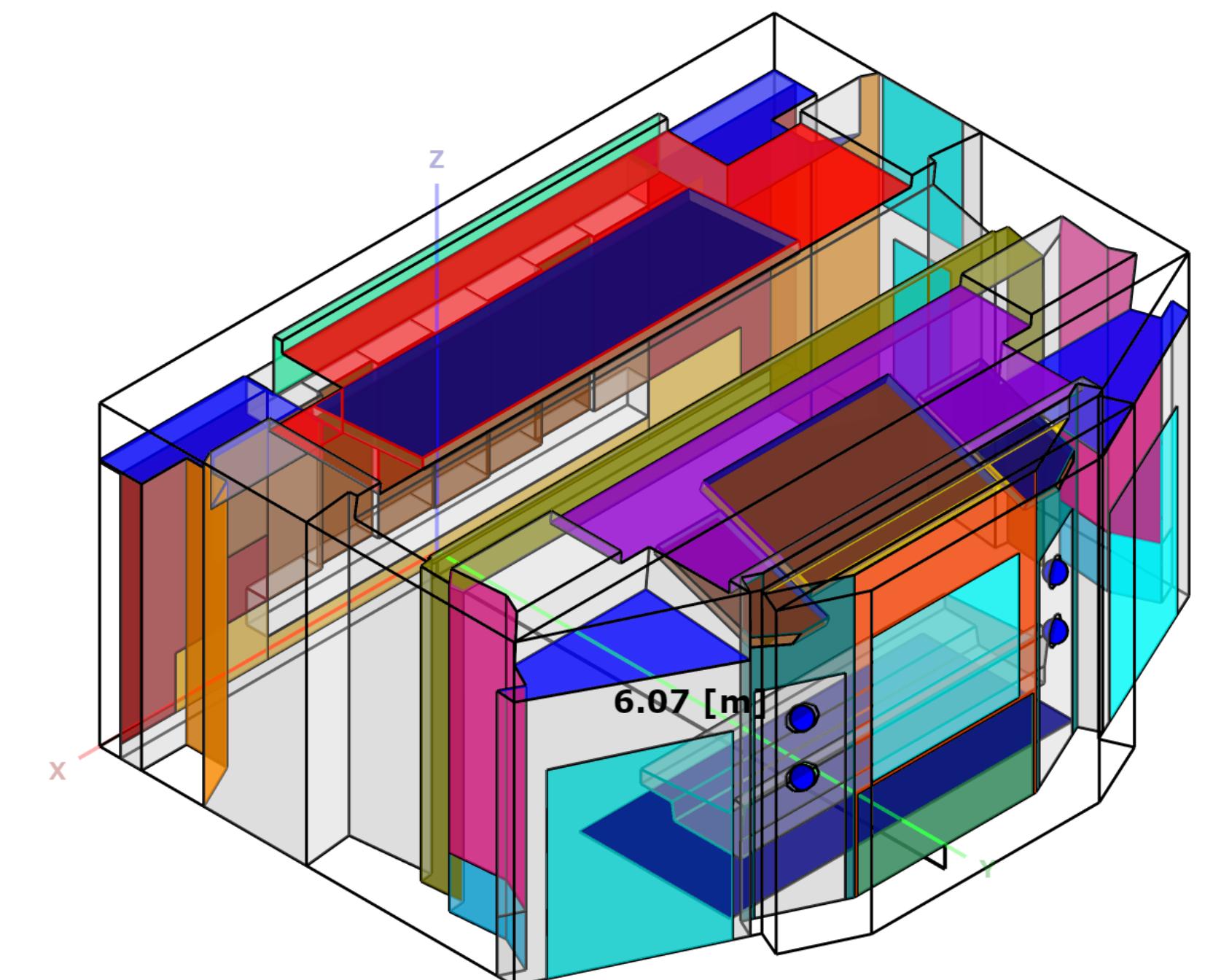


# Rue Boyer - Control Room A

## Measurement vs Simulation Comparison Report

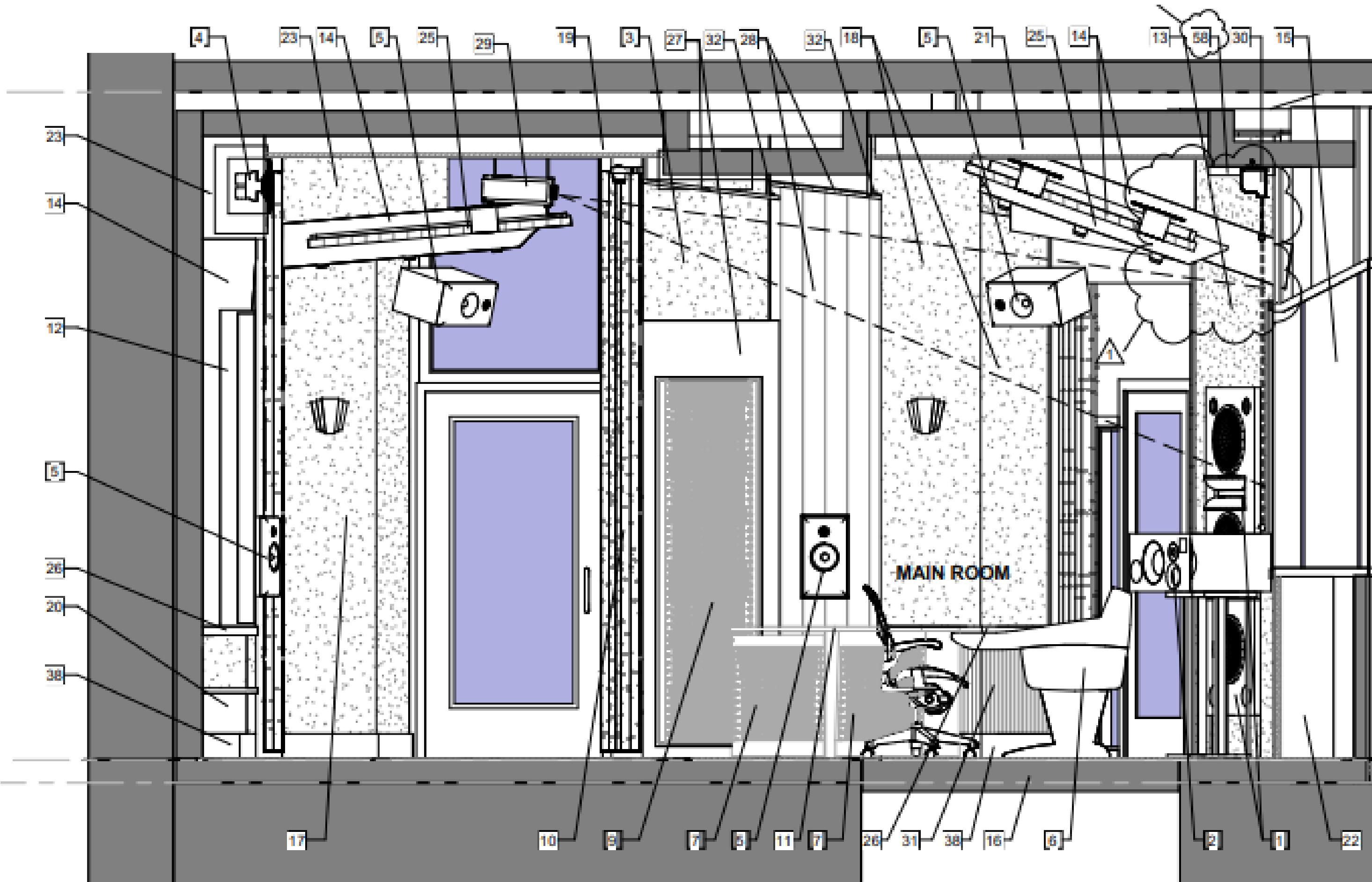
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Studio A of Mix with the Masters at 30 Rue Boyer, Paris, France, is a recently built studio designed by WSDG and REDI Acoustics. Although it serves primarily as a mixing/mastering room, it also aims to double as a live room and a classroom when needed. An innovative elevator system is placed below the mixing console to lower it underground to address the secondary requirements of the room.

The primary reproduction system consists of soffit-mounted AUGSPURGER DUO 15" speakers, with the addition of 5 subwoofers spread across the room for an even low-frequency pressure distribution.



The primary goal of this report is to compare the NIRO numerical predictions with the recently measured Studio A. The impulse responses of the left and right main speakers were measured at the mixing position and compared with a detailed digital model of the room. The following acoustical parameters are compared in this document:

- Reverberation Time (T30);
- Impulse Response;
- Low-frequency Response;
- Temporal Decay.

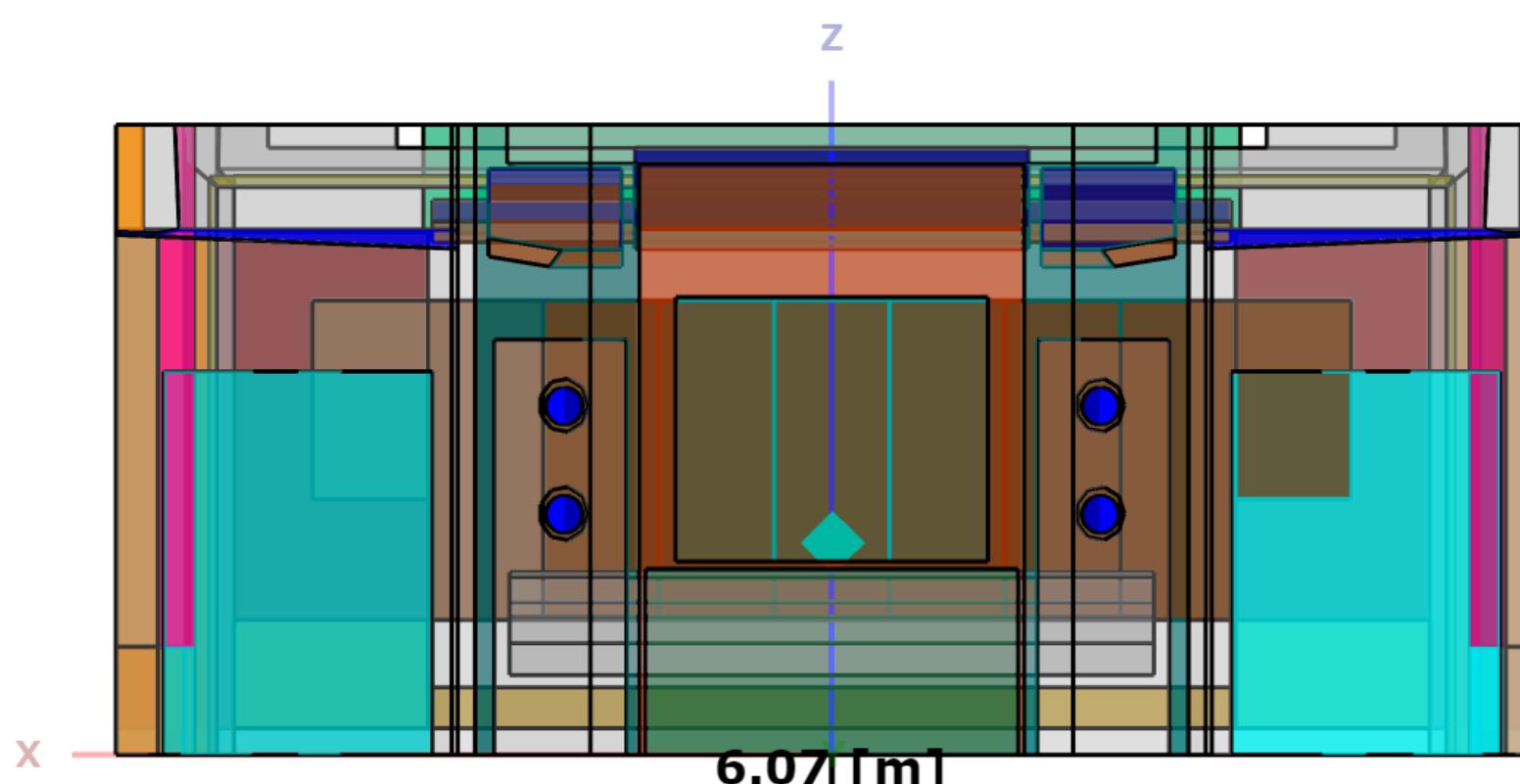
These comparisons allow us to verify and quantify the precision of the NIRO software in several different analyses, both in the frequency and time domains.

## Listening positions:

- Mix Pos.: X: 0.00, Y: 3.93, Z: 1.20 [m]

## Loudspeaker positions:

- AUGSPURGER DUO (Mains): X: -1.51, Y: 5.87, Z: 1.97 [m] | Polarity: (+)  
X: -1.51, Y: 5.87, Z: 1.36 [m] | Polarity: (+)  
X: 1.51, Y: 5.87, Z: 1.97 [m] | Polarity: (+)  
X: 1.51, Y: 5.87, Z: 1.36 [m] | Polarity: (+)

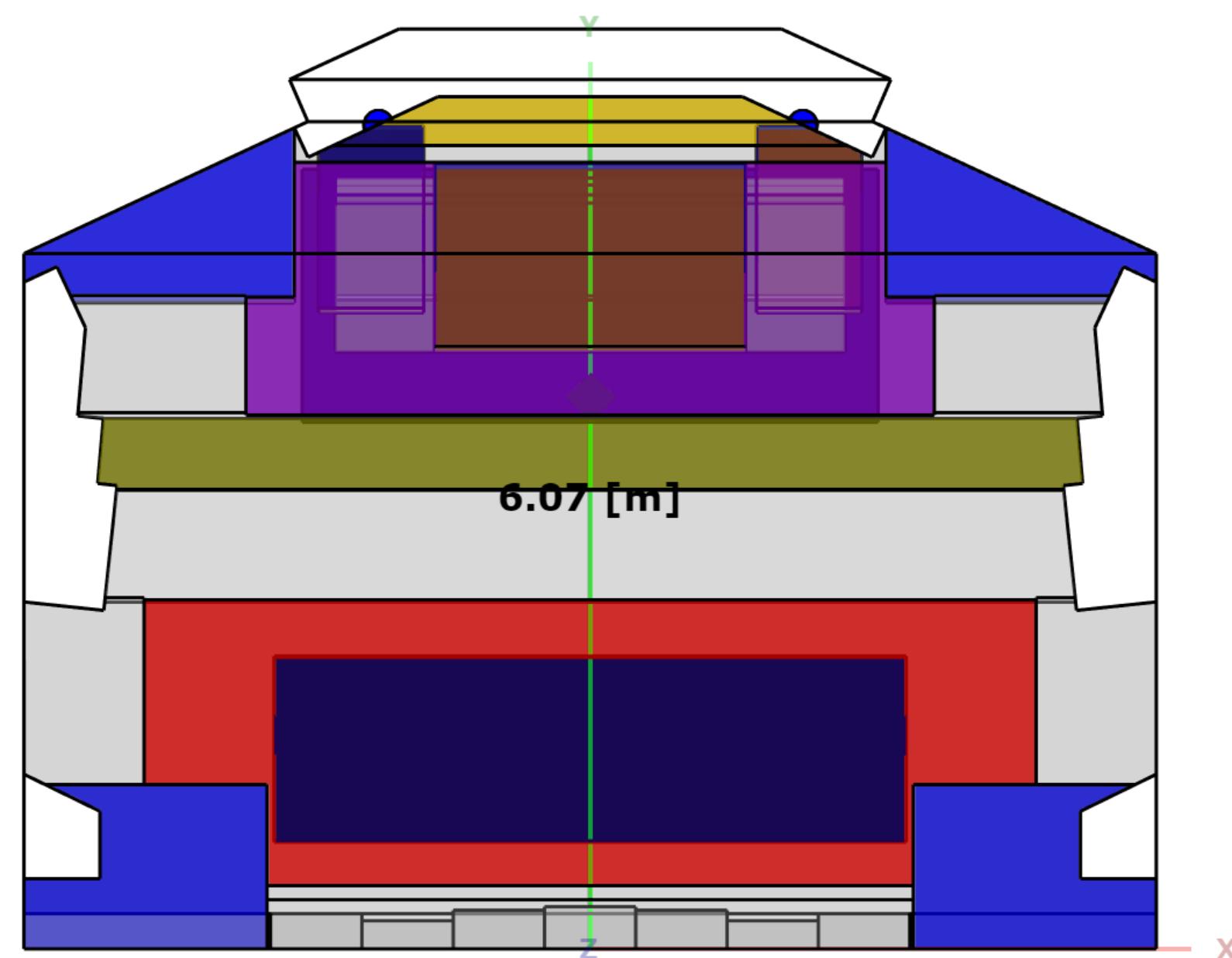


## ① Positions

Listener and speaker positions

Width at front of room:

4.03 [m]



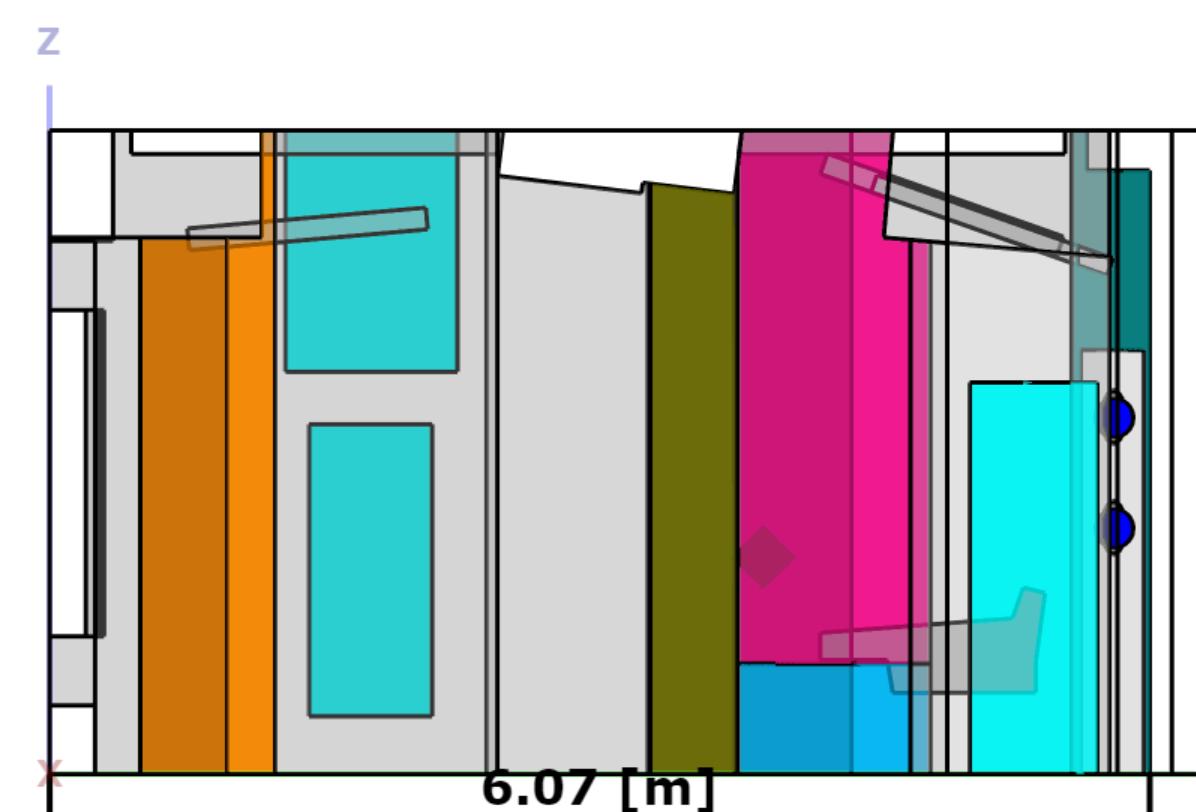
Width at rear of room:

4.03 [m]

## ② Front View

Height at rear of room:

3.55 [m]



## ③ Floorplan View

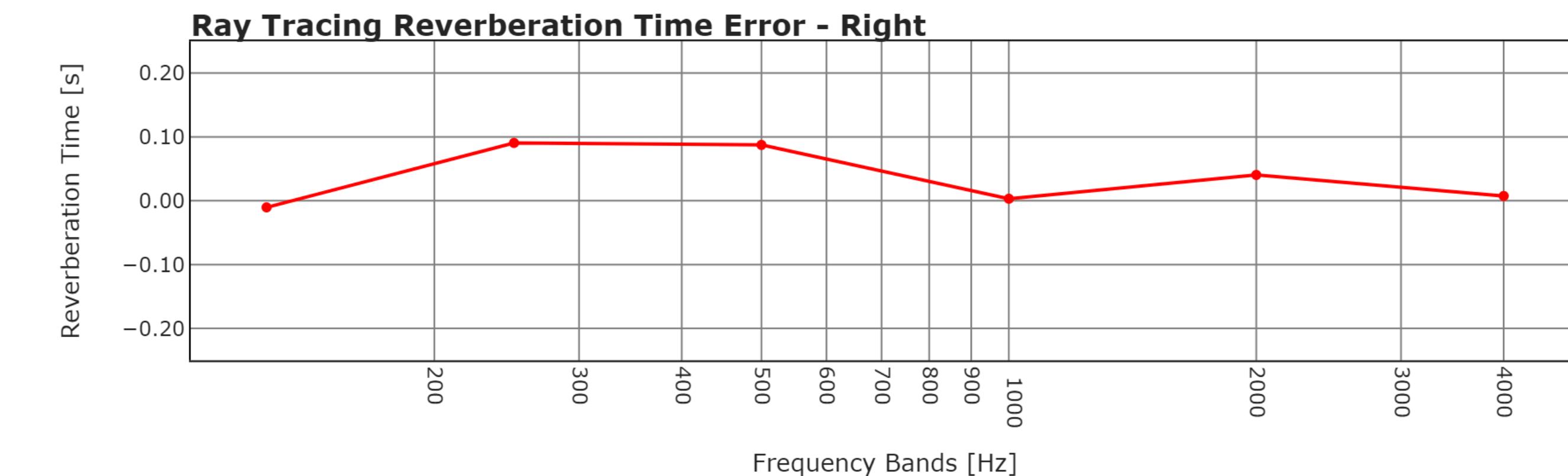
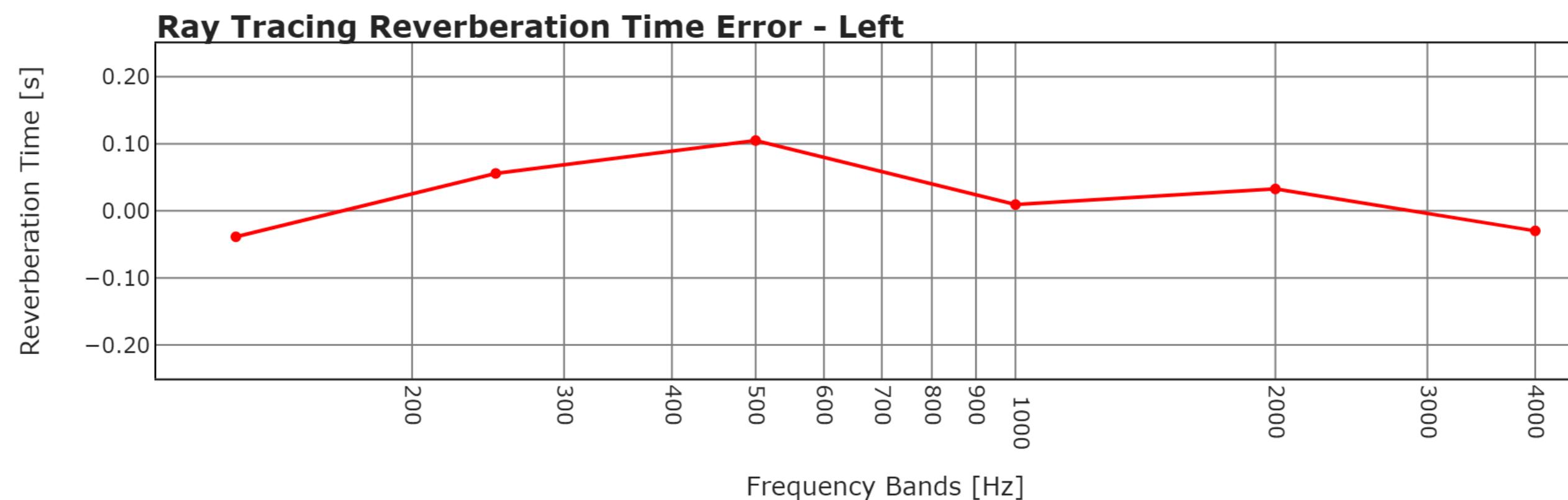
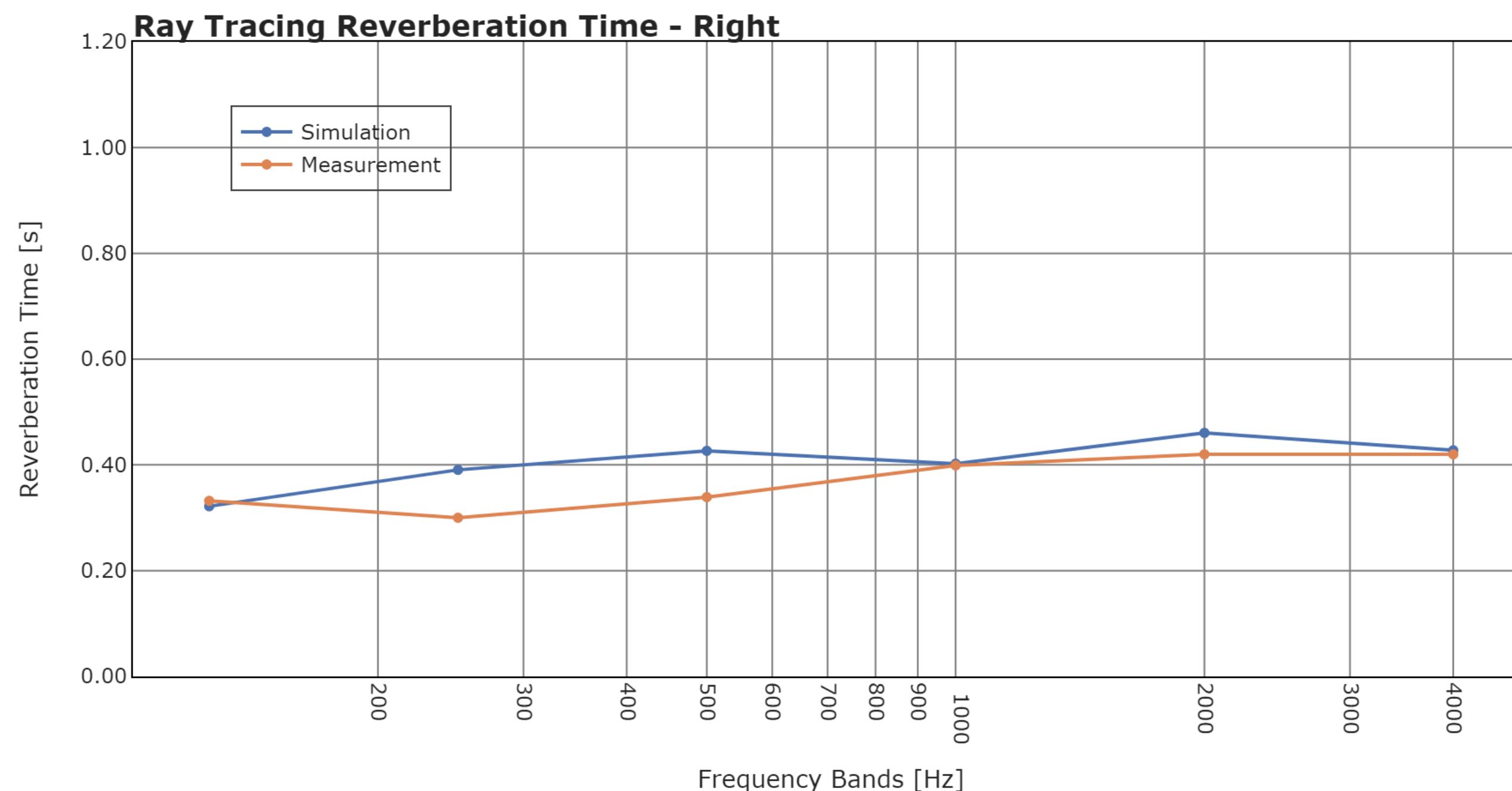
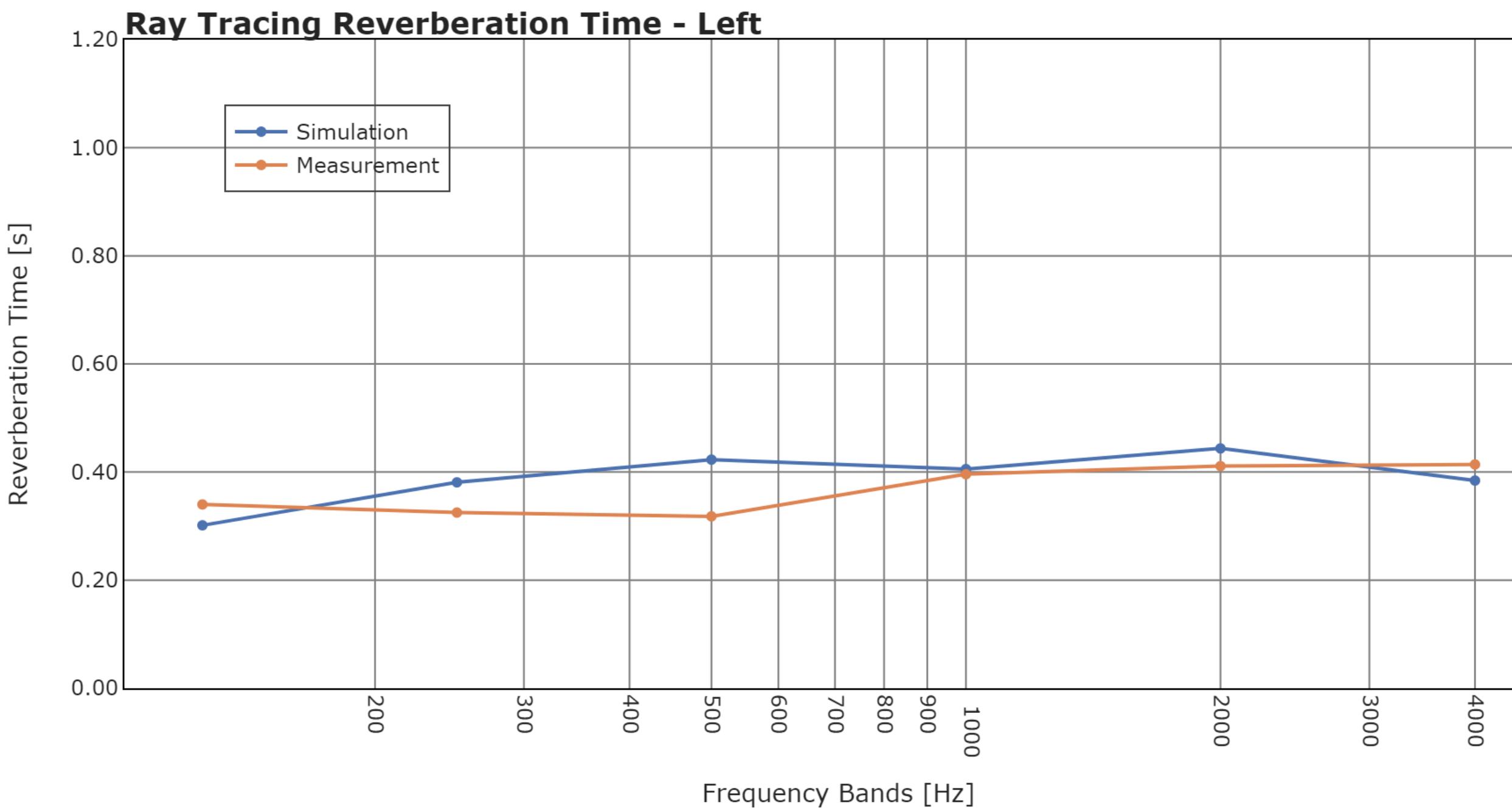
# Layout

