

invisiline

INVISIBLE
LINEAR
DIFFUSERS



VI.7 PL-AESTHETIC-001

AESTHETIC

Acoustic Test Report

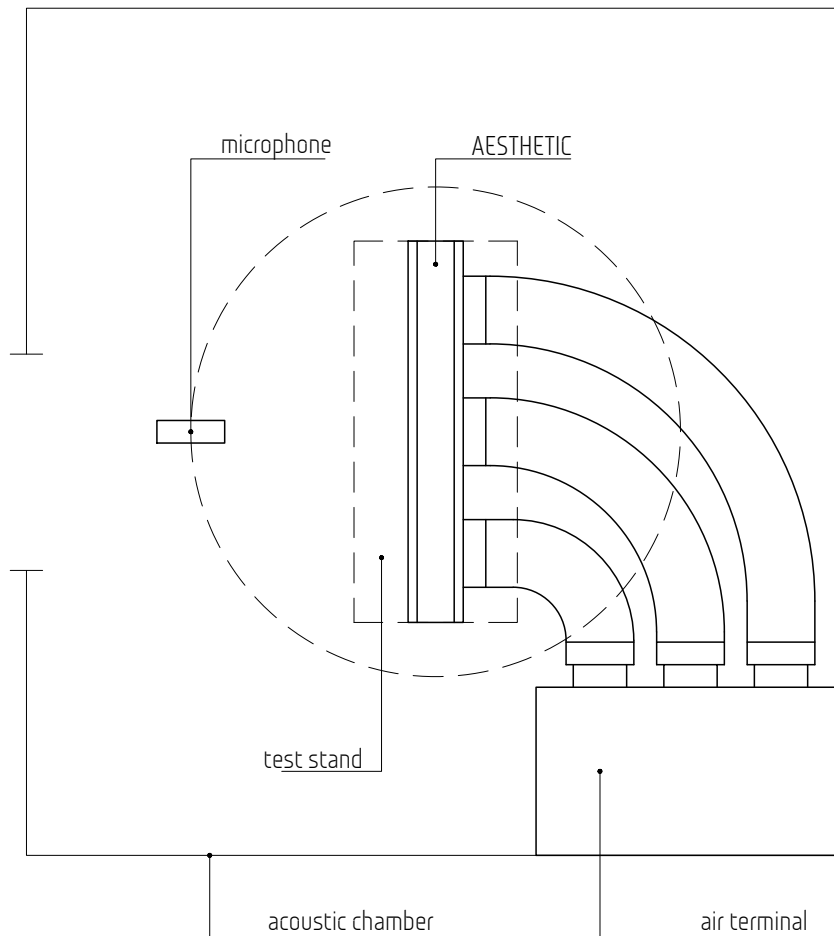
dated 16.09.2025

Moscow
31 Skolkovskoye Hwy, Bldg. 2
+7 495 646 85 98



order@invisiline.ru
www.invisiline.ru

Figure 1 - ACOUSTIC TEST RIG SCHEMATIC



The rig was designed in accordance with GOST 32112-2013, "Acoustics. Determination of noise characteristics of air distribution equipment. Precision methods for semi-anechoic rooms."

The rig consists of a semi-anechoic acoustic chamber and a ventilation system. The chamber walls and ceiling are lined with sound-absorbing material.

The diffuser sample with its plenum box is installed on a stand in the centre of the chamber and connected to the ventilation system using flexible ducts.

The ventilation system is connected to the acoustic chamber and equipped with airflow control and measurement systems.

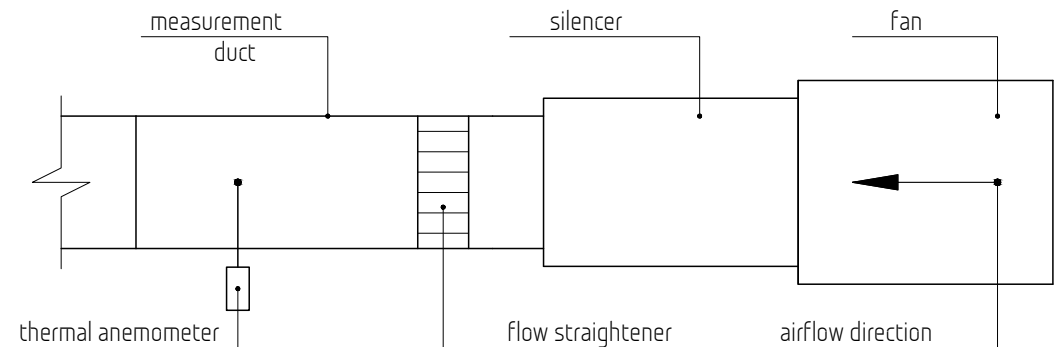




Figure 2 - GENERAL VIEW OF THE ACOUSTIC CHAMBER

Tests are performed on 1000 mm diffuser samples with BOX plenum boxes in the STD version (side connections). The difference in acoustic performance between a diffuser with an STD plenum box and one with an FRNT plenum box does not exceed $\pm 5\%$.

Before testing, the diffuser and BOX plenum box are installed on a stand in the centre of the acoustic chamber and connected to the ventilation system.

During testing, a series of experimental points is recorded to obtain the acoustic performance of the diffuser and plenum box. The rig is set to different specified airflow values. At each steady-state condition, the current airflow and the corresponding sound pressure level are measured simultaneously.

Measured parameters:

- q_v - airflow rate [m^3/h];
- L_{eqA} - A-weighted sound pressure level [dB(A)];
- L_{eq} - sound pressure level [dB];
- T_{meas} - air temperature [$^{\circ}C$];
- ϕ_{rel} - relative air humidity [%];
- B_{meas} - atmospheric pressure [Pa].

