



VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

BRNO UNIVERSITY OF TECHNOLOGY

FAKULTA STAVEBNÍ

ÚSTAV POZEMNÍHO STAVITELSTVÍ

FACULTY OF CIVIL ENGINEERING
INSTITUTE OF BUILDING STRUCTURES

D.1.3 – TECHNICAL REPORT

DIPLOMOVÁ PRÁCE

MASTER'S THESIS

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1. Identification

Construction name: Block of flats in passive standard

Address: Pod Zámečkem/ Kamenec, Frýdek – Místek, 738 01

Cadastral area: Frýdek - Místek

Degree of project documentation: Realization documentation

Type of construction: New construction

Investor: Jan Žižka

Investor's address: Lískovec 139, Frýdek – Místek, 738 01

2. List of sources

- Project documentation – architectonic-construction part
- Decree MVČR 23/2008coll. About technical requirements on buildings
- Decree MVČR 268/2011coll. Which changes decree 23/2008coll.
- Decree MVČR 246/2001coll. About requirements of fire safety
- Law 133/1998coll. About fire safety
- Decree MMRČR no.268/2009coll. About technical requirements on buildings
- Decree MMRČR no.499/2006coll. About buildings documentation
- ČSN 73 0810:06/2005-„Požární bezpečnost staveb-Společná ustanovení”
- ČSN 73 0802:05/2009-„Požární bezpečnost staveb-Nevýrobní objekty”
- ČSN 73 0833:10/2010-„Požární bezpečnost staveb-Budovy pro bydlení a ubytování”
- ČSN 73 0873:06/2003-„Požární bezpečnost staveb-Zásobování požární vodou”

3. General information

3.1. Brief construction description

Project documentation is established for new construction of Energy passive block of apartments composed of 8 residential units with 28 inhabitants. Object has three-floor above terrain and one floor as basemen with collective garage.

Load bearing constructions are designed as a locally supported slab from monolithic reinforced concrete. External wall (infill of skeleton) are formed from ceramic masonry

From the fire safety point of view the structure is composed of non-flammable materials.

The entrance into individual flats is provided with pre steel construction with staircase. Which create open escape road.

3.2. Disposition description

The solved construction consists of collective garage, trolley storage, service room in the underfloor. There are four duplex apartments (one for 5 inhabitants) and four normal apartments (one for 2 inhabitants)

3.3. Description of construction

Vertical load-bearing construction

Vertical load bearing construction is provided by monolithic reinforced columns 300x300 and 300x250. External skeleton filling is from masonry Heluz acoustic 250mm.

Horizontal load-bearing construction

Is locally supported slab th. 300mm from monolithic reinforced concrete

Staircase

The connection between floors in different fire sectors is provided by steel staircase.

The connection between floors in same fire sectors is provided by RC monolithic staircase

Openings

The openings are filled with wooden windows and doors (front mounted installation)

4. Fire safety evaluation

4.1. Brief construction description

The structure is formed with non-flammable building materials acc. To the decree 23/2008 Coll. and acc. ČSN 73 0802 and other relevant standards.

- Construction system – non-flammable except the ETICS system, the fire reaction – max. E
- Fire safety height of the structure $h = 6.12$ m
- Build-up area: 341.91 m²
- Object height: 10.835 m

4.2. Object division into fire sectors

According ČSN 73 0802, ČSN 73 0833:

The building is divided into 10 fire sectors:

- N 1.01, N 1.02, N 1.03, N 1.04 (134.5m²)
- N 3.01, N 3.02, N 3.03, N 3.04 (70.59m²)
- N 0.01(15.6m²)
- The garage should be solved acc. to annex 1 of ČSN 73 0804 (non solved)

4.3. Definition of fire hazard, degree of fire safety and evaluation of the fire sectors size

Fire sectors N 1.01, N 1.02, N 1.03, N 1.04, N 3.01, N 3.02, N 3.03, N 3.04

Fire load $p_v = 40,0 \text{ kg/m}^2$

Degree of fire safety II.

The border dimensions of the fire sectors with dwelling units are acc. ČSN 73 0833 not evaluated.

X

Fire sector N 0.01

$$p_n = 2,2 \text{ (service room)} = 3.3 \text{ kg/m}^2$$

$$p_s = 2 \text{ (doors)} + 5 \text{ (floor)} = 7 \text{ kg/m}^2$$

$$p = p_n + p_s = 10,3 \text{ kg/m}^2$$

$$a = 1,2$$

$$b = 1$$

$$c = 0,75$$

$$p_v = p * a * b * c$$

$$p_v = 10,3 * 1,2 * 1 * 0,75 = 9,27 \text{ kg/m}^2$$

Degree of fire safety II

Material	Demand – ČSN 730802	Actual value
External load-bearing construction		
RC monolithic skeleton system filled with ceramic masonry (Heluz aku 250mm)		<i>Cover designed according to</i>
1 st floor	REW 30	REW 30 DP1(REI 180 DP1)
Internal load-bearing construction RC monolithic skeleton system 1 st floor	REI 30	<i>Cover designed according to</i> REI 30 DP1
Internal fire-resistant partition Plaster boards partition 2x Knauf white 12,5 mm 1 st floor	EI 30	EI 60 DP1
Ceilings monolithic RC slabs above second and third floor	REI 30	<i>Cover designed according to</i> REI 30 DP1
Fire door		

