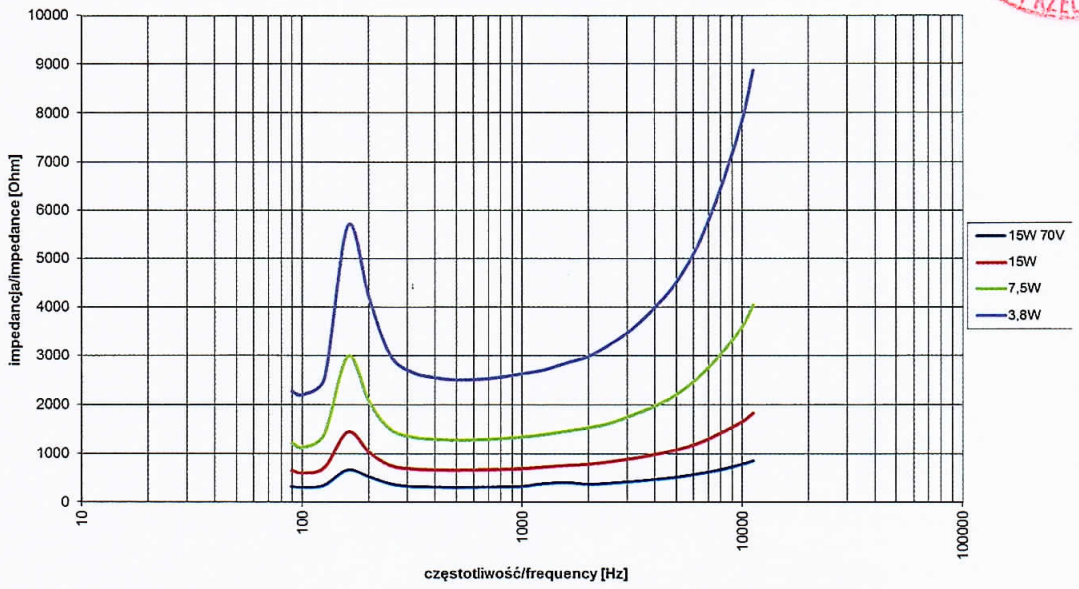
The frequency response of the loudspeaker type CVS 601



The frequency response of the loudspeaker type CVS 801

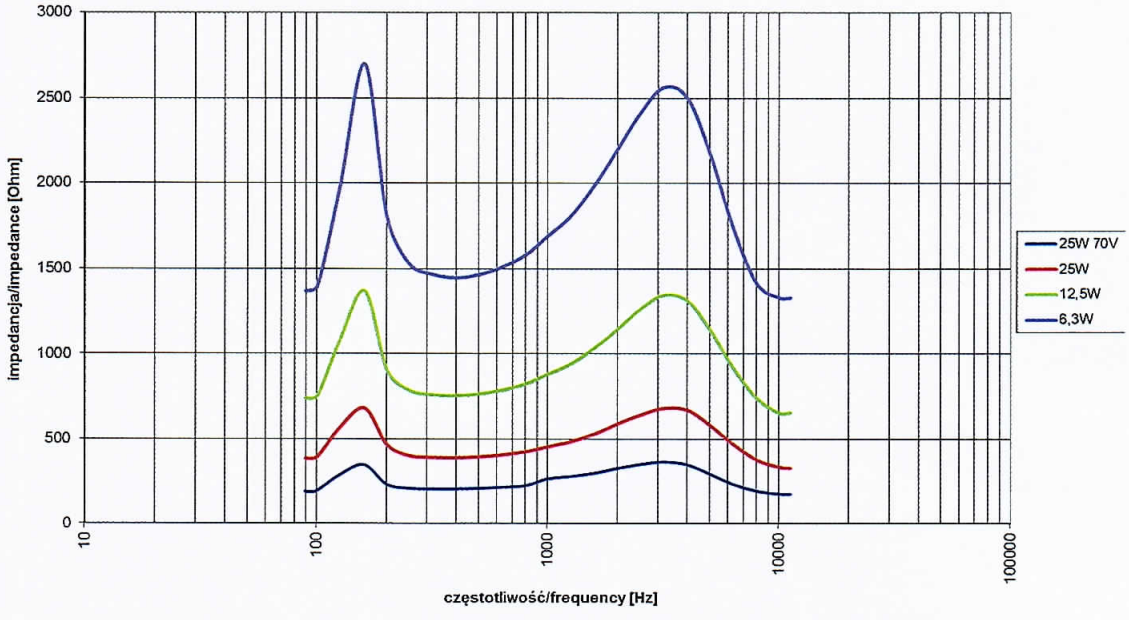
3.	Rated impedance *The lowest impedance modulus given by the ratio of the RMS voltage to the RMS current, over the full frequency range from 89 Hz to 11,2 kHz is not lower than 0,8 of the rated impedance specified by the manufacturer for each tap setting for the given frequency range.*	p. 5.3	Positive

The value of impedance over the range from 89 Hz to 11,2 kHz is not lower than 0,8 of the rated impedance specified by the manufacturer for each tap setting.



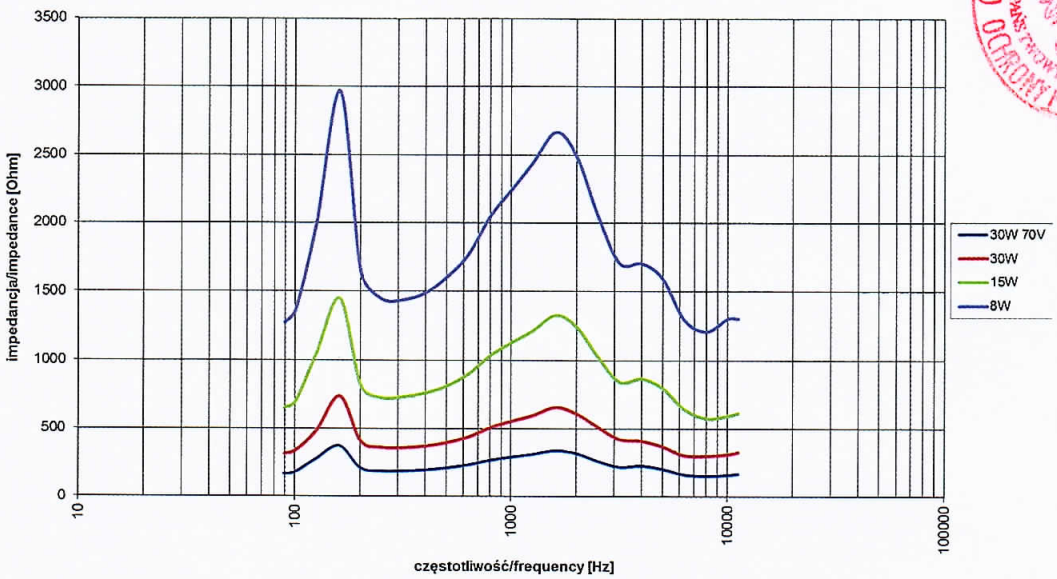
The graph of rated impedance values for CVS 301 (sample no 1)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	15 (70V)	327	317	262	+
2.	15	667	604	534	+
3.	7,5	1333	1133	1066	+
4.	3,8	2632	2203	2106	+



