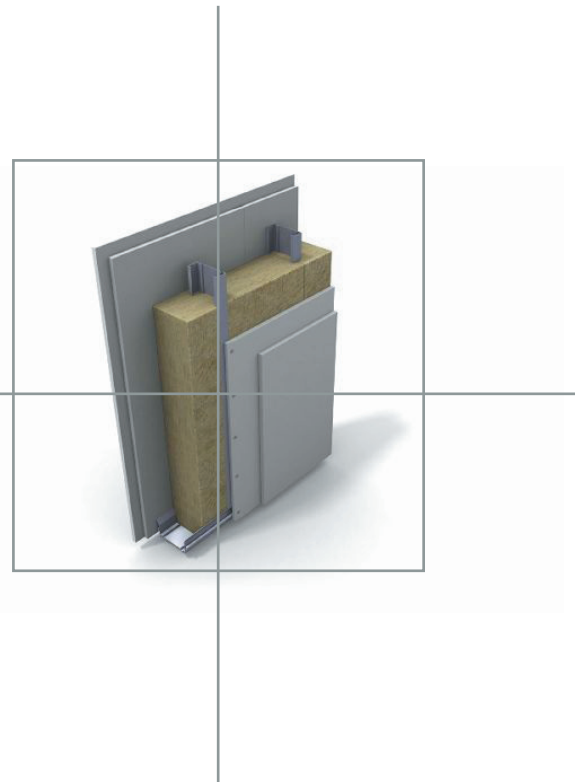


PAROC partitions – Estimations of airborne sound insulation

Statement
No. VTT-S-04550-07



Pekka Sipari & Reijo Heinonen.
"Summary of statement concerning
estimations of airborne sound insulation
of wall structures".
Statement No VTT-S-04550-07.

Requested by Paroc AB
Paroc Building Insulation
SE-541 86 SKÖVDE

Order By e-mail 11 May 2007 / Conny Löfving

Contact person **VTT Technical Research Centre of Finland**
Research Scientist Pekka Sipari
P.O. Box 1000, FIN-02044 VTT, Finland
Tel. + 358 9 20 722 6931, Fax + 358 20 722 4815, E-mail: pekka.sipari@vtt.fi

Task **Summary of statement concerning estimations of airborne sound insulation of wall structures**

Background This document is a summary of the statement VTT-S-04549-07 concerning structures with Paroc's stone wall insulation. The statement is based on the measurements made for the customer, some checking calculations and on the long experience of VTT about sound insulation.

General about sound insulation

The board walls are studied in different laboratories a lot and the weighted sound reduction indices R_w and their reproducibility are known quite well. The sound reduction indices at frequencies under 100 Hz has measured only quite a short time and the values given in the following Tables for spectrum adaptation terms $C_{50-3150}$ represents estimates for average values.

Sound insulation in practice

To achieve nearly the same values as in laboratory the sound insulation of flanking structures shall be as good as the separating structure itself and the connections shall be such that the vibrations can not pass through them excessively, especially when double leaf structures are used. Although with careful detailing and workmanship the sound insulation level that of laboratory may be reached also in practice (in some cases even higher), it is normal to recommend to use a safety limit of 3-7 dB to present practical values.

Statement

In the following Tables presented R'_w and $R'_w + C_{50-3150}$ values for planning contain a relevant safety limit that is sufficient provided that planning, detailing and work is carried out properly avoiding flanking and ensuring that the structures are air tight.

Espoo, 15 May 2007



Pekka Sipari
Research Scientist



Reijo Heinonen
Research Engineer

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April 2007

PAROC partitions

Constructions with recommended

R'_w - respectively $R'_w + C_{50-3150}$ -values
for planning

Comments:

- The R'_w and $R'_w + C_{50-3150}$ values are estimated with some margin. It is possible to reach better values by proper installation.
- For detailed instructions of installation see plaster board suppliers information material.
- The field values are grouped in steps of 4 dB as the requirements normally follow these steps. This makes the differences between laboratory and field values a bit different when comparing the constructions.
- The safety margins are chosen with realistic consideration of the ability to get the constructions properly built.
- See also "Insulation of Partitions", dated March 2005.