The test data are processed using the least-squares method to obtain an approximated characteristic curve. Sound power is calculated using the following equations:

$$L_{wA} = L_{pf} + 10 \log \left(\frac{S_k}{S_0} \right) + C_1 + C_2$$

$$C_1 = -10 \log \left[\frac{B_{meas}}{B_0} \times \sqrt{\frac{313.15}{273.15 + T_{meas}}} \right]$$

$$C_2 = -15 \log \left[\frac{B_{meas}}{B_0} \times \sqrt{\frac{296.15}{273.15 + T_{meas}}} \right]$$

Table 1 - LIST OF MEASURING INSTRUMENTS

No.	Measured parameter	Measuring instrument (QR code: FGIS "Arshin")
1	Air velocity	TTM-2-01 T thermal anemometer 
2	Sound pressure level	Oktava-111 sound level meter 

L_{wA} - A-weighted sound power level [dB(A)]; L_{pf} - mean sound pressure level on the measurement hemisphere [dB(A)]; S_k - measurement hemisphere area [m^2]; S_0 - reference area [m^2];
 C_1, C_2 - corrections for meteorological conditions [dB]; B_0 - atmospheric pressure at standard conditions [Pa].

Table 2.1 - MEASUREMENT RESULTS 10-40

	AESTHETIC 10					AESTHETIC 20					AESTHETIC 30					AESTHETIC 40				
Test no.	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
q_v [m ³ /h]	52.7	88.6	107.7	128.0	151.2	107.5	146.1	182.0	209.4	254.3	164.9	218.7	268.2	323.7	380.5	210.0	272.9	354.9	480.6	516.8
L_{eq} [dB]	25.6	30.1	34.6	38.6	42.3	24.7	30.2	36.0	41.3	47.5	29.2	31.6	35.9	42.6	48.2	29.3	31.9	38.4	46.8	49.2

Table 2.2 - MEASUREMENT RESULTS 50-70

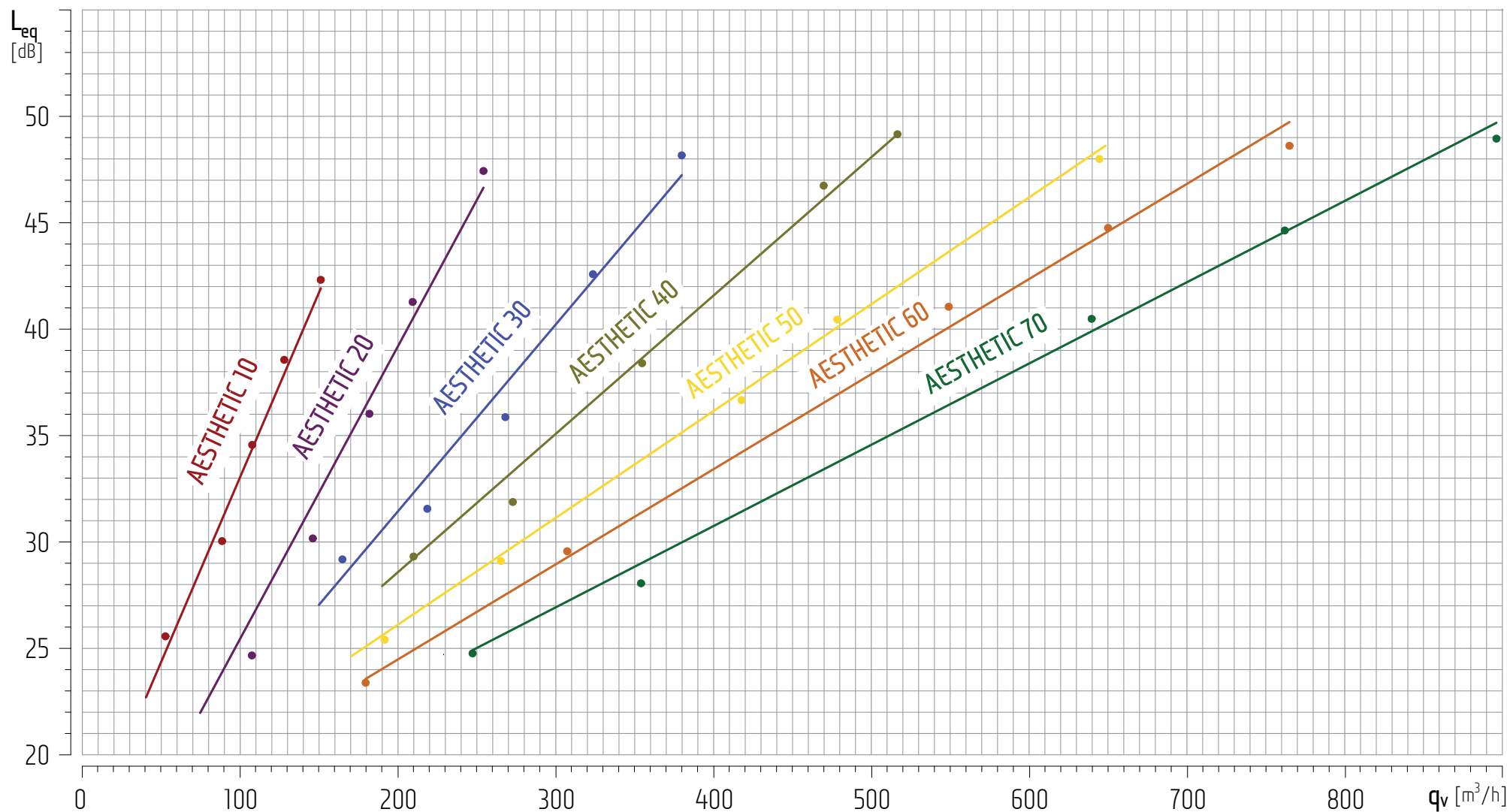
	AESTHETIC 50					AESTHETIC 60					AESTHETIC 70				
Test no.	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
q_v [m ³ /h]	193.0	266.7	419.3	480.0	648.1	179.6	307.4	549.3	650.3	765.3	247.4	354.2	639.9	762.3	896.5
L_{eq} [dB]	25.4	29.1	36.8	40.4	48.1	23.4	29.6	41.1	44.8	48.6	24.8	28.1	40.5	44.7	49.0

q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB].

Important: This test report presents measured equivalent sound pressure levels without A-weighting.

Diffuser noise is generally assessed using the A-weighted sound power levels provided in the catalogues.