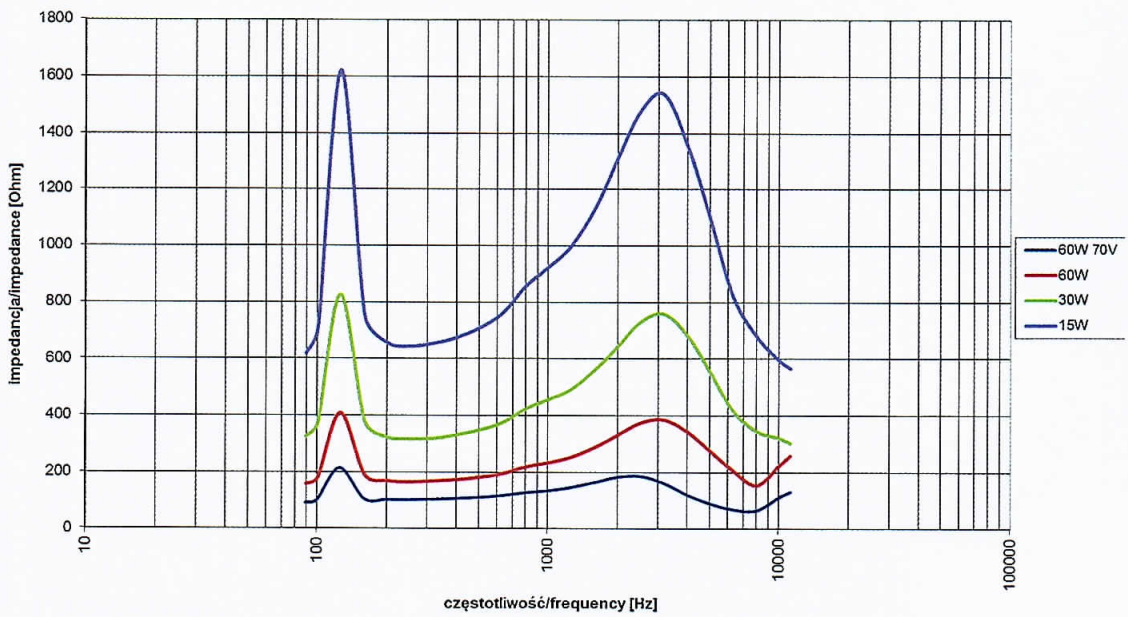
The graph of rated impedance values for CVS 401 (sample no 1a)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	25 (70V)	196	174	157	+
2.	25	400	329	320	+
3.	12,5	800	657	640	+
4.	6,3	1588	1330	1271	+



The graph of rated impedance values for CVS 601 (sample no 1b)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	30 (70V)	163	154	131	+
2.	30	333	302	264	+
3.	15	667	576	534	+
4.	7,5	1333	1210	1066	+



The graph of rated impedance values for CVS 801 (sample no 1c)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	60 (70V)	82	69	66	+
2.	60	167	153	134	+
3.	30	333	301	264	+
4.	15	667	565	534	+

4.

Horizontal and vertical coverage angles
Octave band filters centred on 500 Hz, 1kHz, 2 kHz, 4 kHz; rotate until the sound pressure level is -6dB from that recorded on the reference axis, the results shall be equal to the values specified by the manufacturer within ± 5°.

p. 5.4

Positive

The measured values of the coverage angles for octave band filters centred on 500 Hz, 1 kHz, 2 kHz and 4 kHz are equal to the values specified by the manufacturer within ±5°.

CVS 301:

Octave band filter	Declared coverage angle	Measured coverage angle
500 Hz / 1W / 4 m	180	180
1 kHz / 1 W /4 m	180	177,5
2 kHz / 1 W / 4 m	165	165
4 kHz / 1 W / 4 m	166	167,5

CVS 401:

Octave band filter	Declared coverage angle	Measured coverage angle
500 Hz / 1W / 4m	180	180
1 kHz / 1 W / 4 m	175	175
2 kHz/ 1 W / 4 m	160	157,5
4 kHz / 1 W / 4 m	80	80

CVS 601:

Octave band filter	Declared coverage angle	Measured coverage angle
500 Hz / 1W / 4 m	180	177,5
1 kHz / 1 W /4 m	165	160
2 kHz / 1 W / 4 m	140	140
4 kHz / 1 W / 4 m	80	77,5

CVS 801:

Octave band filter	Declared coverage angle	Measured coverage angle
500 Hz / 1W / 4 m	180	177,5
1 kHz / 1 W /4 m	160	157,5
2 kHz / 1 W / 4 m	124	122,5
4 kHz / 1 W / 4 m	55	50

5.

Maximum sound pressure level
Rated noise voltage, measurement distance: 4 m, the results shall be equal or higher than specified by the manufacturer.

p. 5.5

Positive

The measured value of maximum sound pressure level is greater than or equal to specified value by the manufacturer.

CVS 301:

No.	Measuring conditions	Declared SPL_D [dB]	Measured SPL_M [dB]
1	100 V / 4 m	86	87,5
2	100 V / 4 m	86	87,6
3	100 V / 4 m	86	87,5

CVS 401:

No.	Measuring conditions	Declared SPL_D [dB]	Measured SPL_M [dB]
1	100 V / 4 m	87	90,4
2	100 V / 4 m	87	90,4
3	100 V / 4 m	87	90,3

CVS 601:

No.	Measuring conditions	Declared SPL_D [dB]	Measured SPL_M [dB]
1	100 V / 4 m	95	95,4
2	100 V / 4 m	95	95,3
3	100 V / 4 m	95	95,1

CVS 801:

No.	Measuring conditions	Declared SPL_D [dB]	Measured SPL_M [dB]
1	100 V / 4 m	98	99,4
2	100 V / 4 m	98	99,4
3	100 V / 4 m	98	99,3

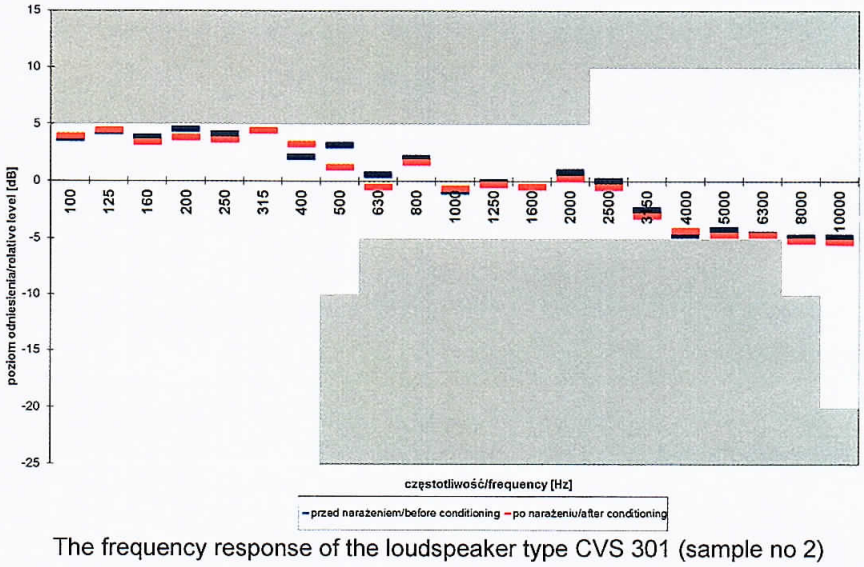
6.

Rated noise power – durability
100 h of sounding at the rated noise voltage

p. 5.6

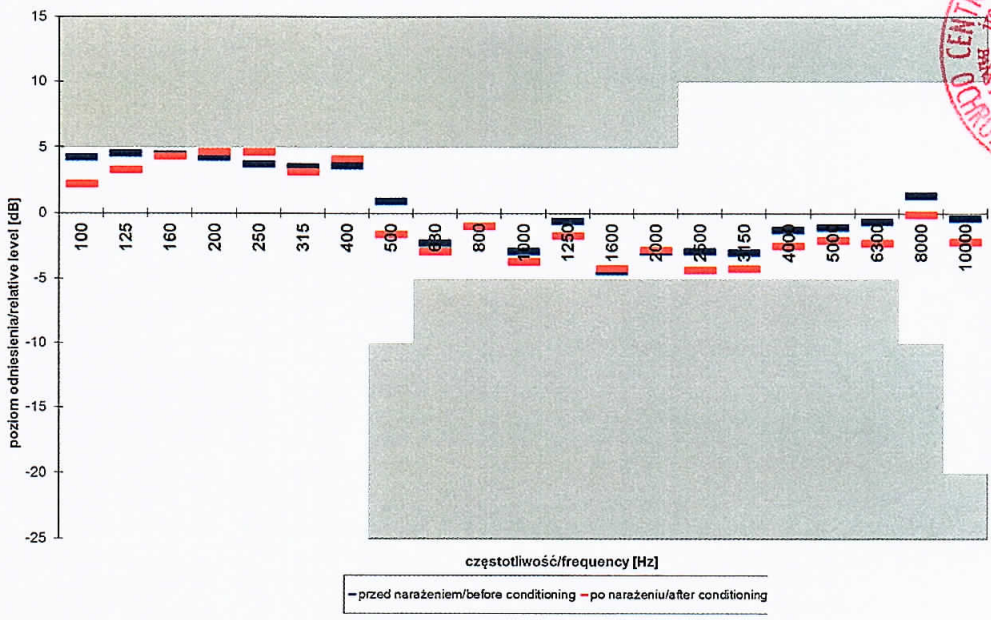
Positive

The loudspeakers type CVS 301, CVS 401, CVS 601, CVS 801 were tested to check that the rated noise power specified by the manufacturer is achieved. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008. The lowest impedance modulus is not lower than 0,8 of the rated impedance specified by the manufacturer.



