



# BRNO UNIVERSITY OF TECHNOLOGY

VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

## FACULTY OF CIVIL ENGINEERING

FAKULTA STAVEBNÍ

## INSTITUTE OF BUILDING STRUCTURES

ÚSTAV POZEMNÍHO STAVITELSTVÍ

## D.1.3 FIRE SAFETY REPORT

BYTOVÝ DŮM, BRNO

### BACHELOR'S THESIS

BAKALÁŘSKÁ PRÁCE

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## **D 1.3 FIRE SAFETY OF BUILDING SOLUTION**

### **FIRE SAFETY REPORT**

Content and extend of fire safety solution corresponds to the legal Regulation No. 246/2001 Coll., about fire prevention issued to the law No. 133/1985 Coll., about fire safety.

# 1 .General Data about the Construction

## 1.1 Urban and architectural solution of the building

The four-storey residential building in Brno-Komín is detached and comprises of 3 flats on first two floors, 1 flat on the last two floors and an underground floor which is planned as garage. Roof is planned as green roof. The parcel number associated with its 2547/7. The surrounding area mainly consists of other detached buildings.

## 1.2 Layout solution of the building

The structure is semi-rectangular in shape and spans across four storey+underground. 1st and 2nd floors have 3 flats, 3rd and 4th floors have 1 flat with terrace. Each storey is connected by common staircase and elevator which are positioned in the shared corridor.

The first floor of the building has 1 flat with a corridor, a terrace, three bedrooms, 2 closets, a bathroom and a toilet and a living room with a combined kitchen. Second flat has a corridor, a terrace, a bedroom, a closets, a bathroom with a toilet and a living room with a combined kitchen. Third flat has a corridor, a bathroom and a toilet, a living room with a kitchen and a terrace. There are technical room and a room for bikes and baby carriages on this floor.

The second floor of the building has 2 flats with a corridor, a balcony, three bedrooms, 2 closets, a bathroom and a toilet and a living room with a combined kitchen. Third flat has a corridor, a bathroom and a toilet, a living room with a kitchen and a balcony.

The third floor of the building has a flat with two corridors, four bedrooms, a bathroom and a toilet, and a living room with kitchen and a terrace.

The fourth floor of the building has a flat with a corridor, two bedrooms, a toilet and a bathroom, a terrace and a kitchen with living room.

## 1.3 Structures solution of the building

The foundation of the structure is built by bearing footing along the reinforced concrete wall, which is located on the underground floor. On the basement, monolithic reinforced concrete walls and partitions are present. From the first to fourth floor, exterior and load-bearing walls are constructed using Porothersm 30 and Porothersm 25. There are partition walls are also present.

The green flat roof is constructed with monolithic reinforced slab that incorporates insulation. To ensure thermal insulation for the structure, EPS ETICS system has been employed.

# 2. Fire Technical Review

## 2.1 Sources used for creation of Fire Safety Report

Technical sources of construction

- Design 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. 246/2001 CL, determines requirements fire safety and performance of state fire supervision (we will learn how make a technical report of the fire safety design – solution, FRS is an authority who controls your solution) – regulation about fire prevention
- Regulation No. 23/2008 CL, technical requirements of fire safety of buildings in amendment No. 268/2011 CL.
- Regulation No. 499/2006 CL, about building documentation

Standards CSN: o ČSN 73 0810 – FSB – General requirements

- ČSN 73 0802 – FSB – Non industrial buildings
- ČSN 73 0818 – FSB – Person surface fire in buildings
- ČSN 73 0835 – FSB – Buildings for sanitary matters and social care
- ČSN 73 0873 – FSB – Fire water supply
- ČSN 06 1008 – Fire safety of heating appliances
- ČSN 01 3495 – Building drawings – Fire protection drawings

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 ČSN 730802.

