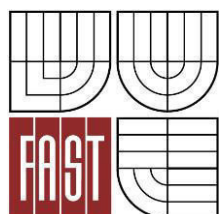




VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ  
BRNO UNIVERSITY OF TECHNOLOGY



FAKULTA STAVEBNÍ  
ÚSTAV POZEMNÍHO STAVITELSTVÍ

FACULTY OF CIVIL ENGINEERING  
INSTITUTE OF BUILDING STRUCTURES

## RESIDENTIAL BUILDING

RESIDENTIAL BUILDING

DIPLOMOVÁ PRÁCE

MASTER'S THESIS

AUTOR PRÁCE

AUTHOR

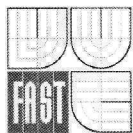
BC. KRISTÝNA BUIGLOVÁ

VEDOUCÍ PRÁCE

SUPERVISOR

prof. Ing. JITKA MOHELNÍKOVÁ, Ph.D.

BRNO 2014



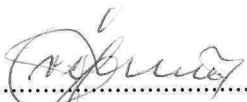
# VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ FAKULTA STAVEBNÍ

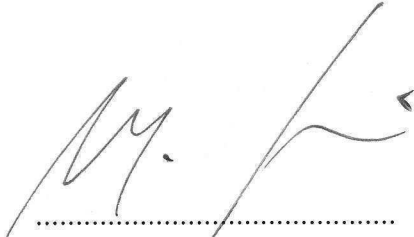
<b>Studijní program</b>	N3607 Civil Engineering
<b>Typ studijního programu</b>	Navazující magisterský studijní program s výukou v anglickém jazyce s presenční formou studia
<b>Studijní obor</b>	3608T001 Pozemní stavby
<b>Pracoviště</b>	Ústav pozemního stavitelství

## ZADÁNÍ DIPLOMOVÉ PRÁCE

<b>Diplomant</b>	Bc. KRISTÝNA BUIGLOVÁ
<b>Název</b>	Residential Building
<b>Vedoucí diplomové práce</b>	doc. Ing. Jitka Mohelníková, Ph.D.
<b>Datum zadání diplomové práce</b>	31. 3. 2013
<b>Datum odevzdání diplomové práce</b>	17. 1. 2014

V Brně dne 31. 3. 2013

  
.....  
prof. Ing. Miloslav Novotný, CSc.  
Vedoucí ústavu

  
.....  
prof. Ing. Rostislav Drochytka, CSc.  
Děkan Fakulty stavební VUT



## Podklady a literatura

Studie dispozičního řešení stavby, katalogy a odborná literatura, Stavební zákon č.183/2006 Sb., Vyhláška č.499/2006 Sb., Vyhláška 268/2009 Sb., Vyhláška 398/2009 Sb., platné ČSN.

## Zásady pro vypracování (zadání, cíle práce, požadované výstupy)

Zadání VŠKP: Projektová dokumentace stavební části k provedení novostavby bytového domu. Projekt včetně jeho textových příloh bude vypracován v anglickém jazyce.

Cíl práce: vyřešení dispozice pro daný účel, návrh vhodné konstrukční soustavy, nosného systému a vypracování výkresové dokumentace včetně textové části a příloh podle pokynů vedoucího práce. Textová i výkresová část bude zpracována s využitím výpočetní techniky (v textovém a grafickém editoru). Výkresy budou opatřeny jednotným popisovým polem a k obhajobě budou předloženy složené do desek z tvrdého papíru potažených černým plátnem s předepsaným popisem se zlatým písmem. Dílčí složky formátu A4 budou opatřeny popisovým polem s uvedením seznamu příloh na vnitřní straně složky.

Požadované výstupy dle uvedené Směrnice:


Textová část VŠKP bude obsahovat kromě ostatních položek také položku h) Úvod (popis námětu na zadání VŠKP), položku i) Vlastní text práce (projektová dokumentace – body A,B,F dle vyhlášky č.499/2006 Sb.) a položku j) Závěr (zhodnocení obsahu VŠKP, soulad se zadáním, změny oproti původní studii).

Příloha textové části VŠKP v případě, že diplomovou práci tvoří konstruktivní projekt, bude povinná a bude obsahovat výkresy pro provedení stavby (technická situace, základy, půdorysy řešených podlaží, konstrukce zastřešení, svislé řezy, pohledy, detaily, výkresy sestavy dílců popř. výkresy tvaru stropní konstrukce, specifikace, tabulky skladeb konstrukcí – rozsah určí vedoucí práce), zprávu požární bezpečnosti, stavebně fyzikální posouzení stavebních konstrukcí včetně zadané specializované části. O zpracování specializované části bude rozhodnuto vedoucím DP v průběhu práce studenta na zadaném tématu.