Figure 3 - SOUND PRESSURE LEVEL VERSUS AIRFLOW



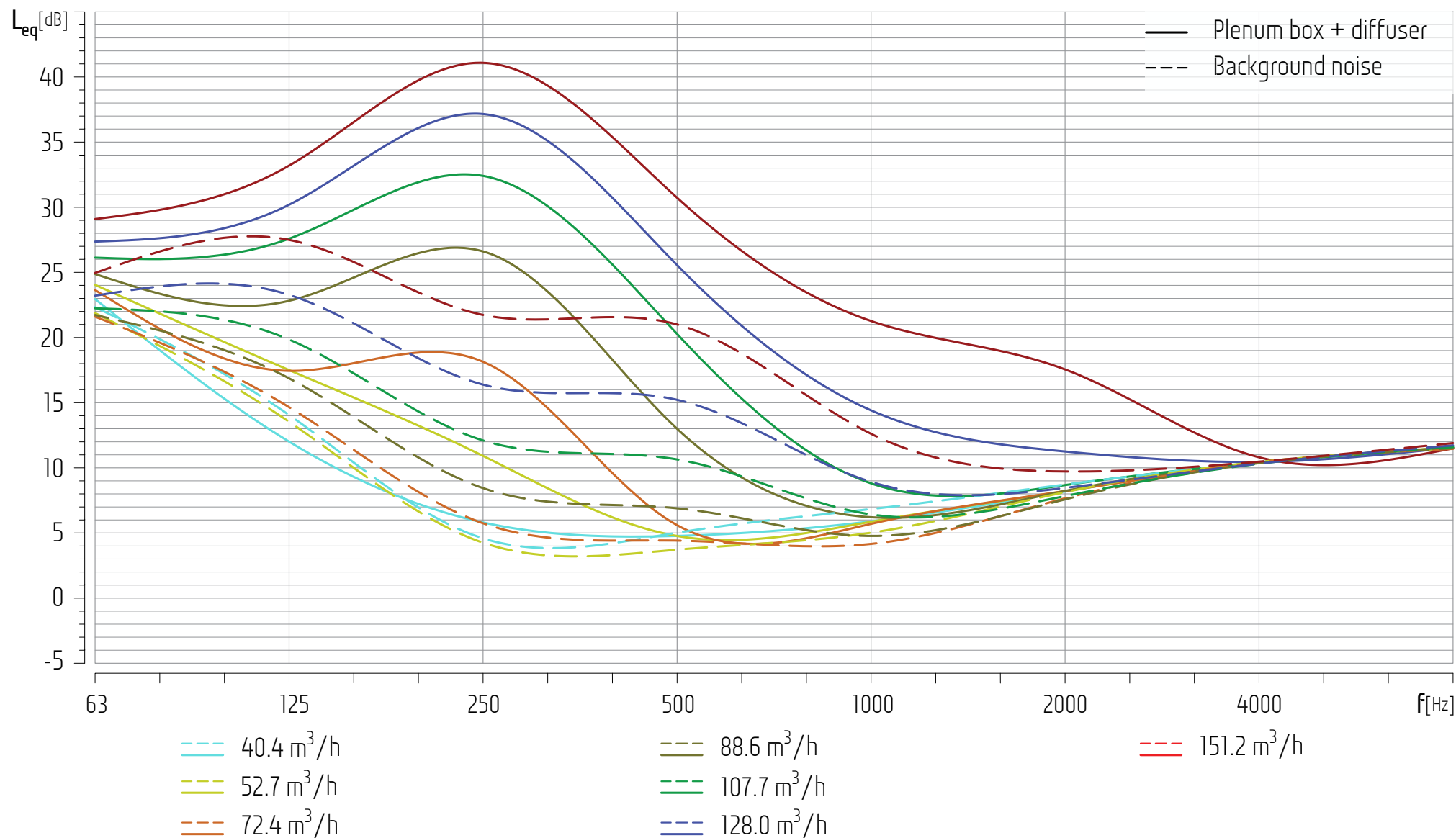
q_v - airflow rate [m^3/h]; L_{eq} - sound pressure level [dB].

Table 3 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 10, 20, 30, 40

	q_v [m³/h]	background [dB]									noise [dB]								
		f [Hz]								L_{eq} [dB]	f [Hz]								L_{eq} [dB]
		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
AESTHETIC 10	40.4	22.3	14.1	4.6	5.0	6.8	8.7	10.4	11.6	23.8	23.0	12.0	5.8	4.8	5.9	8.2	10.4	11.6	24.1
	52.7	21.9	13.5	4.3	3.7	5.0	8.1	10.5	11.5	23.4	24.0	17.5	10.9	4.8	5.9	8.2	10.4	11.6	25.6
	72.4	21.6	14.7	5.8	4.4	4.2	7.7	10.4	11.5	23.3	23.7	17.4	18.1	5.6	5.7	8.2	10.4	11.6	25.9
	88.6	21.7	16.9	8.5	6.9	4.8	7.6	10.4	11.5	23.9	24.9	22.8	26.6	13.0	6.2	8.2	10.4	11.6	30.1
	107.7	22.2	19.9	12.1	10.7	6.4	7.8	10.3	11.6	25.2	26.1	27.6	32.4	20.3	8.8	8.7	10.4	11.5	34.6
	128.0	23.2	23.3	16.4	15.2	8.9	8.5	10.3	11.7	27.3	27.4	30.2	37.2	25.6	14.4	11.3	10.5	11.6	38.6
	151.2	25.0	27.5	21.7	21.0	12.6	9.7	10.5	11.9	30.8	29.1	33.2	41.1	30.7	21.3	17.6	10.8	11.5	42.3
AESTHETIC 20	74.7	21.6	14.2	5.1	4.0	4.2	7.8	10.5	11.5	23.3	23.6	11.2	4.8	4.8	5.7	8.3	10.4	11.5	24.5
	107.5	21.8	17.3	9.0	7.5	5.0	7.6	10.4	11.5	24.0	22.5	17.3	13.7	4.8	5.7	8.2	10.4	11.5	24.7
	146.1	23.0	22.7	15.6	14.4	8.5	8.3	10.3	11.7	26.9	25.1	24.7	25.6	13.2	6.4	8.2	10.4	11.5	30.2
	182.0	25.3	28.1	22.5	21.8	13.2	10.0	10.5	11.9	31.4	29.6	30.3	32.7	21.7	11.4	8.7	10.4	11.6	36.0
	209.4	28.6	33.6	29.6	29.4	19.2	13.0	11.2	12.1	37.0	34.7	35.3	38.0	28.4	19.6	13.5	10.7	11.6	41.3
	254.3	32.6	38.2	35.4	35.3	26.8	19.5	13.6	12.2	42.0	39.9	41.4	44.4	35.2	28.7	24.3	14.1	11.6	47.5
AESTHETIC 30	115.8	23.6	12.9	4.3	3.3	4.8	8.1	11.1	12.2	24.6	28.3	14.3	4.8	4.8	5.8	8.2	10.6	12.3	28.7
	164.9	22.6	15.7	10.1	6.6	5.4	6.9	9.0	10.9	24.2	28.5	15.9	15.8	6.7	5.8	8.3	10.6	12.3	29.2
	218.7	23.2	19.1	15.8	10.5	7.4	7.3	8.4	10.2	25.6	29.3	21.2	25.6	17.7	8.8	8.4	10.6	12.3	31.6
	268.2	25.2	22.8	21.3	14.9	10.5	9.2	9.1	10.1	28.6	31.6	26.6	31.9	25.3	16.8	10.5	10.6	12.3	35.9
	323.7	28.9	27.7	27.7	20.6	15.2	12.9	11.3	10.8	33.3	39.2	33.2	37.6	32.2	25.7	19.2	11.5	12.3	42.6
	357.5	33.8	33.4	34.6	27.3	21.5	18.6	15.5	12.6	39.2	45.0	39.2	42.5	37.3	33.1	29.0	17.5	12.5	48.2
AESTHETIC 40	137.2	23.2	13.4	5.5	3.9	4.8	7.7	10.5	11.9	24.4	29.0	15.0	4.8	4.8	5.7	8.3	10.5	12.3	29.4
	210.0	22.6	17.0	12.4	8.1	6.0	6.9	8.6	10.5	24.5	28.6	17.5	14.3	7.1	5.8	8.2	10.5	12.3	29.3
	272.9	24.3	21.3	19.1	13.1	9.2	8.3	8.7	10.1	27.3	29.8	22.1	24.9	18.6	9.8	8.4	10.6	12.3	31.9
	354.9	28.9	27.7	27.7	20.6	15.2	12.9	11.3	10.8	33.3	34.1	29.9	33.6	29.5	22.3	14.7	10.9	12.3	38.4
	440.6	35.2	35.1	36.5	29.2	23.4	20.4	16.9	13.3	40.9	44.1	37.3	40.0	36.7	32.0	27.0	17.2	12.6	46.8
	516.8	37.3	37.5	39.1	31.9	26.2	23.2	19.1	14.5	43.3	46.7	39.6	41.9	38.8	34.8	30.7	20.9	13.3	49.2