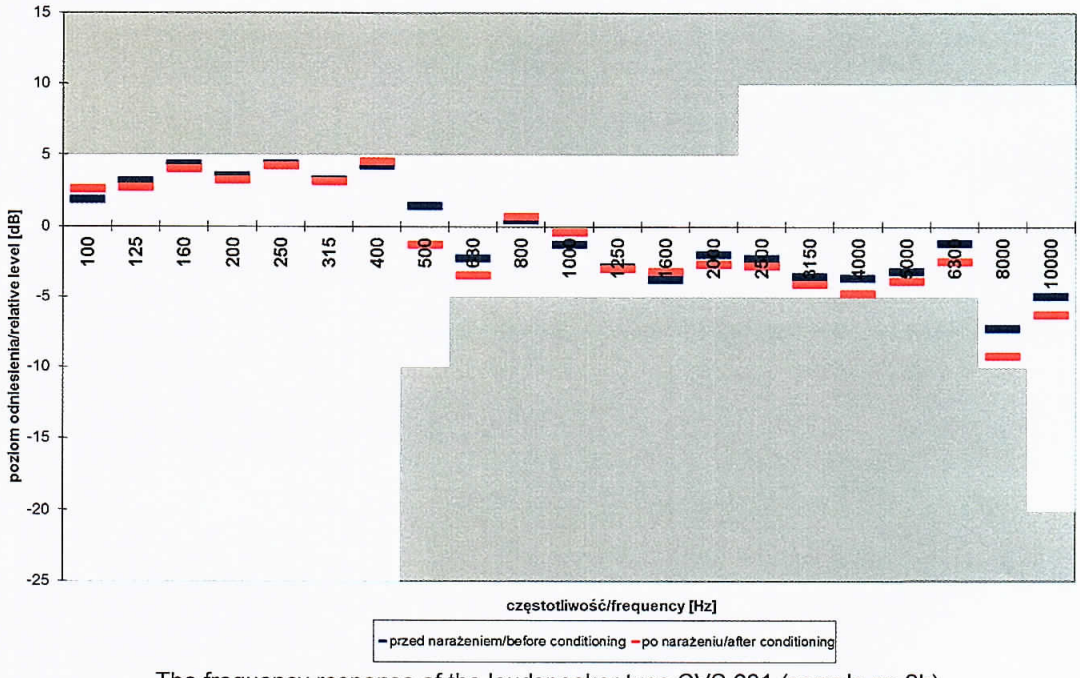
The frequency response of the loudspeaker type CVS 301 (sample no 2)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	15 (70V)	327	298	262	+
2.	15	667	587	534	+
3.	7,5	1333	1109	1066	+
4.	3,8	2632	2185	2106	+



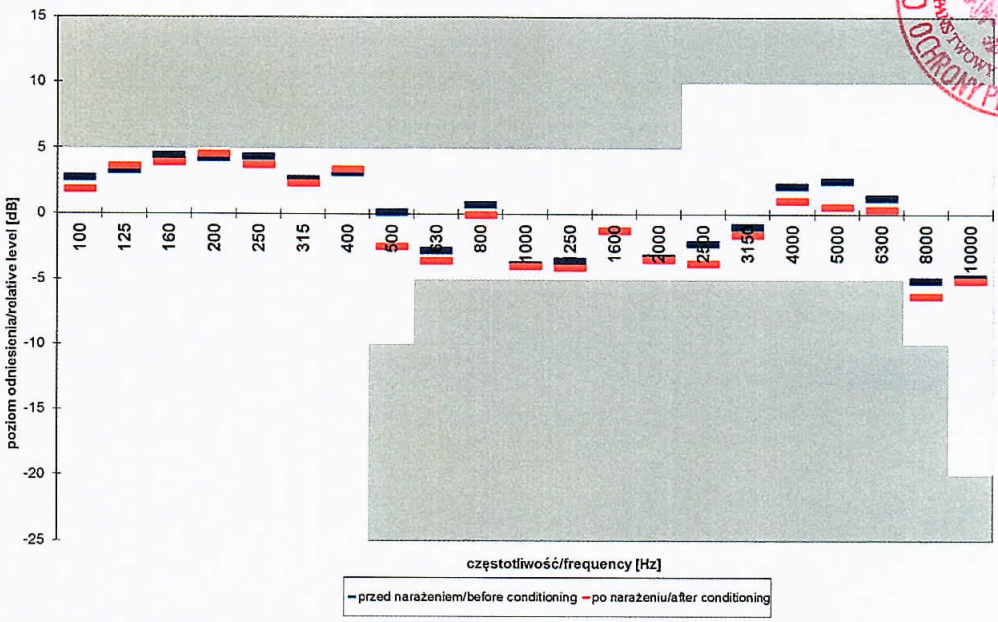
The frequency response of the loudspeaker type CVS 401 (sample no 2a)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	25 (70V)	196	183	157	+
2.	25	400	345	320	+
3.	12,5	800	6662	640	+
4.	6,3	1588	1302	1271	+



The frequency response of the loudspeaker type CVS 601 (sample no 2b)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	30 (70V)	163	148	131	+
2.	30	333	291	264	+
3.	15	667	569	534	+
4.	7,5	1333	1187	1066	+



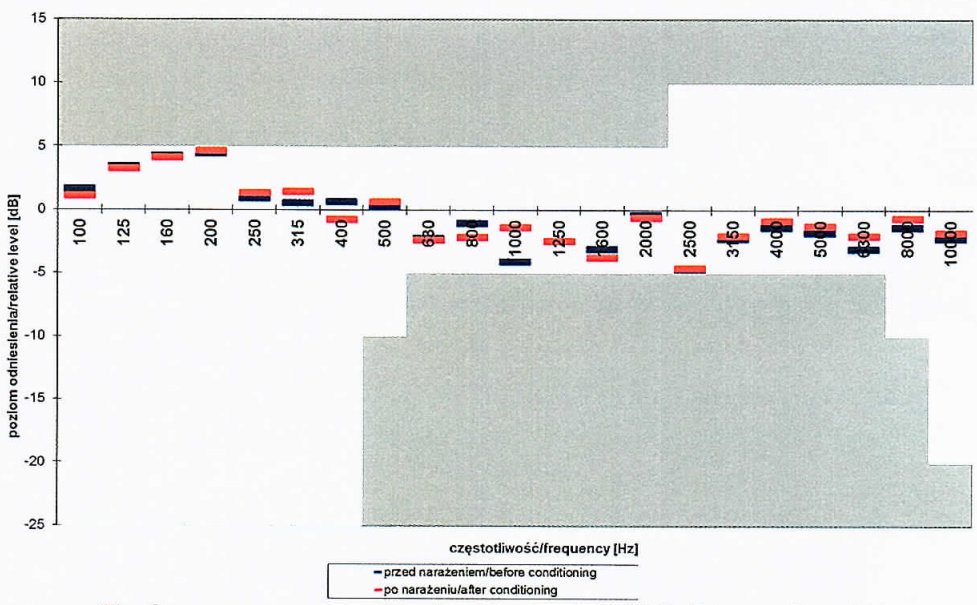
The frequency response of the loudspeaker type CVS 801 (sample no 2c)

No.	Tap setting of the transformer [W]	Declared value of the rated impedance [Ω]	The lowest measured value [Ω]	The lowest acceptable value [Ω]	Result
1.	60 (70V)	82	73	66	+
2.	60	167	146	134	+
3.	30	333	293	264	+
4.	15	667	561	534	+

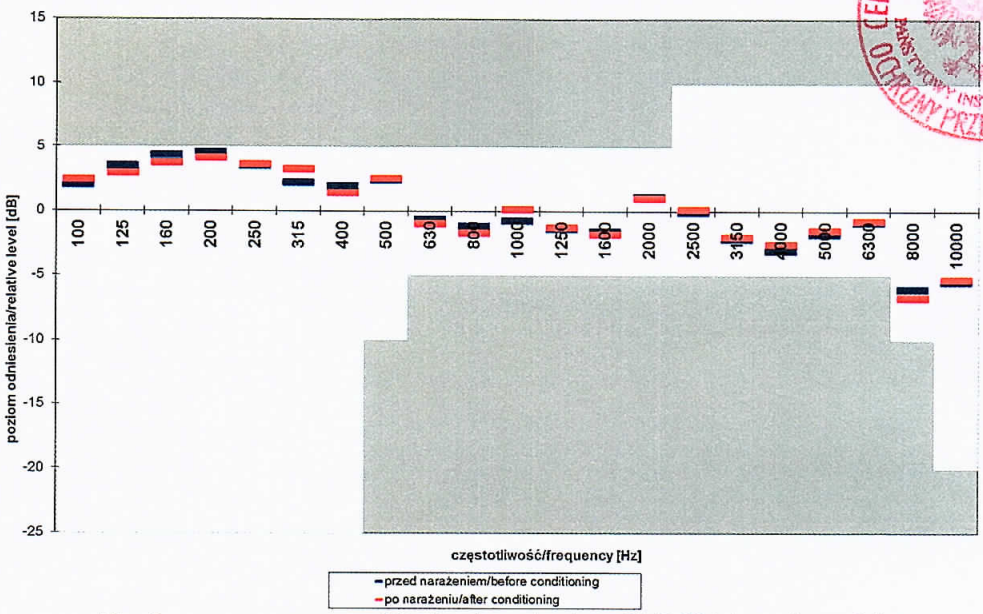
7.