## Struktura bakalářské/diplomové práce

VŠKP vypracujte a rozčleňte podle dále uvedené struktury:

1. Textová část VŠKP zpracovaná podle Směrnice rektora "Úprava, odevzdávání, zveřejňování a uchovávání vysokoškolských kvalifikačních prací" a Směrnice děkana "Úprava, odevzdávání, zveřejňování a uchovávání vysokoškolských kvalifikačních prací na FAST VUT" (povinná součást VŠKP).
2. Přílohy textové části VŠKP zpracované podle Směrnice rektora "Úprava, odevzdávání, zveřejňování a uchovávání vysokoškolských kvalifikačních prací" a Směrnice děkana "Úprava, odevzdávání, zveřejňování a uchovávání vysokoškolských kvalifikačních prací na FAST VUT" (nepovinná součást VŠKP v případě, že přílohy nejsou součástí textové části VŠKP, ale textovou část doplňují).

  
.....  
doc. Ing. Jitka Mohelníková, Ph.D.  
Vedoucí diplomové práce

## **Abstrakt**

Diplomová práce, kterou jsem vypracovala je projektovou dokumentací stavební části k provedení novostavby bytového domu. Navržený bytový dům je umístěn na pozemku parcela č. 109/7, v k. ú. Lazce, v obci Olomouc. Související stavby a inženýrské sítě jsou navrženy dále na pozemcích parcela č. 105/60, 105/78, 282, 290/1, 289, v k. ú. Lazce, v obci Olomouc. Pozemek se nachází při ulici Dlouhá. Tato oblast je tvořena převážně objekty občanské vybavenosti, přičemž bytový dům tvoří přechod mezi stávajícím panelovým sídlištěm a rodinnými domy. Je navržen jako čtyřpodlažní s plochou střechou. V prvním nadzemním podlaží jsou umístěna parkovací stání pro osobní automobily, sklepní kóje a technické vybavení domu. Ve druhém až čtvrtém nadzemním podlaží jsou navrženy byty různých velikostí od 1+kk až po 4+kk. Byty ve druhém a třetím nadzemním podlaží jsou navrženy s lodžiami a ve čtvrtém nadzemním podlaží s terasami.

## **Klíčová slova**

Bytový dům, pozemek, inženýrské sítě, občanská vybavenost, panelové sídliště, plochá střecha, sklepní kóje, lodžie, terasa

## **Abstract**

The aim of my master's thesis is elaboration of the project in the level for realization of new residential building. Designed residential building is located on parcel number 190/7, at the cadastral area of Lazce, in the city of Olomouc. Related buildings and utilities are designed on parcel numbers 105/60, 105/78, 282, 290/1, 289, at the cadastral area of Lazce, in the city of Olomouc. The plot is situated along the Dlouhá Street. This area is mainly made up of civic amenities while the building creates a transition between the existing settlement of blocks of flats and existing family houses. It is four floors building with warm flat roof. On the first floor are designed parking spaces for motor cars, cellar boxes and technical rooms. The second to fourth floors consist of flats which have different dispositions from 1+kk to 4+kk. Flats on the second and third floor are designed with loggias and on the fourth floor with terraces.

## **Keywords**

Residential building, plot, utilities, civic amenities, blocks of flats, warm flat roof, cellar boxes, loggia, terrace

## **Bibliografická citace VŠKP**


BUIGLOVÁ, Kristýna. Residential Building. Brno, 2014. 342 s., 314 s. příl. Diplomová práce. Vysoké učení technické v Brně, Fakulta stavební, Ústav pozemního stavitelství. Vedoucí práce prof. Ing. Jitka Mohelníková, Ph.D..

**Declaration:**

I hereby declare that this master's thesis is my own work and that I stated all used information sources.

Prohlašuji, že jsem diplomovou práci zpracovala samostatně a že jsem uvedla všechny použité informační zdroje.

V Brně dne 17. 1. 2014



.....  
podpis autora  
Kristýna Buiglová

**Acknowledgements**

I would like to gratefully acknowledge the supervision of prof. Ing. Jitka Mohelníková, Ph.D.. I would like to thank her for her kind supervising of my thesis and her helpful advice and insightful comments during consultations.