q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB]; f - octave-band centre frequency [Hz].

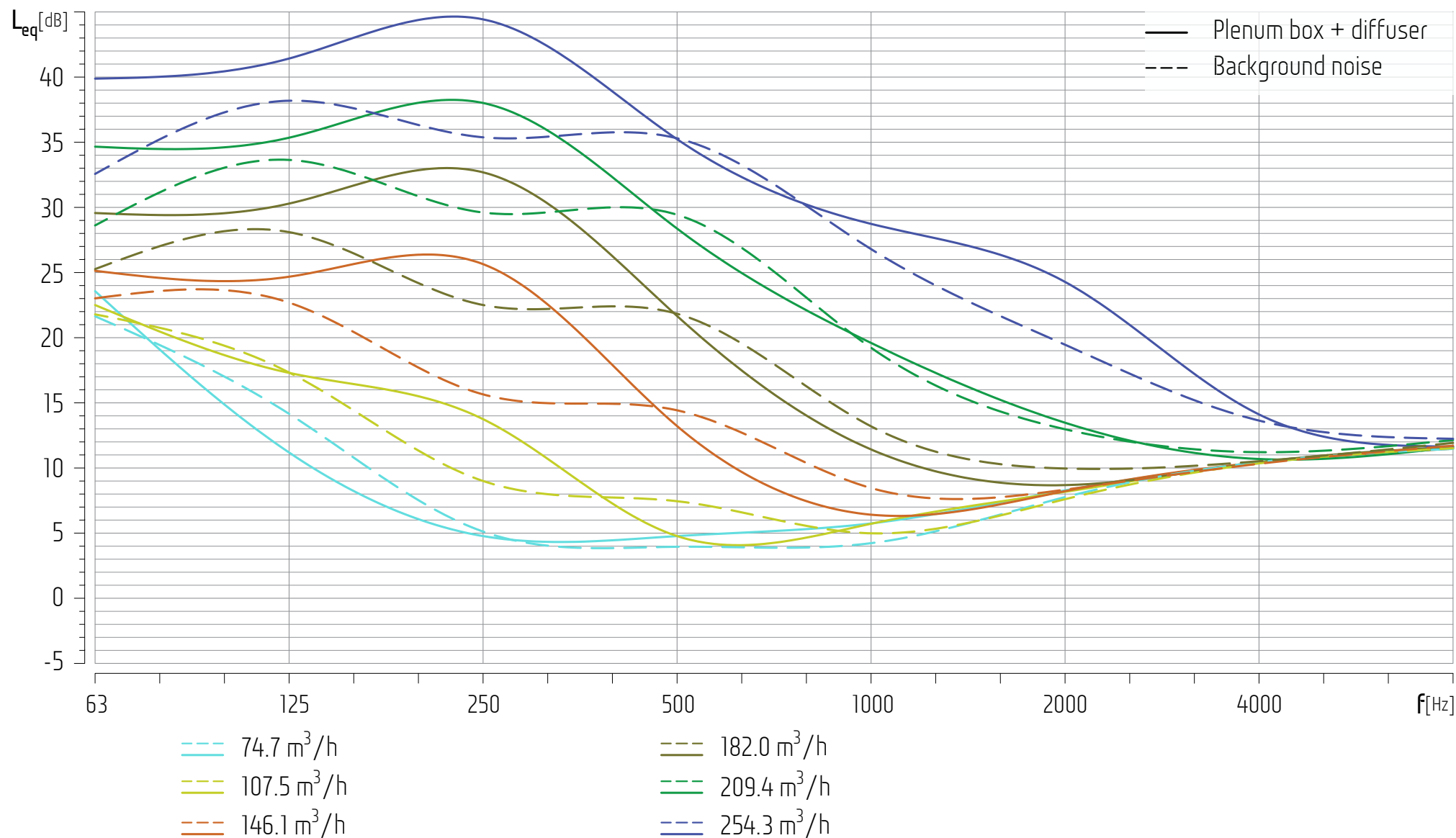
Figure 4 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 10



q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB];

f - octave-band centre frequency [Hz].