Building has... 4 floors, 1 Basement

### Vertical fire barriers and load-bearing structures

#### Basement:

Peripheral load-bearing wall, REI180 DP1 monolithic RC wall th.=300mm  
 Internal load-bearing wall, REI180 DP1 monolithic RC wall th.=250mm  
 Internal partition wall, EI120 DP1 monolithic RC wall th.=115mm

#### 1st Floor:

Peripheral load-bearing wall, REI180 DP1, masonry from Porothersm 30 P10, th.300mm  
 Internal load-bearing wall, REI180 DP1, masonry from Porothersm 25 AKU Z P15, th.250mm  
 Internal acoustic wall, REI180 DP1, masonry from Porothersm 19 AKU Profi, th.190mm  
 Internal partition wall, REI120 DP1, masonry from Porothersm 11.5 Profi, th.115mm

Horizontal fire barriers and load-bearing structures:

Fire ceiling slab, REI180 DP1, monolithic slab, th.160mm

#### 2nd-3rd Floor:

Peripheral load-bearing wall, REI180 DP1, masonry from Porothersm 30 P10, th.300mm  
 Internal load-bearing wall, REI180 DP1, masonry from Porothersm 25 AKU Z P15, th.250mm  
 Internal partition wall, REI120 DP1, masonry from Porothersm 11.5 Profi, th.115mm

Horizontal fire barriers and load-bearing structures:

Fire ceiling slab, REI180 DP1, monolithic slab, th.160mm

**4th Floor:**

Peripheral load-bearing wall, REI180 DP1, masonry from Porothersm 30 P10, th.300mm

Internal load-bearing wall, REI180 DP1, masonry from Porothersm 25 AKU Z P15, th.250mm

Internal partition wall, REI120 DP1, masonry from Porothersm 11.5 Profi, th.115mm

Horizontal fire barriers and load-bearing structures:

Fire ceiling slab, REI180 DP1, monolithic slab, th.160mm

Structural system of the building: Non-combustible system

Fire height: 8.85m

Headroom: 2.67m

Note - contact thermal insulation:

Building has got contact insulation, insulating layer EPS . Fire high of building is 8.85 m, tj. less than 12 m, class of reaction of fire of insulation is E, contact insulation as a unit has the class of reaction of fire B, is = 0 mm.min-1. Item has not influence on type of structure part the peripheral wall, it stays structure part DP1... § 3.1.3.1 „10“ Structure system stays regardless insulation.

**2.3 Determination of Fire Compartments**

The building will be divided to the fire compartments as follows:

**Multi-storeys Fire Compartments:**

FC	ROOM NO	NAME	AREA(m2)	AREA OF FC (m2)
P1.1/N4	0.12	Staircase Hall	21.69	153.5
	0.11	Hall	4.57	
	1.01	Entrance/Staircase Hall	31.81	
	2.01	Staircase Hall	31.81	
	3.01	Staircase Hall	31.81	
	4.01	Staircase Hall	31.81	
S-P1.9/N4		Installation Shaft		
S-P1.10/N4		Installation Shaft		
S-P1.11/N4		Installation Shaft		

**Basement:**

FC	ROOM NO	NAME	AREA(m2)	AREA OF FC (m2)
P1.1	0.01	Garage	26.8	384
	0.02	Garage	26.8	
	0.03	Garage	26.8	
	0.04	Garage	26.8	
	0.05	Garage	26.8	
	0.06	Garage	26.8	
	0.07	Garage	26.8	
	0.08	Garage	26.8	
	0.09	Garage	26.8	
	0.10	Road	142.8	

**1.Floor**

<b>FC</b>	<b>ROOM NO</b>	<b>NAME</b>	<b>AREA(m2)</b>	<b>AREA OF FC (m2)</b>
N1.1	1.14	Corridor	13.12	120.21
	1.15	Bedroom	14.56	
	1.16	Bedroom	19.80	
	1.17	Closet	2.28	
	1.18	Closet	2.28	
	1.19	Bedroom	20	
	1.20	Living Room/Kitchen	40.68	
	1.21	Toilet	2.23	
	1.22	Bathroom	5.26	
N1.3	1.04	Corridor	13.12	91.12
	1.05	Closet	5.90	
	1.06	Bedroom	23.60	
	1.07	Living Room/Kitchen	40.85	
	1.08	Toilet	2.26	
	1.09	Bathroom	5.39	
N1.2	1.10	Corridor	5.60	38.1
	1.11	Bathroom	4.89	
	1.12	Toilet	2.24	
	1.13	Living Room/Kitchen	25.36	
N1.4	1.03	Technical Room	14.67	14.67
N1.5	1.02	Bike and Baby Carriage Room	14.39	14.39

