Buildwise

INSTITUTION RECOGNIZED BY APPLICATION OF THE DECREE-LAW OF 30th OF JANUARY 1947

BELAC 042 - TEST

All tests in this report are executed according to the ISO 9001 certified Quality management system of BUILDWISE

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TEST REPORT

Unit	**TESTING & STANDARDISATION**	**O/References**	DE-TS-0046 TS-24-056-01-E Page 1 / 7

Requested by	Soudal NV Everdongenlaan 18 B-2300 Turnhout		
Date of the order	06-03-2024	**Samples identification**	S-2024-11-020
Date of the test	12-03-2024	**Date of reception of samples**	07-03-2024
Remark(s)	/	**Drafting date of the report**	09-08-2024
Test carried out	Measurement of the sound reduction index R of a building element		
Product tested **Manufacturer**	Acryrub Soudal NV		
References	NBN EN ISO 10140-2:2021 Acoustics - Measurement of sound insulation in buildings and of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2:2021) NBN EN ISO 717-1:2021 Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation (ISO 717-1:2020)		

Disclaimer

Buildwise is not responsible for the accuracy and completeness of the information provided by the customer and taken over in this report. The sampling was not carried out by Buildwise and thus the results of this report apply only to the sample as received. The equivalence between the tested product covered by this report and the commercialised product lies entirely under the responsibility of the requestor.

This report contains 7 pages. It may only be reproduced in its entirety.

☐ No sample
☐ Sample(s) submitted to a destructive test
☒ Sample(s) to be removed from our laboratories 30 calendar days after sending of the report, unless a written request is received by the demander of the test

	AUTHORISED BY : ir. D. Wuyts	
Technical responsible of the test	Responsible in charge of the test	Unit Manager
F. Corbugy	ir. L. De Geetere	ir. D. Wuyts
		

R_s SOUND REDUCTION INDEX - GELUIDVERZWAKKINGSINDEX
INDICE D'AFFAIBLISSEMENT ACOUSTIQUE - SCHALLDAMMINDEX

EN ISO 10140-2:2021 Acoustics - Measurement of sound insulation in buildings and of building elements - Part 2: Measurement of airborne sound insulation
EN ISO 10140-1:2021 Acoustics - Measurement of sound insulation in buildings and of building elements - Part 1: Application rules for specific products (Annex J : Joints filled with fillers or seals - Sound reduction index)
EN ISO 717-1:2020 Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

Mouting / Montage : 07/03/2024 **Curing time / Droogtijd / Temps de séchage / Trockenzeit :** 120 hours
Date of Test / Testdatum / Date d'essais / Prüfdatum: 12/03/2024
Source room / Zendruimte / Salle d'émission / Senderaum: C (V = 78.61 m³) (% H2O = 55.7 %) (T = 15.7 °C)
Receiving room / Ontvangstruimte / Salle de réception / Empfangsraum: D (V = 61.62 m³) (% H2O = 50.9 %) (T = 17.4 °C)
Static pressure / Statische druk / Pression statique / Statischer Druck: 0.1003 MPa
Test sample / Testelement / Elément de l'essai / Testelement: l = 1200 mm b = 10 mm d= 100 mm *(see also page 5)*