A. Zorzo, R. Petrolli, T. Sanchez

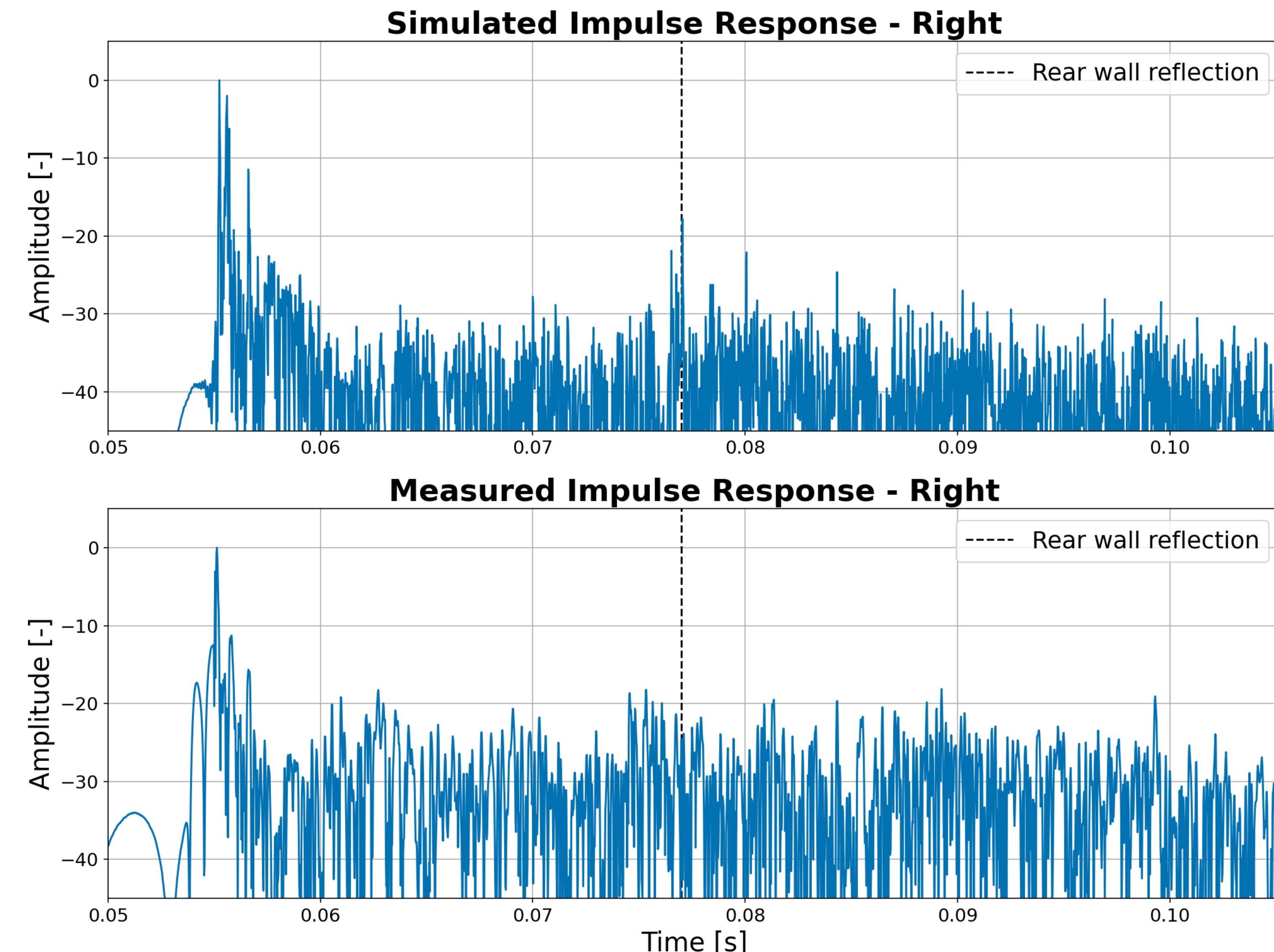
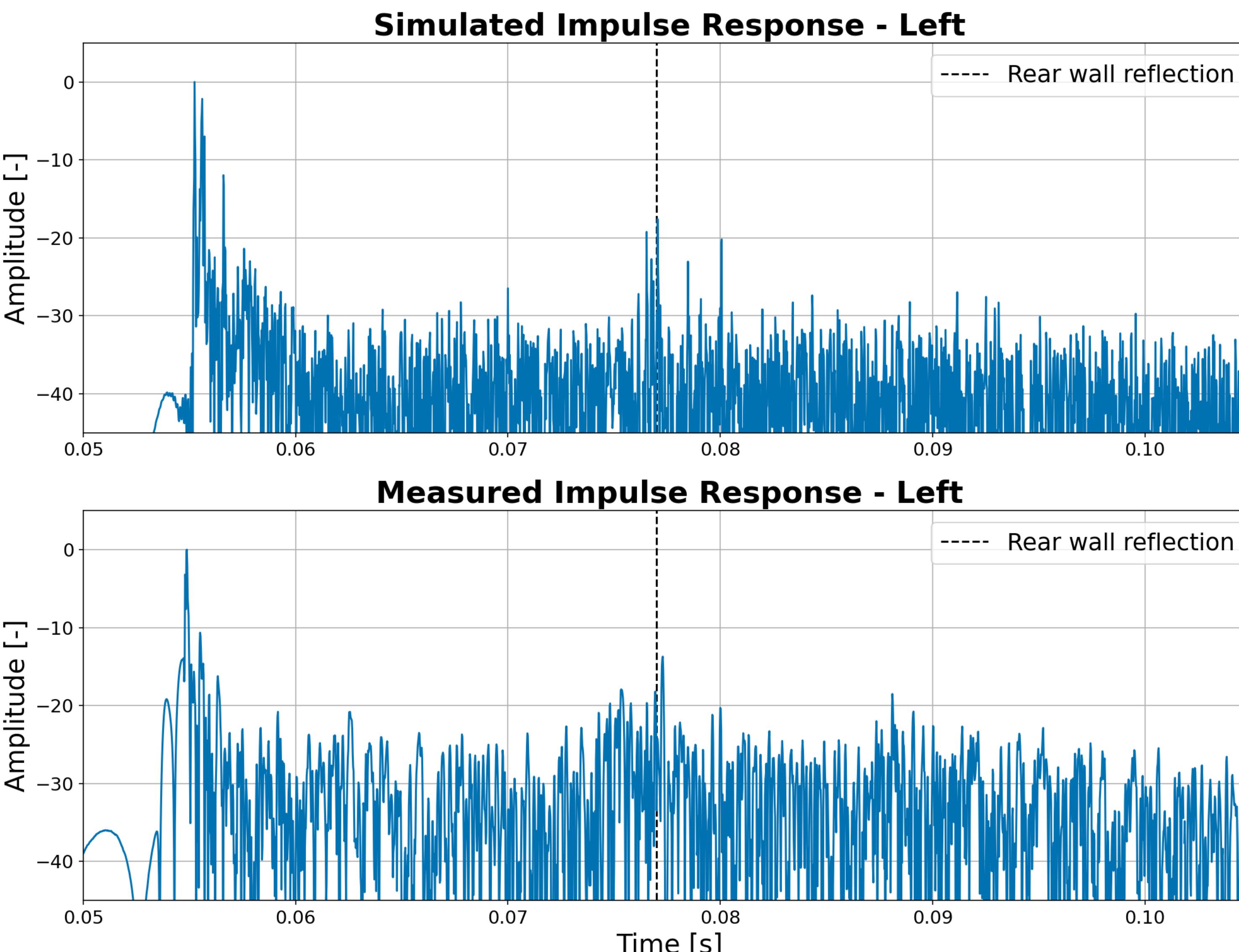
August 12, 2022

The reverberation times (T30), from 125 to 4000Hz and in octave bands, can be seen below. The agreement is quite good in the 125 and 250Hz bands and from 1000 to 4000Hz.

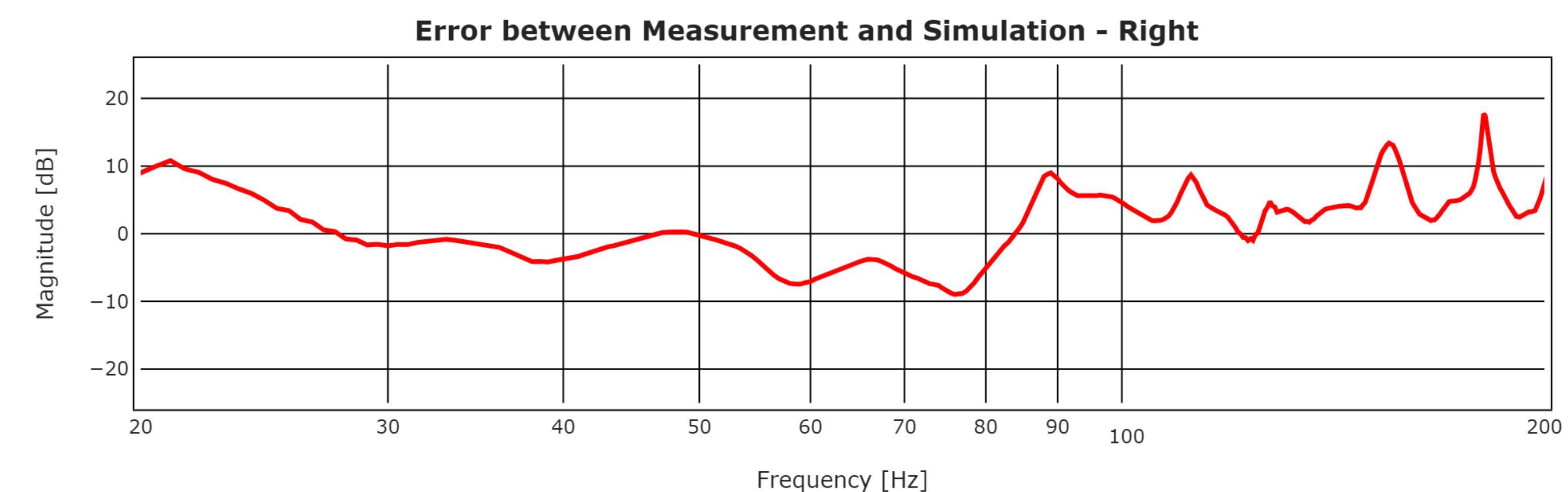
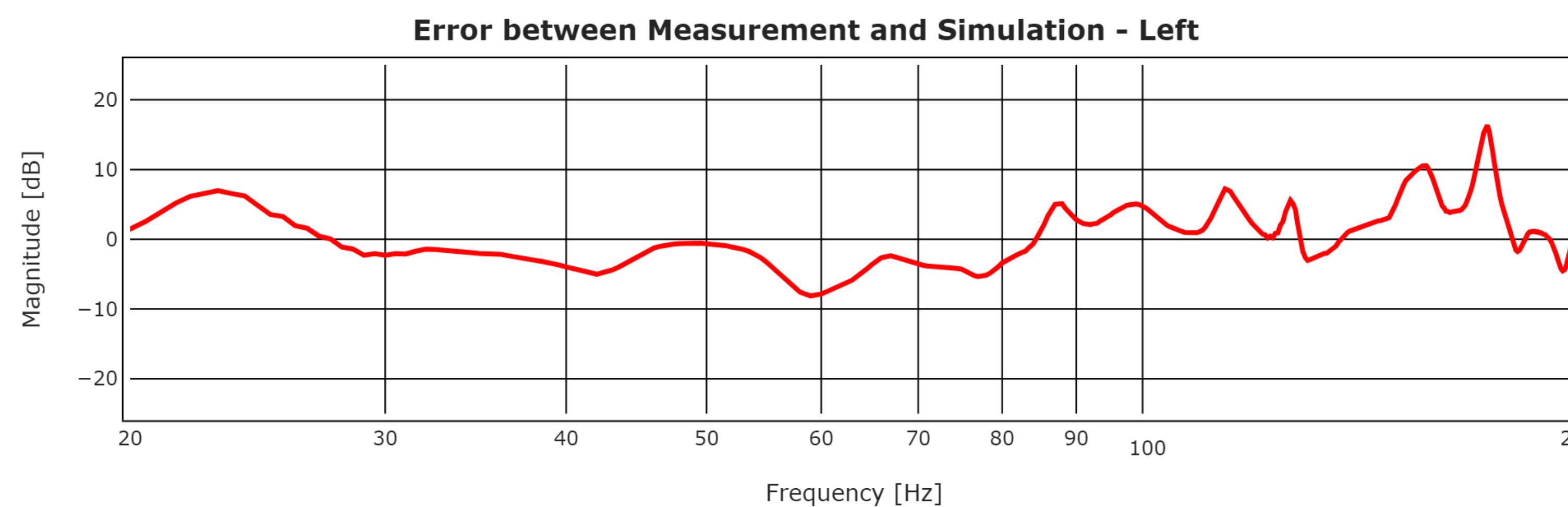
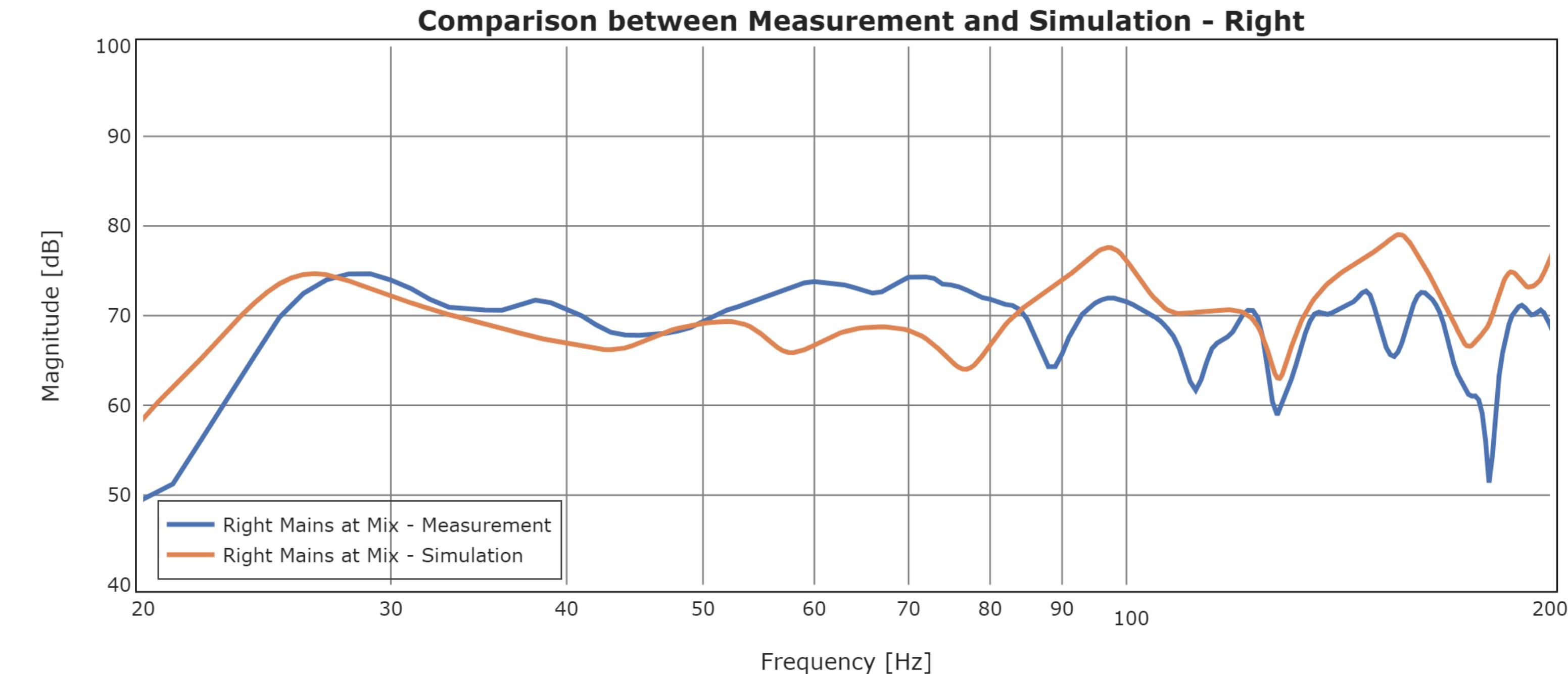
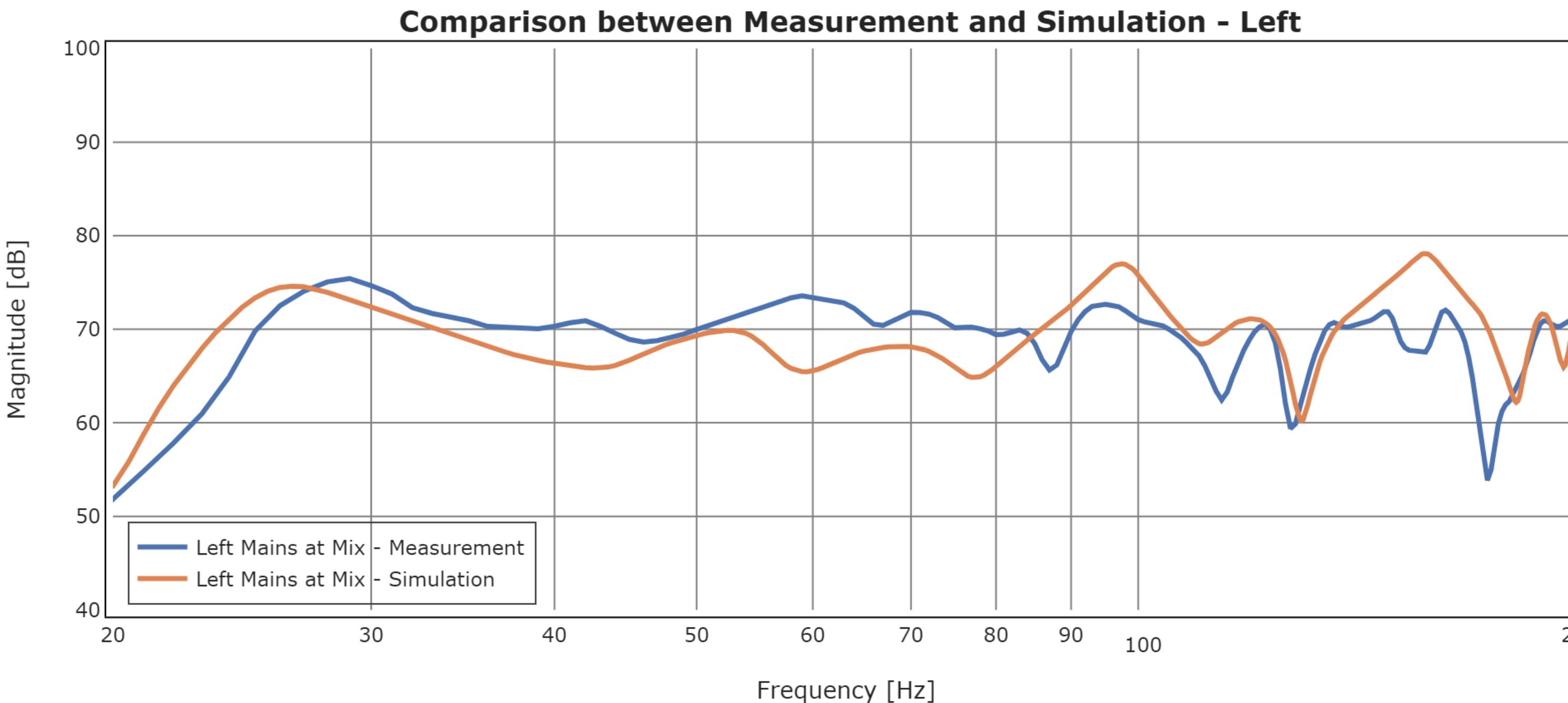
The divergence in the 500Hz band is of 0.1 seconds for the left speaker and of 0.09 for the right speaker.