**2.Floor**

<b>FC</b>	<b>ROOM NO</b>	<b>NAME</b>	<b>AREA(m2)</b>	<b>AREA OF FC (m2)</b>
N2.1	2.14	Corridor	13.12	120.21
	2.15	Bedroom	14.56	
	2.16	Bedroom	19.80	
	2.17	Closet	2.28	
	2.18	Closet	2.28	
	2.19	Bedroom	20	
	2.20	Living Room/Kitchen	40.68	
	2.21	Toilet	2.23	
	2.22	Bathroom	5.26	
N2.2	2.11	Corridor	5.60	38.1
	2.12	Living Room/Kitchen	25.36	
	2.13	Toilet	2.24	
	2.14	Bathroom	4.89	
N2.3	2.10	Corridor	13.12	120.21
	2.02	Bedroom	14.56	
	2.03	Bedroom	19.80	
	2.04	Closet	2.28	
	2.05	Closet	2.28	
	2.06	Bedroom	20	
	2.07	Living Room/Kitchen	40.68	
	2.08	Toilet	2.23	
	2.09	Bathroom	5.26	

### 3.Floor

FC	ROOM NO	NAME	AREA(m <sup>2</sup> )	AREA OF FC (m <sup>2</sup> )
N3.3	3.02	Bedroom	14.74	159.74
	3.03	Bedroom	21.14	
	3.04	Bedroom	18.76	
	3.05	Office	13.72	
	3.06	Living Room and/Kitchen	55.63	
	3.07	Corridor	6.60	
	3.08	Corridor	21.36	
	3.09	Toilet	2.19	
	3.10	Bathroom	5.60	

### 4.Floor

FC	ROOM NO	NAME	AREA(m <sup>2</sup> )	AREA OF FC (m <sup>2</sup> )
N3.3	4.02	Bedroom	14.74	117.96
	4.03	Bedroom	21.14	
	4.04	Living Room and/Kitchen	61.34	
	4.05	Toilet	2.19	
	4.06	Bathroom	5.60	
	4.07	Corridor	12.95	

#### 2.4. Assessment of FC, setting of theirs fire risk, review of area of the FC

FC	S(m <sup>2</sup> )	a	b	c	pv(kg.m-2)	GFS
P1.1	384	0.7	1.06	1	284.928	III
N1.1	120.21	-	-	1	45	III
N1.2	38.1	-	-	1	45	III
N1.3	91.12	-	-	1	45	III
N1.4	14.67	-	-	1	45	I
N1.5	14.39	-	-	1	45	I
N2.1	120.21	-	-	1	45	III
N2.2	38.1	-	-	1	45	III
N2.3	120.21	-	-	1	45	III
N3.3	159.74	-	-	1	45	III
N4.3	117.96	-	-	1	45	III

N1.1; N1.2; N1.3; N2.1; N2.2; N2.3; N3.3; N4.3– flat units as separate fire compartments (ČSN734301), according to norms pv=45, GFS=III

P1.1/N4 – protected escape way according to the article 9.3.2. ČSN 730802, GFS=II

S-P1.9/N4 – installation shaft according to the art. 8.12.2. ČSN 730802 GFS=II

S-P1.10/N4 – installation shaft according to the art. 8.12.2. ČSN 730802 GFS=II

S-P1.11/N4 – installation shaft according to the art. 8.12.2. ČSN 730802 GFS=II

All the fire compartments fulfil the requirements for the maximal size of the fire compartment.