Dry heat (operational) *Temperature +55 ± 2 °C, Duration 16 h.*	p. 5.7	Positive

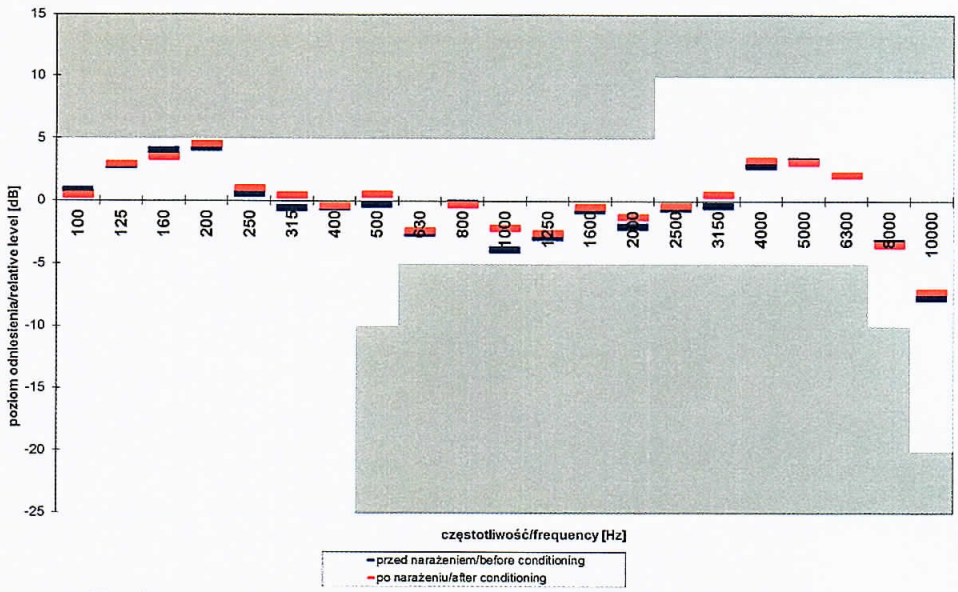
The loudspeakers type CVS 401, CVS 601, CVS 801 were tested to prove the ability to function correctly at high temperatures. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.



The frequency response of the loudspeaker type CVS 401 (sample no 3b)

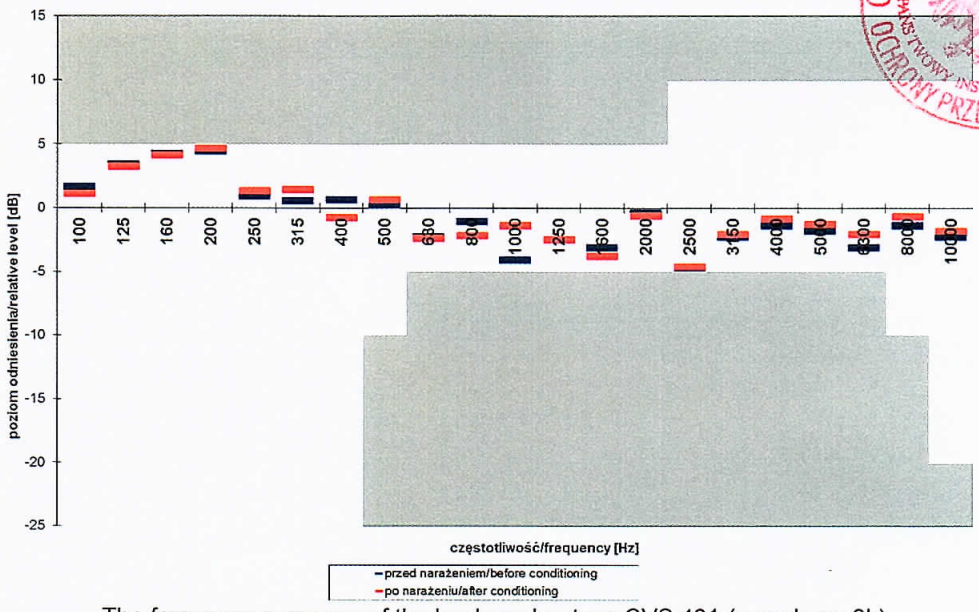


The frequency response of the loudspeaker type CVS 601 (sample no 3c)

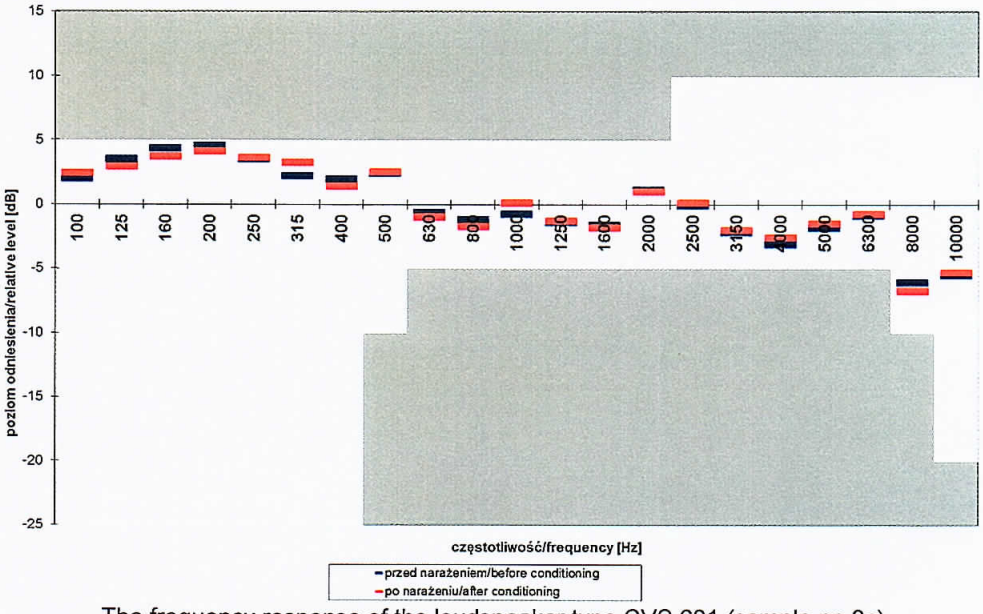


The frequency response of the loudspeaker type CVS 801 (sample no 3d)

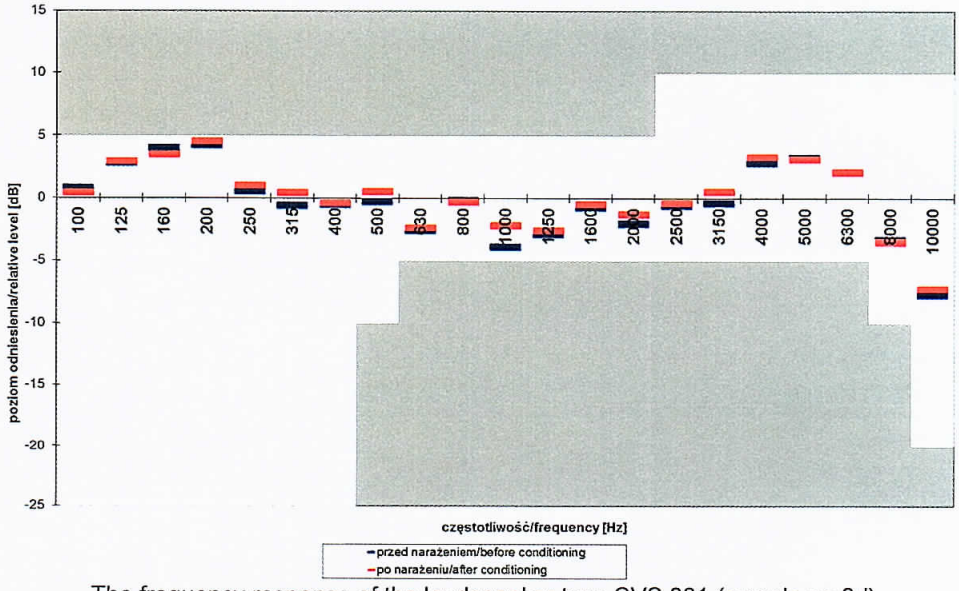
8.	Cold (operational) *Temperature -10 ± 3 °C. Duration 16 h.*	p. 5.9	Positive
	The loudspeakers type CVS 401, CVS 601, CVS 801 were tested to prove the ability to function correctly at low ambient temperatures. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.		