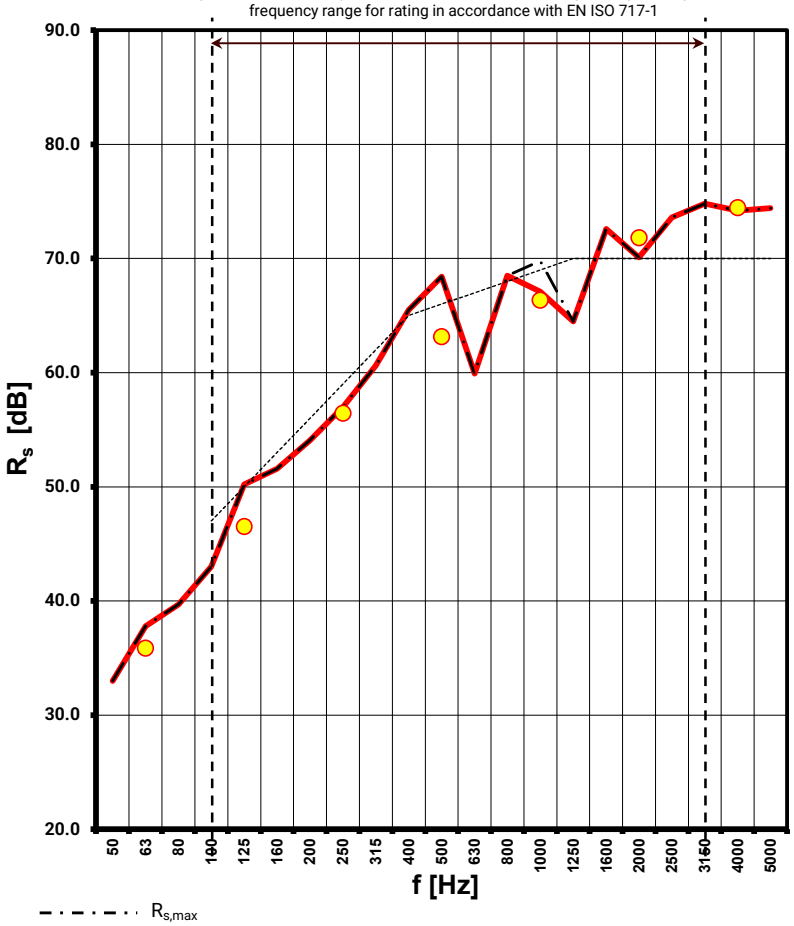
(l = length, b = width, d = depth of the joint)

f (Hz)	R_s (dB) 1/3oct	R_s (dB) oct	$R_{s,max}$ (dB)
50	(≥ 33)		33.0
63	**(≥ 37.8)**	**35.9**	37.8
80	(≥ 39.7)		39.7
100	(≥ 43)		43.0
125	**(≥ 50.2)**	**46.5**	50.2
160	(≥ 51.6)		51.6
200	(≥ 54.1)		54.1
250	**(≥ 57)**	**56.5**	57.0
315	(≥ 60.6)		60.6
400	(≥ 65.5)		65.5
500	**(≥ 68.4)**	**63.2**	68.4
630	(≥ 59.9)		59.9
800	(≥ 68.5)		68.5
1000	**67.1**	**66.4**	69.8
1250	(≥ 64.5)		64.5
1600	(≥ 72.6)		72.6
2000	**(≥ 70.1)**	**71.8**	70.1
2500	(≥ 73.6)		73.6
3150	(≥ 74.8)		74.8
4000	**(≥ 74.2)**	**74.5**	74.2
5000	(≥ 74.4)		74.4

$R_{s,w}$ ($C;C_{tr}$) =
(≥ 66 (-2;-6) dB)
(≥ 66.6 (-2.4;-7.1) dB)

$C_{50\text{-}3150}$= -3 dB
$C_{tr,50\text{-}3150}$= -12 dB
$C_{50\text{-}5000}$= -2 dB
$C_{tr,50\text{-}5000}$= -12 dB

Rating based on laboratory measurement results obtained by an engineering method
frequency range for rating in accordance with EN ISO 717-1



REQUESTED BY / AANVRAGER / DEMANDEUR / AUFTRAGSTELLER:

Soudal NV
Everdongenlaan 18 - B-2300 Turnhout

TEST ELEMENT / PROEFELEMENT / ELEMENT D'ESSAI / PROBE:

(Short description by the manufacturer, details: see next page(s) / Beknopte beschrijving door het bedrijf, details: zie volgende blz(n) / Description sommaire par l'entreprise, détails: voir page(s) suivante(s) / Kurze Beschreibung durch den Hersteller, Details auf Nächste Seite(n))

NL: Acryrub is de beste all-round schilderskit, met een maximale vervorming van 12,5%. Acryrub kan binnen en buitenshuis gebruikt worden en is snel overschilderbaar.