## 2.5. Setting the required value of structures fire resistant with assessment to the limited states, comparing with real structures

Required values of fire resistant are in tab. 12 ČSN 730802, real values of fire resistants are assessed from technical data sheets of products and according the books : Zoufal and coll.: Values of structures fire resistance.

### P1.1-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 30 DP1	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between FC and PEW	REI 30 DP1	-Monolithic RC wall th.250mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 30 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 15 DP1-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 30 DP1	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY

### N1.1-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 45	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between Normal FC	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-LB Between FC and PEW	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 45 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 30 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 45	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 45	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY



### N1.2-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 45	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between Normal FC	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-LB Between FC and PEW	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 45 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 30 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 45	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 45	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY

### N1.3-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 45	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between Normal FC	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-LB Between FC and PEW	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 45 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 30 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 45	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 45	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY

### N1.4-I

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 15	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between Normal FC	REI 15	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-LB Between FC and PEW	REI 15 DP1	-Masonry from Porotherm 20 AKU th.190mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 15 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 15 DP1-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 15 DP1	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY

### N1.5-I

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 15	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls  -LB Between Normal FC  -LB Between FC and PEW  -Non-LB Between FC	REI 15  REI 15 DP1  EI 15 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1 -Masonry from Porotherm 20 AKU th.190mm REI 180 DP1 -Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY  SATISFACTORY  SATISFACTORY
2	Fire Closure to PEW	EW 15 DP1-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 15 DP1	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY

### N2.1-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 45	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls  -LB Between Normal FC  -LB Between FC and PEW  -Non-LB Between FC	REI 45 DP1  REI 45 DP1  EI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1 -Masonry from Porotherm 25 th.250mm REI 180 DP1 -Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY  SATISFACTORY  SATISFACTORY
2	Fire Closure to PEW	EW 30 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 45	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 45	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY

### N2.2-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 45	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls  -LB Between Normal FC  -LB Between FC and PEW  -Non-LB Between FC	REI 45 DP1  REI 45 DP1  EI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1 -Masonry from Porotherm 25 th.250mm REI 180 DP1 -Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY  SATISFACTORY  SATISFACTORY
2	Fire Closure to PEW	EW 30 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 45	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 45	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY

### N2.3-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 45	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between Normal FC	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-LB Between FC and PEW	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 45 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 30 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 45	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 45	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY

### N3.3-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 45	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between Normal FC	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-LB Between FC and PEW	REI 45 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 45 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 30 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 45	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 45	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY

### N4.3-III

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.1	Fire Ceiling	REI 30	RC Slab th.160mm REI 180 DP1	Cover of steel ≥20mm
1.2	Fire Walls			
	-LB Between Normal FC	REI 30 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-LB Between FC and PEW	REI 30 DP1	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY
	-Non-LB Between FC	EI 30 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure to PEW	EW 15 DP3-C	According to Requirements	SATISFACTORY
3	Peripheral Wall	REW 30	Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Wall Inside FC	REW 30	-Masonry from Porotherm 25 th.250mm REI 180 DP1	SATISFACTORY

P1.1/N4-II – PEW A

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.2	Fire Walls to FC			
	-LB Walls Underground	REI 45 DP1	-In-Situ RC wall th.300mm REI 180 DP1	SATISFACTORY
	-LB Walls on above ground floor	REI 30 DP1	- Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-LB Wall on last above ground floor	REI 15 DP1	- Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-non LB walls underground	EI 45 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
	-non LB walls on above ground floor	EI 30 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
	-non LB walls on last above ground floor	EI 15 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure			
	-Entrance	EW 15 DP1	According to Requirements	SATISFACTORY
	-To FC	EI 15 DP3-C		
3	Peripheral Wall			
	-Underground Floor	REW 45 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-Above ground floor	REW 30 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-Last above ground floor	REW 15 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Structures inside PEW			
	-Underground Ceiling	REW 45 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-Above ground floor ceiling	REW 30 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-Last Above Ground Floor Ceiling	REW 15 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-Wall	REW 30 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY

S-P1.9/N4-II; S-P1.10/N4-II; S-P1.11/N4-II

Item	Structure	Fire Resistance and Type		Notes
		Required	Real	
1.2	Fire Walls to FC			
	-LB Walls Underground	REI 45 DP1	-In-Situ RC wall th.300mm REI 180 DP1	SATISFACTORY
	-LB Walls on above ground floor	REI 30 DP1	- Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-LB Wall on last above ground floor	REI 15 DP1	- Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
	-non LB walls underground	EI 45 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY

	-non LB walls on above ground floor	EI 30 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
	-non LB walls on last above ground floor	EI 15 DP1	-Masonry from Porotherm 11.5 th.115mm EI 120 DP1	SATISFACTORY
2	Fire Closure			
	-Underground	EW 30 DP1-C	According to Requirements	SATISFACTORY
	-Above Ground Floor	EW 15 DP3-C		
3	Peripheral Wall	REW 30 DP1	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY
5	LB Structures inside FC	REI 30	-Masonry from Porotherm 30 th.300mm REI 180 DP1	SATISFACTORY

Notes:

Load capacity and stability – R

Integrity – E

Thermal insulation – I

Radiation-controlled insulation – W

Supposed special mechanical effects – M

Fire closure equipped with automatic closing device – C

Structure with special restriction of smoke penetration – S

Fire strips, are not have to be built, if the fire height of building is less than 12 m, in our case it is 8.85m. Art. 8.4.10. ČSN 730802.

Building has got contact insulation, insulating layer EPS. Fire high of building is 8.85m, i.e. less than 12 m, class of reaction of fire of insulation is E, contact insulation as a unit has the class of reaction of fire B, is = 0 mm.min<sup>-1</sup>. Item doesn't influence the type of structure part the peripheral wall, it stays structure part DP1... § 3.1.3.1 „10“ Structure system stays regardless insulation.

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

## 2.6. Escape ways

There are only two directions to escape from the building. One is designed as non-protected escape way and it is solely in for the escape from the fire compartment N1.2 to the free area. For all the remaining parts of the building there is designed protected escape way of type A. It is situated in the staircase, corridor and entrance. It is marked as P1.1/N4-II – A.

Number of the escaping persons  
according to ČSN 730818

-from technical rooms 6 persons

-from flats  $8 \times 1,5 = 12$  persons

-E=18 persons

## Protected escape way

### 1. Choosing of PEW A:

tab. 16 ČSN 730802: to the building high 22,5 m we can use PEW of type A

### 2. Possibility of using only one PEW of type A:

total number of escaping persons from the building  $E = 18 < 200$ , according to the tab. 17 ČSN 730802 item. 3b) we can use only one PEW of type A

### 3. Assessment of the length of PEW of type A

according to the art. 9.10.5. ČSN 730802 is the limited length of PEW A 120 m, real length of PEW A in the building is 45 m, it will be comply with FSB point of View.

### 4. Assessment of the width of PEW of the type A

The smallest width of PEW of type A in the building is 900mm, which is more than the calculated minimal width of 825mm (1,5x550mm)

### 5. Assessment of ventilation in PEW A

Ventilation of the PEW A will be assessed by a forced ventilation system with the required air exchange, of 10 times of volume of air in PEW A in one hour.

## Non protected escape way

### 1. Choose the non-PEW :

all non-PEW used for connection with PEW in giving floor, it will be comply with FSB point of View according to the art. 9.8.1. a) ČSN 730802.

### 2. Possibility of using only one non PEW

Such a solution is not possible due to not satisfying length requirements.