The frequency response of the loudspeaker type CVS 401 (sample no 3b)



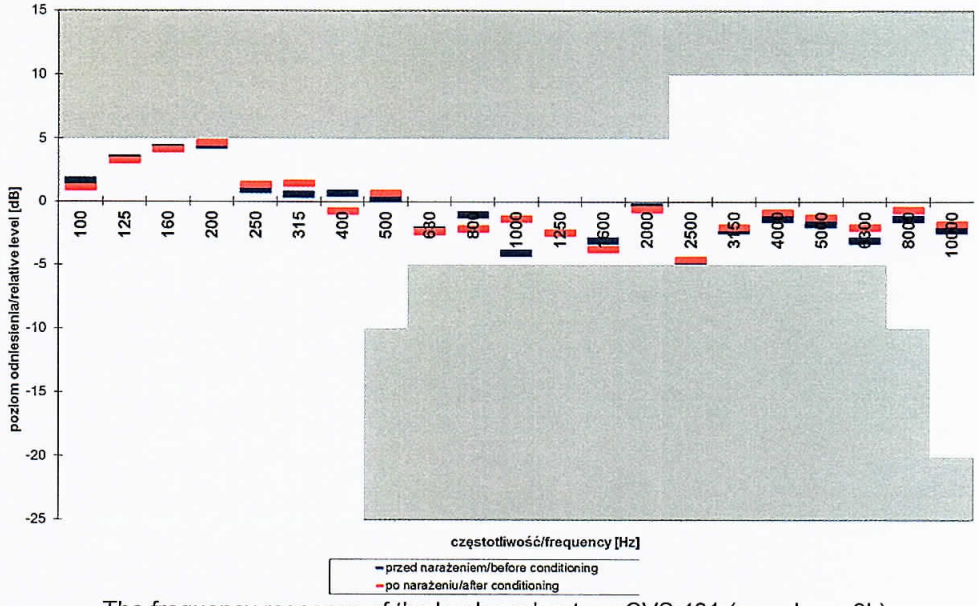
The frequency response of the loudspeaker type CVS 601 (sample no 3c)



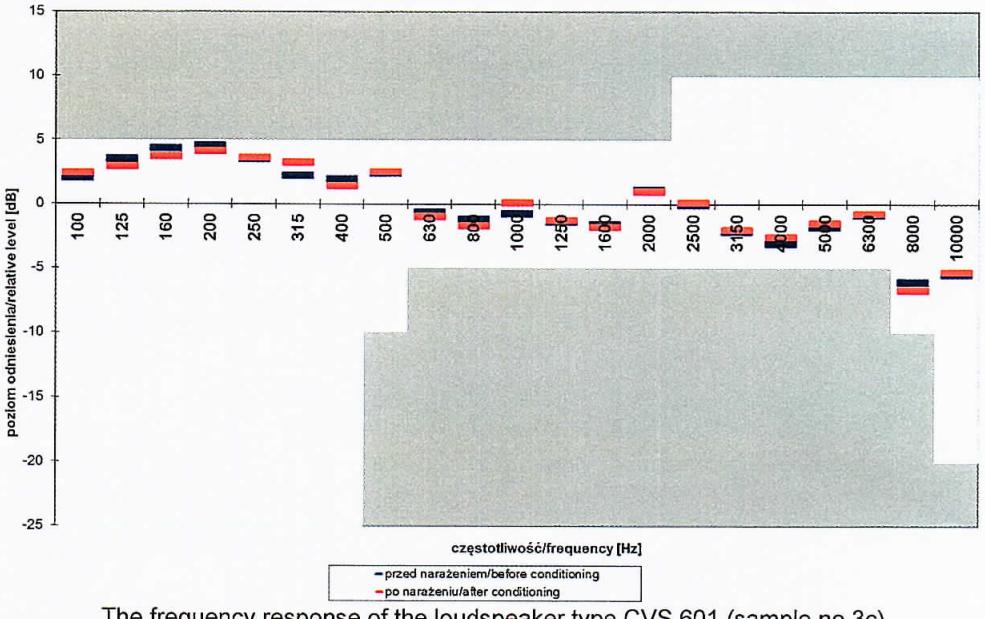
The frequency response of the loudspeaker type CVS 801 (sample no 3d)

9.	Damp heat, cyclic (operational) *Lower temperature. +25 ± 3 °C by relative humidity >95%. Upper temperature: +40 ± 2 °C by relative humidity 93 ± 3 %. Number of cycles 2. Duration of one cycle: 24 h*	p. 5.10	Positive

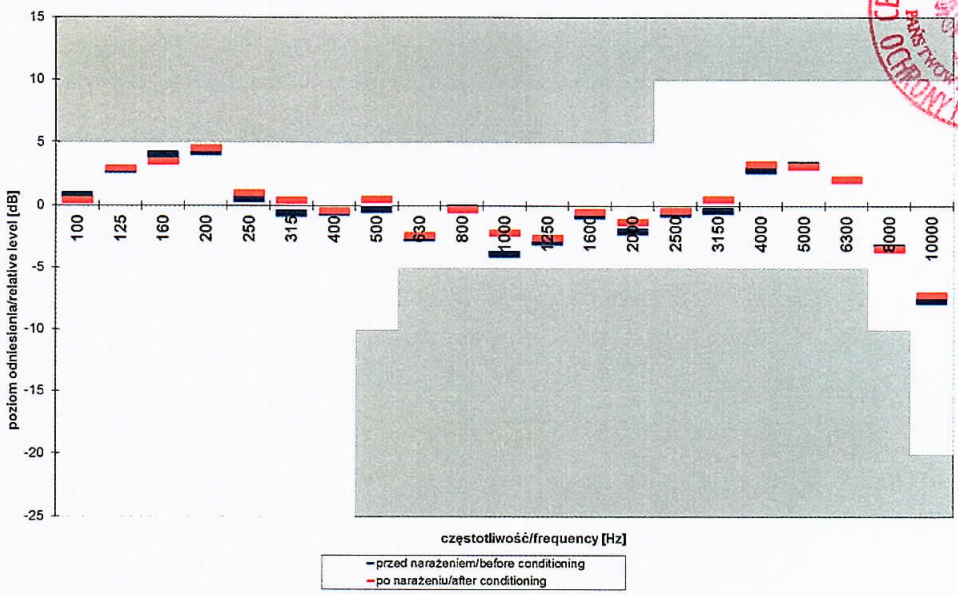
The loudspeakers type CVS 401, CVS 601, CVS 801 were tested to prove the immunity to an environment with high relative humidity. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.