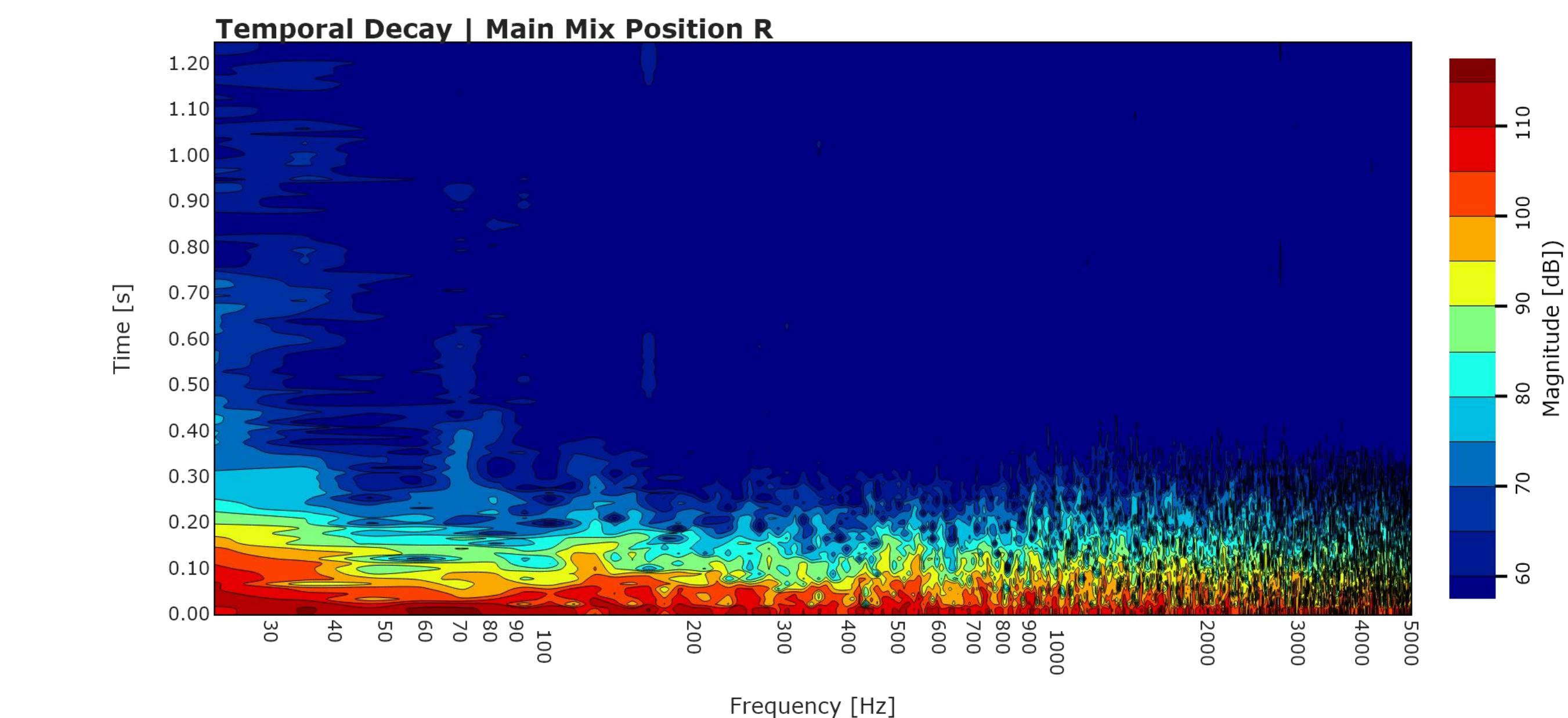
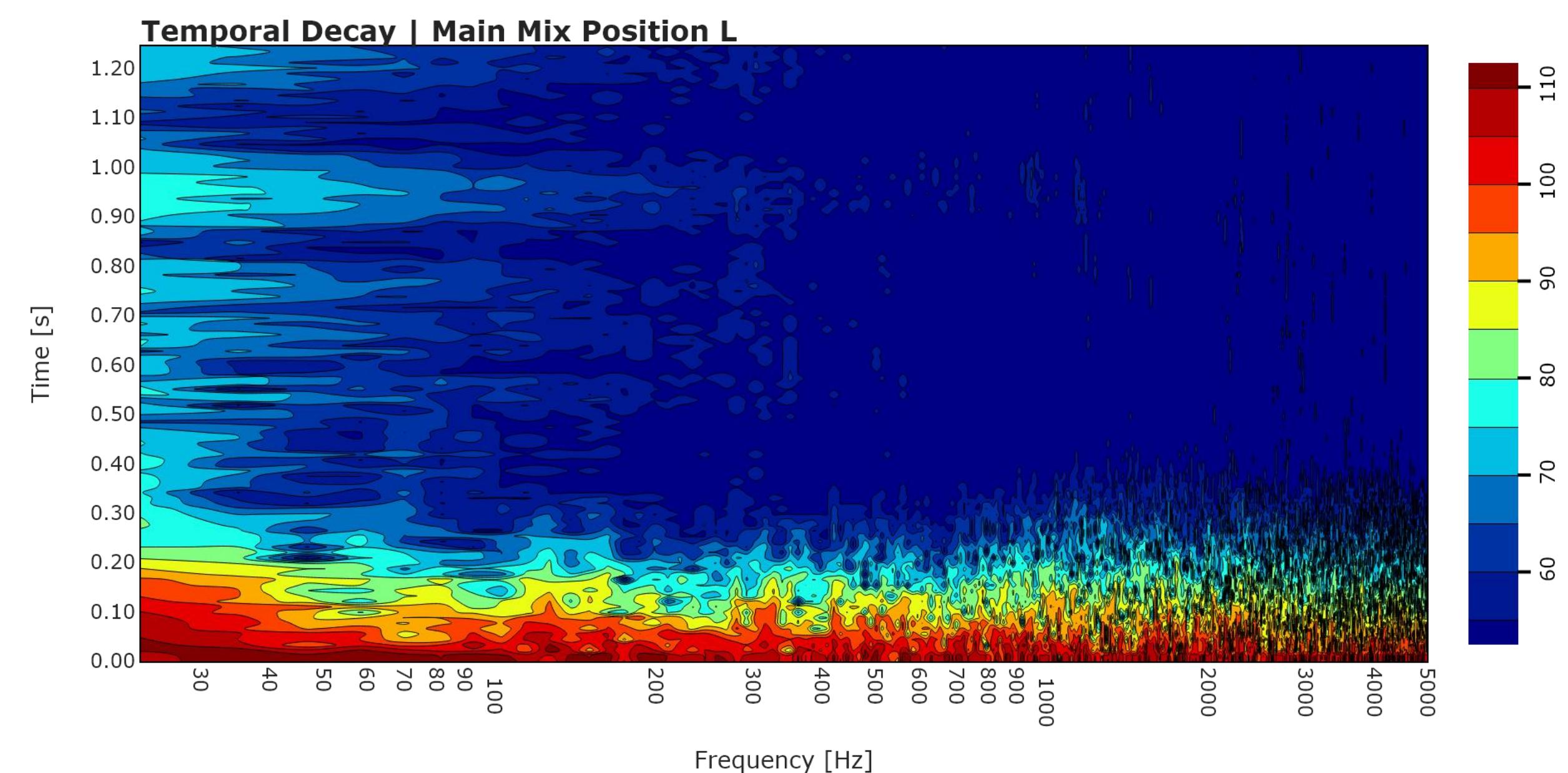
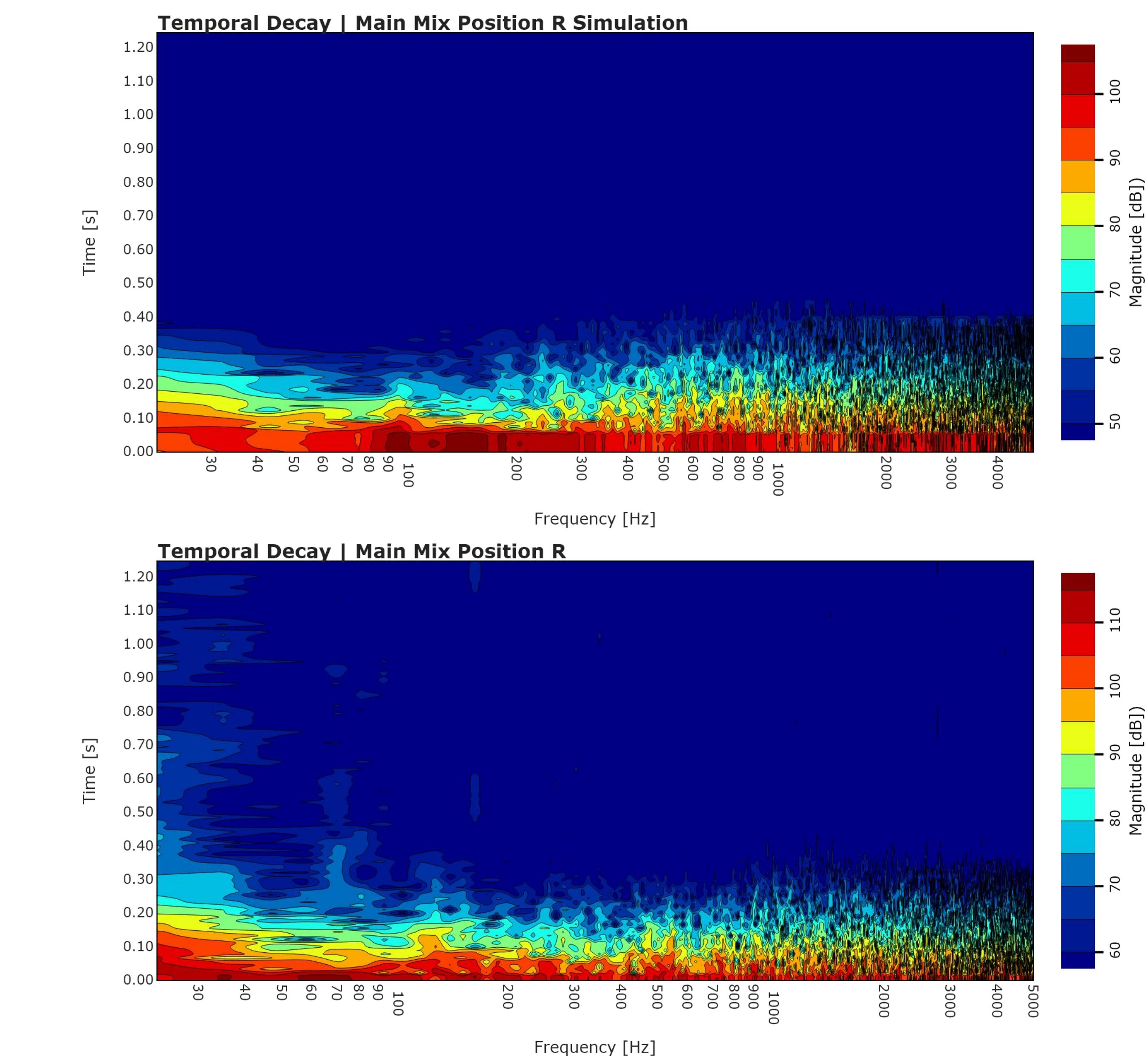
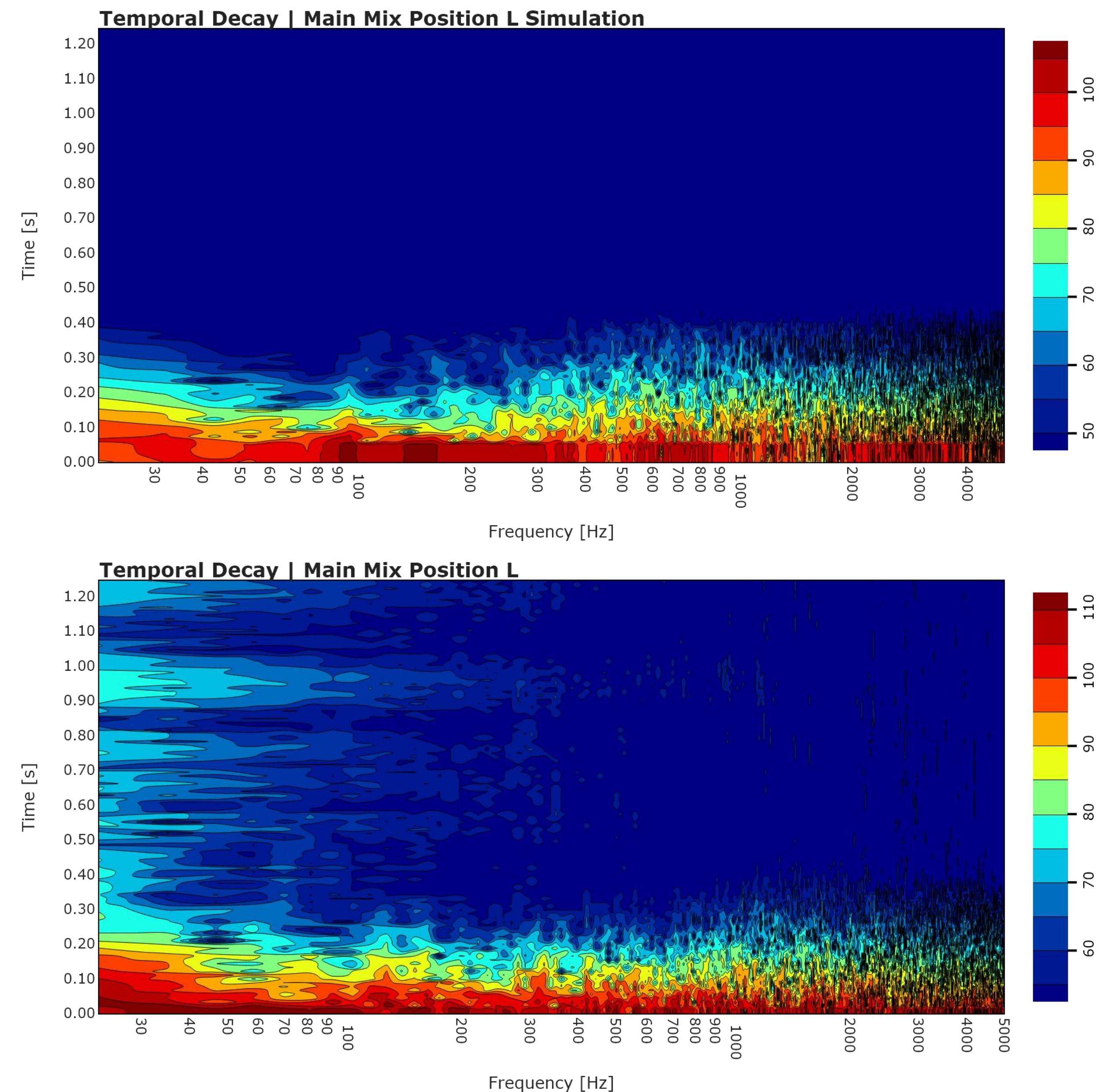
The measured and simulated full range Impulse Responses are shown in dB to evaluate the Reflection Free Zone (RFZ). In both cases, except for the console bounce, no strong reflections arriving between the direct sound and the reflection of the rear wall are found. In addition, the temporal decay, here represented by the slope of the reverberant tail, is similar between measurement and prediction.



The agreement between measurement and simulation in the LF response is excellent. It is clear that the curves have the same overall behavior despite the differences. These differences are acceptable given the simplifications made in the digital representation of the room through numerical models.

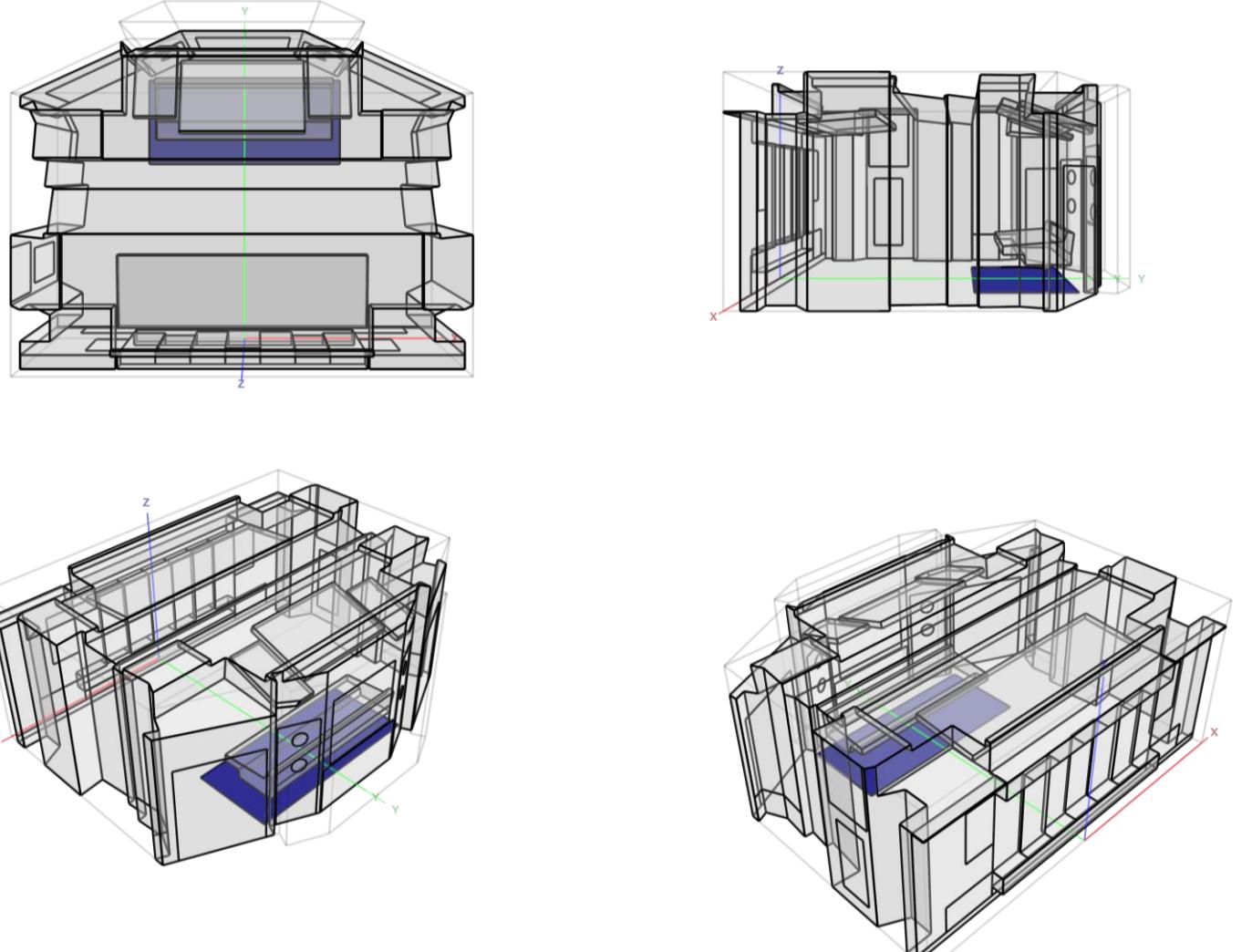
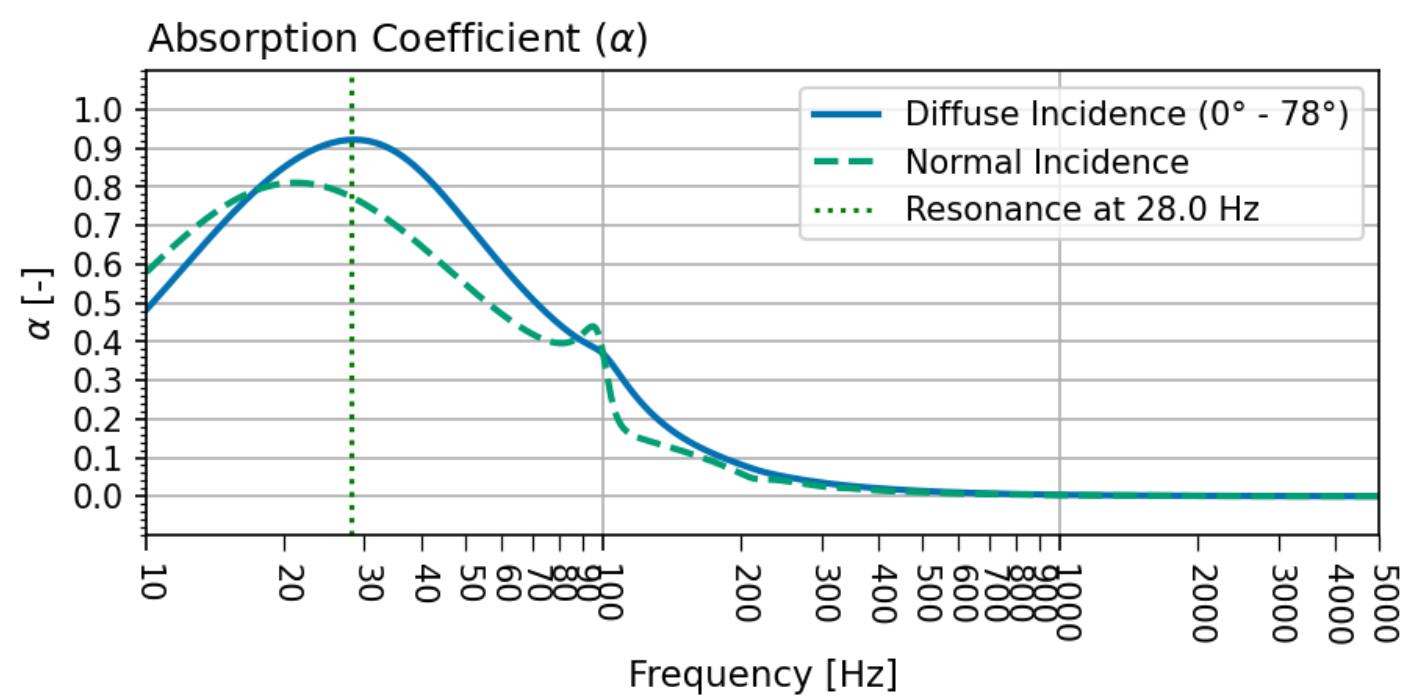


In the temporal decay, the background noise from the measurements in the low frequency can be clearly seen in the lower graphs. Some high-frequency numerical noise can also be seen in the simulated results. However, besides these small differences, the decays are quite similar throughout the spectrum.

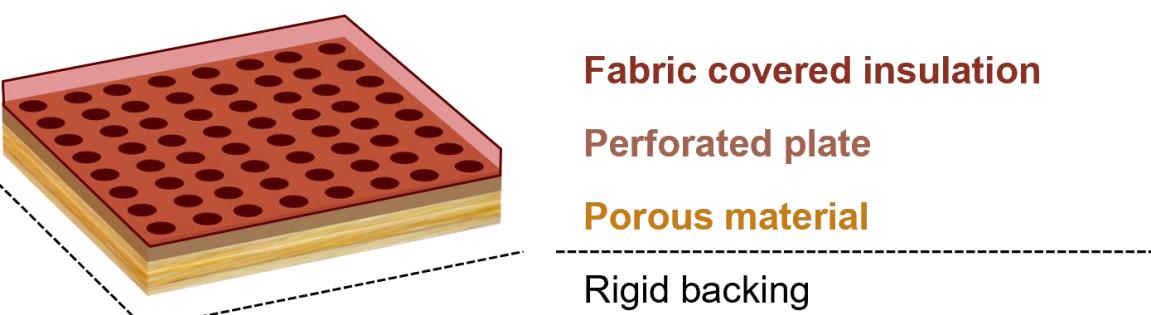




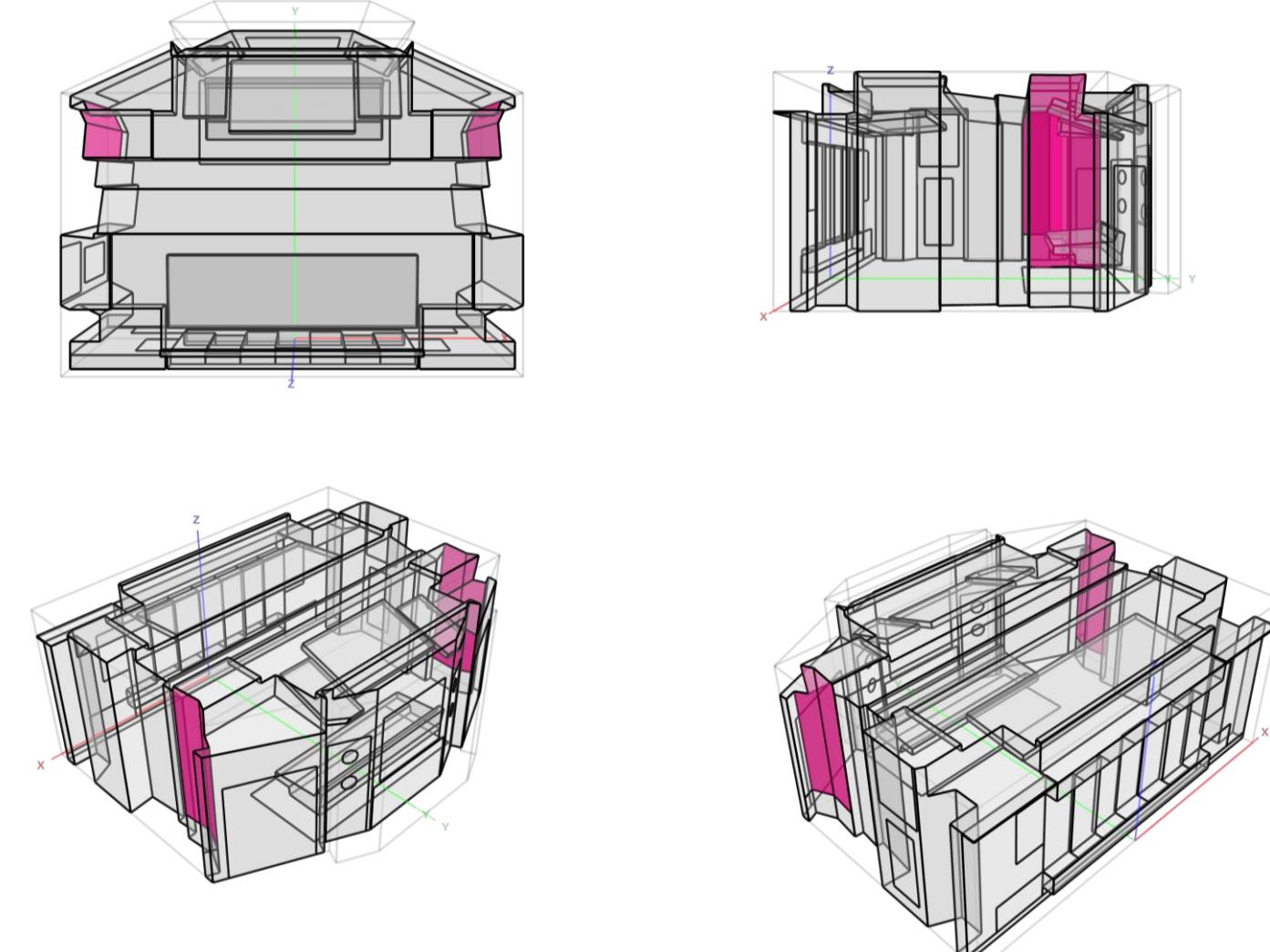
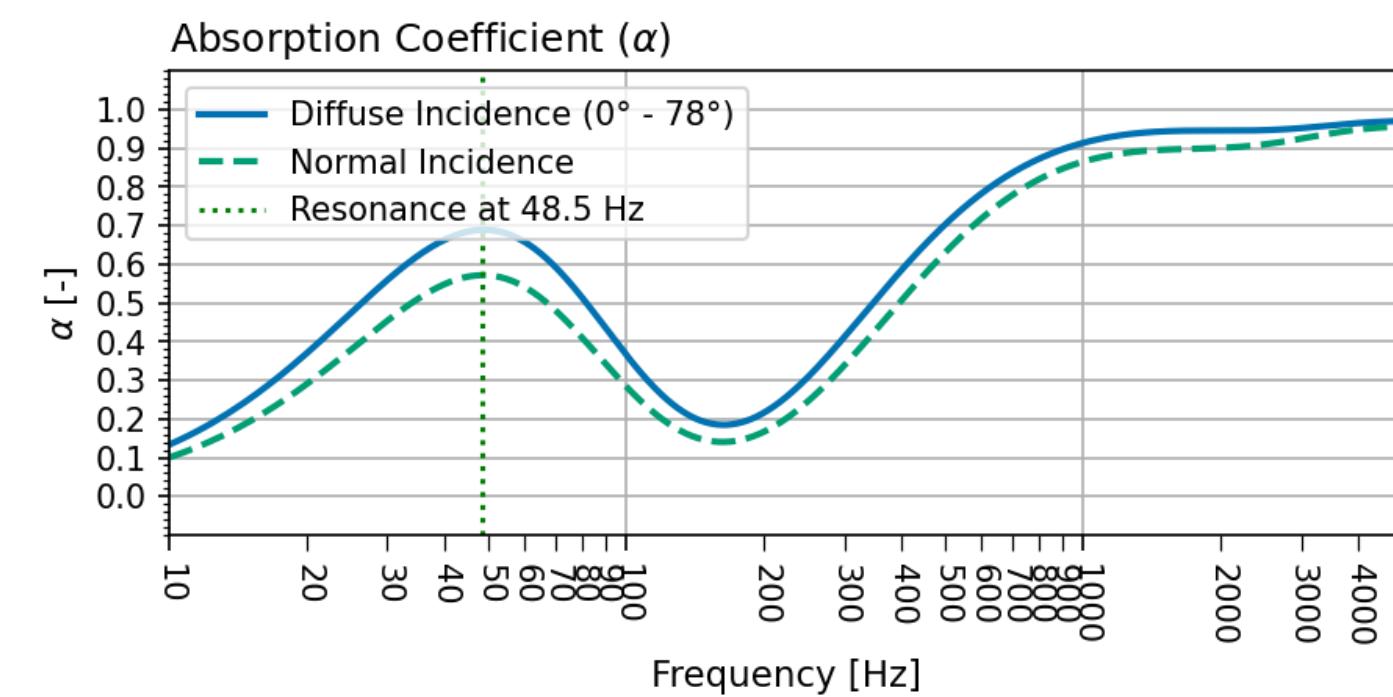
**Finished face of treatment:** Optional fabric covering  
**Plate thickness (plywood):** 38.00 [mm] | 1.50"  
**Hole diameter/spacing:** 6.00 [mm] holes spaced 48.00 [mm] on-center | 0.25" and 1.90"  
**Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 300.00 [mm] | 11.80"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Air gap depth:** 1492.00 [mm] | 58.75"  
**Total treatment depth:** 1830.00 [mm] | 72.05"  
**Surface Area:** 7.50 [m<sup>2</sup>] | 79.50 [ft<sup>2</sup>]