### 3. Assessment of the length of non-PEW

PEW N1.2-II :

$a=0,9$

$l_{max}=30m$

$l=10m$

### 4. Assessment of the width of non-PEW

assessment of the width of non-PEW

N1.2-II :

$a=0,9$

$u_{min}=550mm$

$u=900mm$

## *Doors on the escape ways ... čl. 9.13. ČSN 730802*

Doors must enable easy escape, be hand operated and self-unlocking. They need to be opening in the direction of the escape. They must be without doorsill. They must allow a safe intervention of fire brigade. Doors from the room or group of rooms, where the start of an escape way can be moved, might be oriented against the direction of the escape. Doors to the free are might be oriented against the direction of the escape, for less than 200 escape persons.

### *Fire safety equipment on the PEW A*

On the PEW A is designed emergency lighting with time of duration 1 hour ... ČSN EN 1838.

### *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.

## **2.7. Standoff distances**

Additional thermal insulation – ETICS

-The insulation with thickness up to 200 mm, in our building 140 mm, do not build fire opened space of peripheral wall, there is no need to determine the amount of heat released from 1 m<sup>2</sup> of peripheral wall.

-On the peripheral wall are only fire opened area of the windows and doors.

-Structures system of the building is non-combustible

Assessments of the completely fire open areas – radiation

North Elevation

FC	Pv(kg/m <sup>2</sup> )	Sp(m <sup>2</sup> )	Spo(m <sup>2</sup> )	Po	D(m)
N1.1	45	21.19	1.875	8.8	3.1
N1.2	45	0	0	0.0	0
N1.3	45	0	0	0.0	0
N1.4	45	11.18	2.52	22.5	3.1
N1.5	45	10.02	1.81	18.1	3.1
N2.1	45	21.19	1.875	8.8	3.1
N2.2	45	0	0	0.0	0
N2.3	45	21.19	1.875	8.8	3.1
N3.3	45	21.19	1.875	8.8	3.1
N4.3	45	21.19	1.875	8.8	3.1

### South Elevation

FC	Pv(kg/m2)	Sp(m2)	Spo(m2)	Po	D(m)
N1.1	45	22.73	7.82	34.4	2.8
N1.2	45	12.46	4.82	38.7	2.9
N1.3	45	22.73	7.82	34.4	2.8
N1.4	45	0	0	0.0	0
N1.5	45	0	0	0.0	0
N2.1	45	22.73	7.82	34.4	2.8
N2.2	45	12.46	4.82	38.7	2.9
N2.3	45	22.73	7.82	34.4	2.8
N3.3	45	33.67	9	26.7	2.7
N4.3	45	33.67	10.82	32.1	2.8

### East Elevation

FC	Pv(kg/m2)	Sp(m2)	Spo(m2)	Po	D(m)
N1.1	45	0	0	0.0	0
N1.2	45	12.46	3.75	30.1	2.7
N1.3	45	0	0	0.0	0
N1.4	45	0	0	0.0	0
N1.5	45	0	0	0.0	0
N2.1	45	0	0	0.0	0
N2.2	45	0	0	0.0	0
N2.3	45	22.73	3.75	16.5	2
N3.3	45	33.67	3.75	11.1	1.7
N4.3	45	33.67	3.75	11.1	1.7



## West Elevation

FC	Pv(kg/m2)	Sp(m2)	Spo(m2)	Po	D(m)
N1.1	45	43.65	6	27.9	2.5
N1.2	45	0	0	0.0	0
N1.3	45	0	0	0.0	0
N1.4	45	0	0	0.0	0
N1.5	45	0	0	0.0	0
N2.1	45	43.65	6	27.9	2.5
N2.2	45	0	0	0.0	0
N2.3	45	0	0	0.0	0
N3.3	45	28	7.82	27.9	2.5
N4.3	45	18.54	4.87	26.3	2.4

### *Note*

Radiation is not produced by the fire opened areas of PEW.

### *Conclusion - radiation:*

Fire dangerous area from assessed fire opened areas achieve on own land of owner or to the public space, in there are not other buildings. Assessed building isn't in fire dangerous area of other buildings. It will be comply with FSB point of view.

### *Fall of burning parts of structures:*

There are not the structures part of DP3 on the building envelope, standoff distance from impact of falling burning parts hasn't to be solved ...čl. 10.4.7. ČSN 730802.