The frequency response of the loudspeaker type CVS 401 (sample no 3b)



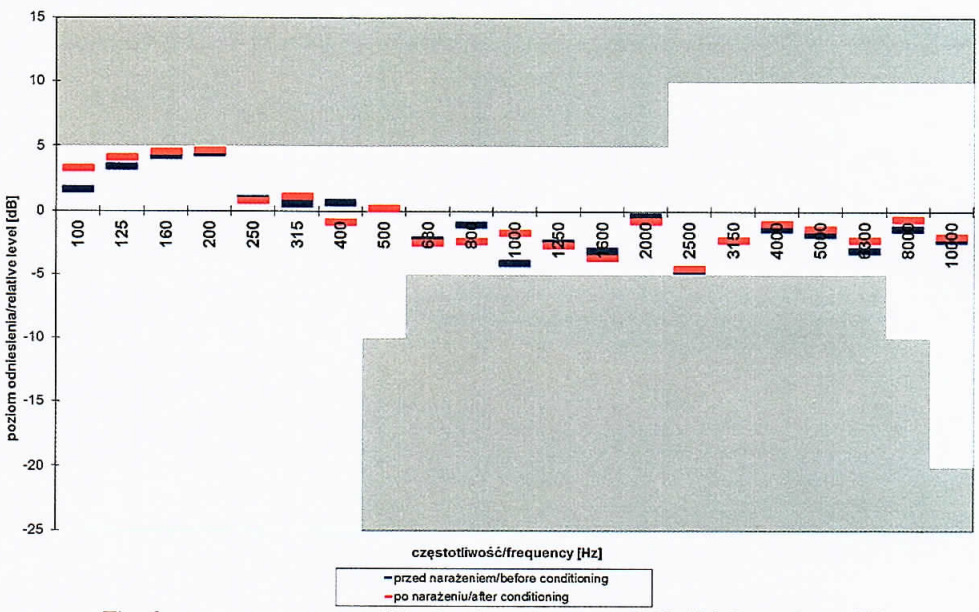
The frequency response of the loudspeaker type CVS 601 (sample no 3c)



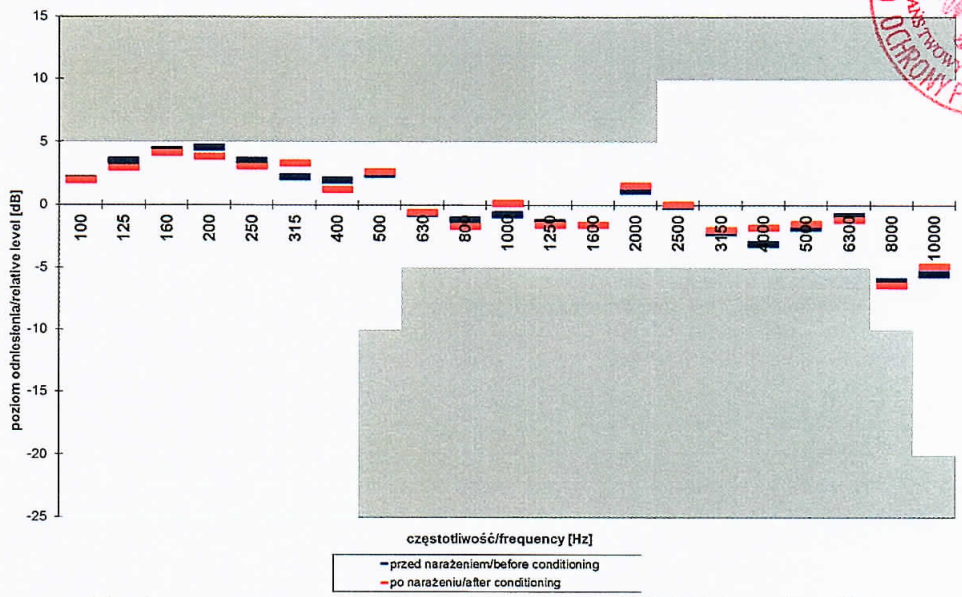
The frequency response of the loudspeaker type CVS 801 (sample no 3d)

10.	Damp heat, steady state (endurance) *Temperature: +40 ± 2 °C, relative humidity 93 ± 3%, duration: 21 days*	p. 5.11	Positive

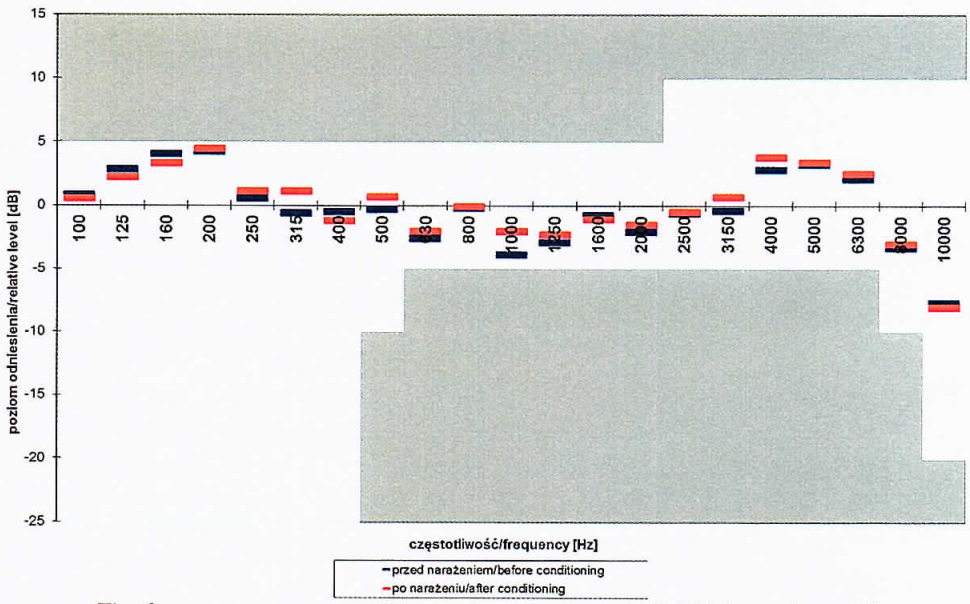
The loudspeakers type CVS 401, CVS 601, CVS 801 were tested to prove the ability to withstand the long term effects of humidity in the service environment. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.



The frequency response of the loudspeaker type CVS 401 (sample no 3b)

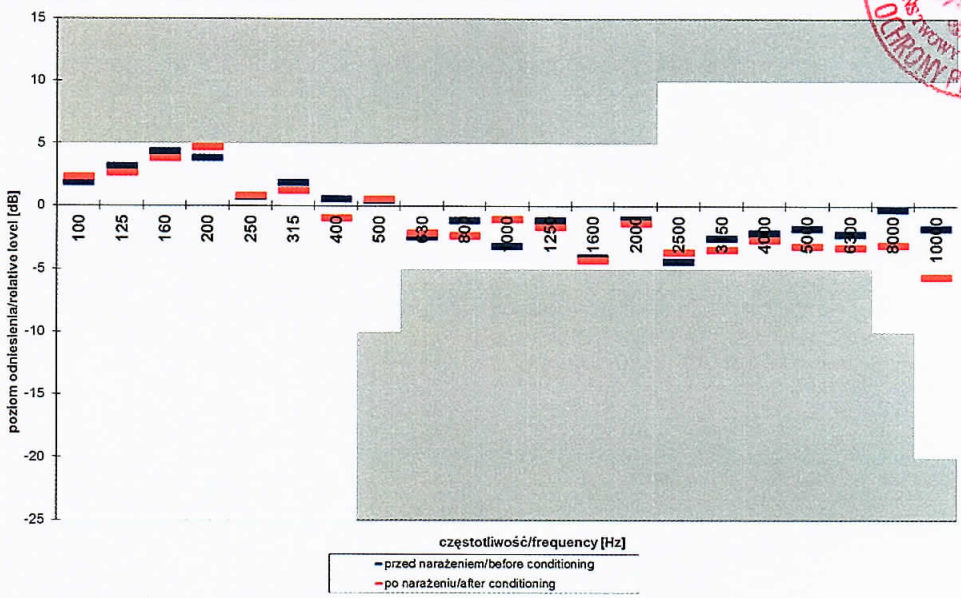


The frequency response of the loudspeaker type CVS 601 (sample no 3c)