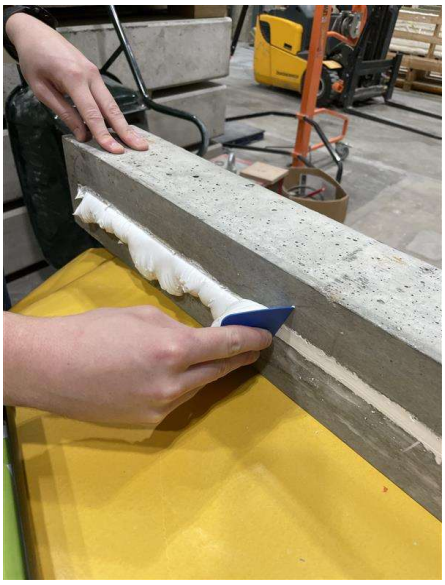
FR: Acryrub est le meilleur mastic polyvalent pour peintres, avec une distorsion maximale de 12,5%. Acryrub peut être utilisé à l'intérieur et à l'extérieur et peut être rapidement peint.

GB: Acryrub is the best all-round acrylic painters sealant, with a maximum distortion of 12,5%. Acryrub can be used in- and outdoors and is fast paintable.

D: Keine Deutsche Beschreibung verfügbar

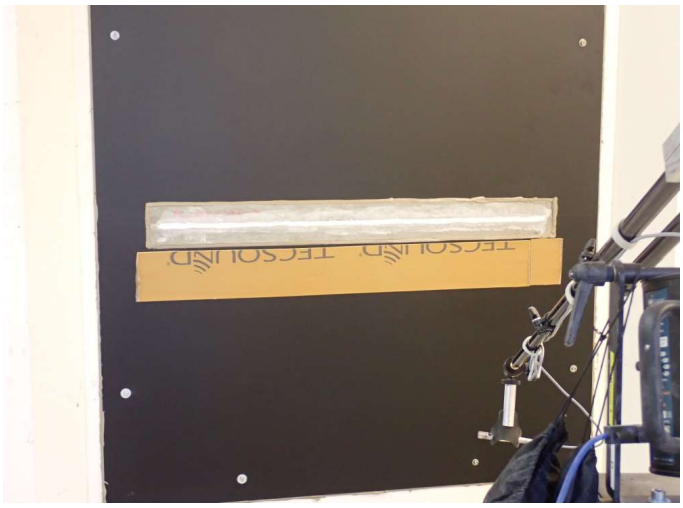
DETAILED DESCRIPTION OF THE BUILDING ELEMENT

This description is given by the producer of the test element and is not guaranteed by Buildwise. The equivalence between the tested product in this report and the commercialised product is the sole responsability of the producer.



Filling of the cassette



Source room (cell C)

Receiving room (cell D)

MEASUREMENT PRECISION, TEST EQUIPMENT AND MEASUREMENT METHOD

1. MEASUREMENT PRECISION

Air temperature	± 0.5 °C
Relative humidity	± 5%
Atmospheric pressure	0.0005 MPa

2. MEASUREMENT UNCERTAINTY

The values of standard deviation of reproducibility (Situation A) in Table 3 of the ISO 12999-1:2020 can be applied as an estimation of the standard uncertainty of the single number ratings. The reported expanded uncertainty is calculated for a coverage factor k = 1.96 (two-sided) corresponding to a confidence level of 95% assuming a Gaussian distribution.

$R_{s,w}$ = 66.6 dB ± 2.4 dB (k=1.96, two-sided)
$R_{s,w}+C$= 64.2 dB ± 2.5 dB (k=1.96, two-sided)
$R_{s,w}+C_{tr}$= 59.5 dB ± 2.9 dB (k=1.96, two-sided)

The values in Table 2 (ISO 12999-1) can be applied as an estimation for the standard uncertainty of the sound reduction index R, in one-third octave bands (page 2).