Fire sector: N 1.01, N 1.02, N 1.03, N 1.04

	EIS 15 D3	EIS 15 D3
Material	Demand 730802 – ČSN	Actual value

Fire sector: N 0.01

Material	Demand 730802 – ČSN	Actual value
Externall load-bearing wall RC wall th. ,250 mm	REI 30	<i>cover designed according to REI 30 DP1</i>
Internal non load-bearing wall Heluz aku 250 mm	EI 30	EI 180DP1
Ceilings monolithic RC slabs above first floor	REI 30	<i>cover designed according to REI 30 DP1</i>
Fire door	EIS 15 D3	EIS 15 D3

Fire sector: N 3.01, N 3.02, N 3.03, N 3.04

External load-bearing construction		
RC monolithic skeleton system filled with ceramic masonry (Heluz aku 250mm)		<i>Cover designed according to</i>
1 st floor	REW 15	REW 30 DP1(REI 180 DP1)
Internal load-bearing construction RC monolithic skeleton system 1 st floor	REI 15	<i>Cover designed according to</i> REI 30 DP1
Internal fire-resistant partition Plaster boards partition 2x Knauf white 12,5 mm 1 st floor	EI 30	EI 60 DP1
Ceilings monolithic RC slabs above second and third floor	REI 30	<i>Cover designed according to</i> REI 30 DP1
Fire door	EIS 15 D3	EIS 15 D3

4.4. Escape routes

Acc to ČSN 730833 the structure meets description of buildings from the group OB2.

The evacuation of persons is provided with two non-protected escape route.

The escape route has minimal width 1250mm and length 34m (max 35m).

4.5. Fire hazardous area

The fire hazardous area from the structure's openings in the external wall of the fire sectors lead to the free space around the building ; it will not reach beyond the border of the building plot.

The existing nearby building will not be included in the fire hazardous area of the solved structure.

Safe distance acc. Table F. of ČSN 73 0802:

sector	fire load (kg/m ²)	area S _p		area S _{po} (m ²)	% open	safe distance (m)
		length l (m)	height h _u (m)			
north facade						
1 01	40	1	2.1	2.1	100	4.4
1 02	40	4.45	2.1	3.35	36	2.3
1 03	40	4.45	2.1	3.35	36	2.3
1 04	40	1	2.1	2.1	100	4.4
3 01	40	1	2.1	2.1	100	4.4
3 02	40	4.45	2.1	3.35	36	2.3
3 03	40	4.45	2.1	3.35	36	2.3
3 04	40	1	2.1	2.1	100	4.4
south facade						
1 01	40	7.35	2.3	11.93	71	4.5
1 02	40	7.35	2.3	11.93	71	4.5
1 03	40	7.35	2.3	11.93	71	4.5
1 04	40	7.35	2.3	11.93	71	4.5
3 01	40	7.35	2.3	11.36	67	4.4
3 02	40	7.35	2.3	12,225	67	4.4
3 03	40	7.35	2.3	12,225	67	4.4
3 04	40	7.35	2.3	12,075	67	4.5
d01	40	7.35	2,4	6,15	67	4.4
east facade						
1 04	40	1.25	2.3	1.625	57	3
3 04	40	1.25	2.3	1.625	57	3
west facade						
1 01	40	1.25	2.3	1.625	57	3
3 01	40	1.25	2.3	1.625	57	3

4.6. Fire water supply

External fire water supply

The need of external fire water supply will be provided with existing fire water network within nearby communication (underground hydrants).

Internal fire water supply

Water supply was designed according ČSN 730833

4.7..Access

The structure is connected with existing public communication with two garage access roads (width = 3.4m) and foot access to the building's entrance (width = 2 m). No special adjustments are required.

4.8. Mobile extinguisher

Acc. Čsn 73 0873 will be installed powder extinguisher (21A) in technical room. Then according to project documentation.

4.9. Technical equipment of the structure

a) Ventilation – overall ventilation in the building is covered with forced ventilation with exchange of air is 0.5 of ventilated space.

b) Heating – the heating is provided with condensing boiler situated in the service room.

c) Electric installations – will be installed acc. to latest standards regarding this problematic. The atmospheric electricity protection will be provided with external lightning protection.

4.10. Special requirements on building constructions

There are none.

4.11. Requirements on automatic fire sensors

The structure is provided with automatic fire sensors (A1) acc. Decree 23/2008 Coll. This devices will be situated at each floor of stairwell as well as inside each fire sector. The further situation is defined in accompanying drawings.

5. Safety marks and tables

The escape route and fire water supply stations will be marked acc. ČSN ISO 3864, ČSN ISO 01 0813 and Decree 11/2002 Coll. with safety marks and tables.

6. Conclusion

The solved structure will suffice all fire safety requirements while keeping all prescribed constructions and solutions.