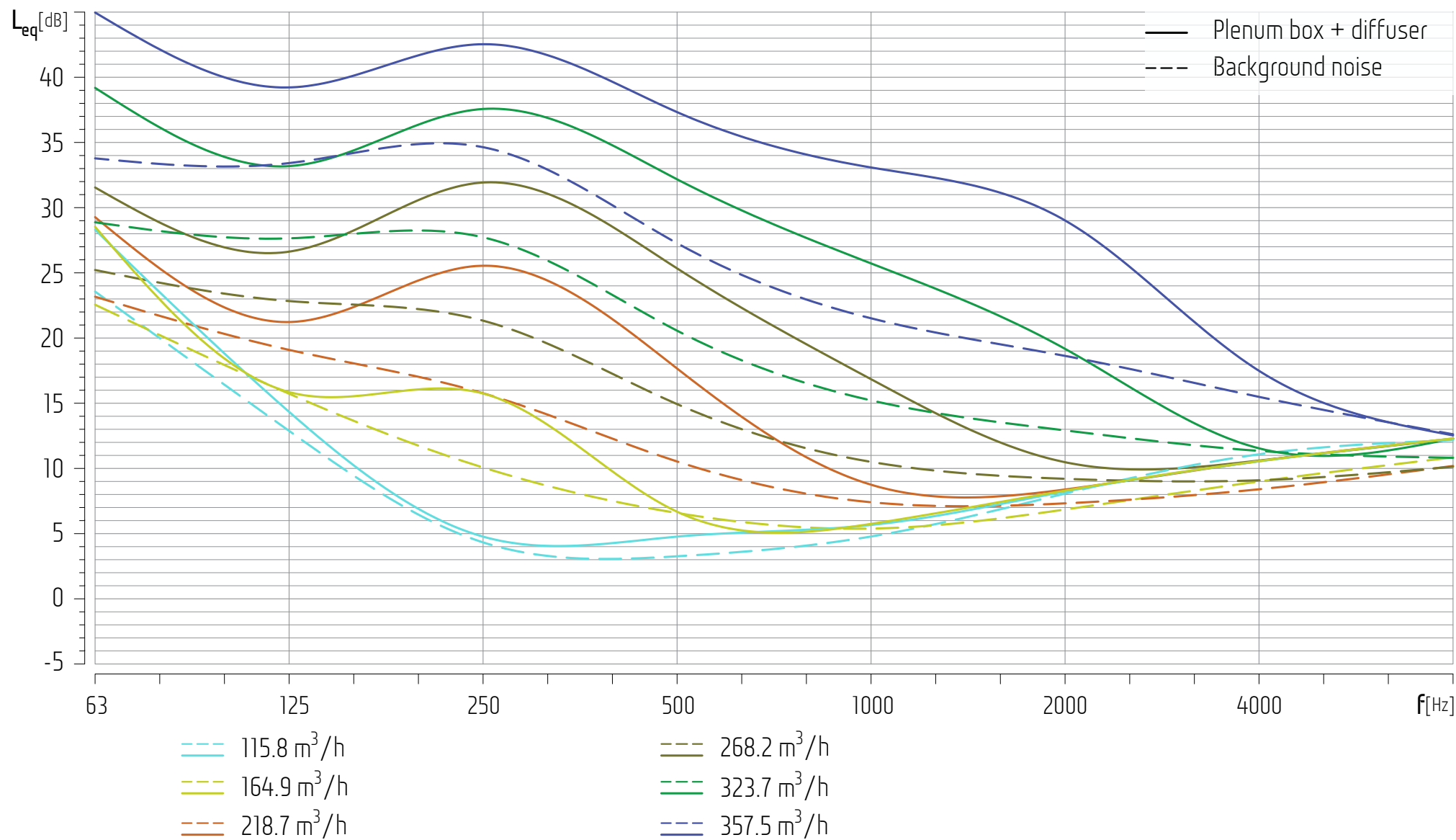
Figure 5 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 20



q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB];

f - octave-band centre frequency [Hz].

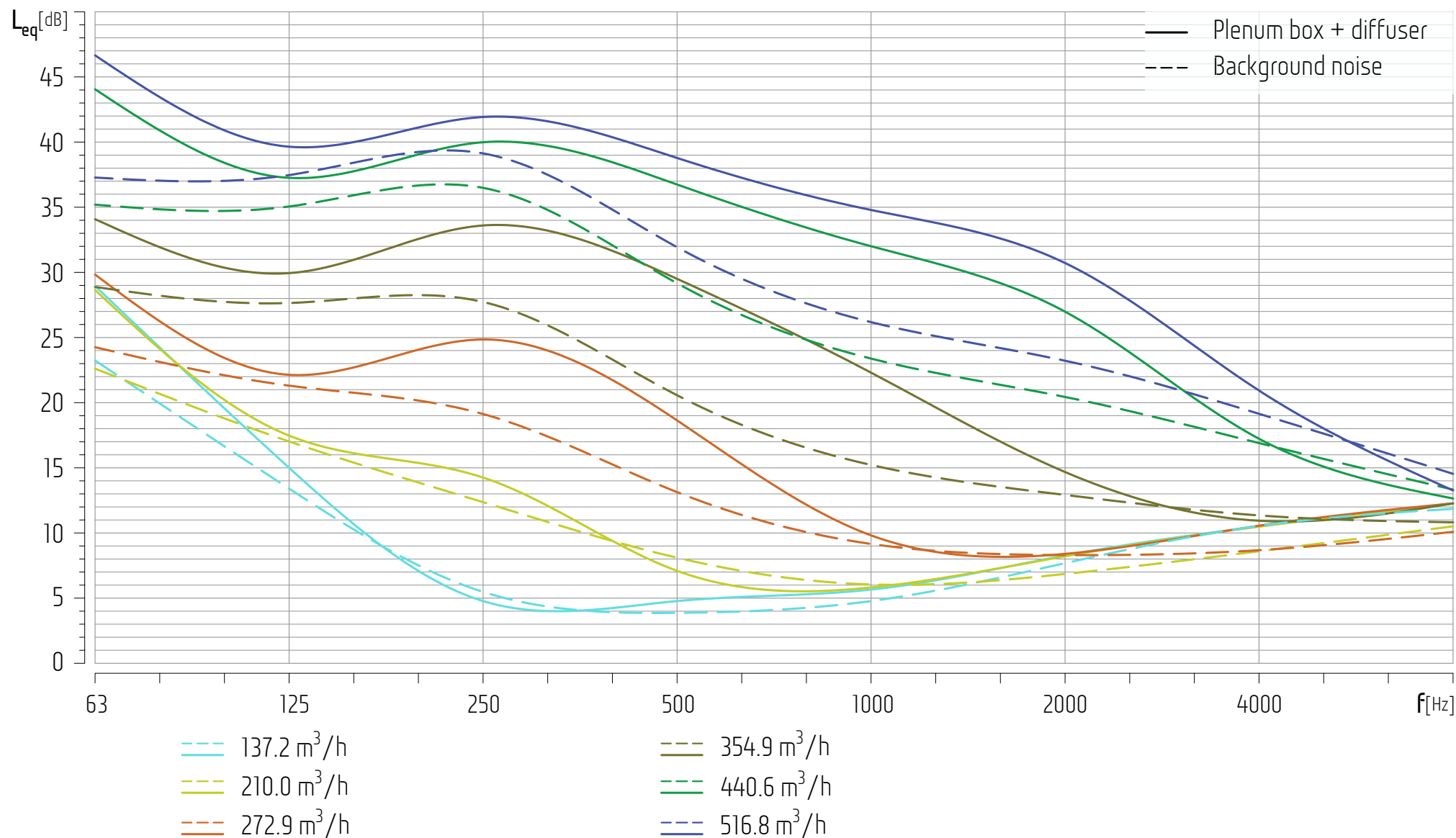
Figure 6 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 30