3. TEST EQUIPMENT

- 01dB-DO12: Two fixed loudspeakers (dodecahedrons) in each room
- Bruël & Kjaer - 4943: Two microphones in each room
- Bruël & Kjaer - 2669-L: Two preamplifiers for microphones
- Bruël & Kjaer - 2829: Two current supplies for microphones
- Bruël & Kjaer - 4228: A pistonphone calibration source
- Norsonic - Nor265: One rotating microphone boom in each room
- Norsonic - Nor850: A real time analyser
- Norsonic - Nor850: Building Acoustics software

4. MEASUREMENT METHOD TO DETERMINE Rs

A detailed description of the measurement method to determine the spectrum of the sound reduction indices Rs, can be found in the EN ISO 10140-2 standard (see references on the title page). In a limited and thus incomplete way, the test method can be described as follows:

The measurements are made in a dedicated test facility construction (see last pages) composed of a source room and a receiving room. This construction meets the requirements of EN ISO 10140-5 and -1 (Annex J). In the source room a steady pink noise is emitted. It is generated by two fixed sound sources (dodecahedrons) so as to obtain an as good as possible diffuse sound field. The sound sources and their fixed positions fullfil the requirements in annex D of EN ISO 10140-5. The average sound pressure level spectrum is measured per 1/3d octave bands in the source room and receiving room by means of two microphones mounted on a continuously rotating beam. In that way, an integration of the sound pressure level in time and space is obtained, resulting in the energetically averaged sound pressure level spectrum for the source room and receiving room.

In the receiving room the reverberation time is measured as well allowing to calculate the correction term in the formula for the sound reduction index R (via the equation of Sabine: A=0.16V/T, V = volume of the receiving room). The sound reduction index R is calculated with the formula:

$$R_s = L_1 - L_2 + 10\lg\frac{S_n l}{A l_n}\ \text{dB}$$

L_1 = the average (space / time) sound pressure level per 1/3d octave bands in the source room [dB] (ref. 20 micro Pa)
L_2 = the average (space / time) sound pressure level per 1/3d octave bands in the receiving room [dB] (ref. 20 micro Pa)
S_n = the reference area (=1), in m²
l = the length of the joint, in m ;
l_n = the reference length of the joint (=1), in m ;
A = the equivalent absorption-surface of the receiving room [m²] (from A=0.16 V/T with V=volume of receiving room in m³).

NOTE: RATING OF THE SOUND INSULATION and SPECTRUM ADAPTATION TERMS

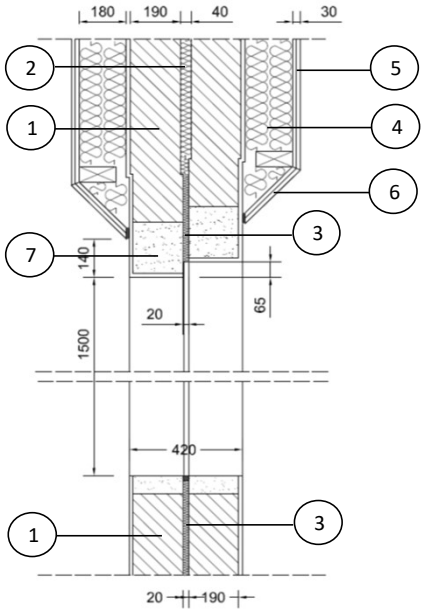
Calculations of the single rating and the different spectrum adaptation terms are carried out as to EN ISO 717-1 (see references title page) and cannot be explained in a few lines. Calculation modules and additional information about the rating of single values for sound insulation (and about standards related to building acoustics in general) are given on the following website:

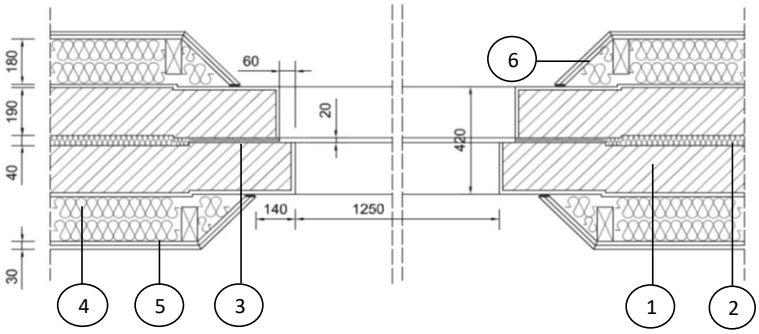
www.normen.be (Dutch) and www.normes.be (French)

SPECIFIC PARTITION FOR REDUCED-SIZE TEST ELEMENTS

1. Partition between the source room and the emission room

The construction of the partition wall with test opening for reduced-size test elements is illustrated by the vertical and horizontal section below. The wall is symmetrically composed by different, well decoupled wall parts at both sides of the central cavity.