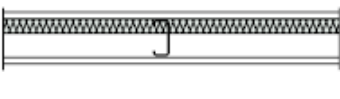
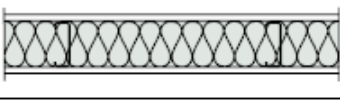
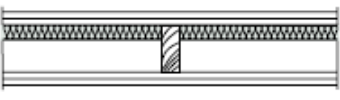
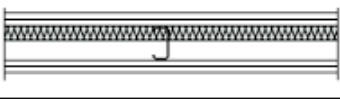
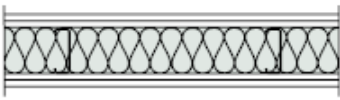
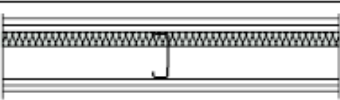
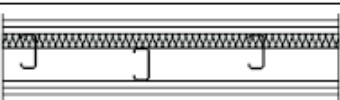
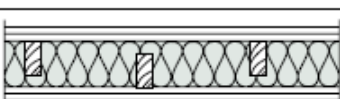
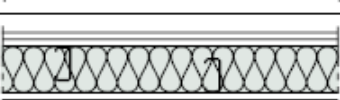
Constructions marked **ETA** are approved in ETA-07/0071 from VTT

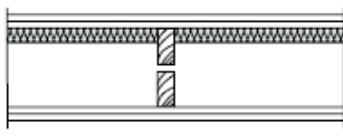
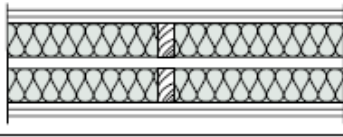
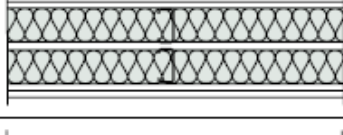
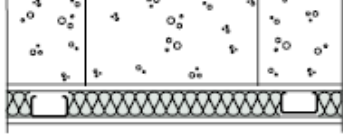
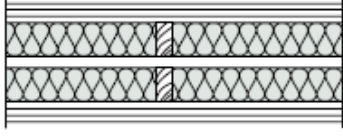

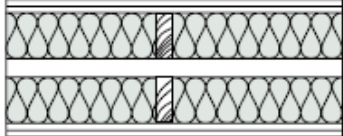
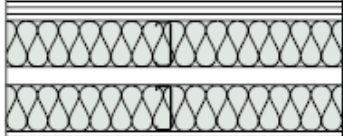
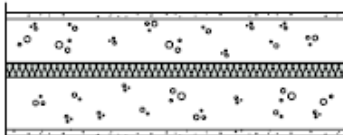
R_w = estimated laboratory value

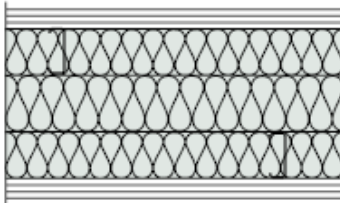
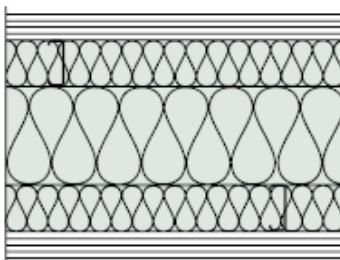
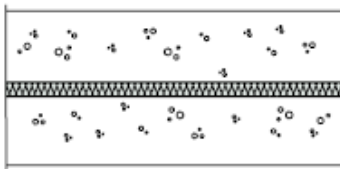
$R_w + C_{50}$ = estimated laboratory value $R_w + C_{50-3150}$

R'_w = estimated field value for planning

$R'_w + C_{50}$ = estimated field value $R'_w + C_{50-3150}$

Construction		R_w dB	$R_w + C_{50}$ dB	R'_w dB	$R'_w + C_{50}$ dB
1	 <p>12.5 mm plasterboard Steel stud 66-100 mm, c 450-600 PAROC UNS 37 / PAROC eXtra 95-100 mm 12.5 mm plasterboard</p>	44	39	36	32
2	 <p>12.5 mm plasterboard Steel stud 95-100 mm, c 600 PAROC UNS 37 / PAROC eXtra 95-100 mm 12.5 mm plasterboard</p>	ETA1 45	40	36	32
3	 <p>2 x 12.5 mm plasterboard Wooden stud 70-100 mm, c 450-600 PAROC UNS 37 / PAROC eXtra ≥30 mm 2 x 12.5 mm plasterboard</p>	48	43	40	36
4	 <p>2 x 12.5 mm plasterboard Steel stud 66-70 mm, c 450-600 PAROC UNS 37 / PAROC eXtra ≥30 mm 2 x 12.5 mm plasterboard</p>	51	42	40	36
5	 <p>2 x 12.5 mm plasterboard Steel stud 95-100 mm, c 450-600 PAROC UNS 37 / PAROC eXtra 95-100 mm 2 x 12.5 mm plasterboard</p>	ETA2 55	48	44	40
6	 <p>2 x 12.5 mm plasterboard Steel stud 95-160 mm, c 450-600 PAROC UNS 37 / PAROC eXtra ≥30 mm 2 x 12.5 mm plasterboard</p>	54	48	44	40
7	 <p>2 x 12.5 mm plasterboard Double set of steel studs 66-70 mm, c 600 PAROC UNS 37 / PAROC eXtra ≥30 mm 2 x 12.5 mm plasterboard</p>	57	50	48	44
8	 <p>2 x 12.5 mm plasterboard Double set of wooden studs 70 mm, c 450-600 PAROC UNS 37 / PAROC eXtra 95-100 mm 2 x 12.5 mm plasterboard</p>	52	48	48	44
9	 <p>2 x 12.5 mm plasterboard Double set of steel studs 66-70 mm, c 600 PAROC UNS 37 / PAROC eXtra 95-100 mm 2 x 12.5 mm plasterboard</p>	ETA3 58	51	48	44