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Tímto bych ráda poděkovala vedoucí diplomové práce prof. Ing. Jitce Mohelníkové, Ph.D. za vlídné vedení mé diplomové práce a za její podporu a cenné připomínky při konzultacích.

## **FOLDER CONTENTS:**

### **FOLDER A – BASIC DOCUMENTS**

#### **1. ASSIGNMENTS OF MASTER'S THESIS**

- a) FRONT SHEET
- b) TASK OF MASTER'S THESIS
- c) ABSTRACT IN CZECH AND ENGLISH LANGUAGE, KEYWORDS IN CZECH AND ENGLISH LANGUAGE
- d) BIBLIOGRAPHICAL QUOTE OF ACADEMIC QUALIFICATION WORK
- e) DECLARATION
- f) ACKNOWLEDGEMENTS
- g) CONTENT OF FOLDERS
- h) INTRODUCTION
- i) OWN TEXT
- j) CONCLUSION
- k) SOURCES
- l) LIST OF ABBREVIATIONS AND SYMBOLS
- m) LIST OF APPENDIXES

### **FOLDER B1 – REPORTS**

1. ACCOMPANYING REPORT
2. SUMMARY TECHNICAL REPORT
3. TECHNICAL REPORT



## FOLDER B2 – PROJECT DRAWINGS

1. SITUATION – URBAN PLAN, 1:2000
2. SITUATION – COORDINATION, 1:500
3. FLOOR PLAN – FOUNDATIONS, 1:50
4. FLOOR PLAN – 1<sup>ST</sup> FLOOR, 1:50
5. FLOOR PLAN – 2<sup>ND</sup> FLOOR, 1:50
6. FLOOR PLAN – 3<sup>RD</sup> FLOOR, 1:50
7. FLOOR PLAN – 4<sup>TH</sup> FLOOR, 1:50
8. FLOOR PLAN OF THE 1<sup>ST</sup> FLOOR – CEILING, 1:50
9. FLOOR PLAN OF THE 2<sup>ND</sup> FLOOR – CEILING, 1:50
10. FLOOR PLAN OF THE 3<sup>RD</sup> FLOOR – CEILING, 1:50
11. FLOOR PLAN OF THE 4<sup>TH</sup> FLOOR – CEILING, 1:50
12. FLOOR PLAN – ROOF, 1:50
13. SECTION A-A', 1:50
14. SECTION B-B', 1:50
15. NORTHEAST VIEW, 1:100
16. SOUTHEAST VIEW, 1:100
17. SOUTHWEST VIEW, 1:100
18. NORTHWEST VIEW, 1:100
19. DETAIL – OUTLET, 1:5
20. DETAIL – TYPICAL ROOF EDGE, 1:5
21. DETAIL – LIFT SHAFT, 1:5
22. DETAIL – TYPICAL WINDOW SILL, WINDOW HEAD, WINDOW JAMB, 1:5
23. DETAIL – TYPICAL WINDOW SILL, WINDOW HEAD, 1:5

## FOLDER B3 – TABLES OF BUILDING COMPONENTS

1. FLOOR COMPOSITIONS
2. WALL COMPOSITIONS
3. ROOF COMPOSITIONS
4. WINDOWS
5. DOORS
6. JOINERY PRODUCTS
7. LOCKSMITH PRODUCTS
8. TINSMITH PRODUCTS
9. OTHER PRODUCTS

## FOLDER C – CALCULATIONS

1. FOUNDATIONS
2. CONCRETE MEMBERS
3. STAIRCASE
4. BUILDING PHYSICS
  - ACOUSTICS
  - THERMAL PROTECTION OF BUILDINGS
5. DESIGN OF OUTLETS
6. PARKING SPACES
7. MUNICIPAL WASTE

## FOLDER D – FIRE SAFETY

1. FIRE SAFETY REPORT
2. DRAWINGS
  - FIRE PREVENTION DISTANCES, 1:500
  - LAYOUT OF THE 1<sup>ST</sup> FLOOR, 1:100
  - LAYOUT OF THE 2<sup>ND</sup> FLOOR, 1:100
  - LAYOUT OF THE 3<sup>RD</sup> FLOOR, 1:100
  - LAYOUT OF THE 4<sup>TH</sup> FLOOR, 1:100

## **INTRODUCTION:**

This master's thesis deals with design of new residential building. Residential building is located in the eastern part of a city Olomouc, at the cadastral area of Lazce. It is oriented along the eastern side of plot with an entrance eastbound to the public pavement. The drive road to the garage is in the north-eastern part of building. The building is rectangular in shape. It is four floors building with warm flat roof. Designed number of flats is 23 and designed number of parking spaces inside the building is 19.