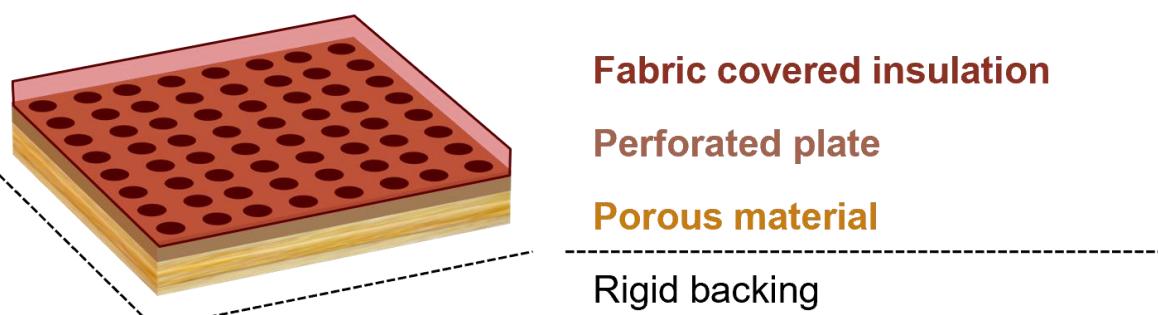
**① Perforated Resonator**



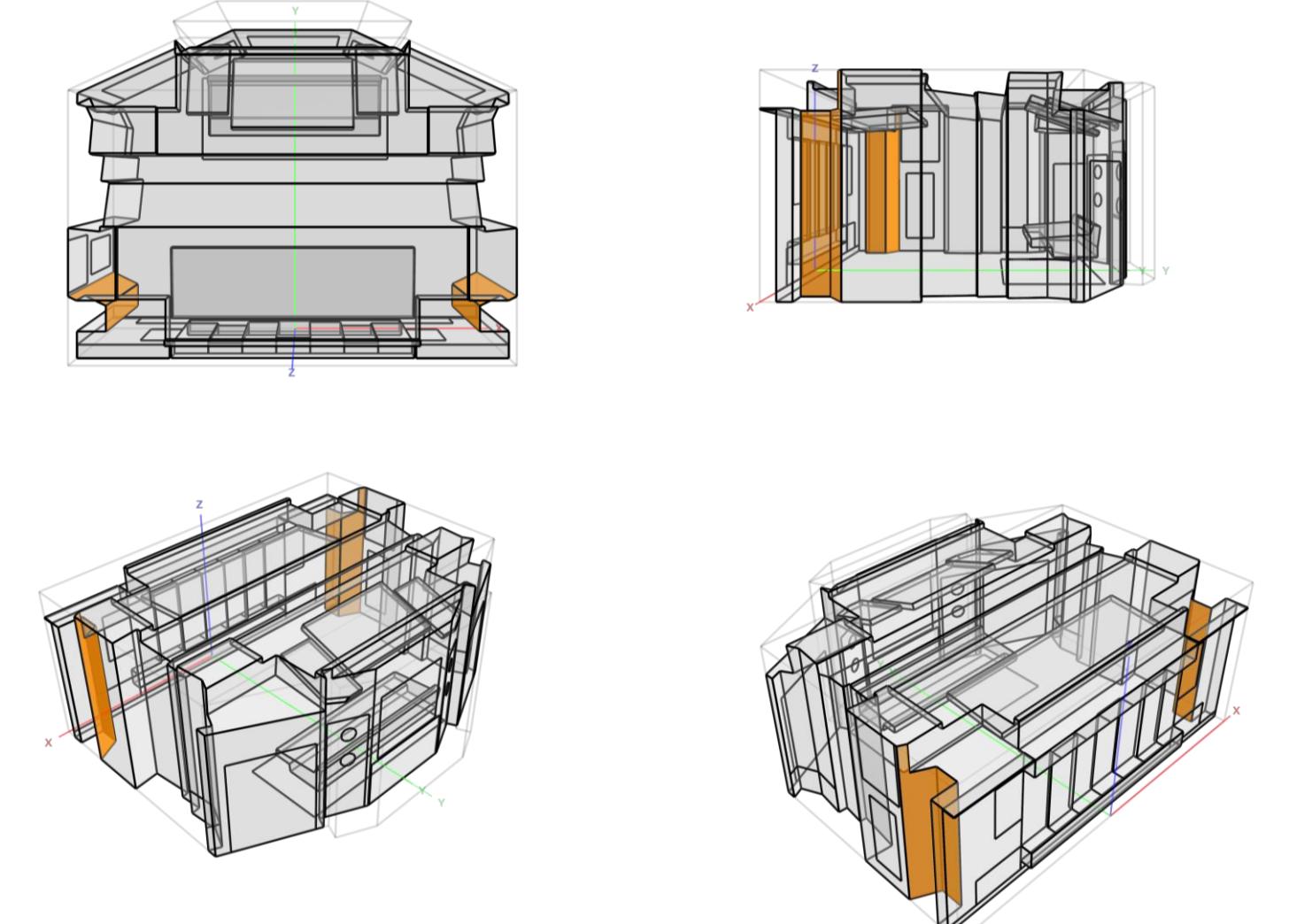
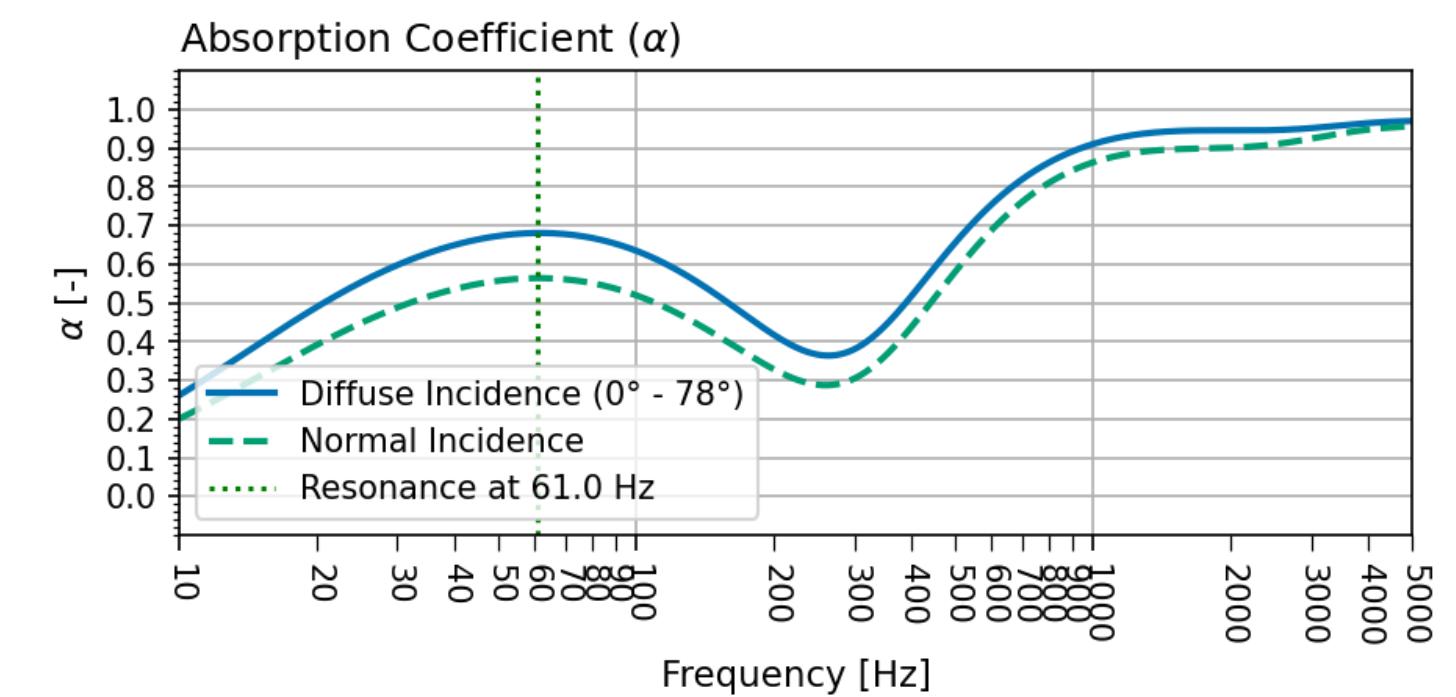
**Finished face of treatment:** Fabric covered Owens Corning 705 unfaced fiberglass - 50.00 [mm] | 1.95"  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 6.00 [mm] holes spaced 64.00 [mm] on-center | 0.25" and 2.50"  
**Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 250.00 [mm] | 9.85"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 319.00 [mm] | 12.55"  
**Surface Area:** 6.00 [m<sup>2</sup>] | 67.00 [ft<sup>2</sup>]



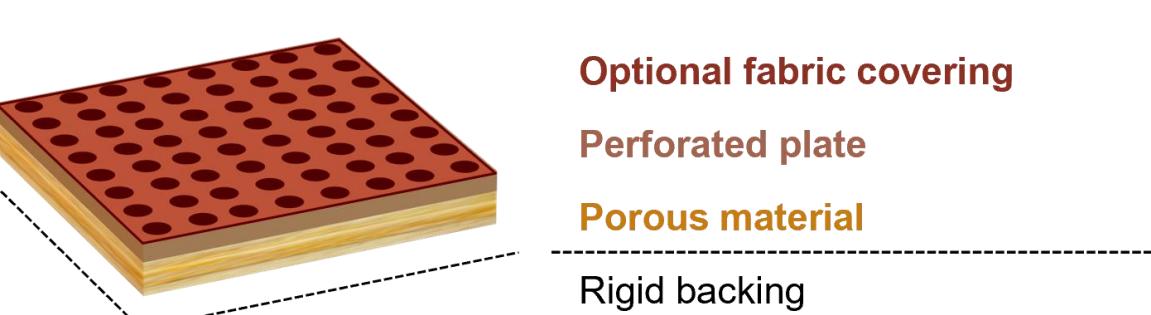
**② Perforated Resonator**



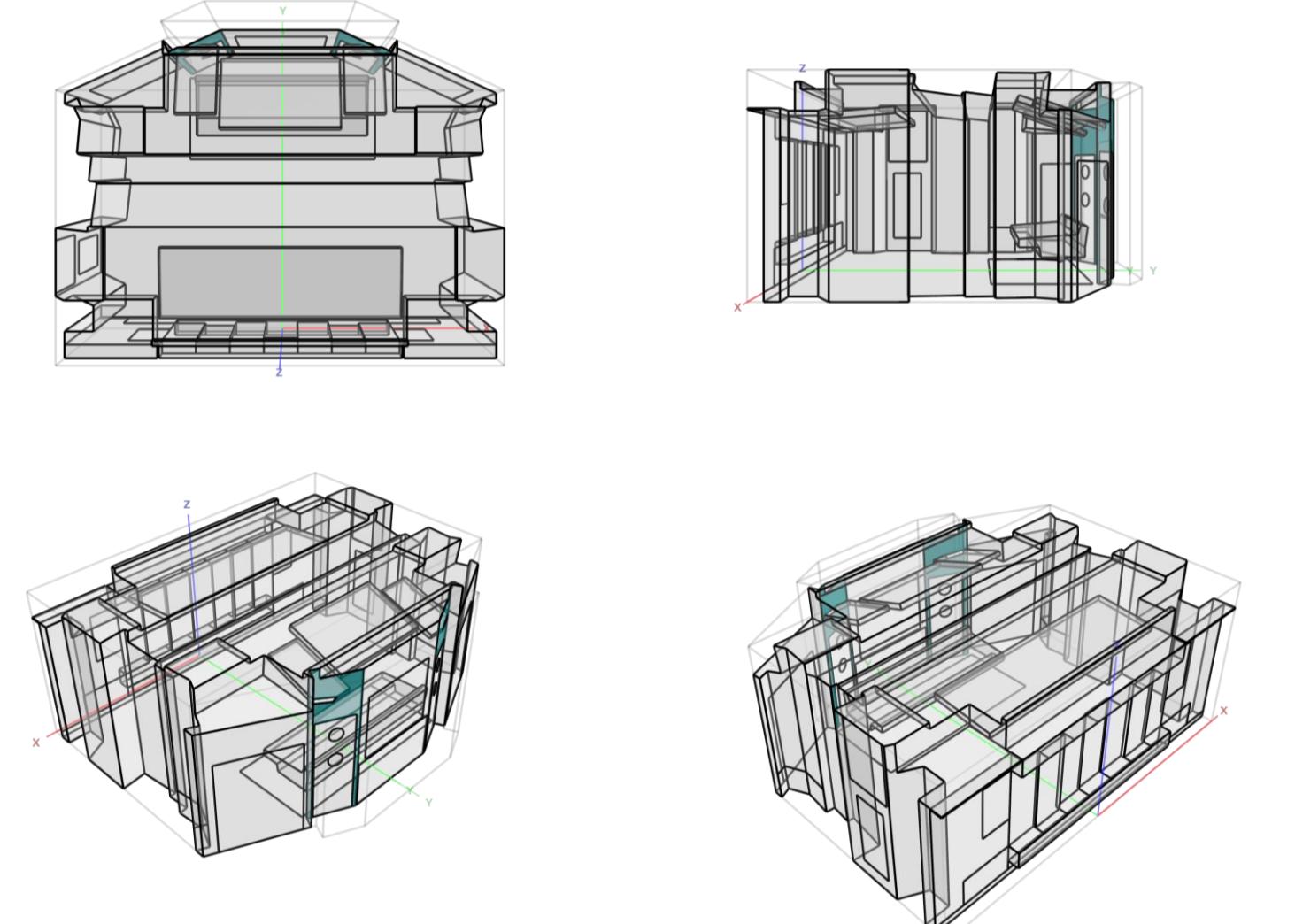
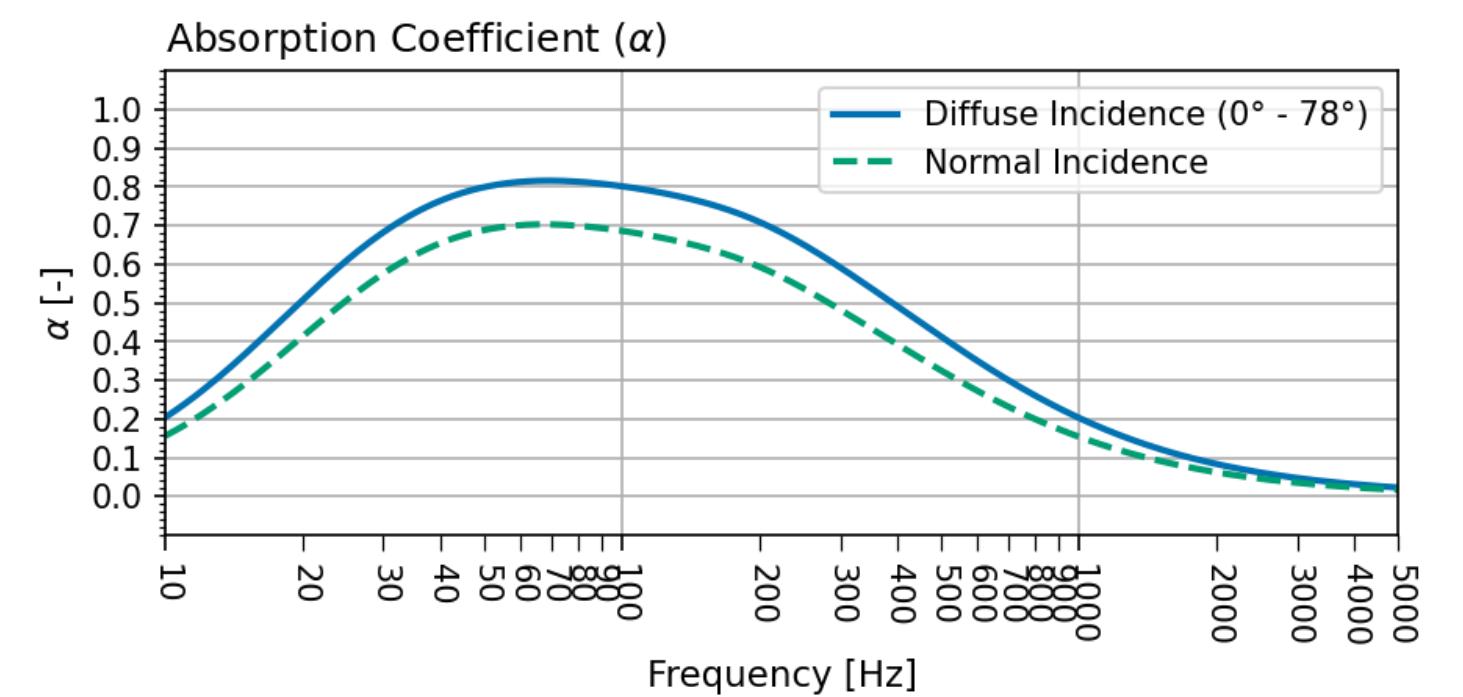
**Finished face of treatment:** Fabric covered Owens Corning 705 unfaced fiberglass - 50.00 [mm] | 1.95"  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 6.00 [mm] holes spaced 40.00 [mm] on-center | 0.25" and 1.55"  
**Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 400.00 [mm] | 15.75"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 469.00 [mm] | 18.45"  
**Surface Area:** 6.50 [m<sup>2</sup>] | 71.00 [ft<sup>2</sup>]



**③ Perforated Resonator**



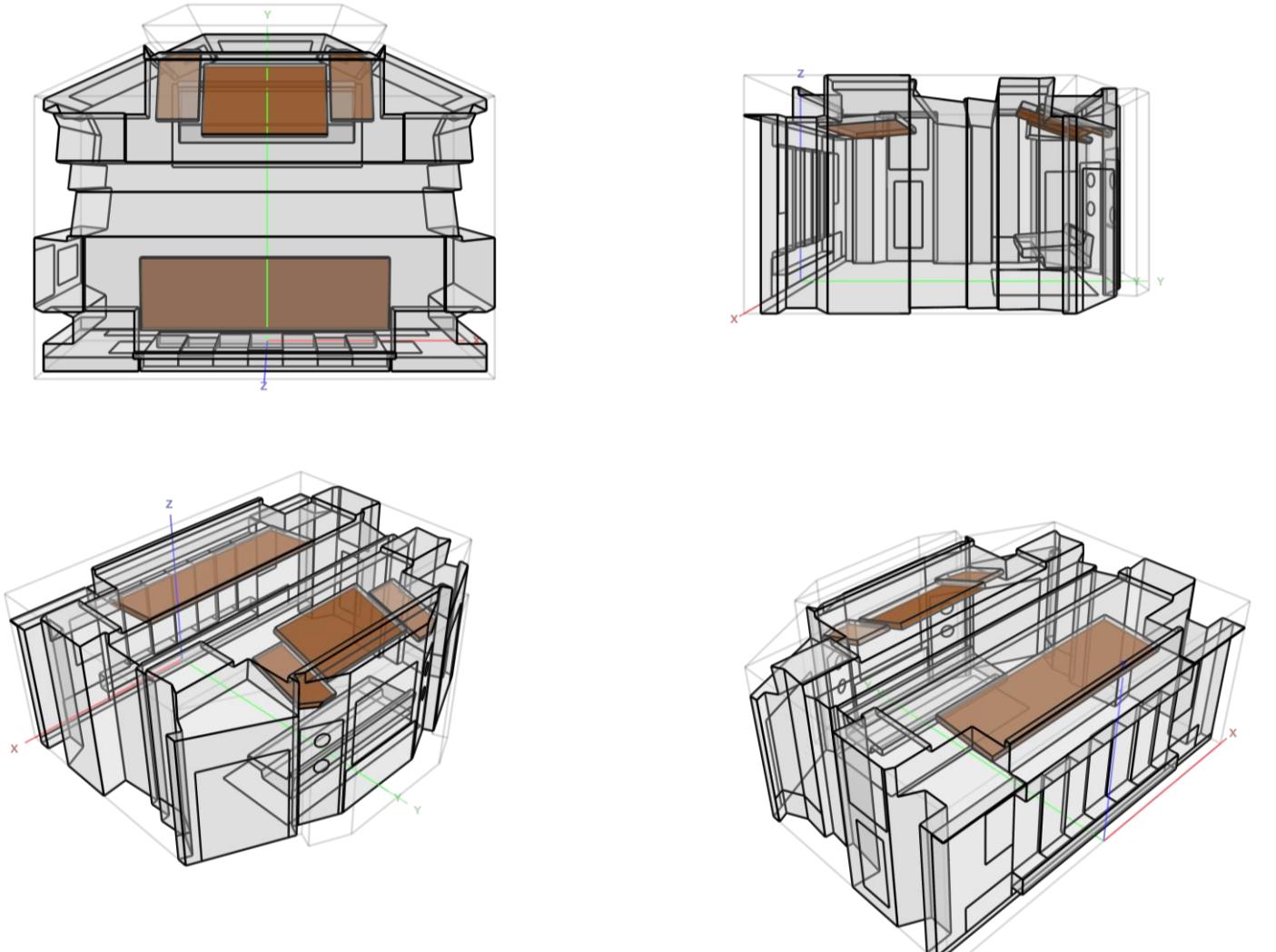
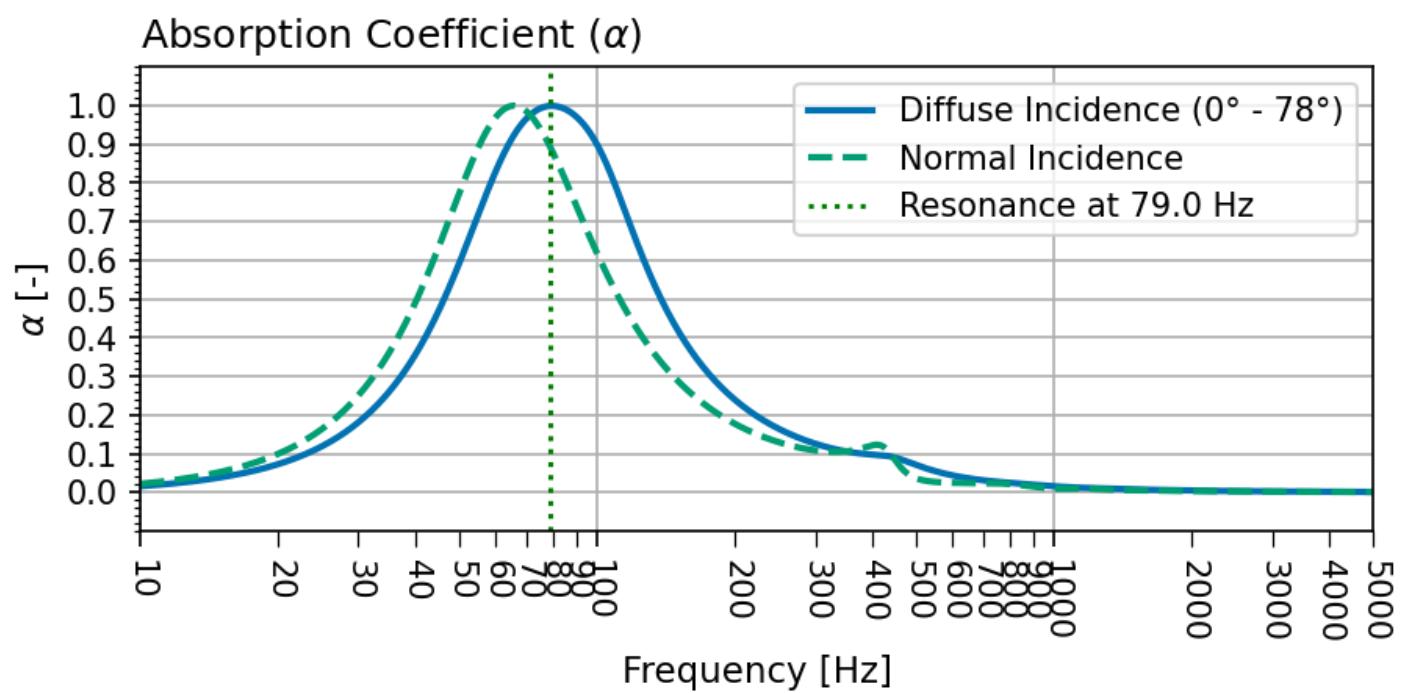
**Finished face of treatment:** Optional fabric covering  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 0.30 [mm] holes spaced 1.50 [mm] on-center | 0.00" and 0.05"  
**Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 540.00 [mm] | 21.25"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 559.00 [mm] | 22.00"  
**Surface Area:** 3.00 [m<sup>2</sup>] | 32.00 [ft<sup>2</sup>]