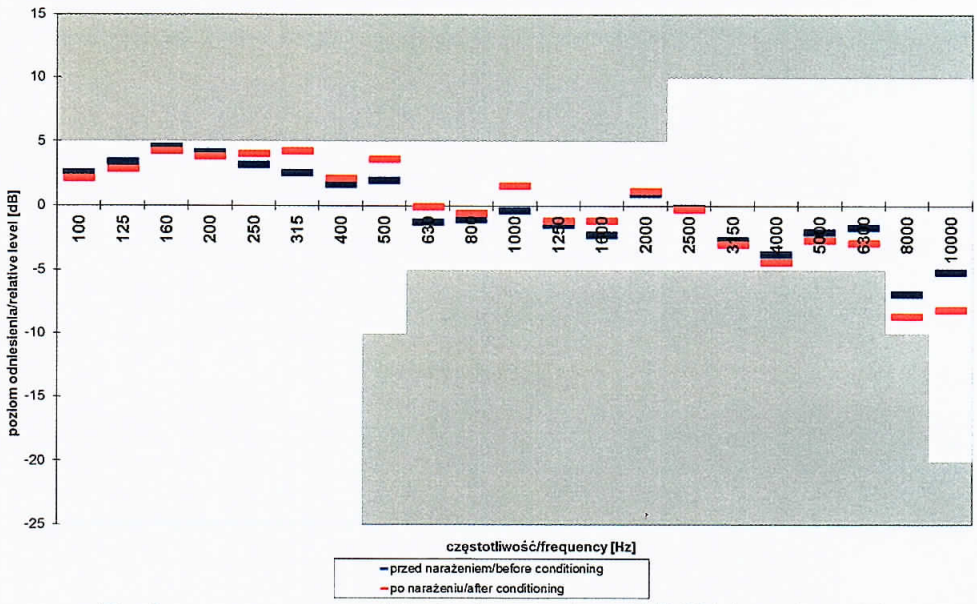


The frequency response of the loudspeaker type CVS 801 (sample no 3d)

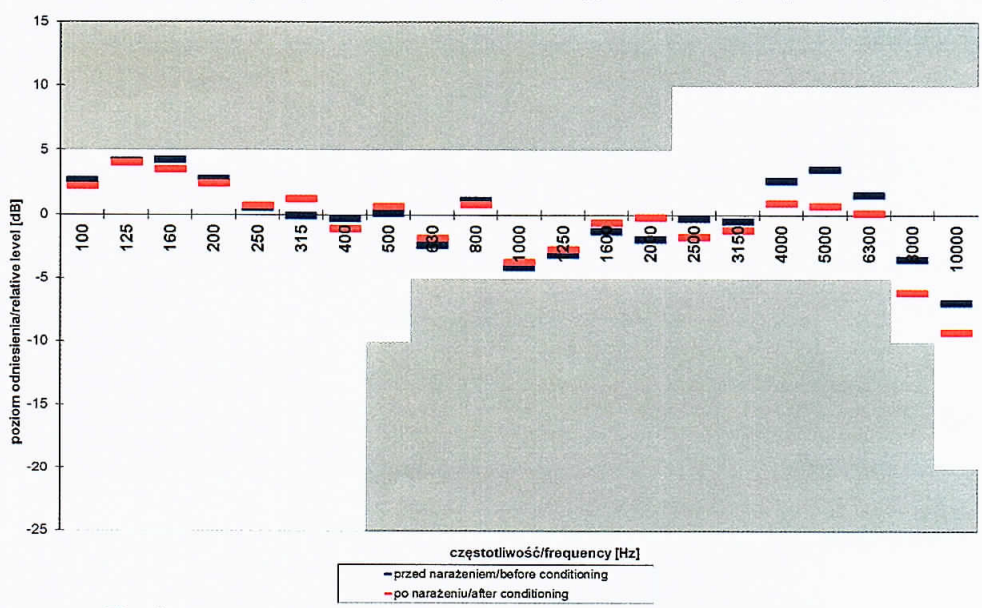
11.	SO_2 –corrosion (endurance) *Content of SO_2 25 ± 5 ppm. Temperature 25 ± 2 ^{0}C, relative humidity 93 ±3 %. Duration: 21 days*	p. 5.13	Positive
	The loudspeakers type CVS 401, CVS 601, CVS 801 were tested to prove the ability to withstand the corrosive effect of sulphur dioxide as an atmospheric pollutant. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008. The test apparatus and procedure was as described in EN 60068-2-27:1993* - PN-EN 60068-2-6:2008.		



The frequency response of the loudspeaker type CVS 401 (sample no 4b)



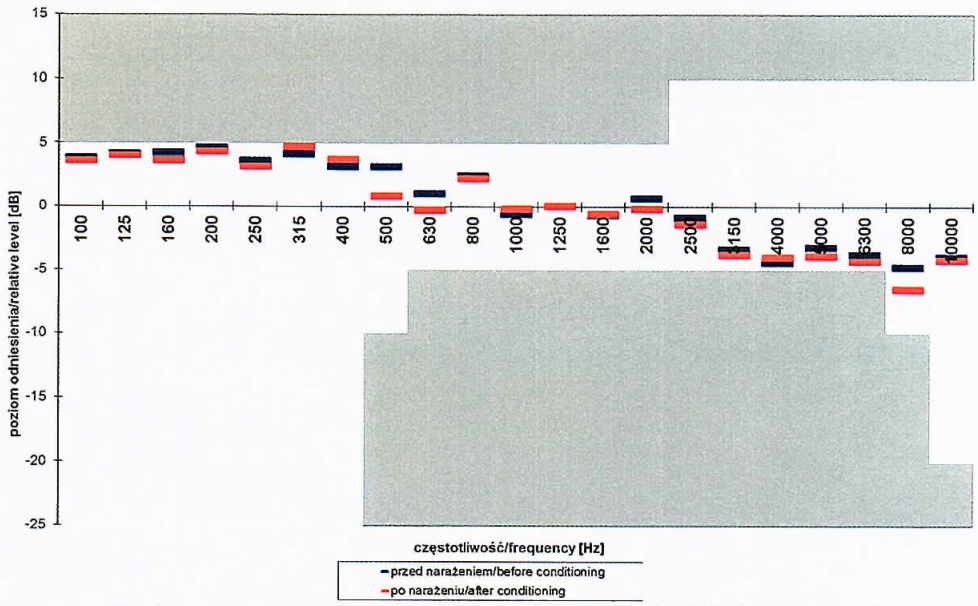
The frequency response of the loudspeaker type CVS 601 (sample no 4c)



The frequency response of the loudspeaker type CVS 801 (sample no 4d)

12.	Shock (operational) *Pulse type: half sine. Pulse duration: 6 ms; Maximum acceleration related to specimen mass M in kg: 10x(100-20M). Number of shock per direction: 6. Number of pulses per direction: 3.*	p. 5.14	Positive

The loudspeaker type CVS 301 was tested to prove the immunity to mechanical shocks. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.

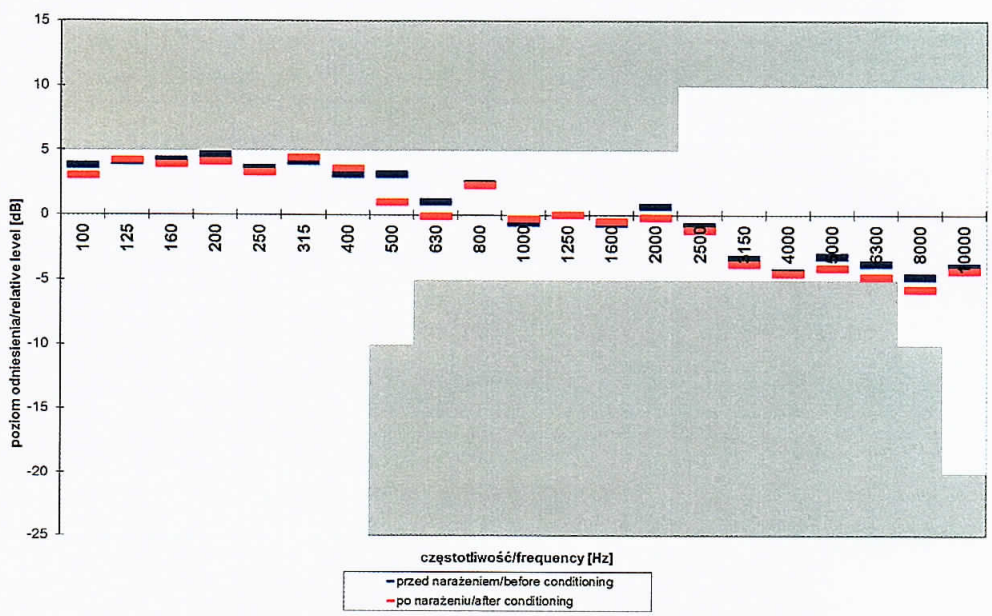


The frequency response of the loudspeaker type CVS 301 (sample no 3)

*) standard not accredited. In The Department Laboratory BA an analysis was made to compare EN 60068-2-27:1993 and PN-EN 60068-2-6:2008 standards and no differences were established in scope of test methods