q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB];

f - octave-band centre frequency [Hz].

Figure 7 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 40



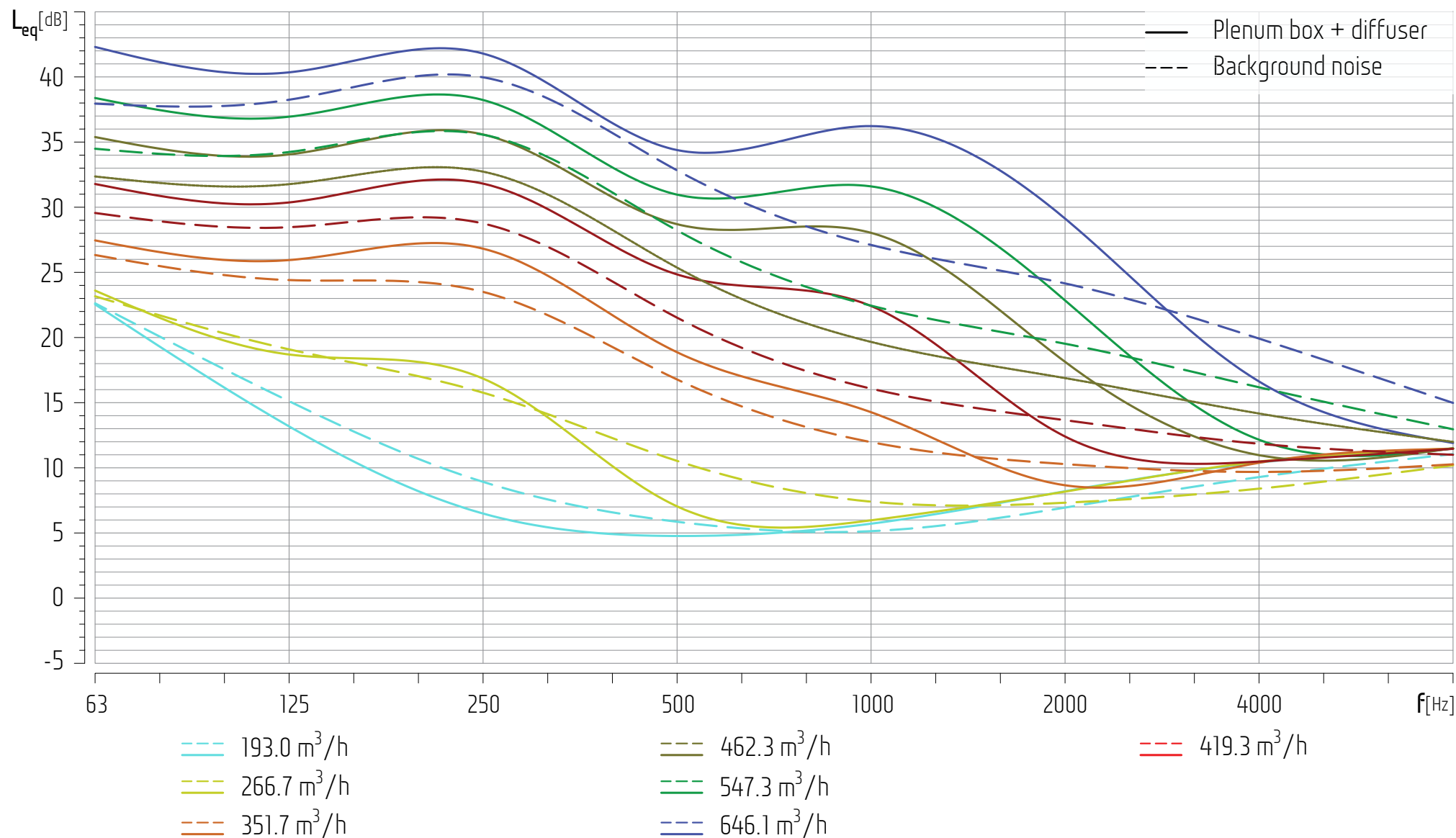
q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB];

f - octave-band centre frequency [Hz].