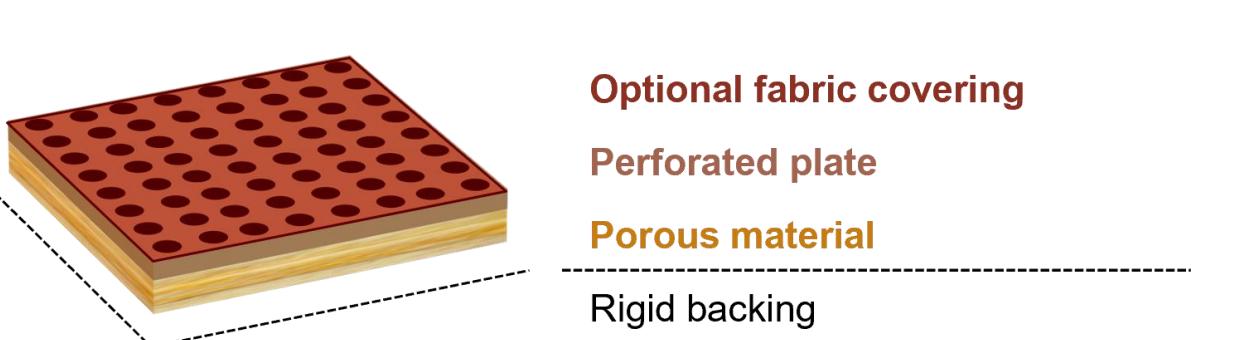
**④ Perforated Resonator**



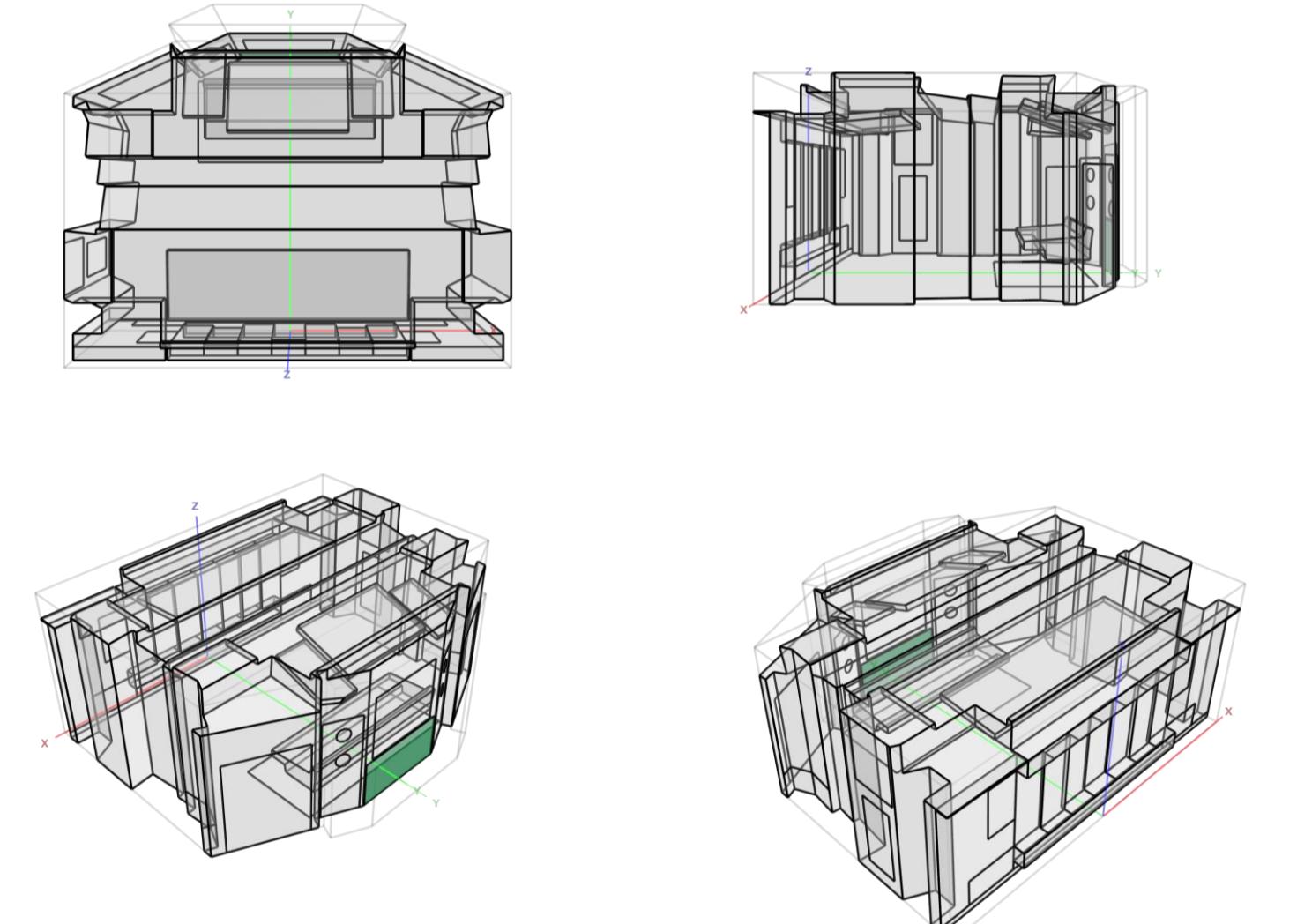
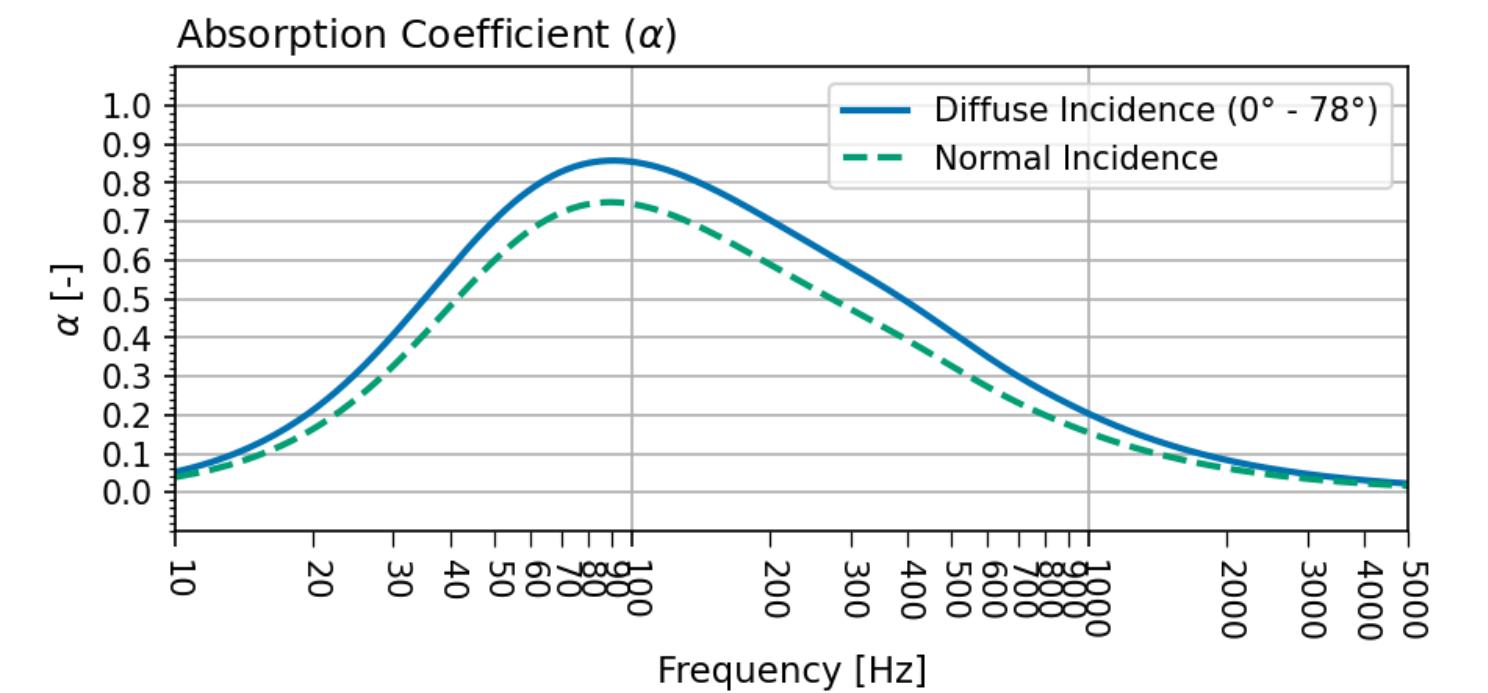
**Finished face of treatment:** Optional fabric covering  
**FlutterFree T thickness:** 25.00 [mm] | 1.00"  
**FlutterFree T width/spacing:** 100.00 [mm] wood slats spaced 2.00 [mm] apart | 3.95" and 0.10"  
**Porous material type and thickness:** Owens Corning R-13 EcoTouch Pink unfaced fiberglass - 100.00 [mm] | 3.95"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Air gap depth:** 300.00 [mm] | 11.80"  
**Total treatment depth:** 425.00 [mm] | 16.75"  
**Surface Area:** 11.00 [m<sup>2</sup>] | 118.50 [ft<sup>2</sup>]



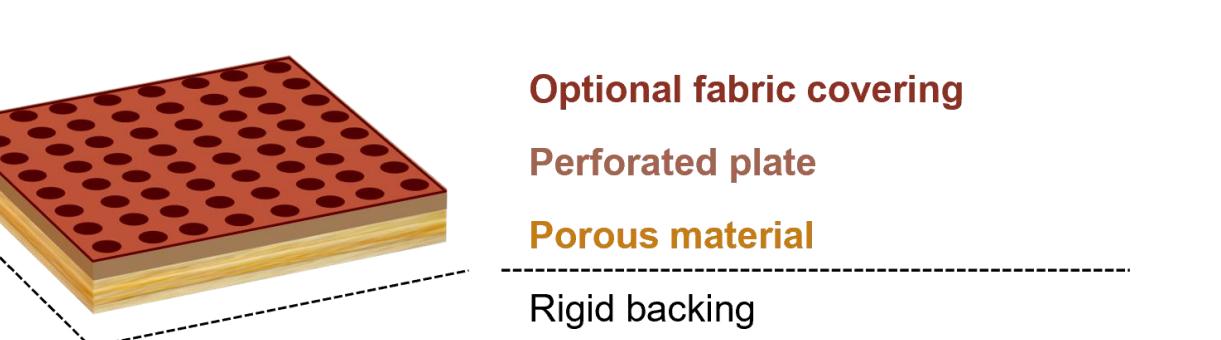
**⑤ Slotted Resonator**



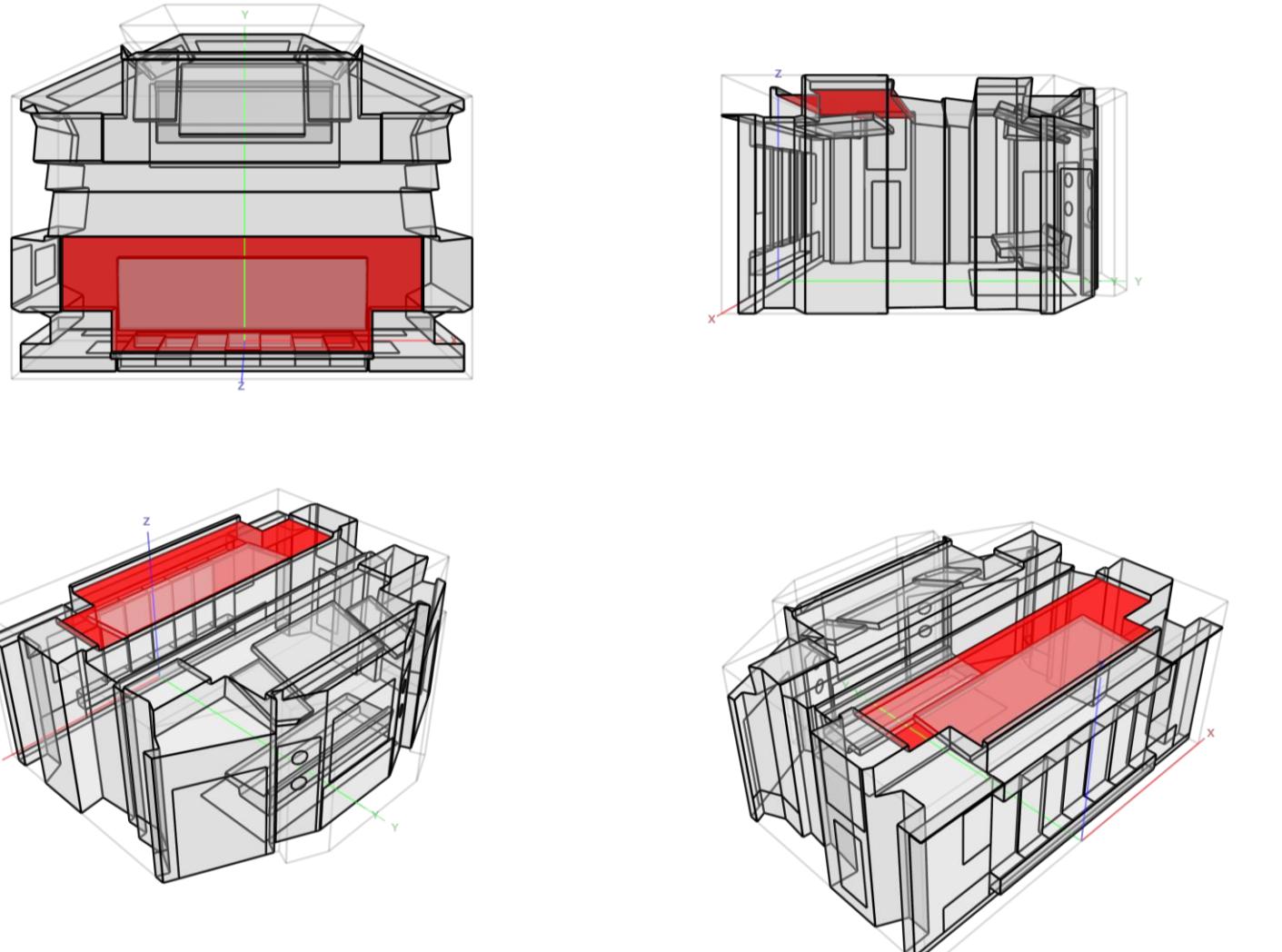
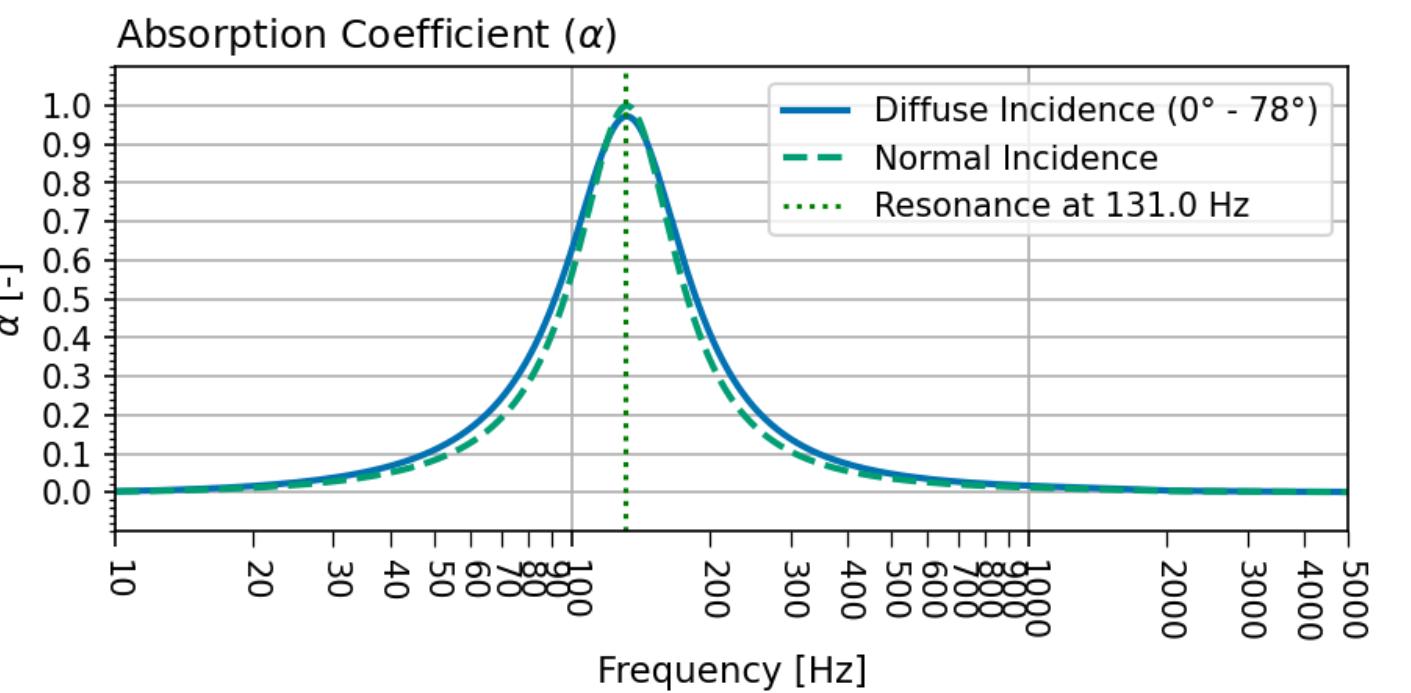
**Finished face of treatment:** Optional fabric covering  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 0.30 [mm] holes spaced 1.50 [mm] on-center | 0.00" and 0.05"  
**Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 300.00 [mm] | 11.80"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 319.00 [mm] | 12.55"  
**Surface Area:** 2.00 [m<sup>2</sup>] | 23.50 [ft<sup>2</sup>]



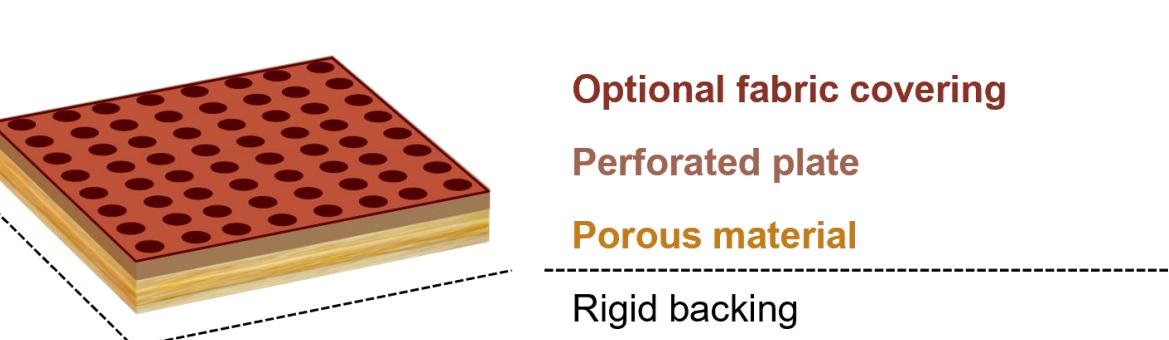
**⑥ Perforated Resonator**



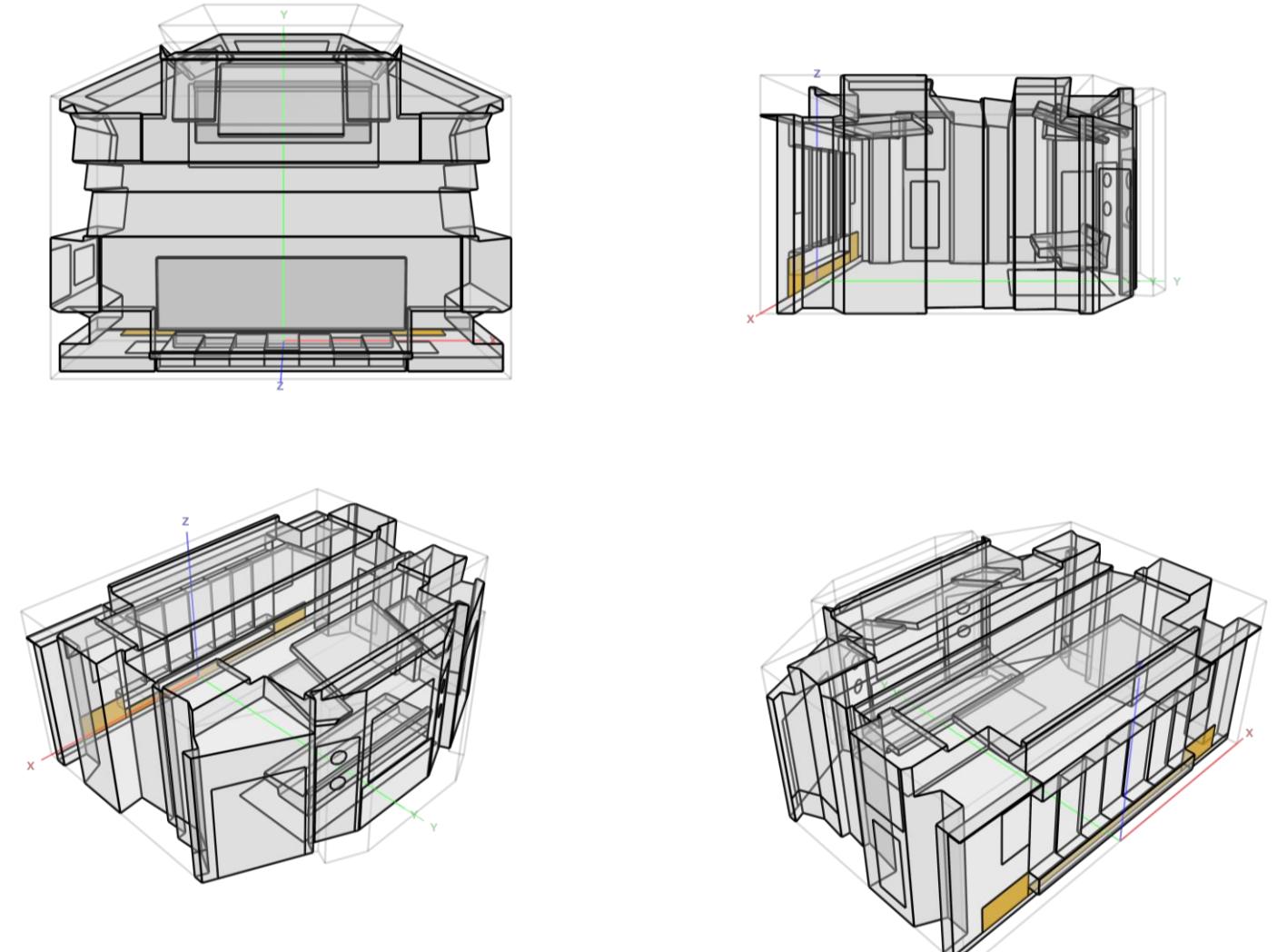
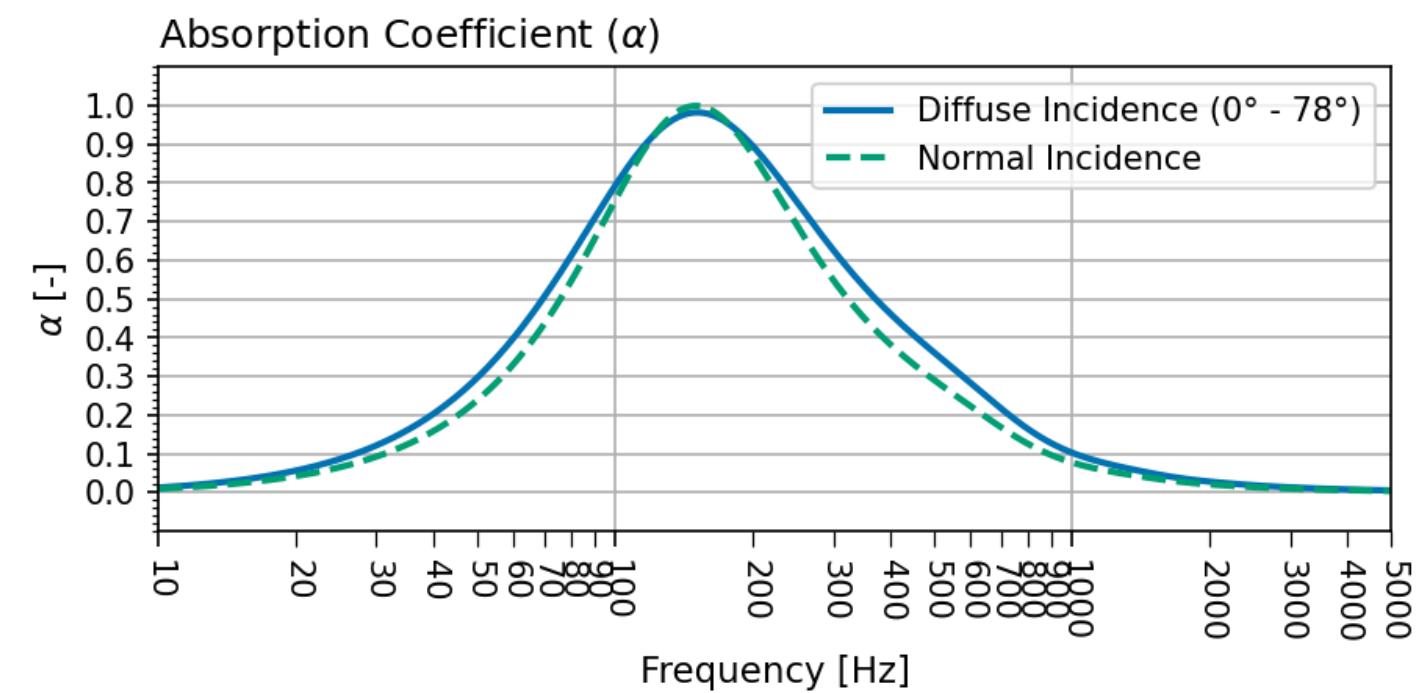
**Finished face of treatment:** Optional fabric covering  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 6.00 [mm] holes spaced 40.00 [mm] on-center | 0.25" and 1.55"  
**Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 100.00 [mm] | 3.95"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 119.00 [mm] | 4.70"  
**Surface Area:** 11.50 [m<sup>2</sup>] | 125.50 [ft<sup>2</sup>]



