



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

D.1.3.01 FIRE SAFETY REPORT

BACHELOR'S THESIS

BAKALÁŘSKÁ PRÁCE

AUTHOR

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BRNO 2024

1 Building identification data

1.1 General information about the construction

Construction:	Guesthouse
Location:	Pasohlávky 69122, Czech Republic
Cadastral location:	Pasohlávky 584762, parcel No. 3163/596
Grade of project:	Building permit
Investor:	Šimon Madzik
Project engineer:	Šimon Madzik

1.2 Structural solution of the building

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

2 Fire technical review

2.1. Sources used for creation of Fire safety Report

- **Technical sources of construction:**
 - project for building permit
- **Law and other regulation:**
 - Law No. 320/2015 CL., about the FRC in the Czech Republic
 - Law No. 133/1985 CL, fire protection law in amendments
 - Regulation No. 23/2008 CL, technical requirements of fire safety of buildings in amendment No. 268/2011 CL., about technical conditions of fire safety of buildings – Regulation about fire prevention
 - Regulation No. 246/2001 CL, determines requirements fire safety and performance of state fire supervision – regulation about fire prevention (about the determination of the conditions of fire safety and the performance of state fire supervision)
 - Reg. No. 268/2009 CL., about technical requirements of constructions
 - Reg. 499/2006 CL about building documentation – fire safety solution of building
- **Standards ČSN:**
 - ČSN 73 0810 – FPB – General requirements
 - ČSN 73 0802 – FPB – Non-industrial buildings
 - ČSN 73 0818 – FPB – Person surface rate in buildings
 - ČSN 73 0835 – FPB – Buildings for sanitary matters and social care
 - ČSN 73 0872 – FPB – Protection of buildings to extension of fire by air distributing equipment (standard for ventilation)
 - ČSN 73 0873 – FPB – Equipment for fire-water supply
 - ČSN 73 0821, ed. 21 – FPB – Fire resistance of engineering structures
 - ČSN 73 4200 – Chimneys – General requirements
 - ČSN 73 4201 – Chimneys and flues
 - ČSN 06 1008 – Fire safety of thermal equipment
 - ČSN 01 3495 – Construction drawings in fire safety of buildings
- **Other sources:**
 - Zoufal and coll.: Values of structure's fire resistance according to the EC
 - technical data sheets

2.2. Fire technical characteristics

Building will be solved according to the Regulation No.23/2008 comply ČSN 730802 and also ČSN 730873 and other related standards.

Fire technical characteristics of the building

Building: 2GF, two floors, with no basement

Vertical fire barriers and load bearing structures:

DP1 Brick wall Porothersm 25 EKO Profi Dry Fix, insulated
DP1 KNAUF W112 with KNAUF diamond plaster boards
DP1 Brick partition wall Porothersm 11.5 Profi Dryfix
DP1 KNAUF W551 with KNAUF Vidiwall plaster board

Horizontal fire barriers and load bearing structures:

DP1

RC slab 200 mm

Structural system of the building:

non-combustible str. system

- čl. 7.2.8. a) „02“ vertical and horizontal fire barriers and load bearing structures are from the structures part of DP1- non-combustible str. system

Fire height house: $h = 3,40\text{m}$

Headroom height house: $h_s = 3,05\text{m}$

2.3 Division of the object into fire compartments

The building will be divided into 14 fire compartments:

FC N1.01 – Restaurant/Kitchen

$p_v = 30 \text{ kg/m}^2$, $c = 1,0$ – due to tab. 8 ČSN 73 0802

dimensions of FC – $l_{\max} = 70 \text{ m}$ $l_{\text{real}} = 17,5 \text{ m}$ ---- Satisfied

$w_{\max} = 44 \text{ m}$ $w_{\text{real}} = 13,8 \text{ m}$ ---- Satisfied

FC N1.04/N2 – PEW

$P_n = 5 \text{ kg/m}^2$ due to ČSN 73 0802 article 6.3.1 --- $p_v = 10 \text{ kg.m}^2$ --- due to tab. 8 ČSN 73 0802

FC N1.02 – Room 1

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^2$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802

Dimensions of fire compartments residential cells are not assessed.

FC N1.03 – Room 2

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^2$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802

Dimensions of fire compartments residential cells are not assessed.

FC 2.05 – Room 3

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^2$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802

Dimensions of fire compartments residential cells are not assessed.

FC 2.06 – Room 4

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^2$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802

Dimensions of fire compartments residential cells are not assessed.

FC 2.07 – Room 5

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^2$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802

Dimensions of fire compartments residential cells are not assessed.