Construction	R_w dB	$R_w + C_{50}$ dB	R'_w dB	$R'_w + C_{50}$ dB
 <p>2 x 12.5 mm plasterboard Double set of wooden studs 70 mm, c 450-600 PAROC UNS 37 / PAROC eXtra ≥ 30 mm 2 x 12.5 mm plasterboard</p>	58	53	52	48
 <p>2 x 12.5 mm plasterboard Double set of wooden studs 70 mm, c 450-600 2 x PAROC UNS 37 / PAROC eXtra 70 mm 2 x 12.5 mm plasterboard</p>	62	55	56	52
 <p>2 x 12.5 mm plasterboard Double set of steel studs 66-70 mm, c 450-600 2 x PAROC UNS 37 / PAROC eXtra 70 mm 2 x 12.5 mm plasterboard</p>	63	56	56	52
 <p>Render ≥ 12 mm Expanded clay blocks (~ 850 kg/m³) thickness ≥ 200 mm Masonry mortar, thickness of joints ≥ 10 mm Render ≥ 12 mm PAROC UNS 37 / PAROC eXtra ≥ 50 mm Gypsum plasterboards 12.5 mm mounted on metal frame, c 600 mm</p>	58	54	56	52
 <p>3 x 12.5 mm plasterboard Double set of wooden studs 70 mm, c 450-600 2 x PAROC UNS 37 / PAROC eXtra 70 mm 3 x 12.5 mm plasterboard</p>	65	61	60	56
 <p>3 x 12.5 mm plasterboard Double set of steel studs 66-70 mm, c 450-600 2 x PAROC UNS 37 / PAROC eXtra 70 mm 3 x 12.5 mm plasterboard</p>	65	61	60	56
 <p>3 x 12.5 mm plasterboard Double set of wooden studs 95-100 mm, c 450-600 2 x PAROC UNS 37 / PAROC eXtra 95 mm 3 x 12.5 mm plasterboard</p>	68	64	64	60
 <p>3 x 12.5 mm plasterboard Double set of steel studs 95-100 mm, c 450-600 2 x PAROC UNS 37 / PAROC eXtra 95 mm 3 x 12.5 mm plasterboard</p>	68	64	64	60
 <p>Render 10 mm Concrete 100-120 mm PAROC SSB1 30 mm Concrete 100 mm Render 10 mm</p>	70	69	68	64

Construction		R_w dB	$R_w + C_{50}$ dB	R'_w dB	$R'_w + C_{50}$ dB
19	 <p>3 x 12.5 mm plasterboard Double set of steelstuds 95-100 mm, c 450-600 PAROC UNS 37 / PAROC eXtra 95-100 mm PAROC UNS 37 / PAROC eXtra 110-120 mm PAROC UNS 37 / PAROC eXtra 95-100 mm 3 x 12.5 mm plasterboard</p>	72	68	68	64
20	 <p>4 x 12.5 mm plasterboard Double set of steelstuds 95-100 mm, c 450-600 PAROC UNS 37 / PAROC eXtra 95-100 mm PAROC UNS 37 / PAROC eXtra 200 mm PAROC UNS 37 / PAROC eXtra 95-100 mm 4 x 12.5 mm plasterboard</p>	76	72	68	68
21	 <p>Lightweight concrete 140 mm, $\rho = 1200 \text{ kg/m}^3$ PAROC SSB1 30 mm Lightweight concrete 140 mm, $\rho = 1200 \text{ kg/m}^3$</p>	67	66	64	60

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PAROC OY AB
 Building Insulation
 Neilikkatie 17, PO BOX 294
 FIN-01301 Vantaa, Finland
 Telephone +358 204 55 4868
 Telefax +358 204 55 4738
www.paroc.com

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