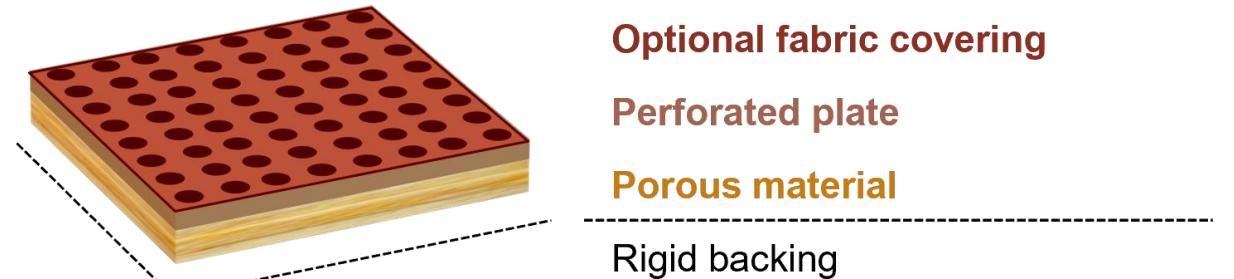
**⑦ Perforated Resonator**



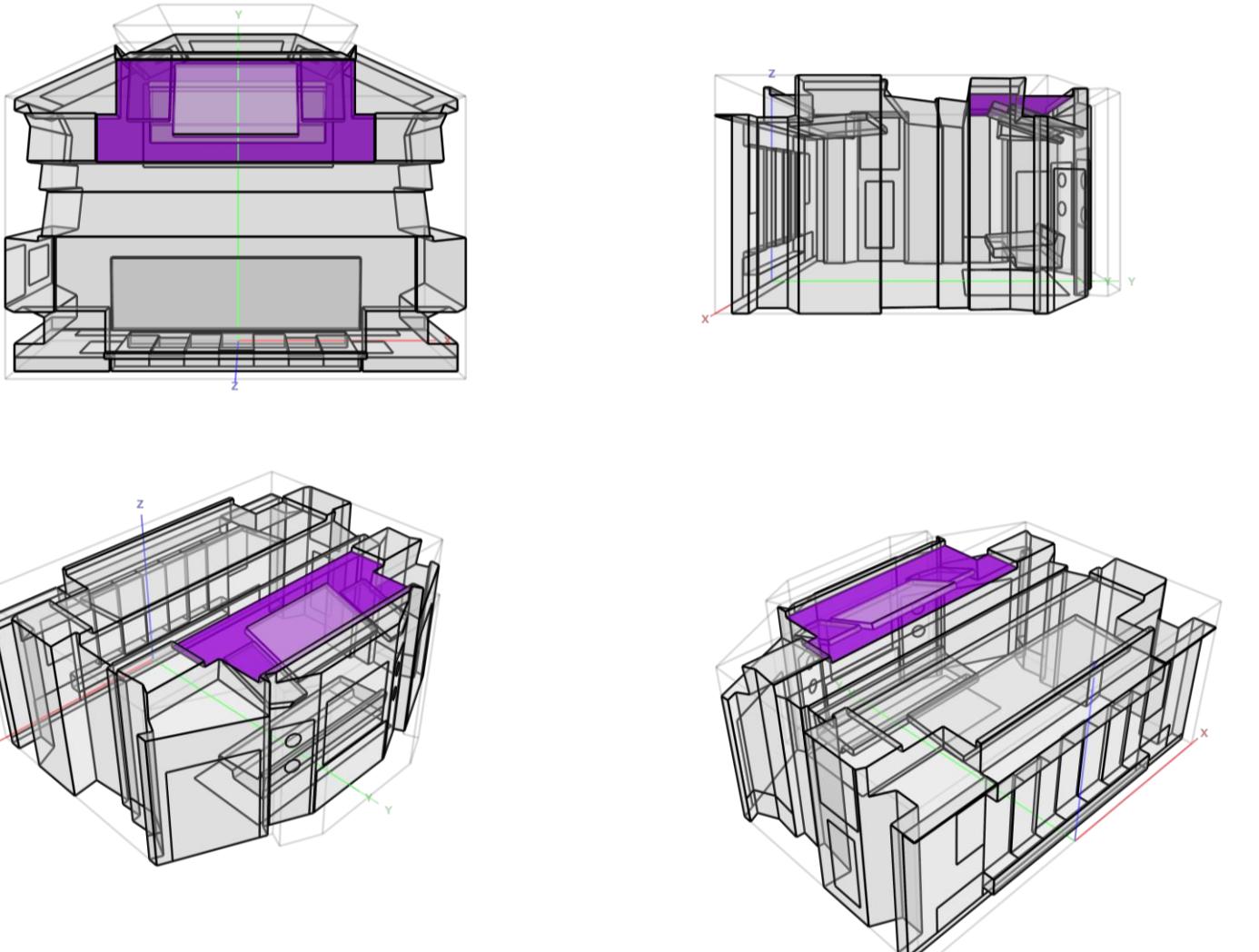
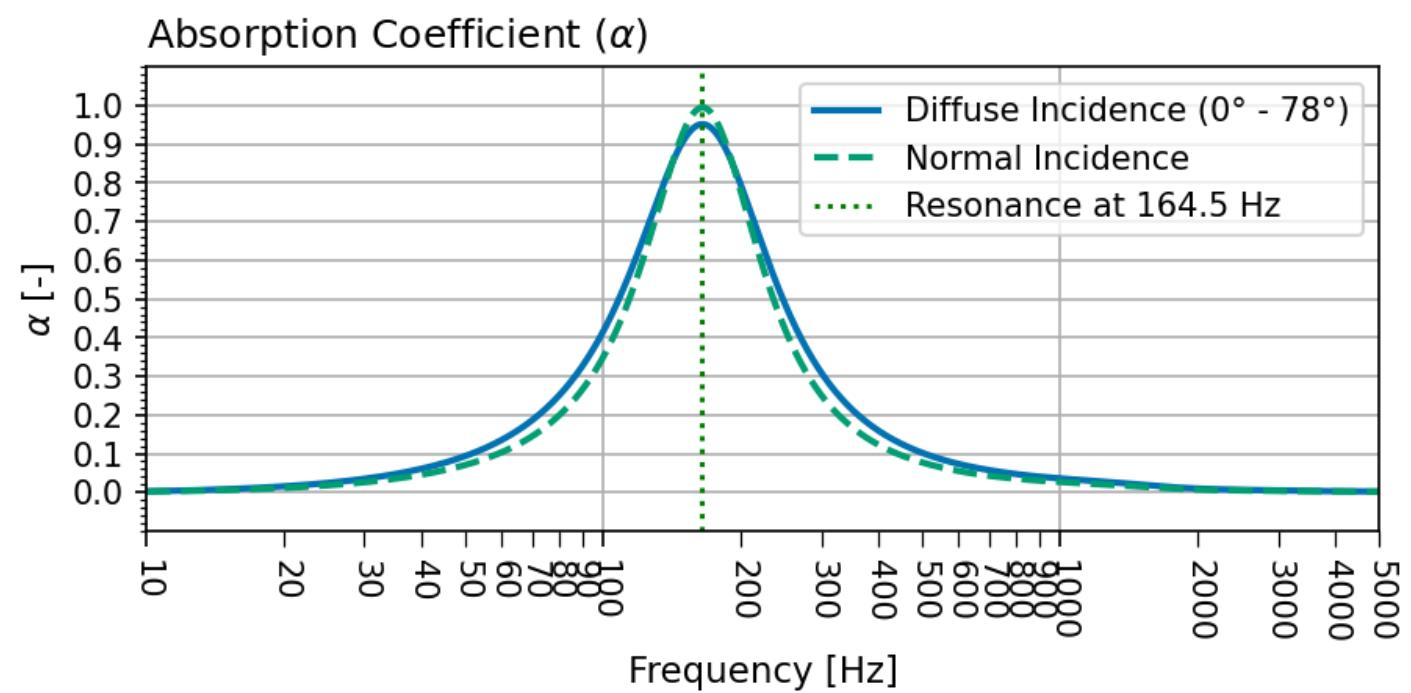
**Finished face of treatment:** Optional fabric covering  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 6.00 [mm] holes spaced 24.00 [mm] on-center | 0.25" and 0.95"  
**Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 200.00 [mm] | 7.85"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 219.00 [mm] | 8.60"  
**Surface Area:** 2.50 [m<sup>2</sup>] | 25.50 [ft<sup>2</sup>]



**⑧ Perforated Resonator**



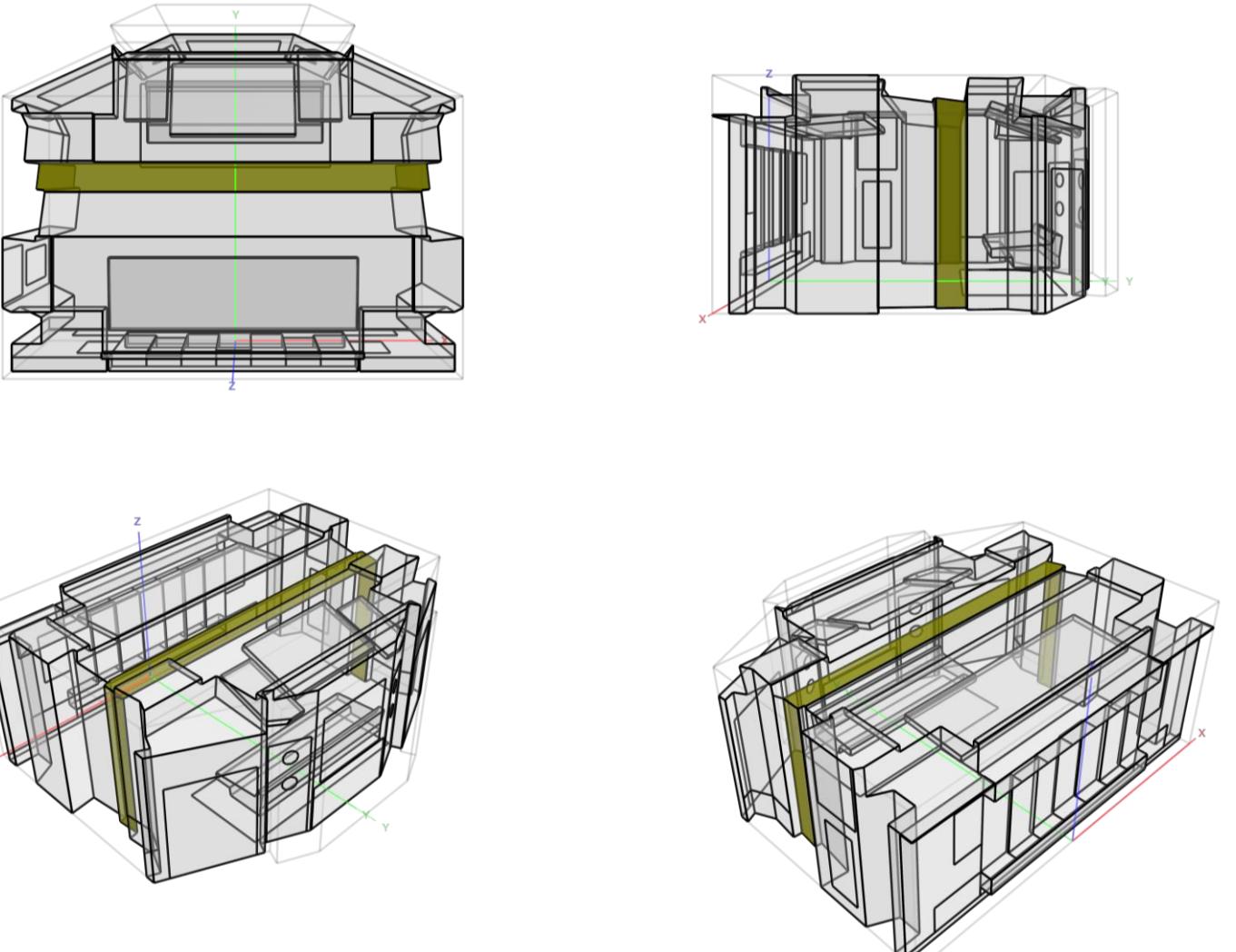
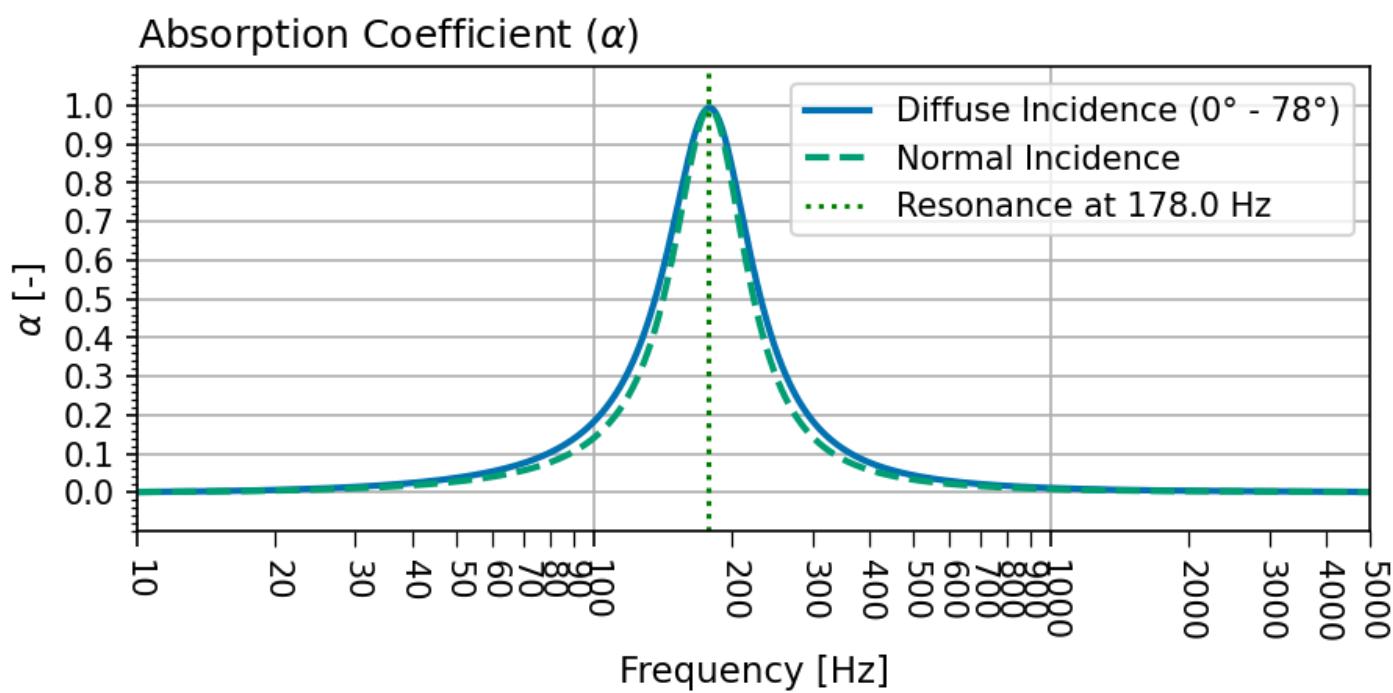
**Finished face of treatment:** Optional fabric covering  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 6.00 [mm] holes spaced 32.00 [mm] on-center | 0.25" and 1.25"  
**Porous material type and thickness:** Owens Corning R-13 EcoTouch Pink unfaced fiberglass - 100.00 [mm] | 3.95"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 119.00 [mm] | 4.70"  
**Surface Area:** 8.00 [m<sup>2</sup>] | 88.00 [ft<sup>2</sup>]



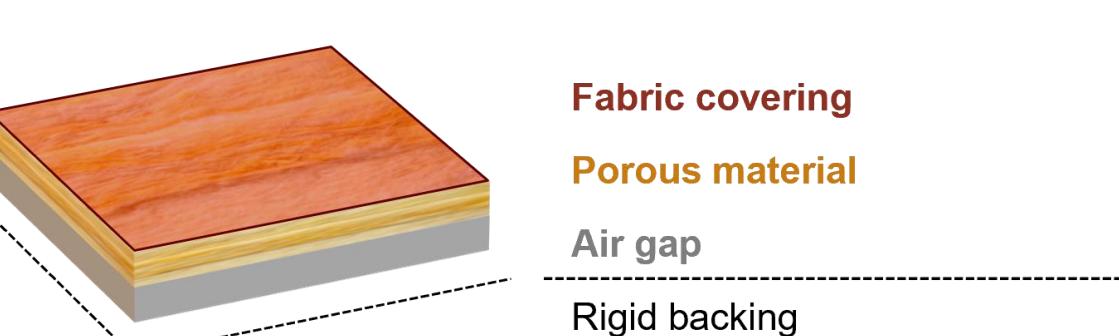
**⑨ Perforated Resonator**



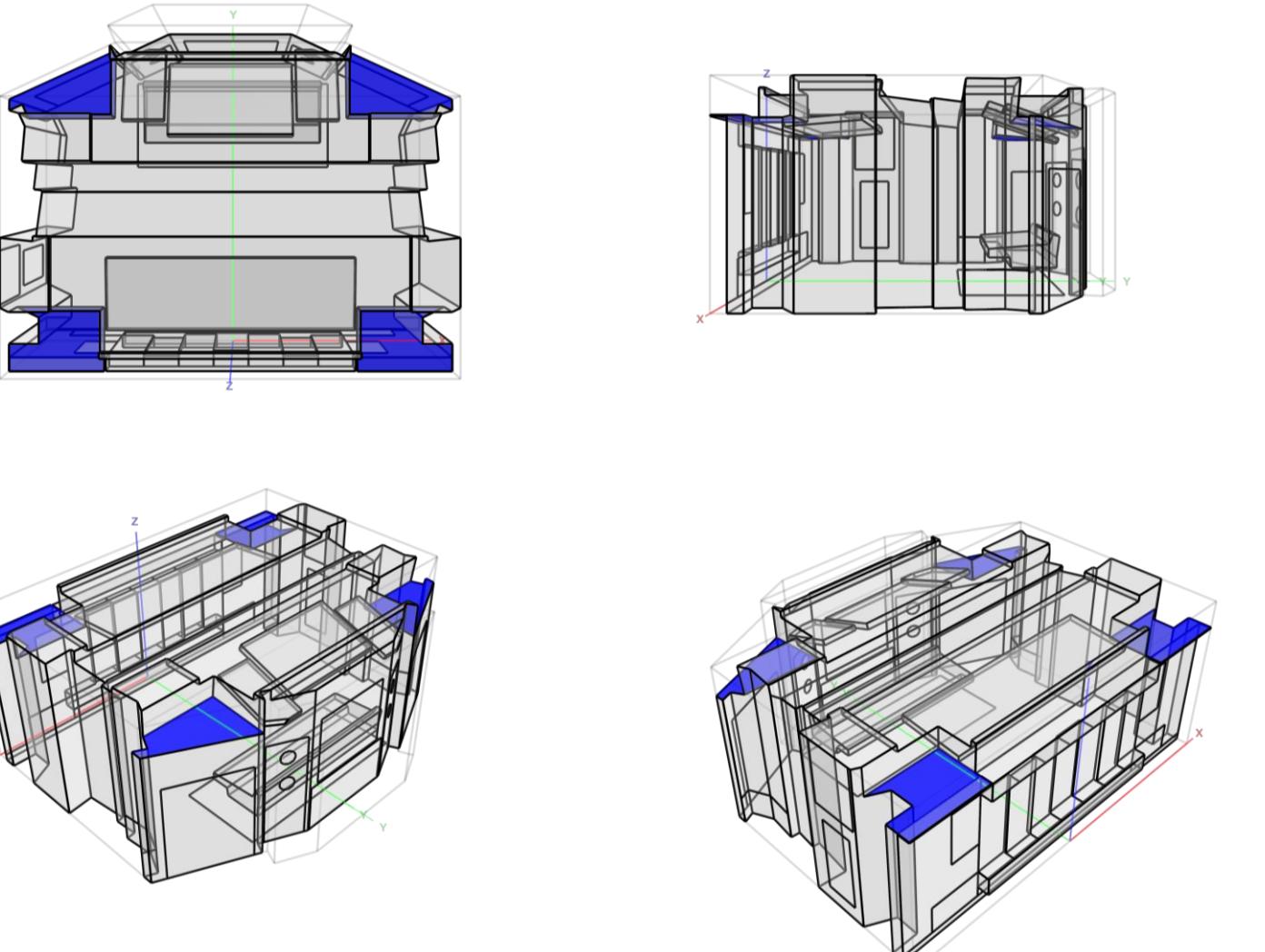
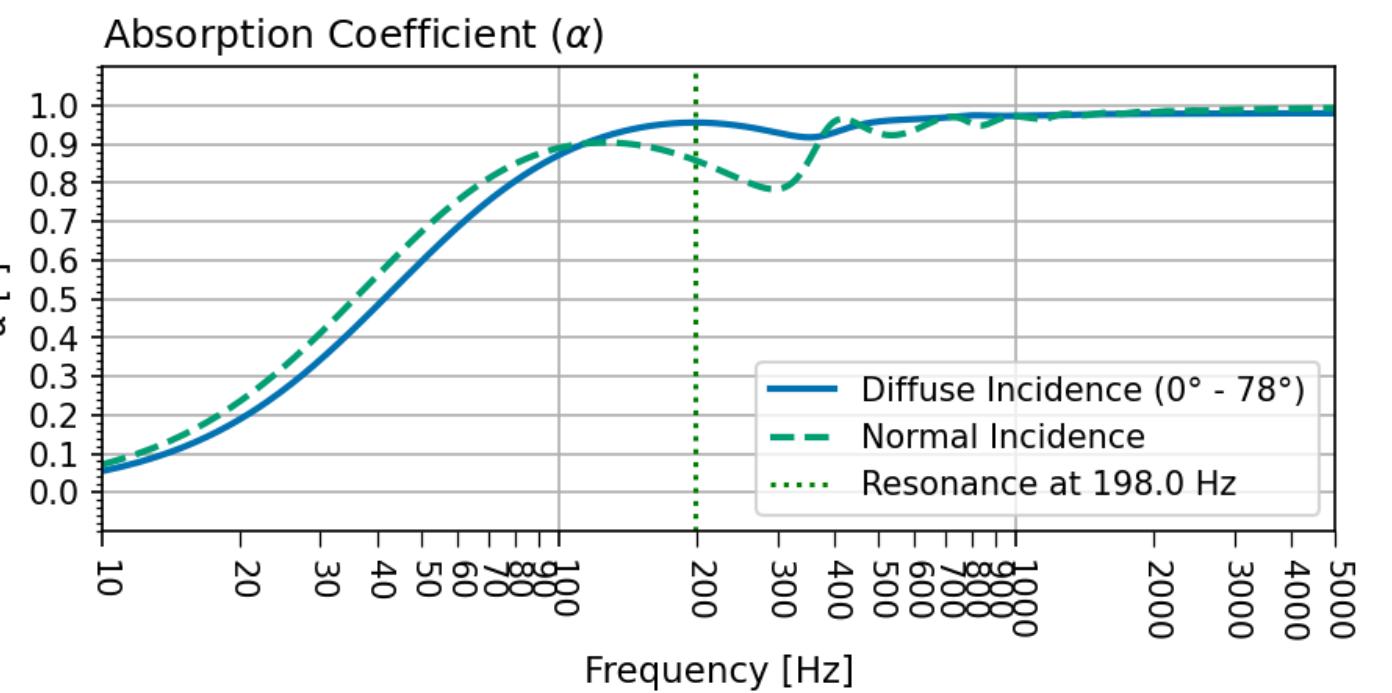
**Finished face of treatment:** Optional fabric covering  
**FlutterFree T thickness:** 25.00 [mm] | 1.00"  
**FlutterFree T width/spacing:** 100.00 [mm] wood slats spaced 2.00 [mm] apart | 3.95" and 0.10"  
**Porous material type and thickness:** Owens Corning R-13 EcoTouch Pink unfaced fiberglass - 50.00 [mm] | 1.95"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 75.00 [mm] | 2.95"  
**Surface Area:** 6.50 [m<sup>2</sup>] | 70.50 [ft<sup>2</sup>]