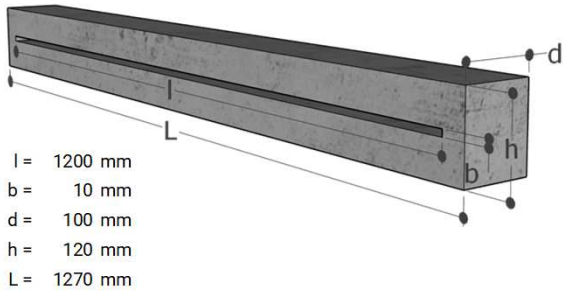




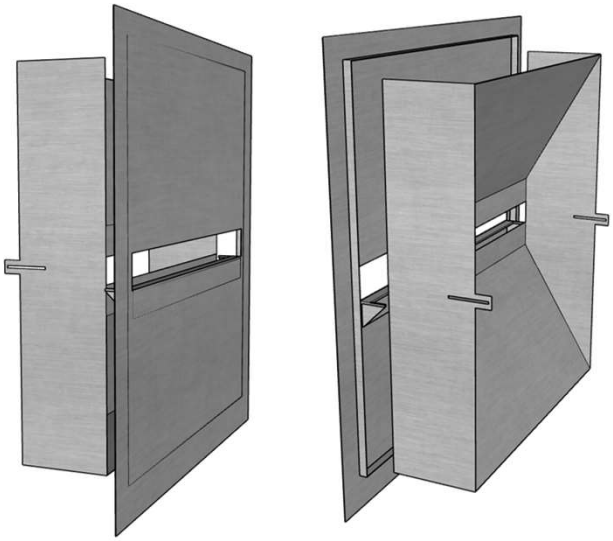
1 : *plastered, hollow concrete blocs filled with stabilized sand (ca. 1800 kg/m³)*
2 : *4 cm cavity filled with mineral wool*
3 : *2 cm (!) cavity filled with mineral wool*
4 : *18 cm cavity filled with mineral wool*
5 : *2 x 15 mm gypsum board*
6 : *gypsum boards chamfer of 45 %*
7 : *concrete beam (ca. 2300 kg/m³)*

2. Mounting

The joint filler to be tested is mounted in a concrete cassette with dimensions indicated below. This cassette is mounted in a highly insulating filler element consisting of a decoupled double steel structure with mineral wool filling. Both the mounting of the filler element and the cassette is carried out by the Buildwise in accordance with the requirements from EN ISO 10140-1 (Annex J),-2,-4,-5:2021. The joint filler is also applied by the client, in as representative a manner as possible. The different stages of assembly are illustrated in the "Detailed description of the building element".



3D view of the concrete cassette and high-insulating infill element (mineral wool not shown)



ACOUSTIC TEST FACILITIES (1/2)

Generalities

(see next page with 3D drawings)

The test facilities consist of 6 fixed transmission rooms (A, B, C, D, E, F), a mobile room M and a reverberation room (alfa). The rooms are organized in such way that airborne sound insulation measurements are possible according to following combinations (source, receiving) : (A,B), (C,B), (C,D), (E,D), (E,F), (A,F) and (E,B). Measurements are always made from the largest to the smallest room (minimum volume difference of 10 %). Finally measurements can be made from the mobile room M (movable with overhead crane) to every other ixed transmission room underneath.

Combinations of transmission rooms

(C,D) and (A,F): partition with small-sized test opening (1.25 m x 1.50 m) in accordance with "§3.3.3 Specific small-sized test opening" of the EN ISO 10140-5 to measure the sound reduction index, mainly for glazings or windows.

(E,B): partition with small-sized test opening (1 m x 2.6 m) to measure door constructions, board material, etc.