Table 4 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 50, 60, 70

	q_v [m ³ /h]	background [dB]									noise [dB]								
		f [Hz]								L_{eq} [dB]	f [Hz]								L_{eq} [dB]
		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
AESTHETIC 50	193.0	22.6	15.1	8.9	5.9	5.1	7.0	9.3	11.1	24.1	22.5	13.2	6.5	4.8	5.7	8.2	10.4	11.5	23.9
	266.7	23.2	19.1	15.8	10.5	7.4	7.3	8.4	10.2	25.6	23.6	18.7	16.9	7.0	6.0	8.2	10.5	11.5	25.9
	351.7	26.3	24.4	23.5	16.8	12.0	10.3	9.7	10.3	30.1	27.5	26.0	26.8	18.9	14.3	8.7	10.4	11.5	32.0
	462.3	32.4	31.8	32.7	25.4	19.7	16.9	14.2	12.0	37.5	35.4	34.1	35.6	28.7	28.0	18.1	11.0	11.5	40.5
	547.3	34.5	34.2	35.6	28.2	22.4	19.5	16.2	13.0	40.0	38.4	37.0	38.2	31.0	31.6	22.9	12.2	11.5	43.3
	646.1	38.0	38.3	40.0	32.8	27.1	24.2	19.9	15.0	44.1	42.3	40.4	41.8	34.4	36.2	29.1	16.6	11.9	47.1
	419.3	29.6	28.5	28.8	21.5	16.1	13.7	11.9	11.0	34.1	31.8	30.4	31.8	24.8	22.4	12.4	10.5	11.5	36.7
AESTHETIC 60	179.6	22.8	14.5	7.8	5.2	5.0	7.1	9.7	11.3	24.1	22.2	11.0	5.0	4.8	5.7	8.1	10.4	11.4	23.4
	229.0	22.6	17.0	12.4	8.1	6.0	6.9	8.6	10.5	24.5	23.3	15.3	9.9	4.8	5.8	8.2	10.3	11.4	24.7
	307.4	25.2	22.8	21.3	14.9	10.5	9.2	9.1	10.1	28.6	26.0	23.5	23.2	15.1	10.6	8.3	10.3	11.4	29.6
	433.6	29.6	28.5	28.8	21.5	16.1	13.7	11.9	11.0	34.1	31.2	30.1	30.7	24.0	21.6	12.2	10.6	11.5	36.0
	549.3	33.8	33.4	34.6	27.3	21.5	18.6	15.5	12.6	39.2	35.9	35.1	35.9	29.5	28.9	20.2	12.2	11.5	41.1
	650.3	37.3	37.5	39.1	31.9	26.2	23.2	19.1	14.5	43.3	39.3	38.6	39.8	32.8	33.8	26.3	16.5	11.9	44.8
	765.3	41.2	42.0	43.9	37.1	31.6	28.8	23.9	17.5	47.9	43.3	42.3	43.5	36.2	38.0	32.3	22.8	14.1	48.6
AESTHETIC 70	247.4	22.6	17.0	12.4	8.1	6.0	6.9	8.6	10.5	24.5	23.5	15.4	6.2	4.8	5.7	8.2	10.4	11.4	24.8
	354.2	25.2	22.8	21.3	14.9	10.5	9.2	9.1	10.1	28.6	25.0	22.4	19.9	11.1	7.5	8.2	10.4	11.5	28.1
	499.5	31.0	30.1	30.8	23.4	17.9	15.2	13.0	11.5	35.8	30.9	30.0	30.2	23.2	20.9	11.3	10.5	11.5	35.6
	639.9	35.2	35.1	36.5	29.2	23.4	20.4	16.9	13.3	40.9	35.2	34.5	35.5	28.8	28.6	19.3	11.6	11.7	40.5
	762.3	39.3	39.8	41.6	34.6	28.9	26.0	21.5	15.9	45.7	39.1	38.3	39.6	33.1	34.1	26.7	15.3	12.6	44.7
	896.5	43.6	44.8	46.7	40.2	34.9	32.4	27.2	19.7	50.6	43.5	42.3	43.9	37.1	39.0	33.4	21.9	14.1	49.0

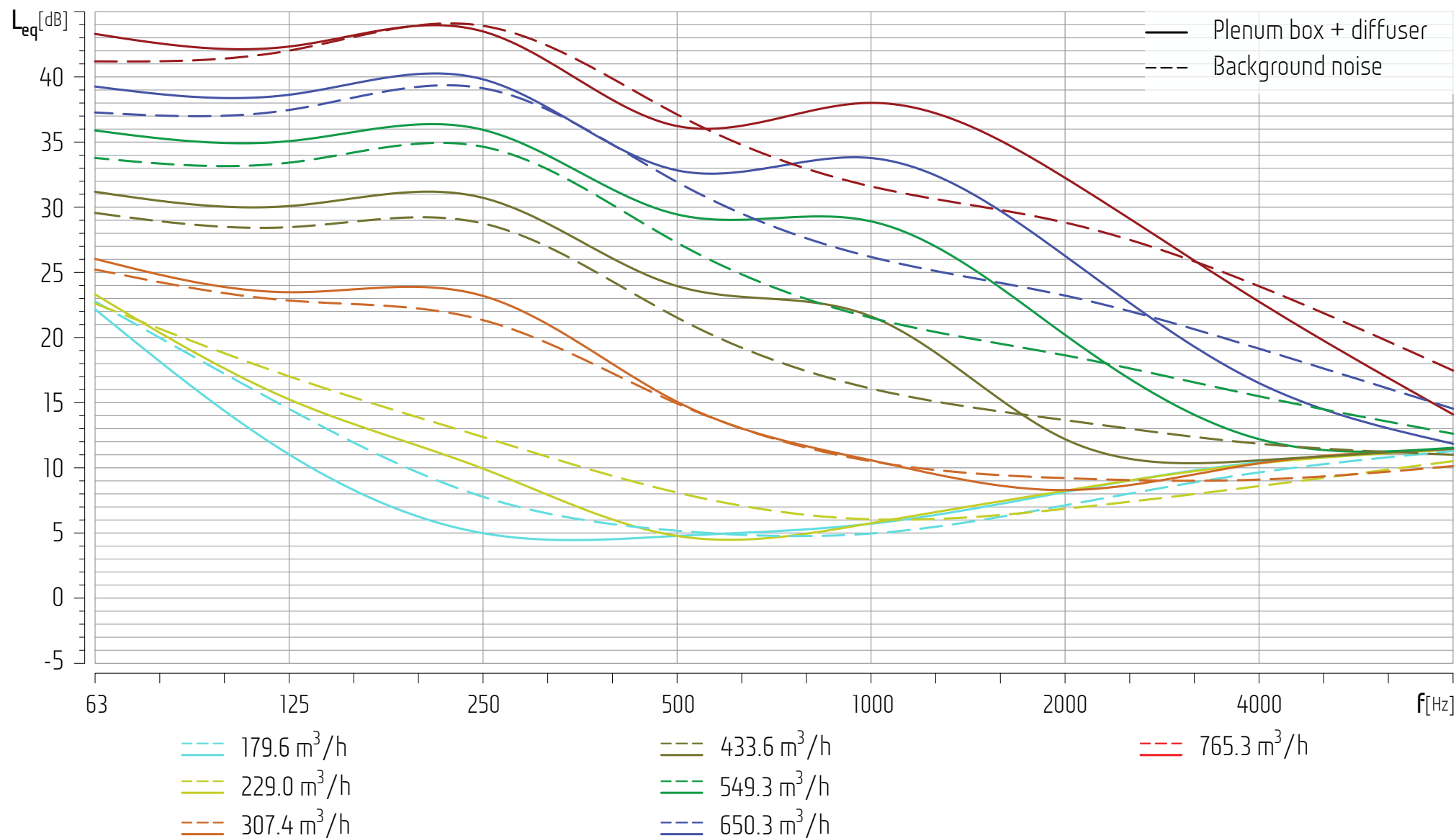
Figure 8 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 50



