



# BRNO UNIVERSITY OF TECHNOLOGY

VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

## FACULTY OF CIVIL ENGINEERING

FAKULTA STAVEBNÍ

## INSTITUTE OF BUILDING STRUCTURES

ÚSTAV POZEMNÍHO STAVITELSTVÍ

## GUESTHOUSE IN PASOHLÁVKY

PENZION PASOHLÁVKY

## ACOUSTICS ASSESSMENT

### BACHELOR'S THESIS

BAKALÁŘSKÁ PRÁCE

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## **1. Structural solution**

- For exterior load bearing walls:
- In first overground floor are ceramic blocks POROTHERM 25 EKO Profi Dry Fix, with dimensions 248 x 249 x 250 mm
  
- For internal load bearing walls:
- In first overground floor are ceramic blocks POROTHERM 25 EKO Profi Dry Fix, with dimensions 248 x 249 x 250 mm
  
- For internal partition walls:
- In first overground floor are ceramic blocks POROTHERM 11.5 Profi Dryfix, with dimensions 497 x 249 x 115 mm
  
- In second overground floor are plaster board systems:
- KNAUF W112 with KNAUF diamond plaster boards, thickness 155 mm
- KNAUF W551 with KNAUF Vidiwall plaster board and KNAUF Red plasterboards, thickness 163 mm

## • **The aim of assessment**

The main aim of the assessment is to find out, whether the building satisfies the requirements in regulation n. 268/2009 Coll., about technical requirement on construction and in ČSN 73 0532:2020 Acoustics – Noise Protection in buildings and related acoustic properties of construction products.

## • **Used regulations and norms**

- Law no. 350/2012 Coll., about Territorial Planning and Building Regulations
- Notice no. 20/2012 Coll., about Technical requirements of buildings,
- Notice no. 62/2012 Coll., about Documentation of buildings,
- Government Regulation no. 272/2011 Coll., about Health Protection against negative effects of noise and vibrations,
- ČSN 73 0532:2020 Acoustics – Noise Protection in buildings and related acoustic properties of construction products – requirements,
- ČSN EN 12354-2: 2001: Building Acoustics – Impact sound reduction between rooms.
- ISO 12354-1:2017 Building acoustics —Estimation of acoustic performance of buildings from the performance of elements
- ISO 12354-2:2017 Building acoustics —Estimation of acoustic performance of buildings from the performance of elements

- **Airborne sound insulation assessment**

**A. General equations**

$$Rw' = Rw - kn$$

$$Rw' \geq Rw_{\text{standard}}$$

Where:

$Rw$  ..... laboratory measured airborne sound reduction index

$Rw'$  ..... in situ measured/apparent sound reduction index

$Rw_{\text{standard}} = 40$  dB for walls in between the structures

$Rw_{\text{standard}} = 47$  dB for RF concrete Ceilings

$k$  ..... correction which depends on the side ways of sound spreading

$k_1 = 2$  dB, All separating structures in solid masonry or prefabricated panel buildings of traditional materials (bricks, concrete)

$k_2 = 2-5$  dB, Heavy separating structures in skeleton constructions (brick lining of skeleton construction)

$k_3 = 4-8$  dB, Light separating structures in skeleton, steel or wooden construction (slab components, wooden ceilings, plasterboard structures)

**B. External load bearing wall POROTHERM 25 EKO Profi Dry**

**Fix**

Soundproofness:

$Rw = 51$  dB ... with plaster, given from the distributor Porotherm

$$Rw' = Rw - k_1$$

$$Rw' = 51 - 2 = 49 \text{ dB}$$

$$Rw' \geq Rw_{\text{standard}}$$

**49 ≥ 47 SATISFIES**

**C. Internal load bearing wall POROTHERM 25 EKO Profi Dry**

**Fix**

Soundproofness:

$Rw = 48$  dB ... with plaster, given from the distributor Porotherm

$$Rw' = Rw - k_1$$

$$Rw' = 48 - 2 = 46 \text{ dB}$$

$$Rw' \geq Rw_{\text{standard}}$$

**46 ≥ 45 SATISFIES**

**D. Internal partition wall POROTHERM 11.5 Profi Dryfix**

Soundproofness:

$Rw = 47$  dB ... with plaster, given from the distributor Porotherm

$$Rw' = Rw - k_1$$

$$Rw' = 47 - 2 = 45 \text{ dB}$$

$$Rw' \geq Rw_{\text{standard}}$$

**45≥45 SATISFIES**

**E. KNAUF W112 with KNAUF diamond plaster boards  
th. 155mm**

Soundproofness:

$R_{w1} = 59 \text{ dB}$  ... given from KNAUF distributor

$R_{w'} = R_{w1} - k_2$

$R_{w'} = 59 - 2 = 57 \text{ dB}$

$R_{w'} \geq R_{w, \text{standard}}$

**57 ≥ 47 SATISFIES**

**F. KNAUF W551 with KNAUF Vidiwall and Red plaster  
boards th. 163mm**

Soundproofness:

$R_{w1} = 53 \text{ dB}$  ... given from KNAUF distributor

$R_{w'} = R_{w1} - k_2$

$R_{w'} = 53 - 2 = 51 \text{ dB}$

$R_{w'} \geq R_{w, \text{standard}}$

**51 ≥ 47 SATISFIES**

• **Conclusion**

The structure is in accordance with the ČSN 73 0532:2020, so it fulfills the conditions for soundproofness.