(E,F): special test opening on to which a mobile concrete frame can be mounted. The test element is mounted outside the room in the concrete frame and transported into this test opening with the overhead crane.

(A,B, (C,B) and (E,D) have traditional test openings in accordance with EN ISO 10140-5. The test element is mounted in rooms B or D which are completely built as a box-in-a-box by means of an additional floating floor on top of the floor slab mounted on resilient pads.

Floor slabs

Each fixed room as well as the reverberation room is built up a 30 cm thick massive concrete floor slab, resiliently mounted by CDM-pads on massive foundation beams. These slabs are isolated from the environment and the adjacent rooms by a 5 cm large cavity filled with mineral wool. The mobile room is supported on the side of the central axis (seperation rooms A,B,C from rooms F,E,D) by the adjacent rooms, and on the outside by a steel frame attached to the columns carrying the overhead crane. This way no hard contacts exist between the mobile room M and any fixed room below . To complete the box-in-box construction in rooms B en D, a 10 cm thick floating concrete slab (in blue on the figures) is placed by means of 5 cm thick CDM-pads on top of the decoupled slabs. The cavity is filled with mineral wool.

Ceiling slabs

The ceiling slab on each fixed transmission room consists of three parts, carrying from the outer walls to the central axis. The three parts are : (1) a concrete slab with 14 cm thick local savings, used for impact sound measurements according to EN ISO 140-3, and an all-around 30 cm thick and 25 cm large concrete border. (2) and (3) are 30 cm (or 35 cm) thick massive concrete elements. All ceiling slabs can be removed by the overhead crane. For each room, they are joint together and to the underlaying walls by a mortar joint. Still three exceptions remain: in rooms B en D a resilient joint is put into place between the border of the ceiling slabs and the concrete beam connected to the test element beneath, to avoid flanking transmission to the latter. The slab parts (2) and (3) as well as the thick edges of (1) are shielded by heavy (movable) suspended ceiling constructions. This in order to avoid radiated impact sound from slab parts (2) and (3), als well as to determine the vertical airborne sound insulation between the mobile room M and the fixed room below for test elements within the surface of (1) (adaptable, with or without shielded edges)

Frame structure

The fixed rooms are built with a frame structure consisting of concrete columns supporting 60 cm high and 20 cm thick concrete beams. 30 cm thick beams are used in connection with test elements (in red on figure). The beams are fixed mechanically and can be removed easlily. The columns close to the central axis are conceived to allow for the filler walls to continue behind the columns and connect with the test element. Between the column and the filler wall, a decoupling insulation is placed. The aim of this construction is to allow for a sufficiently high, necessary coupling loss for the test element.

Filler walls

The non load-bearing basic filler walls are made of 19 cm thick hollow concrete blocks, mounted inversely and fully filled with stabilized sand. The surface mass of such a wall is about 380 kg/m². Only the filler walls in the central axis are plastered. All walls are shielded with linings.

Linings

To allow for the ceiling slabs to be removed, the linings are attached to the walls. Therefore a timberframe structure (see picture) is fixed resiliently, to which a lightweight metal frame (metal studs) en gypsum boards (2 x 15 mm) are mounted. The 18 cm wide cavity is completely filled with mineral wool.

ACOUSTIC TEST FACILITIES (2/2)

3D illustration of the acoustic test facilities, showing the overhead crane, the mobile room M and the ceiling slabs with local savings (rooms illustrated without doors).