FC 2.08 – Room 6

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^2$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802

Dimensions of fire compartments residential cells are not assessed.

FC 2.09 – Room 7

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^2$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802

Dimensions of fire compartments residential cells are not assessed.

FC 2.10 – Room 8

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^{-2}$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802
Dimensions of fire compartments residential cells are not assessed.

FC 2.11 – Room 9

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^{-2}$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802
Dimensions of fire compartments residential cells are not assessed.

FC 2.12 – Room 10

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^{-2}$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802
Dimensions of fire compartments residential cells are not assessed.

FC 2.13 – Room 11

Due ČSN 73 0833, article 6.1.1 --- $p_v = 30 \text{ kg.m}^{-2}$, $c = 1,0$ --- Due tab. 8 ČSN 73 0802
Dimensions of fire compartments residential cells are not assessed.

2.4 Assessment of fire resistance of building structures

According to ČSN 73 0802, table 12, required values of fire resistance of individual structures are determined. Actual values of fire resistance of structures are determined according to the technical sheets of manufacturers and according to Zoufal et al.: Determination of fire resistance of building structures according to Eurocodes

FC N1.01/N2-II				
Item	Type of structure	Fire resistance		Assessment
		Required	Real	
1	Fire wall between room and restaurant	REI 45 DP1	Wall from Porotherm 25 EKO profi REI 120 DP1	Complies
2	Fire door between FCs	EW 15 DP3 -C	Fire door with a resistance of min. EW 15 DP3-C (with self-closure)	Complies
3.1	Load bearing peripheral wall	REW 45 DP1	Wall from Porotherm 25 EKO profi REI 120 DP1	Complies
3.2	Load bearing wall in overground floor	R 30	Wall from Porotherm 25 EKO profi REI 120 DP1	Complies
4	Ceiling above 1GF	RE 30	RFC slab thickness 200mm REI 60	Complies
5	Non-load bearing walls	—	Wall from Porotherm 11,5 P+D	-
6	Roof deck	-		-

FC N2.0				
Item	Type of structure	Fire resistance		Assessment
		Required	Real	

1	Fire wall between rooms	EI 15 DP1	KNAUF W112 EI 90 DP1	Complies
2	Fire door between FCs	EW 15 DP3 -C	Fire door with a resistance of min. EW 15 DP3-C (with self-closure)	Complies

Notes:

Fire strips doesn't have to be built, if the fire high of building is less than 12 m, here 3,40m and 0m. Art.. 8.4.10. ČSN 730802.

If building structures meet described requirements, it will **comply** with FSB point of View.

2.5 Escape ways

FC N1.03/N2-II -Living quarters

In object there is only one possible escape way in case of living quarters from every other FC there is door which enables safe evacuation. The maximum length of the unprotected escape route is not exceeded, so PEW is not required. NEW occupies the space of the staircase in the 2nd floor, the staircase connects to the corridor connecting the rooms.

FC N1.01-I- Restaurant/Kitchen

In this fire compartment, only one direction of escape is available from all places (escape via opening to the restaurant. Due to the size of the fire compartment is designed unprotected escape way. In the kitchen there will be at the same time max. 5 working people, and the maximum number of people will be 20 in the restaurant room. At the same time there will be maximum of 25 people.

Total number of the escape persons from the building:

E(habitants)= 28 escape persons according to designed number of people

E(restaurant)=25 escape persons according to annex G, ČSN 73 0818 tab.1 (14)

E(total)=**53 escape persons**

- The possibility of using a **single NONPEW** – limit number of people escaping from the fire compartment according to table 17, ČSN 730802 is for the upper floor **120 persons** if $a \leq 1,1$. We have **53 persons**, $a=0,971$, so the conditions are **SATISFIED**.
- Assessment of **length** of unprotected escape way for $a=0,971$ rounded to $a=1$ is $l_{max}=\mathbf{45m}$.

Assessment of lengths of unprotected escape routes: The maximum lengths are determined only for NONPEW and the restaurant in this guesthouse. For other spaces, maximum lengths are not determined because the residential units have an area less than 100 m², there will be fewer than 40 people, and the farthest distance to the door is less than 15 m.

The maximum length for the NONPEW is set at 45 m, according to Article 6.3.2, point a) in ČSN 73 0833 for buildings up to three above-ground floors. For this building, the critical distance to room No. 13 was measured at 23.7 m, which is less than 45 m, thus it complies.

The maximum length for the restaurant is set at 25 m. In the restaurant, the critical distance was measured at 16.3 m, which is less than 25 m, therefore it complies.