q_v - airflow rate [m^3/h]; L_{eq} - sound pressure level [dB];

f - octave-band centre frequency [Hz].

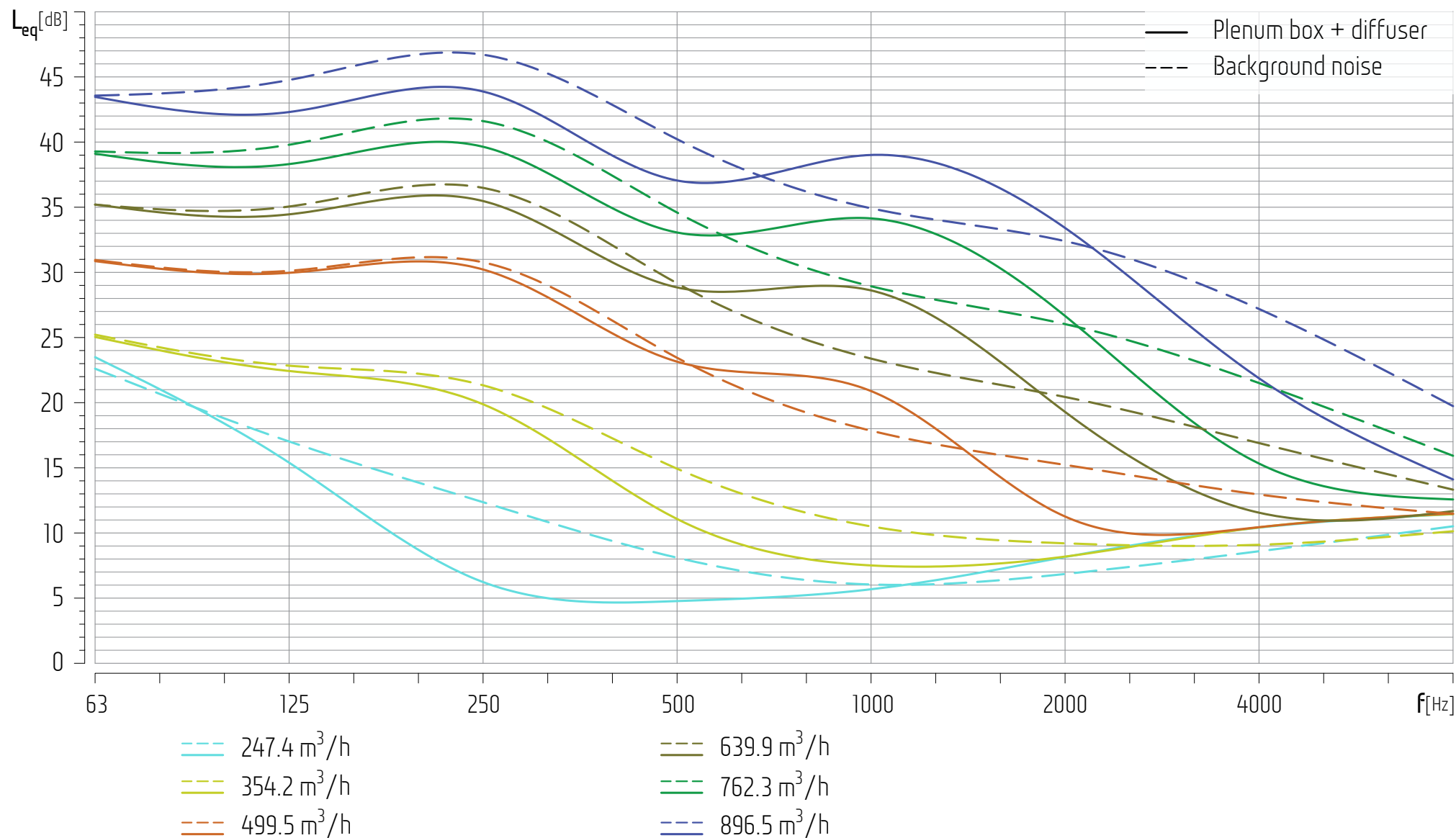
Figure 9 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 60



q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB];

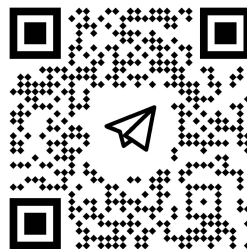
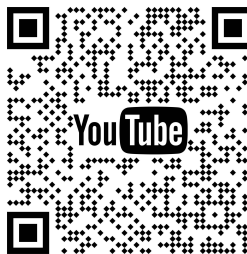
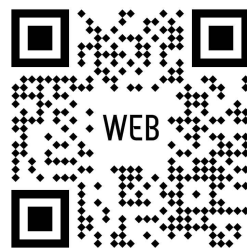
f - octave-band centre frequency [Hz].

Figure 10 - NOISE SPECTRA FOR DIFFUSERS AESTHETIC 70



q_v - airflow rate [m³/h]; L_{eq} - sound pressure level [dB];

f - octave-band centre frequency [Hz].



invisiline

INVISIBLE
LINEAR
DIFFUSERS