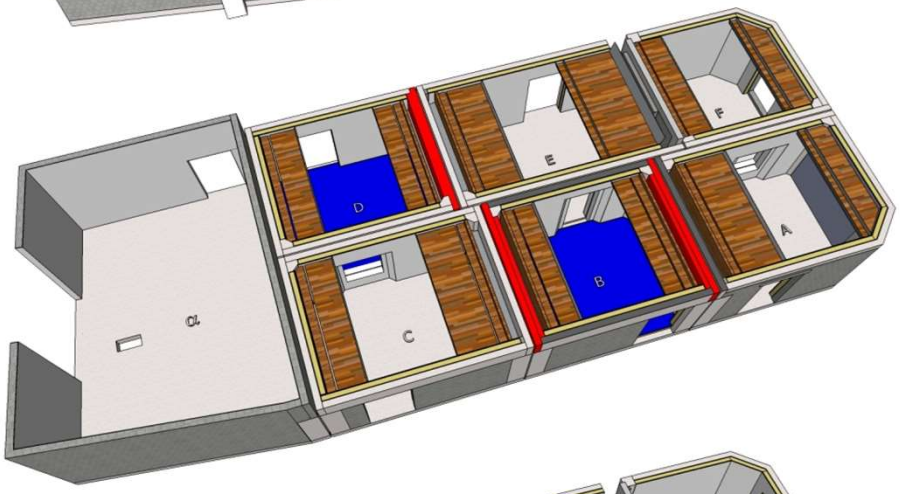
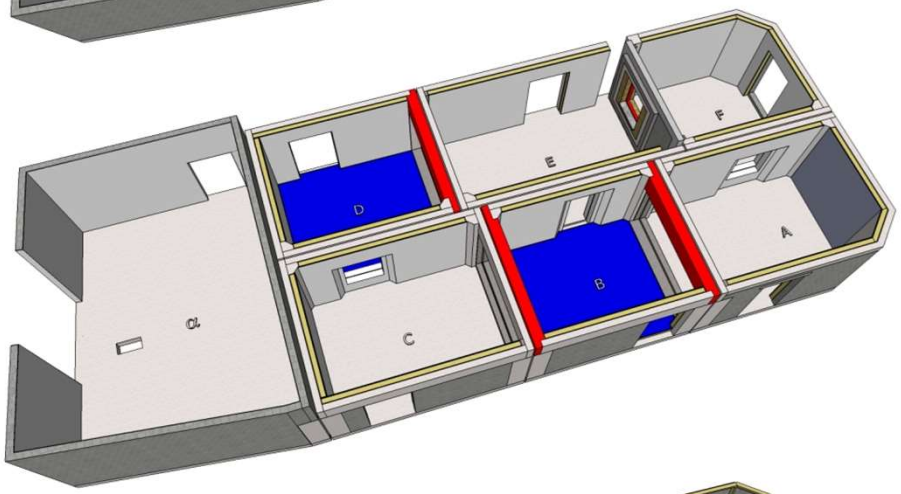
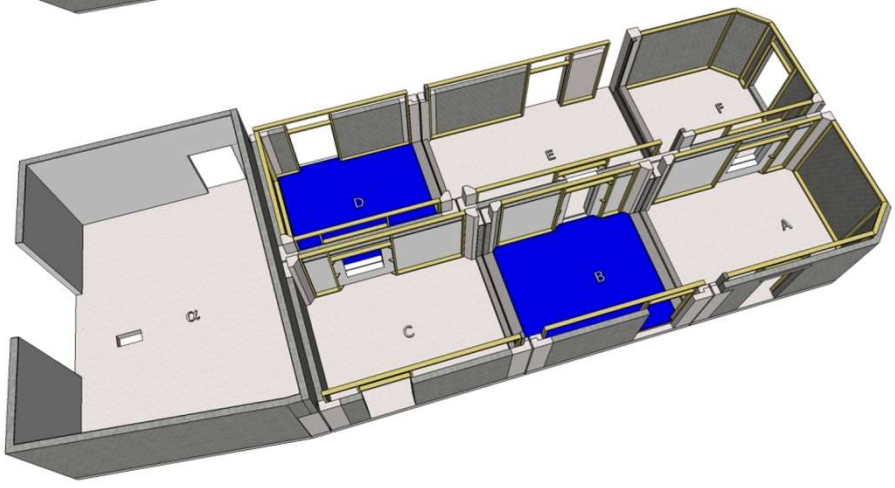


Illustration of the test facilities without overhead crane, mobile room and ceiling slabs. View on the suspended ceilings inside the transmission rooms A to F.



View inside the transmission rooms. Blue : floating concrete slab inside rooms D and B. Red : beams and filler wall in connection with the test element (not illustrated).



View inside the transmission rooms showing the timber frame structure on which the metal framework and gypsum boards (ommitted in picture) of the linings are mounted.