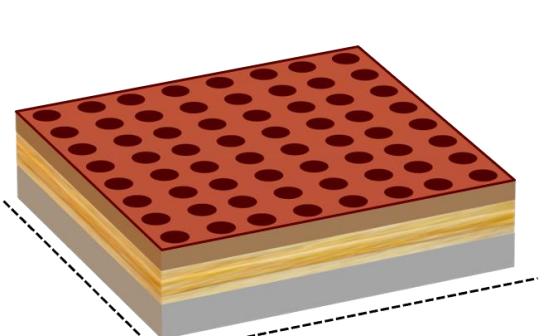
**⑩ Slotted Resonator**



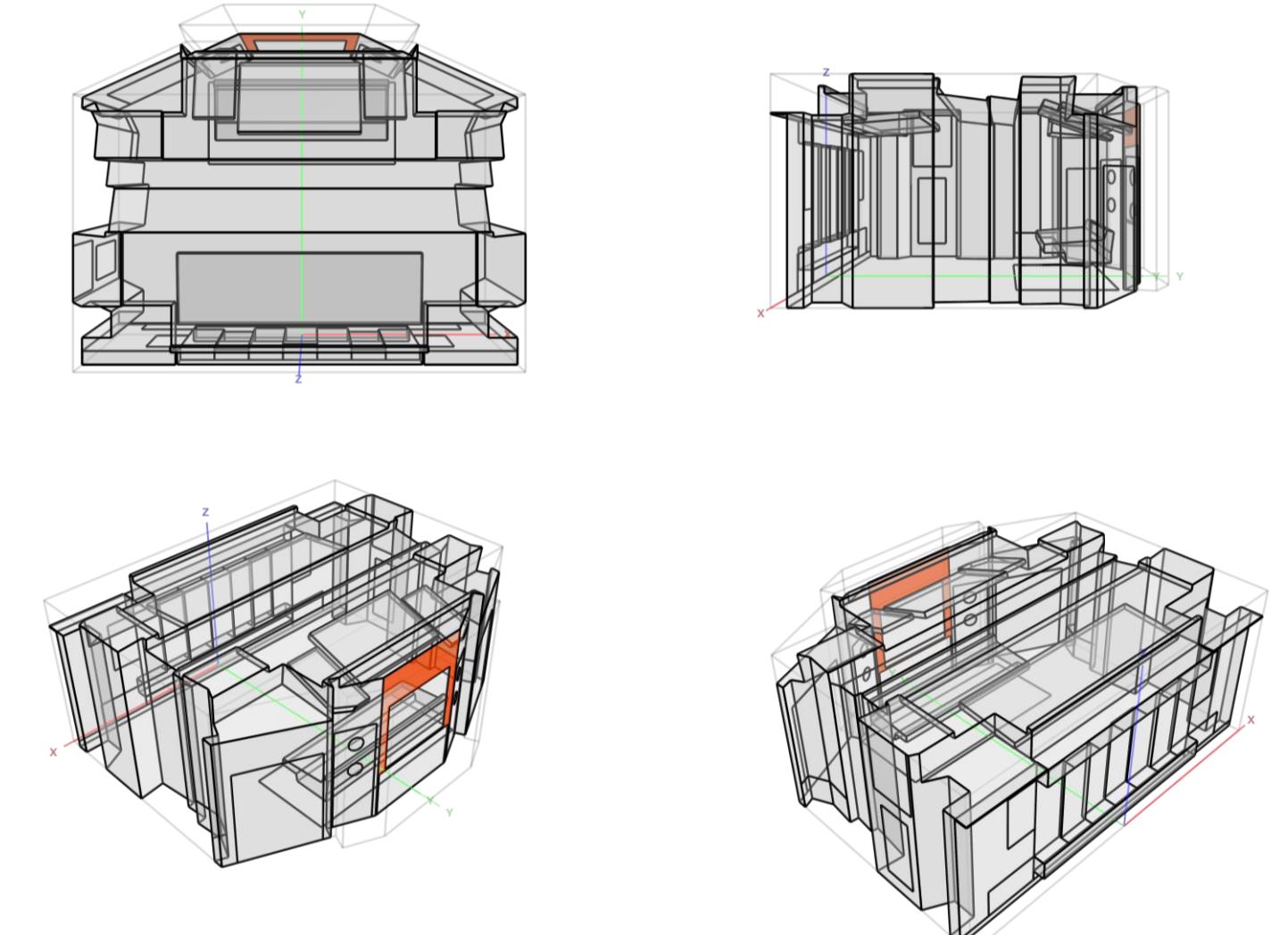
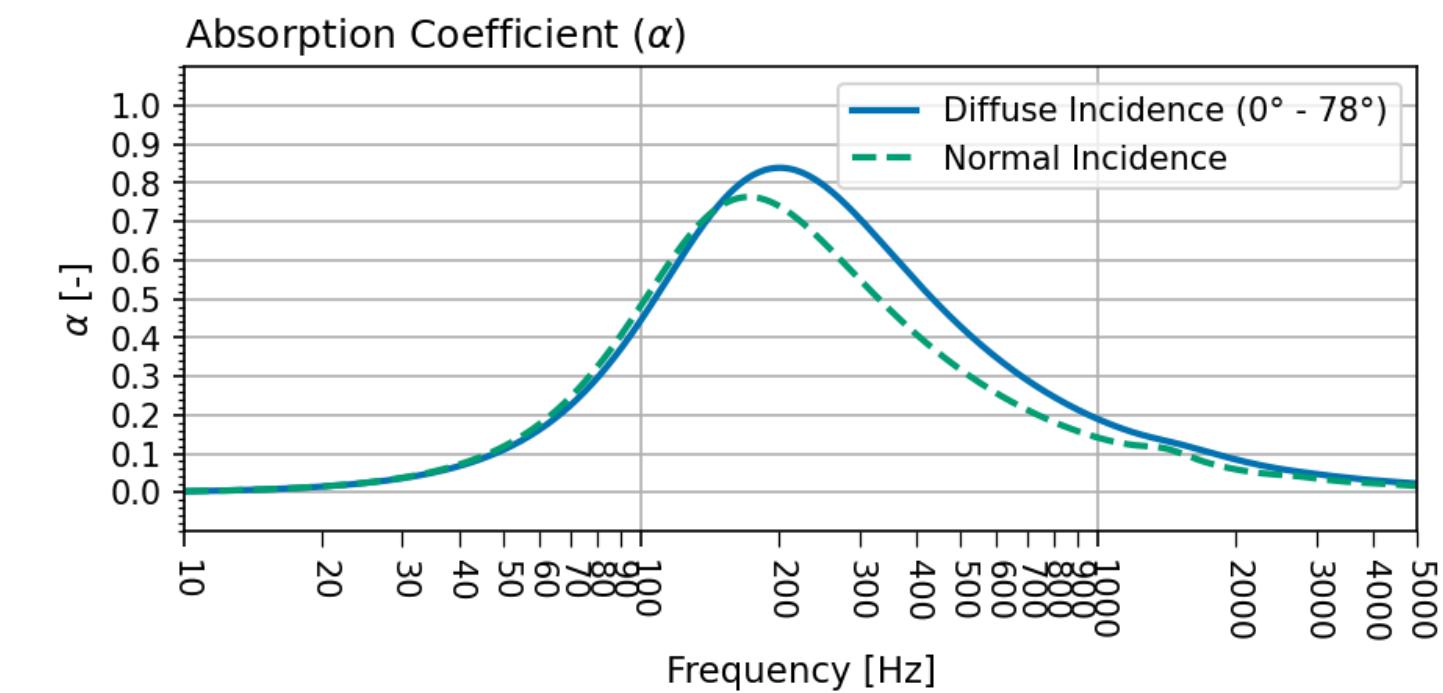
**Finished face of treatment:** Fabric covered Owens Corning 705 unfaced fiberglass - 200.00 [mm] | 7.85"  
**Air gap depth:** 390.00 [mm] | 15.35"  
**Total treatment depth:** 590.00 [mm] | 23.25"  
**Surface Area:** 6.50 [m<sup>2</sup>] | 68.50 [ft<sup>2</sup>]



**⑪ Fabric Panel**

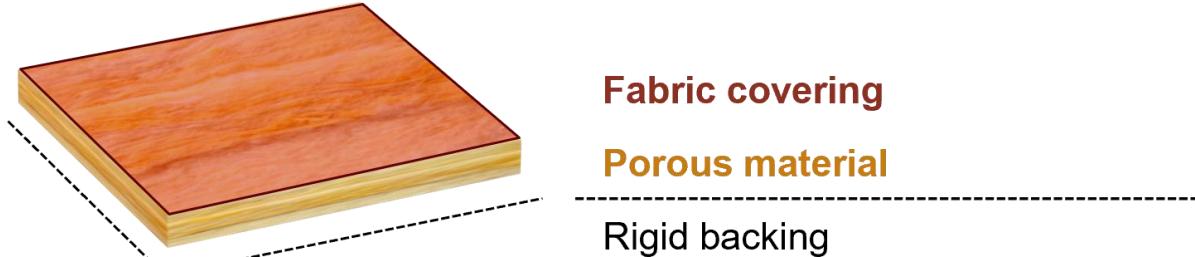


**Finished face of treatment:** Optional fabric covering  
**Plate thickness (plywood):** 19.00 [mm] | 0.75"  
**Hole diameter/spacing:** 0.30 [mm] holes spaced 1.50 [mm] on-center | 0.00" and 0.05"  
**Porous material type and thickness:** Owens Corning R-13 EcoTouch Pink unfaced fiberglass - 50.00 [mm] | 1.95"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Air gap depth:** 70.00 [mm] | 2.75"  
**Total treatment depth:** 139.00 [mm] | 5.45"  
**Surface Area:** 2.50 [m<sup>2</sup>] | 25.50 [ft<sup>2</sup>]

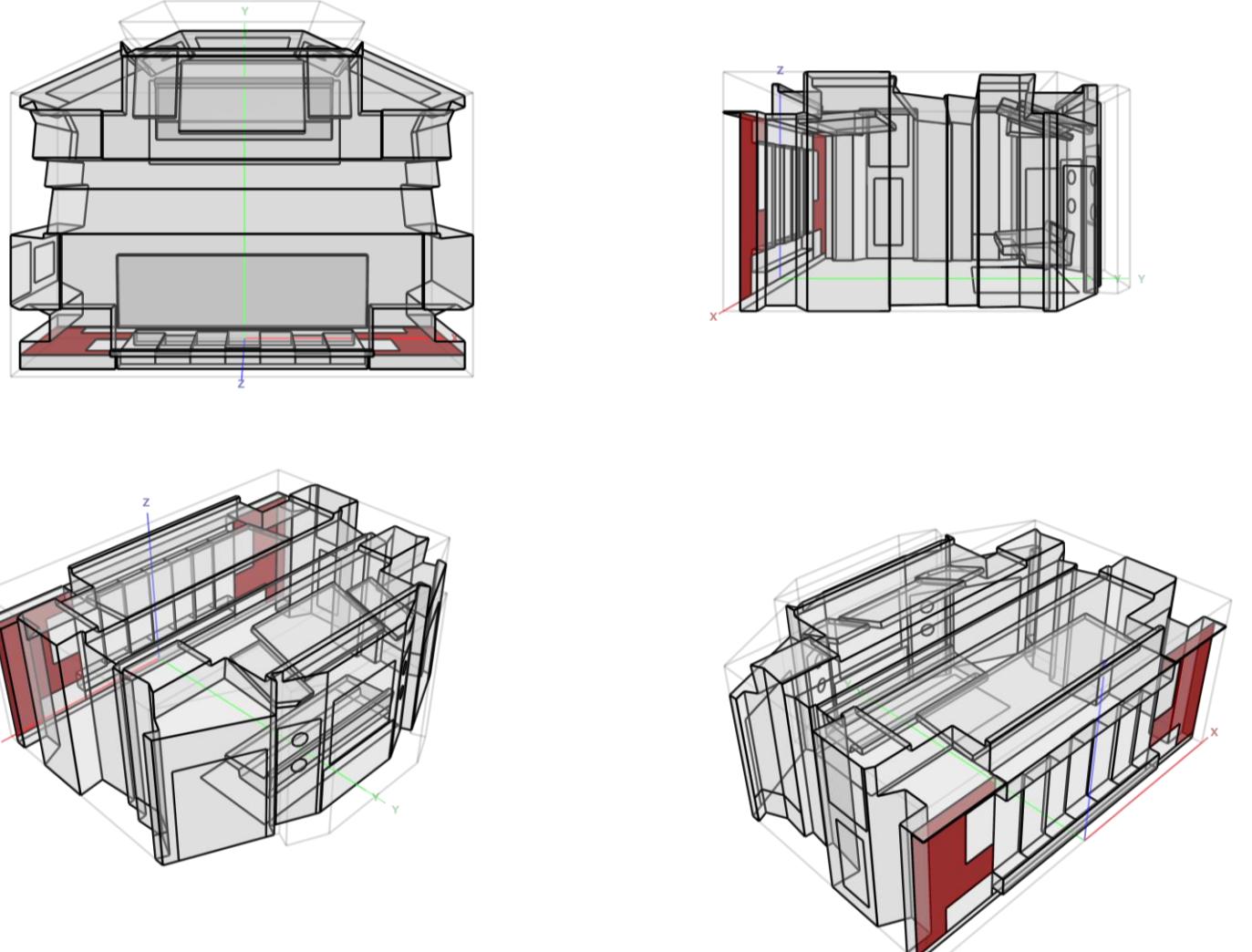
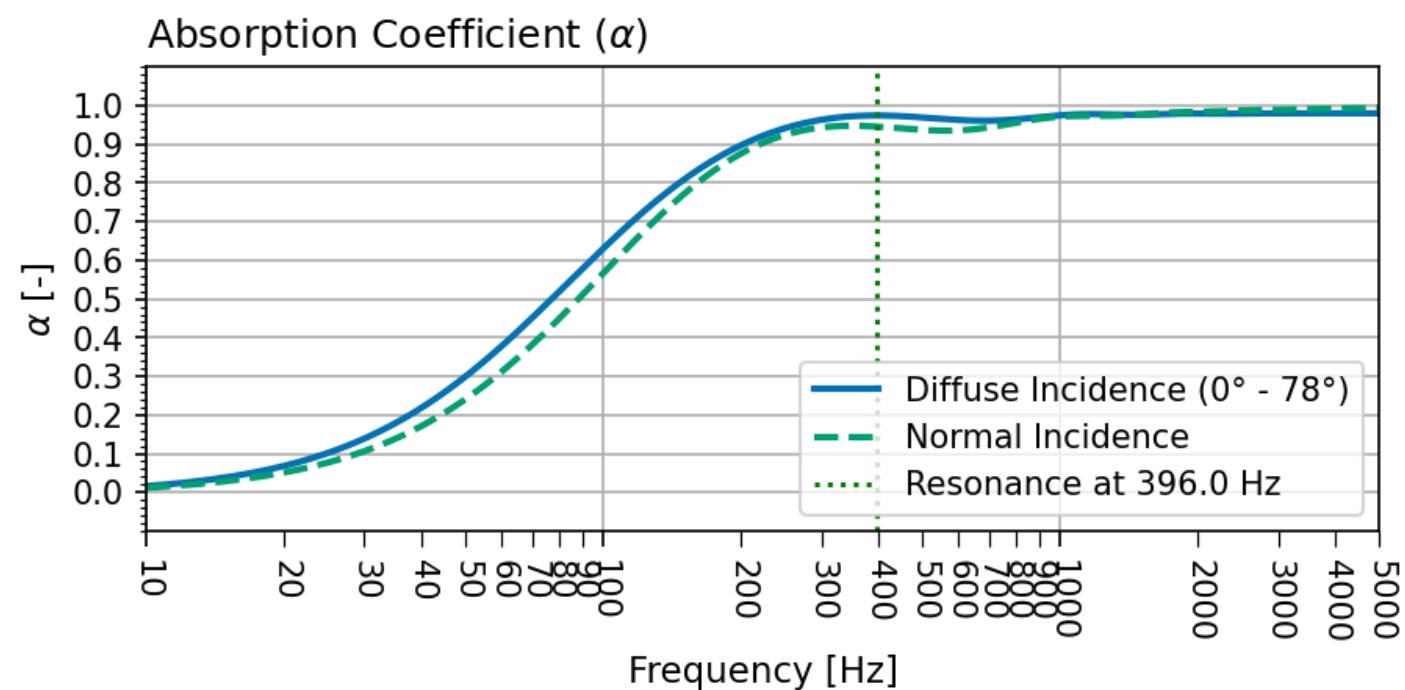


**⑫ Perforated Resonator**

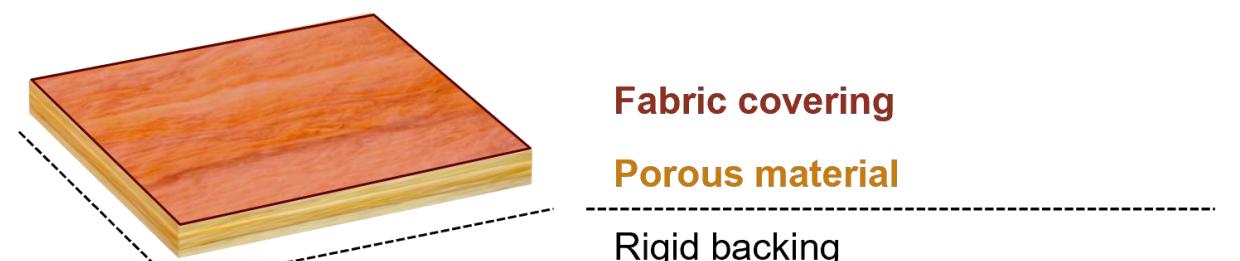
## Treatment Specification



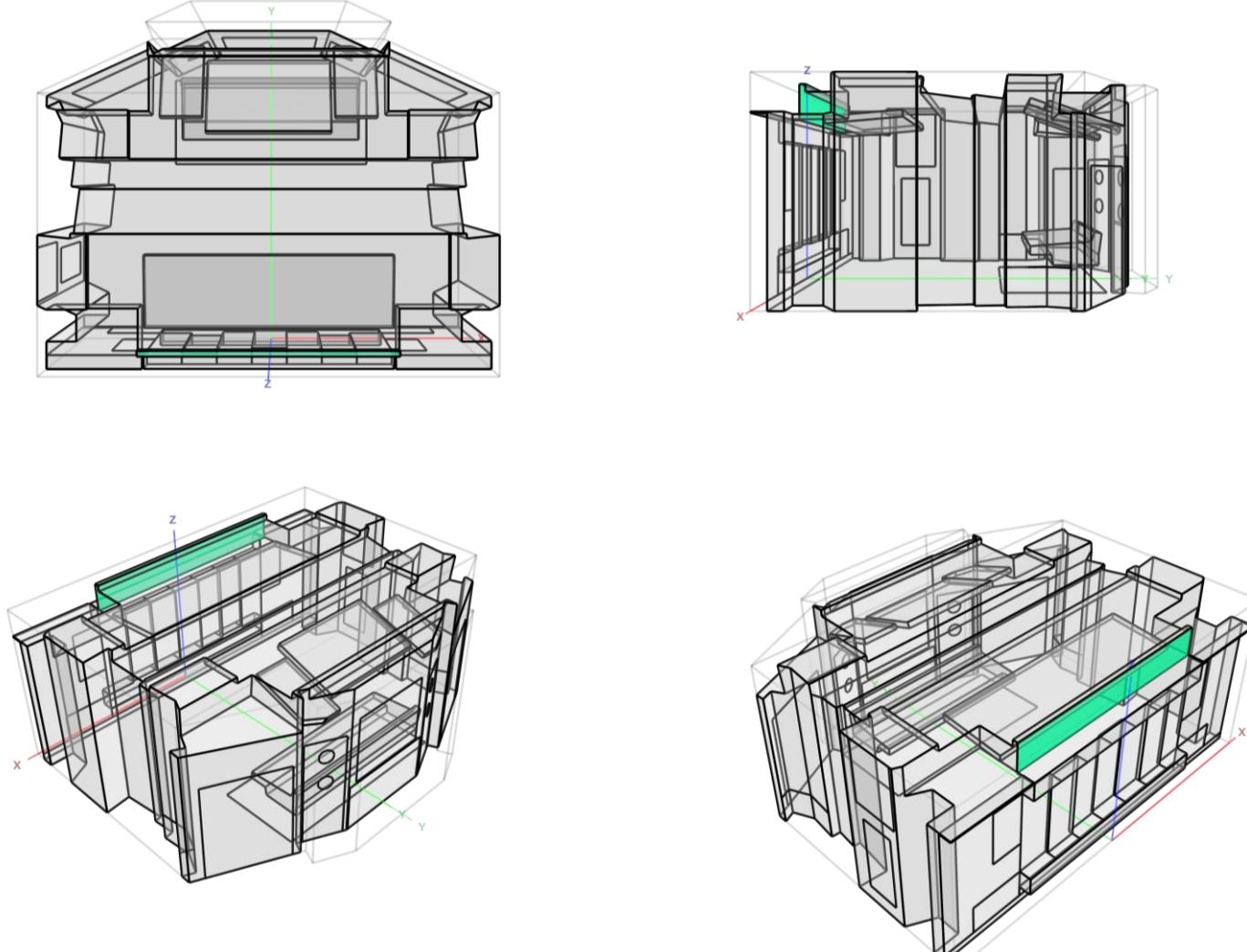
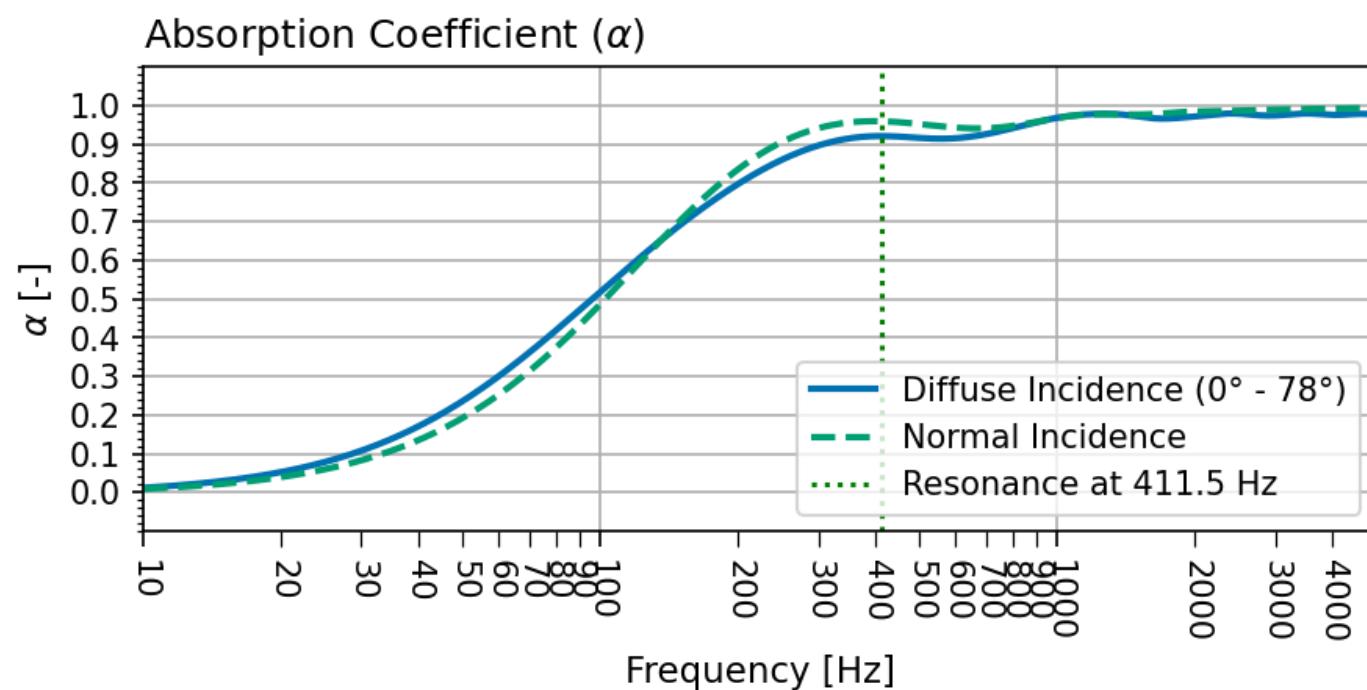
**Finished face of treatment:** Fabric covering  
**Porous material type and thickness:** Owens Corning 705 unfaced fiberglass - 225.00 [mm] | 8.85"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 225.00 [mm] | 8.85"  
**Surface Area:** 7.00 [m<sup>2</sup>] | 75.50 [ft<sup>2</sup>]



