

3. External thermal insulation composite system - outside

Question:

How does an external thermal insulation composite system (ETICS) determine or change the transmission loss of an external wall? Which solutions do exist and what needs to be paid attention to?

Answer:

The application of an ETICS to an external wall influences the sound insulation of that wall. Dependent upon the chosen material and fastening means, an improvement as well as a degradation can occur. Reasons are the resulting resonance system of massive wall in combination with plaster on the insulation layer and the latter's fastening.

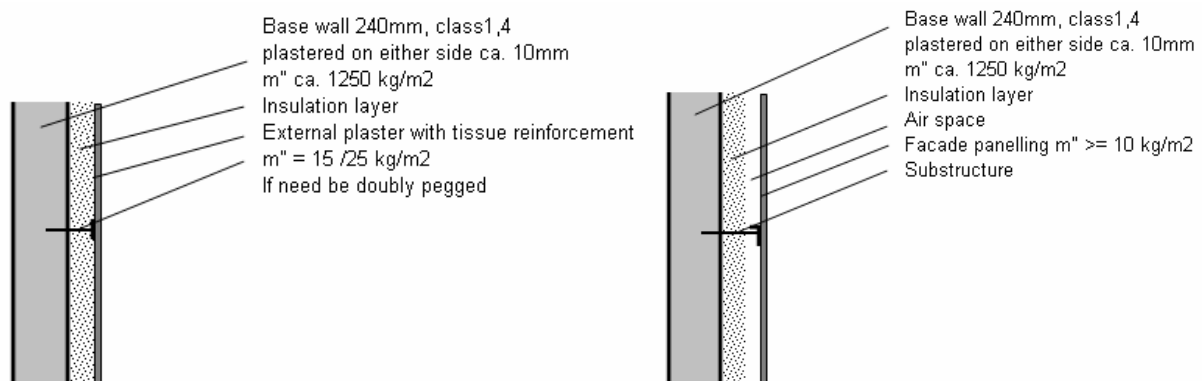
Insulation material with a high dynamic stiffness (EPS/ Mineral Wool Lamella Mats) and light plaster normally lead to a degradation of the sound insulation. The position of the resonance frequency is decisive. Fastening by means of dowel pins causes an additional decline. (see Table)

Unchanged or improved system sound insulations compared to the initial wall result from elastic insulation materials or mineral fiber boards with heavy plasters.

Here too, fastening with or without dowel pins is influential.

The frequency presentation underlines that even an optimized system with improved insulation can display R_w low frequency drops of the insulation curve. With low frequency exterior noise (truck noise) the combination of disturbing noise peak and resonance leads despite improvements of the insulation index to a higher noise irritation of inhabitants.

In these cases a hung facade constitutes an alternative.



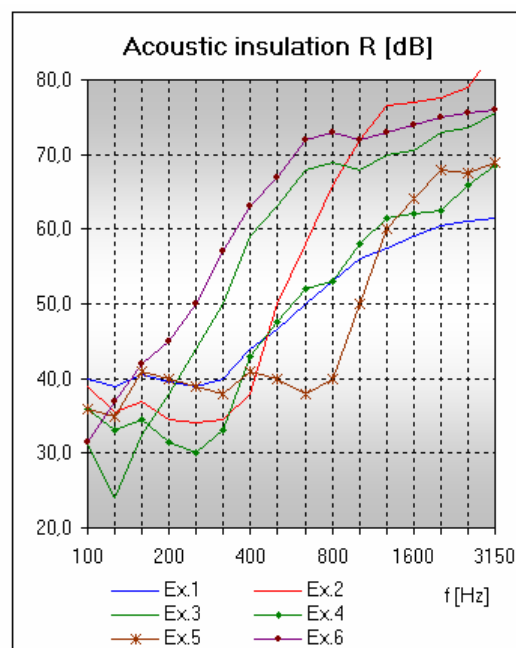
Sketch 1: ETICS with/without dowel pin

Sketch 2: hung facade

Material	Fastening	Dynamic stiffness [MN/m ³]	Thickness [mm]	R _w [dB]	dR _w with plaster 15 / 25 kg/m ² [dB]	Execution see picture	Spectra see curve
Base wall				51	- -		Ex.1
EPS	only glued	50 - 79	all		-2 / -1	1	
EPS	glued + pegged	50	all	48	- / -3	1	Ex.2
Elastified EPS	only glued	13	ca.100	53	2 / 4		Ex.3
Mineralwool boards	glued + pegged	13	ca.100		- / 2		
Mineralwool boards	glued + pegged	27 / 40	ca. 50	47	-4 / 4	1	Ex.4
Mineralwool lamella mats	glued + pegged	20 / 17	ca.100		-2 / 2		
Mineralwool lamella mats	only glued	53	ca.100	46	-5 / -	1	Ex.5
Hung facade				60		2	Ex.6

Table of sound insulation measures R wand improvement measures dR of a wall with ETICS / facade

f [Hz]	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6
100	40,0	39,0	31,0	36,0	36,0	31,5
125	39,0	35,5	24,0	33,0	35,0	37,0
160	40,5	37,0	32,5	34,5	41,0	42,0
200	39,5	34,5	38,0	31,5	40,0	45,0
250	39,0	34,0	44,0	30,0	39,0	50,0
315	40,0	34,5	50,0	33,0	38,0	57,0
400	44,0	38,0	59,0	43,0	41,0	63,0
500	46,5	50,0	63,0	47,5	40,0	67,0
630	50,0	58,0	68,0	52,0	38,0	72,0
800	53,0	66,0	69,0	53,0	40,0	73,0
1000	56,0	72,0	68,0	58,0	50,0	72,0
1250	57,5	76,5	70,0	61,5	60,0	73,0
1600	59,0	77,0	70,5	62,0	64,0	74,0
2000	60,5	77,5	73,0	62,5	68,0	75,0
2500	61,0	79,0	73,5	66,0	67,5	75,5
3150	61,5	84,0	75,5	68,5	69,0	76,0
R _w	51	48	53	47	46	60



Spectra of examples chosen from above table (heavy print)