13.	Impact (operational) Impact energy: 0,5 ± *0,04 J. Number of impacts per accessible point: 3.*	p. 5.15	Positive

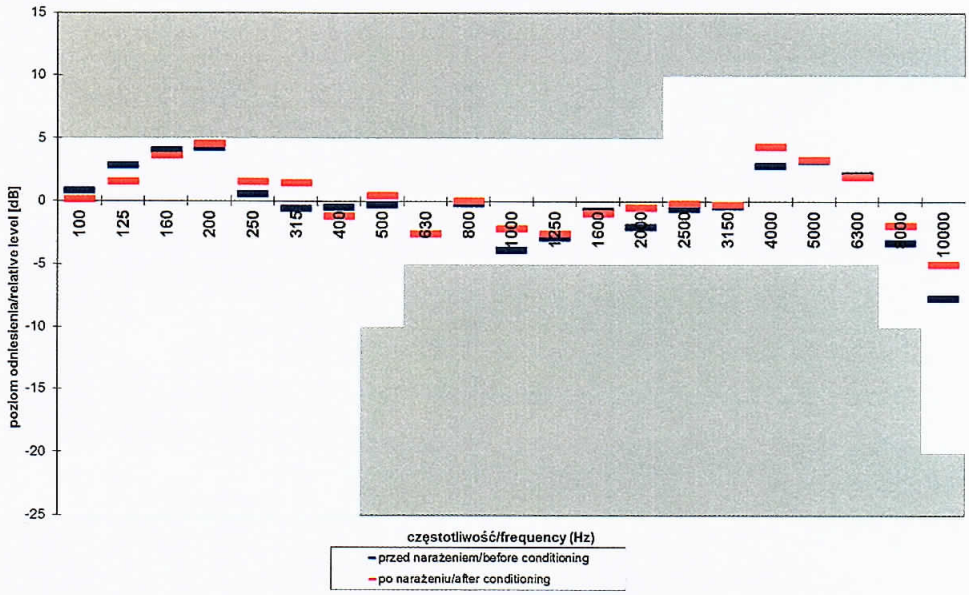
The loudspeaker type CVS 301 was tested to prove the immunity to mechanical impacts upon its surface. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.



The frequency response of the loudspeaker type CVS 301 (sample no 3)

14.	Vibration sinusoidal (operational) *Frequency range 10 ÷ 150 Hz. Acceleration amplitude 0,5 g. Number of axis: 3. Sweep rate:1 octave/min. Number of sweep cycles per axis per functional conditions: 1.*	p. 5.16	Positive

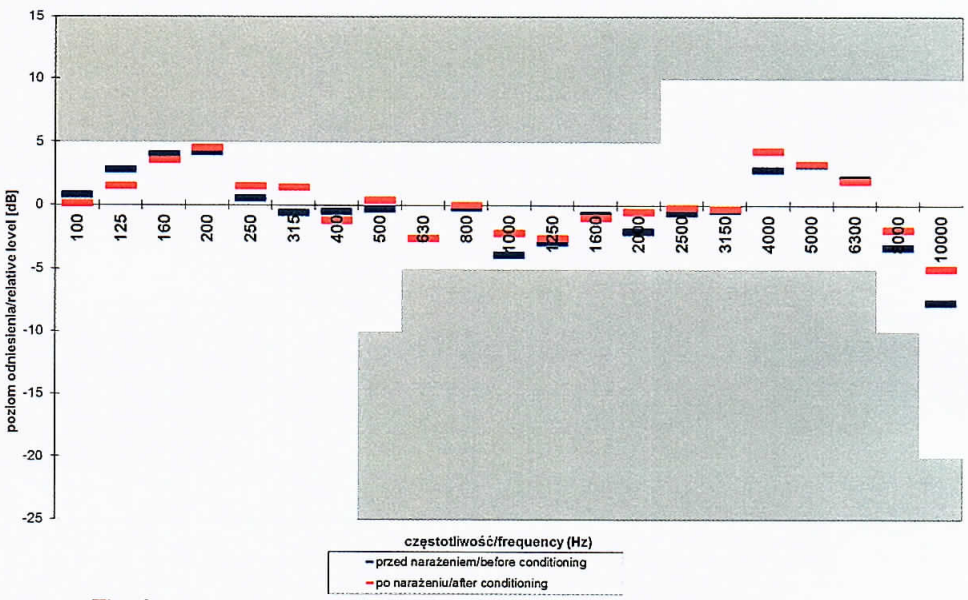
The loudspeaker type CVS 801 was tested to prove the immunity to vibration at levels considered appropriate to the normal service environment. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.



The frequency response of the loudspeaker type CVS 801 (sample no 3d)

15.	Vibration sinusoidal (endurance) *Frequency range 10 ÷ 150 Hz. Acceleration amplitude 1 g. Number of axis 3. Sweep rate 1 octave/min. Number of sweep cycles per axis per functional conditions: 20.*	p. 5.17	Positive

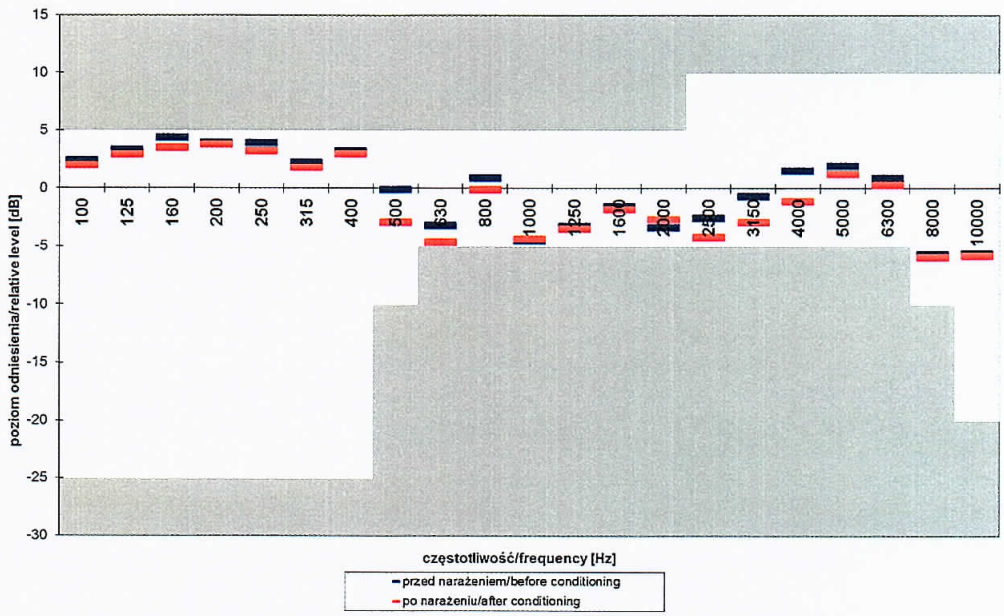
The loudspeaker type CVS 801 was tested to prove the ability to withstand the long term effects of vibration at levels appropriate to the service environment. The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in 4.2 of EN 54-24:2008.



The frequency response of the loudspeaker type CVS 801 (sample no 3d)

16.	Enclosure protection *IP 21C.*	p. 5.18	Positive

The loudspeaker type CVS 801 was tested to demonstrate that the degree of protection provided by the enclosure of the loudspeaker with regard to the ingress of solid foreign objects with minimal diameter of 12,5 mm (IP2x), the harmful effects due to the ingress of water, dripping water (IPx1) and protection against ingress to dangerous parts, solid objects with diameter 2,5 mm (IPxxC). The frequency response curve does not deviate from the one measured before the test by more than ±3 dB, between and including 500 Hz and 8 kHz, the frequency response curves complies with the frequency response limits described in point 4.2 of EN 54-24:2008.



The frequency response of the loudspeaker type CVS 801 (sample no 2d)

The results were adopted from the protocols of the tests annexed to 3rd copy of the polish version of the testing report.

5. REPRESENTATIONS AND RESERVATIONS

The test results refer only to the tested product sample / object of research. Without the written permission of the Laboratory Department report must not be reproduced otherwise than in entire document. The test report has been prepared in 2 copies.

THE END OF REPORT

Prepared by	**M. Eng. Tomasz Sowa** ..... Title or equivalent description, Name, surname	24.05.2019 Sowa ..... Date and signature
Reviewed and authorised by	**Head of Department Laboratory of Fire Alarm Systems and Fire Automation – BA** **Eng. Paweł Stępień** ..... Title or equivalent description, Name, surname	24.05.2019 ..... Date and signature