## **2.8. Technical and technological equipments**

### **2.8.1. Pipelines pervade**

Distribution systems have to be designed in such a way, that their penetration through the fire barriers will be minimalized. Fire barriers, in the place of the passage, have to have the same structure and fire resistance as in the rest of the structure. Pipeline pervade to cross-section 40000 mm<sup>2</sup> don't need to take any additional measures according to §11.1.1.02.

### **2.8.2. Heating**

In the boiler room there are 1 pices of boilers with the power - kW, the boiler room have to be separated fire compartment.

Boilers have to obey their legal and normative perscriptions. The building is heated by the ventilation heat pumps integrated into the ventilation unit. Boilers and ventilation units must obey their legal and normative prescriptions.

### **2.8.3. Ventilation**

There is designed forced ventilation in the building with the dimension of ducts to 40 000 mm<sup>2</sup>, it can pervade during fire barriers without further measures. It haven't to be solve according to the ČSN 730872.

#### 2.8.4. Technical requirements to the technical equipments

Technical equipment must have to obey their legal and normative prescriptions.

### 2.9. Equipments for fire fighting

#### 2.9.1. Access roads and boarding area

The building has ensured the following facilities enabling effective and easy fire intervention. Pursuant to paragraph 12.2c) of ČSN 73 0802, the access road must be up to a maximum distance of 20 m from all entrances to the building, which are expected to be used for fire intervention, unless these buildings require a boarding area according to paragraph 12.4 or internal intervention routes according to 12.5.1.

During project documentation elaboration and fire safety assessment of the building, the access road has not been constructed in the assessed area, but within the project construction the road will be built in such a way that it is up to 20 m from all entrances and thus ensures compliance with the above requirements.

Fire height of building is less than 12 m, boarding area isn't required.

#### 2.9.2. Fire water supply

##### Outdoor offtake place

Requirement of this according to ČSN 730873, tab. 1 a 2:

Type of offtake place	Distance		DN	V	Q
	From the Building	Between each Other			
Outdoor Hydrant	150	300	100	0.8/1.5	6/12

##### Indoor offtake place

1. According to the product  $p.S > 9\,000\text{ kg}$  in art. 4.4 b)1) ČSN 730873, is needed the indoor offtake place – indoor hydrant

$p.S < 9000\text{kg}$  (is not necessary to design an indoor hydrant)

#### 2.9.3. Proposal of the number of fire-extinguishers

-According to article 5.4 ČSN 73 0833+Z1:2013

PEW P1.1/N4-II – A

-1x21A powder

-nr=10,45, nHJ=11→3x21A powder

→4x21A powder

P1.4-IV

-nr=1, nHJ=6→1x13A powder

P1.5-IV

-nr=1, nHJ=6→1x13A powder

-they will be evenly distributed evenly in the fire compartments

#### 2.9.4. Supply of electricity

It will be solved according to the art. 12.9.1. ČSN 730802.

Switchboards located in PEW A will be designed with fire resistance according to the standard.

### **2.9.5. Fire safety equipment**

On the PEW A is designed emergency lighting with a time of duration 1 hour ... ČSN EN 1838. Other active fire safety equipment isn't designed.

### **3. 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

### **4. Conclusion**

Design project for building permit „Residential Building“ is dealing with the object with 4 above ground floors with basement.

Building is designed according to ČSN 730802 and follows design standards, e.g. ČSN 730835.

There are 23 fire compartments in the building.

Fire resistance of the structures fulfill the requirements. Escape ways are sufficient.

Fire dangerous area achieve on own land of owner or to the public space, in there aren't other buildings.

**If the building meets described requirements, it will be complied with FSB point of View.**

### **APPENDIXES:**

SITUATION

FLOORPLAN 1.B - FSB

FLOORPLAN 1.F - FSB

FLOORPLAN 2.F - FSB

FLOORPLAN 3.F - FSB

FLOORPLAN 4.F - FSB