Assessment of the width of the non-protected escape route (NONPEW):

The minimum width for the non-protected escape route (NUC) is set at 1.1 m according to ČSN 73 0833, Article 6.3.6. Door openings may be narrowed to 0.9 m. Therefore, the actual width is 1,5 and 2,0 m (for both corridor and staircase), with door openings of 0.9 m (clear dimensions), thus it complies.

Signs and tables

Escape ways will be marked according to the ČSN ISO 3864-1, ČSN 01 8013 and NV 11/2002 Sb. wherever isn't exit to open area visible. Escape ways in the building will be comply with FSB point of View.

2.6 Stand-off distances

On the peripheral walls are only fire opened areas of the windows and doors, there are no elements, that would fall off in the event of a fire like a burning fire. Structural system of the building is non-combustible.

FC N1.01/N2-II -Living quarters

NORTH FAÇADE

1 window $S_{po}=1,25 \cdot 0,9=1,35=S_{p} \dots po=100\%$
tab F.2 annex F ČSN 73 0802

$p_v = 45,75 \text{ kg/m}^2$
 $d = 1,50 \text{ m}$

SOUTH FAÇADE

3 windows

$$S_{po}=1,25 \times 0,9=1,35=S_{p} \dots po=100\%$$

tab F.2 annex F ČSN 73 0802

$$p_v=45,75 \text{ kg/m}^2$$

$$d=1,50 \text{ m}$$

$$S_{po}=4,55 \times 0,5=4,55=S_{p} \dots po=100\%$$

tab F.2 annex F ČSN 73 0802

$$p_v=45,75 \text{ kg/m}^2$$

$$d=2,38 \text{ m}$$

WEST FAÇADE

7 windows and 3 doors

$$S_{po}=1,276 \times 2,419 \times 4=12,34 \text{ Sp} \dots po=100\%$$

tab F.2 annex F ČSN 73 0802

$$p_v=45,75 \text{ kg/m}^2$$

$$d=2,36 \text{ m}$$

$$S_{po}=1,5 \times 1,5 \times 3=6,75 \text{ Sp} \dots po=100\%$$

tab F.2 annex F ČSN 73 0802

$$p_v=45,75 \text{ kg/m}^2$$

$$d=1,86 \text{ m}$$

$$S_{po}=0,8 \times 1,97 \times 3=4,728 \text{ Sp} \dots po=100\%$$

tab F.2 annex F ČSN 73 0802

$$p_v=45,75 \text{ kg/m}^2$$

$$d=1,71 \text{ m}$$

EAST FAÇADE

LEFT SIDE, 7 windows

$$S_{po}=1,276 \times 2,419 \times 5=15,43$$

$$S_{p} \dots po=100\%$$

tab F.2 annex F ČSN 73 0802

$$p_v=45,75 \text{ kg/m}^2$$

$$d=2,36 \text{ m}$$

$$S_{po}=2 \times 2,4 \times 2=9,6 \text{ Sp} \dots po=100\%$$

tab F.2 annex F ČSN 73 0802

$$p_v=45,75 \text{ kg/m}^2$$

$$d=2,76 \text{ m}$$

NOTE:

There are not structural parts of DP3 on the building envelope. There is no danger of falling parts from both objects - no assessment is necessary in accordance with the provisions of Article 10.4.7. note), because the slope of the roof coverings does not exceed 45° and ledges coverings do not exceed 1m. Individual distances were assessed and determined according to ČSN 73 0802, table F1 and F2, no adjacent objects are at risk and all stand-off distances.

3 Technical and technological equipment

3.1.1 Heating

Object is heated by thermal pump and electric boiler.

3.1.2 Ventilation

Ventilation is provided by separated units one for the living quarters and one for kitchen and restaurant.

3.1.3 Pipeline pervade

House Pipeline is connected to the access road, which fulfills needed requirement. Access road water main dimension is PE90. Water main, sewage and rain water sewage are brought along this pipeline.

3.1.4 Electrical equipment

According to §9 of Decree 23/2008, electrical equipment for protection of people and properties must be designed in such a way, that the electric power supply is assured in case of fire, meeting conditions set by ČSN 730802 and ČSN 730810.

3.1.5 Installation passages

In accordance with art. 8.6 and 11.1 of ČSN 730802 passage of installations through the fire barrier construction must be sealed.

3.1.6 Lighting rod

According to ČSN EN 62305-1-4 the object will be provided with a lightning rod.