**⑬ Fabric Panel**



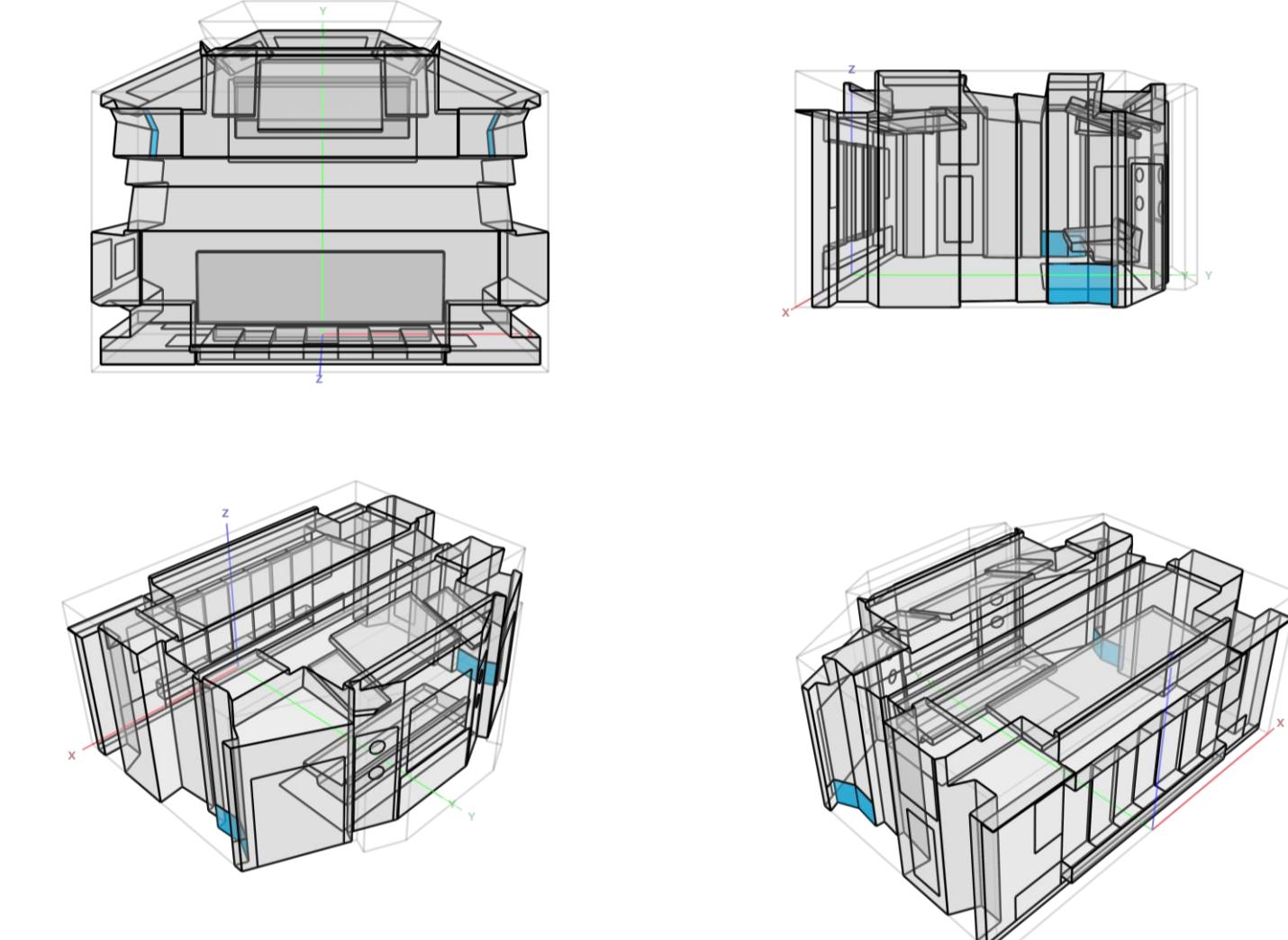
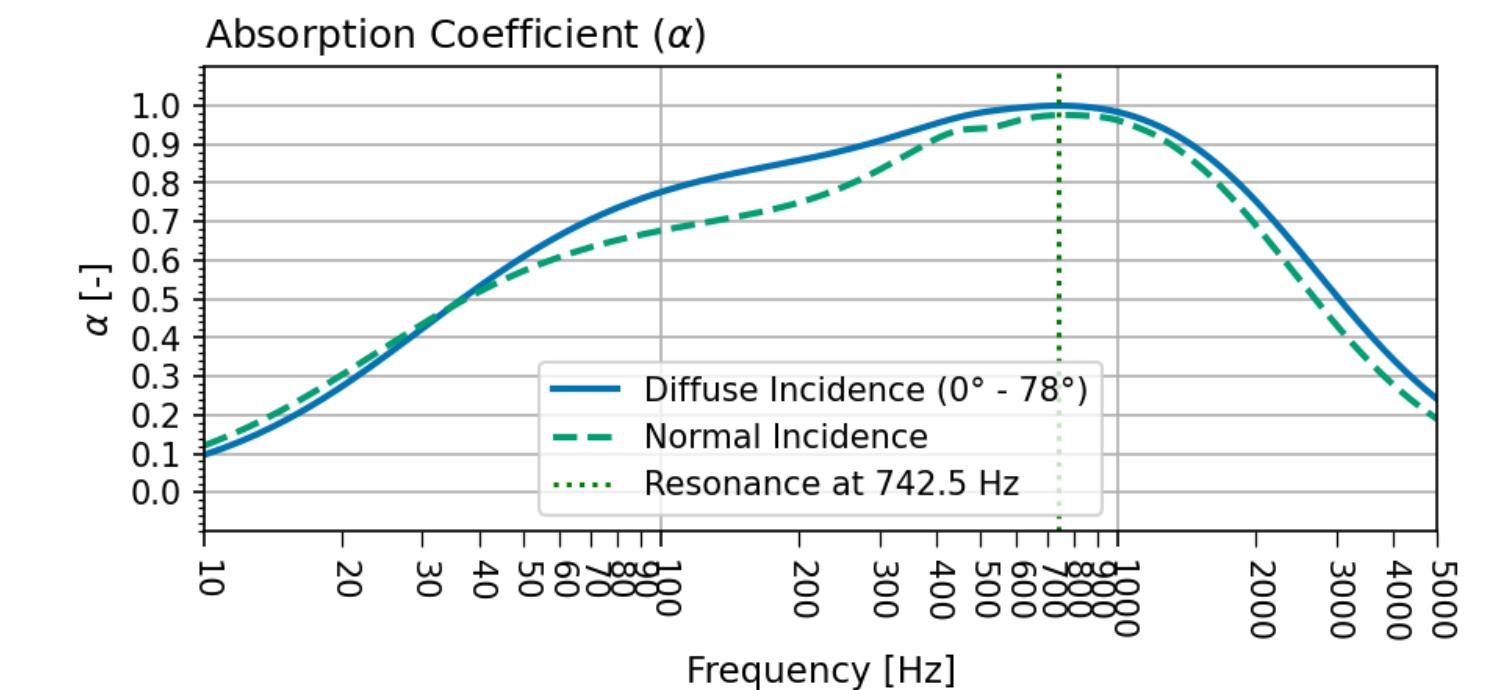
**'Porous material type and thickness:** Owens Corning R-19 EcoTouch Pink unfaced fiberglass - 200.00 [mm] | 7.85"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 200.00 [mm] | 7.85"  
**Surface Area:** 3.00 [m<sup>2</sup>] | 30.00 [ft<sup>2</sup>]



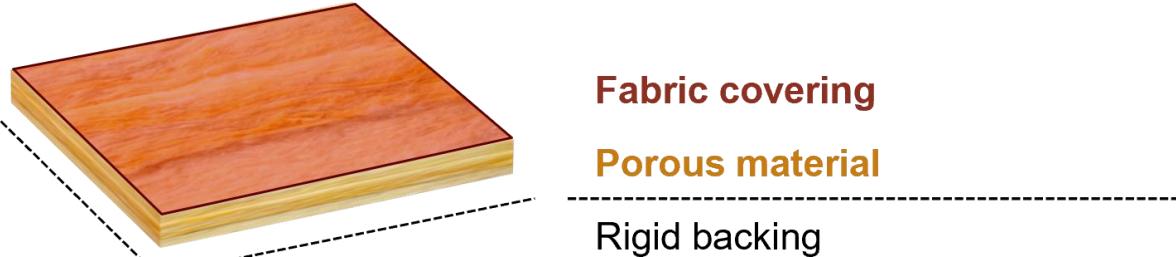
**⑭ Fabric Panel**



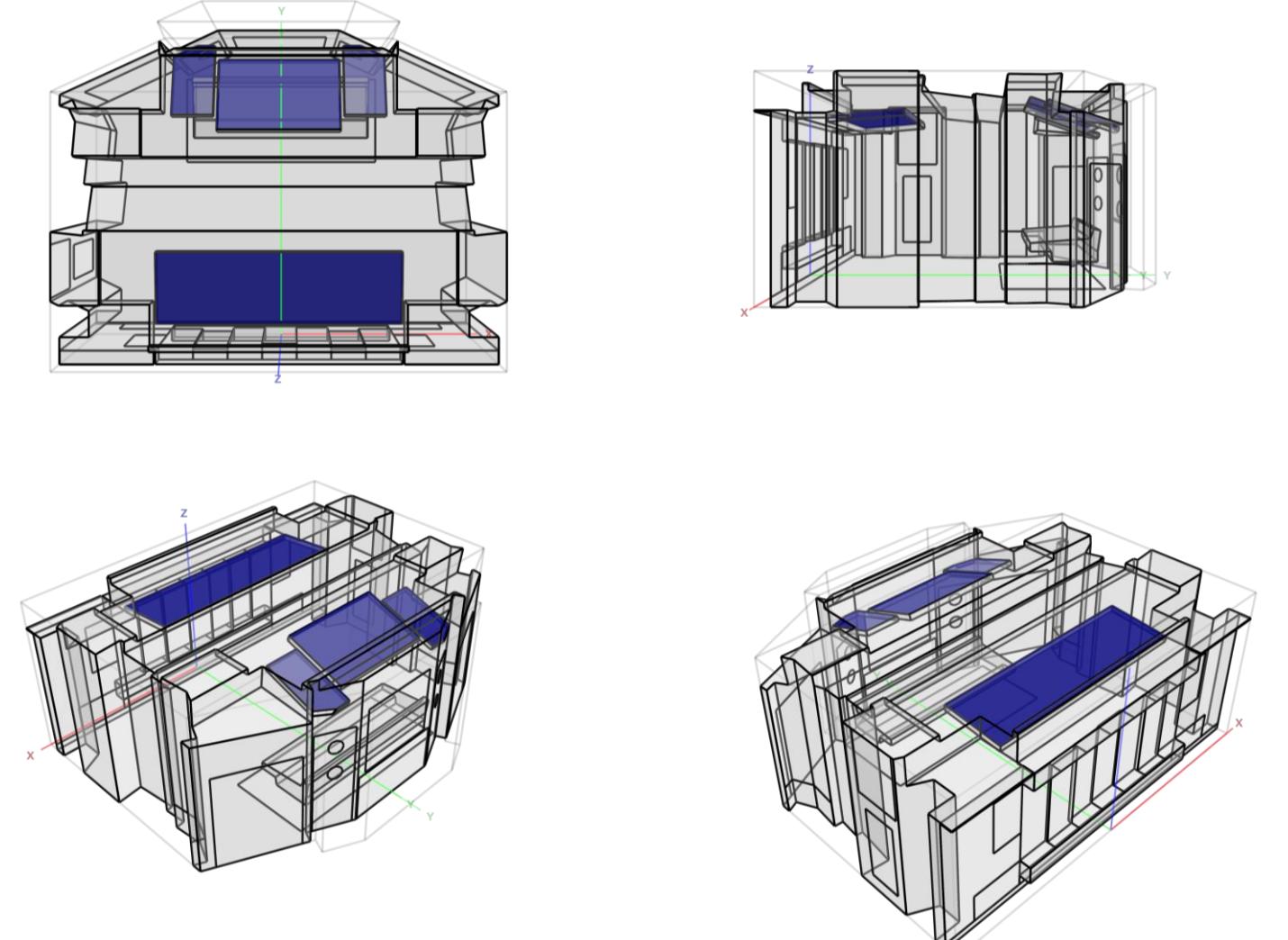
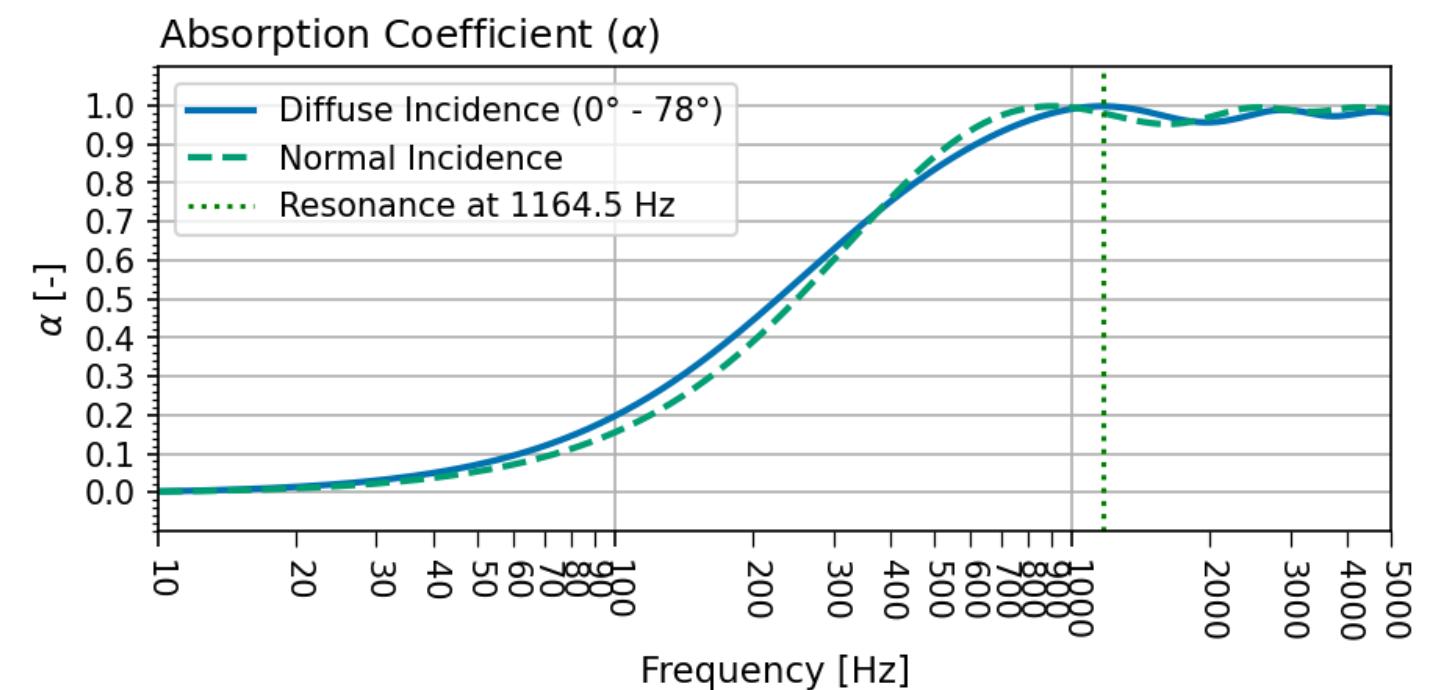
**Finished face of treatment:** Optional fabric covering  
**Plate type:** RPG Acoustics DADO Panel  
**Porous material type and thickness:** Owens Corning 705 unfaced fiberglass - 100.00 [mm] | 3.93"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 119.00 [mm] | 4.68"  
**Surface Area:** 1.50 [m<sup>2</sup>] | 14.50 [ft<sup>2</sup>]



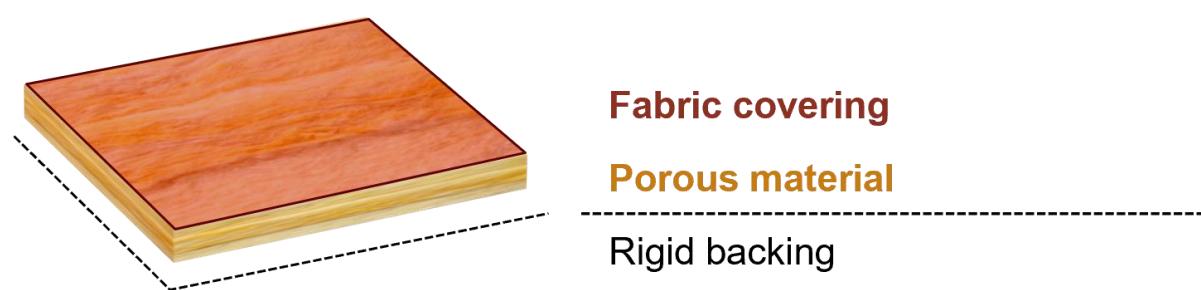
**⑮ Slotted Resonator**



**Finished face of treatment:** Fabric covering  
**Porous material type and thickness:** Owens Corning 705 unfaced fiberglass - 100.00 [mm] | 3.95"  
**Flow resistivity of porous material:** 4000 [rayls/m]  
**Total treatment depth:** 100.00 [mm] | 3.95"  
**Surface Area:** 11.00 [m<sup>2</sup>] | 118.00 [ft<sup>2</sup>]



**⑯ Fabric Panel**



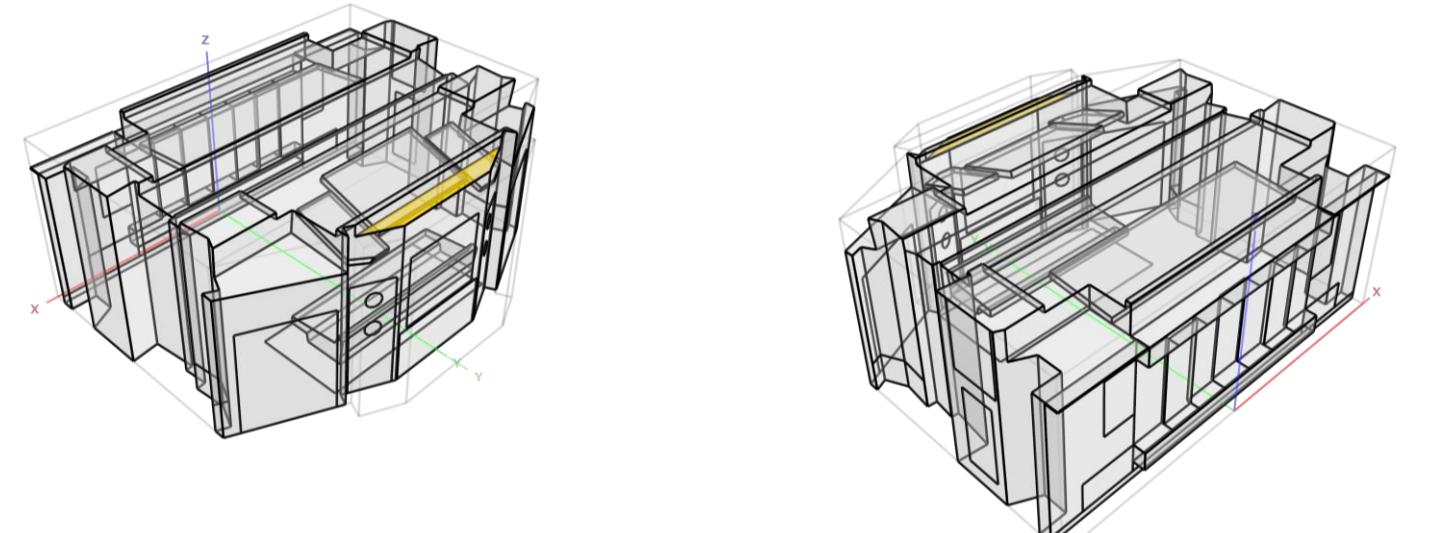
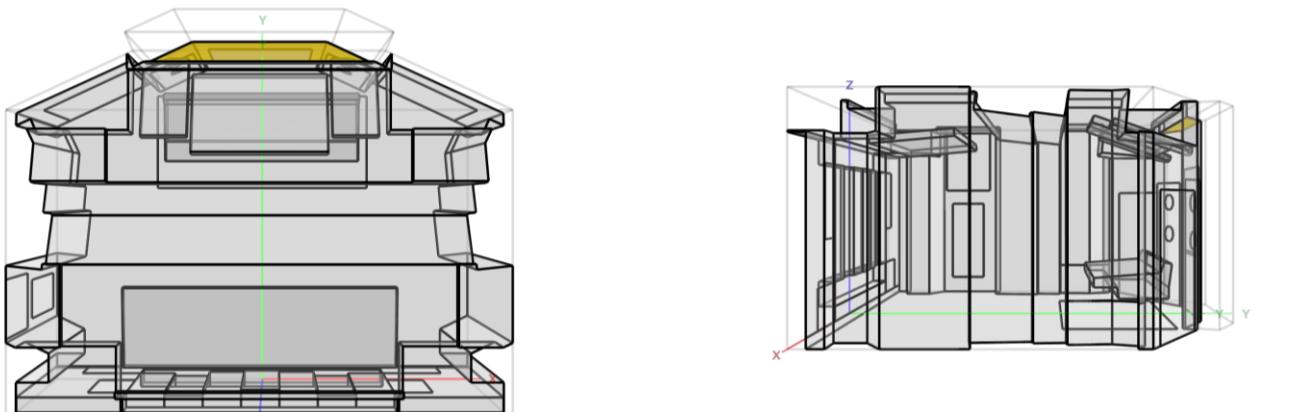
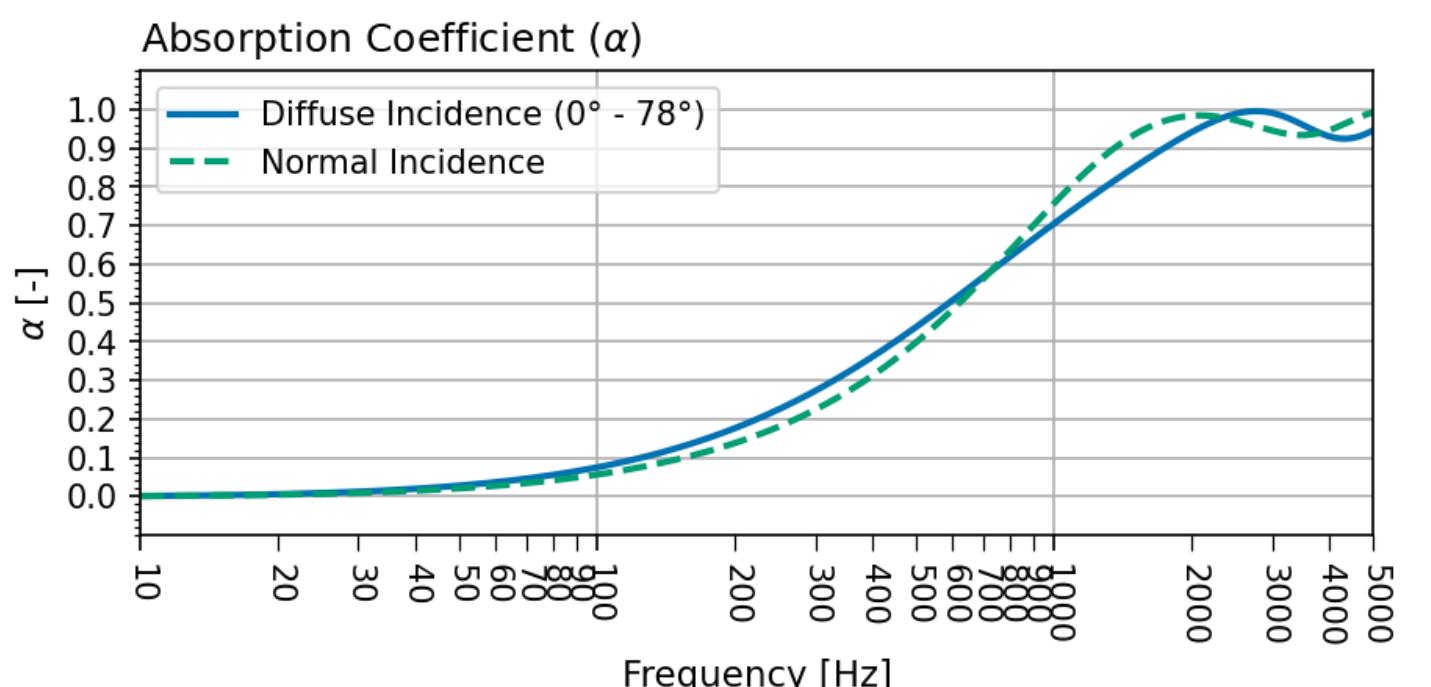
**Finished face of treatment:** Fabric covering

**Porous material type and thickness:** Owens Corning 705 unfaced fiberglass - 50.00 [mm] | 1.95"

**Flow resistivity of porous material:** 4000 [rayls/m]

**Total treatment depth:** 50.00 [mm] | 1.95"

**Surface Area:** 1.00 [m<sup>2</sup>] | 11.00 [ft<sup>2</sup>]



**(17) Fabric Panel**

ID   Target Frequency	Type	Surface area [m <sup>2</sup> ]	Approx. Dimensions (LxWxD) [m]*	$\alpha$ 32 Hz	$\alpha$ 63 Hz	$\alpha$ 125 Hz	$\alpha$ 250 Hz	$\alpha$ 500 Hz	$\alpha$ 1000 Hz	$\alpha$ 2000 Hz	$\alpha$ 4000 Hz	$\alpha$ 8000 Hz
Treatment 1   28 Hz	Perforated Resonator	7.4	1: 4.10 x 1.80 x 1.83	0.88	0.55	0.22	0.05	0.01	0.00	0.00	0.00	0.00
Treatment 2   48 Hz	Perforated Resonator	6.2	1: 2.94 x 1.08 x 0.32 2: 2.94 x 1.08 x 0.32	0.59	0.60	0.25	0.34	0.71	0.91	0.95	0.96	0.97
Treatment 3   61 Hz	Perforated Resonator	6.6	1: 0.91 x 0.32 x 0.47 2: 3.55 x 0.91 x 0.47	0.61	0.67	0.56	0.40	0.67	0.91	0.95	0.96	0.97
Treatment 4   68 Hz	Perforated Resonator	3	1: 3.55 x 1.02 x 0.56 2: 3.55 x 1.02 x 0.56	0.70	0.81	0.78	0.63	0.40	0.20	0.08	0.03	0.01
Treatment 5   79 Hz	Slotted Resonator	11	1: 1.16 x 1.44 x 0.42 2: 1.11 x 1.55 x 0.42 3: 4.60 x 1.71 x 0.42 4: 2.55 x 2.04 x 0.42	0.24	0.86	0.59	0.17	0.06	0.02	0.00	0.00	0.00
Treatment 6   90 Hz	Perforated Resonator	2.2	1: 1.05 x 2.10 x 0.32	0.46	0.80	0.81	0.63	0.40	0.20	0.08	0.03	0.01
Treatment 7   131 Hz	Perforated Resonator	11.7	1: 6.36 x 2.03 x 0.12	0.05	0.24	0.79	0.23	0.05	0.02	0.00	0.00	0.00
Treatment 8   151 Hz	Perforated Resonator	2.4	1: 0.61 x 6.76 x 0.22	0.15	0.47	0.91	0.72	0.35	0.10	0.03	0.01	0.00
Treatment 9   164 Hz	Perforated Resonator	8.2	1: 4.90 x 1.80 x 0.12	0.04	0.18	0.72	0.48	0.10	0.04	0.01	0.00	0.00
Treatment 10   178 Hz	Slotted Resonator	6.5	1: 7.05 x 2.42 x 0.07	0.02	0.07	0.51	0.40	0.05	0.01	0.00	0.00	0.00
Treatment 11   198 Hz	Fabric Panel	6.4	1: 1.94 x 1.39 x 0.59 2: 1.73 x 1.17 x 0.59 3: 1.73 x 1.17 x 0.59 4: 2.01 x 1.25 x 0.59	0.39	0.72	0.92	0.94	0.95	0.97	0.98	0.98	0.98
Treatment 12   200 Hz	Perforated Resonator	2.4	1: 3.33 x 2.16 x 0.14	0.05	0.21	0.64	0.76	0.42	0.19	0.08	0.03	0.01
Treatment 13   396 Hz	Fabric Panel	7	1: 2.79 x 1.76 x 0.23 2: 2.79 x 1.76 x 0.23	0.17	0.42	0.75	0.94	0.97	0.97	0.98	0.98	0.98
Treatment 14   412 Hz	Fabric Panel	2.8	1: 0.61 x 4.60 x 0.35	0.13	0.34	0.63	0.86	0.92	0.97	0.97	0.98	0.98
Treatment 15   742 Hz	RPG DADO Panel	1.4	1: 0.61 x 1.08 x 0.12 2: 0.61 x 1.08 x 0.12	0.46	0.68	0.81	0.89	0.98	0.97	0.72	0.33	0.14
Treatment 16   1164 Hz	Fabric Panel	11	1: 1.10 x 1.55 x 0.10 2: 1.16 x 1.41 x 0.10 3: 2.55 x 2.04 x 0.10 4: 4.60 x 1.71 x 0.10	0.04	0.11	0.28	0.56	0.84	0.98	0.97	0.98	0.98
Treatment 17   2768 Hz	Fabric Panel	1	1: 3.66 x 0.35 x 0.05	0.01	0.04	0.11	0.24	0.46	0.72	0.94	0.95	0.98

**(18) Treatment Table**