3.2 Equipment for fire-fighting

3.2.1 Access roads and boarding area

According to Article 12.2 ČSN 73 08 02, an access road with a width of at least 3 m must lead to the building at maximum distance of 20 m from the building. In reality the building is on the road with the width 4 m > 3 m, main entrance to the building is from the road in distance 13m < 20 m. It will comply with FSB point of View. Fire high of building is less than 12 m, so the boarding area isn't required. The same case is the dental clinic, that has entrance from the other road that has 3m width, and distance from the road to the building is 6,17m.

3.2.2 Outdoor offtake place

Requirement according to ČSN 730873, tab. 1 a 2. Hydrants must be installed on the local water mains with min. DN 100 mm and the distance to the object cannot exceed 150 m. The withdrawal of water from the hydrant must be at least 6 l/s with recommended speed of 0,8m/s. Static pressure of the hydrant must be at least 0,2 MPa.

Type of offtake place	Distance[m] from the building	DN mm	v m.s-1	Q l.s-1
outdoor hydrant	150/300	100	0,8	6

In the distance 50 m from the assessed building is a hydrant on the pipeline DN 100, it will comply with FSB point of View.

3.2.3 Indoor offtake place

According to ČSN 73 0873, Article 4.4, in OB3 buildings where the total number of people in residential and accommodation areas exceeds 20 persons, internal water supply points must be provided. Considering the accommodation of 24 people, it is necessary to establish internal water supply points.

An internal hose system DN 25 with a permanently shaped hose will be installed, as indicated in Drawing 1st Floor. On the 1st and 2nd floors, an internal hose system DN 19 with a permanently shaped hose will be installed, as shown in Drawings 1st and 2nd Floors.

The hose system will be connected to the internal water supply and maintained under constant pressure. It will be installed at a height of 1.1-1.3 m above the floor, with its location marked in the fire safety drawings.

Proposal of the number of fire-extinguishers

a. In fire compartments designated for accommodation, one fire extinguisher with a fire rating of 21A should be provided for every 12 accommodated persons, with portable fire extinguishers spaced no more than 25 m apart, but always at least one fire extinguisher per floor. Since 12 persons are accommodated per floor, the proposal is for one portable fire extinguisher with a fire rating of 21A (6 kg powder) installed in the corridor of the accommodation block.

b. In fire compartments designated for storage and in facilities related to accommodation for OB3 groups with a floor area exceeding 20 m², one water or foam fire extinguisher with a fire rating of 13A or one portable powder fire extinguisher with a fire rating of 34A should be provided for every 100 m² of floor area.

For the restaurant (119.88 m²), I propose two 34A powder fire extinguishers.

For the kitchen (28.67 m²), I propose one 13A foam fire extinguisher.

Supply of electricity

There are no electrical distribution systems ensuring function or control of the equipment used for fire fighting according to Article 12.9.1. ČSN 73 0802. Electrical devices, which do not serve the fire protection of the building, may have according to Article 12.9.3. ČSN 73 0802 any wires and cables, which correspond to the operating conditions. Electric devices will comply with applicable legislation and will be installed and operated according to the relevant standards and regulations, or instructions for use. The distance of any heat appliances from combustible materials will be done according to No. 23/2008 Coll. as amended No. 268/2011 Coll.

3.2.4 Fire safety equipment

House is equipped with autonomous detection and signalling according to Decree no. 23/2008 Coll.. This device must be located in the section leading to the exit of the object. If the area of

the object is bigger than 150m², there should be another autonomous detection and signalling device above the staircase to the 2GF. In our case will be devices located in the staircase hall in 2GF.

4. Safety labels

The building will be marked according to the ČSN ISO 3864-1, ČSN 01 8013, NV 11/2002
Sb.:

- direction of escape
- fire-extinguishers
- indoor offtake places
- outdoor offtake places
- switchboard of electricity
- main water shut
- main gas shut
- pipeline pervade seals

5. Conclusion

Fire safety report deals with design project for building permit „Guesthouse in Pasohlávky“. The object with two above ground floors is divided into 14 functionally separate structures that are interconnected. Building is designed according to ČSN 730802 and follows design standards according to ČSN 730835. Fire resistance of the structures fulfills the requirements. Escape ways are sufficient. Fire dangerous area does not endanger neighboring buildings and does not extend to neighboring properties. All in all, the building satisfies the standards and given requirements.

6. Attachements

- D.1.3.2 – SITE PLAN
- D.1.3.3 – FIRST GROUND FLOOR PLAN
- D.1.3.4 – SECOND GROUND FLOOR PLAN

Done by: Šimon Madzik
Date, place: 4.5.2024, Brno