**OWN TEXT:**

1. ACCOMPANYING REPORT

## **CONTENT:**

A) IDENTIFICATION DATA ABOUT CONSTRUCTION AND INVESTOR

B) MAIN CHARACTERISTIC OF BUILDING AND ITS PURPOSE

C) DATA ABOUT PRESENT USE OF AREA AND DEVELOPMENT OF AREA, DATA ABOUT BUILDING PLOT AND PROPRIETARY LEGAL RELATIONS

Plots affected by construction

D) DATA ABOUT SURVEYS PERFORMED AND ACCESS TO THE ROUTES, TO THE TECHNICAL INFRASTRUCTURE

Surveys performed

Access to the routes

Access to the technical infrastructure

E) INFORMATION ABOUT THE FULFILMENT OF REQUIREMENTS OF TOUCHED AUTHORITIES

F) INFORMATION ABOUT COMPLIANCE WITH GENERAL REQUIREMENTS FOR CONSTRUCTION

G) DATA ABOUT FULFILMENT OF PLANNING PERMISSION

H) SUBJECT AND TIME LINKS OF CONSTRUCTION ON THE SURROUNDING BUILDINGS AND OTHER MEASURES IN THE RELATED AREA

I) SUPPOSED TIME-LIMIT OF CONSTRUCTION INCLUDING DESCRIPTION OF CONSTRUCTION PROCESS

J) STATISTICAL DATA

## A) IDENTIFICATION DATA ABOUT CONSTRUCTION AND INVESTOR

Identification of building: New construction of residential building

Type of building: Residential building

Investor: Dlouhá, spol. s r.o., Lazce, 779 00 Olomouc

Locality: Parcel number 109/7, Dlouhá Street, Olomouc

Cadastral area: Lazce

## B) MAIN CHARACTERISTIC OF BUILDING AND ITS PURPOSE

Project documentation solves construction of new residential building.

Residential building is designed like as a four-storey building without basement. Parking is available on the first floor of building. The garage has together 19 parking spaces.

Furthermore, the first floor contains of bicycle room and baby strollers, cellars and exchange room. The other storeys are divided into individual dwelling units. Total number of dwelling units is 23.

The structural system of building is transversal with module 7,9m. The construction of the first floor is made from monolithic reinforced concrete columns in combination with external reinforced concrete walls and reinforced concrete ceilings with visible reinforced concrete girders. The upper structure is made from ceramic blocks that are insulated in combination with monolithic reinforced concrete ceiling. The roof is designed like as warm flat roof construction.

## C) DATA ABOUT PRESENT USE OF AREA AND DEVELOPMENT OF AREA, DATA ABOUT BUILDING PLOT AND PROPRIETARY LEGAL RELATIONS

BO 01 – Residential building is located in the eastern part of a city Olomouc, cadastral area Lazce on the unbuilt plot parc.no.109/7. Parcel is bordered by service road connected to the Dlouhá Street (NW), semi-detached houses (NE), pedestrian pathway (SE) and garden of GEMO building office (SW).

BO02 – Road, fencing, landscaping on the public plots.

BO03 – Landscaping of the surrounding plots.

EO – The Engineering objects that will be done on the following plots.

The plots are located within the monument protection zone of town heritage zone of the city Olomouc. The mandatory statement of Municipality of Olomouc, Department of conservation, approves the construction. On the other hand defines requirement on construction height of building max.14m. Designed building has construction height of 13,340m. The plot 109/7 is left as free grassed area with a group of several trees. This area is prepared for further housing development in accordance with planning study. It respects building line of existing buildings. The plot where the construction of residential building BO 01 will be realized is in property of investor. Within the realization public and private plots will be influenced. New service connections and relocations, new pavement realization and landscaping will be done.

List of plots influenced by construction by means of engineering services:

Plot 105/60

- gas pipeline relocation
- new existing pavement
- new existing road

Plot 105/78

- Gas pipeline relocation
- new existing pavement
- landscaping

Plot 282

- public lighting relocation, water-piping relocation, gas pipeline relocation
- new existing pavement

Plot 290/1

- heavy current relocation
- new pavement, new existing pavement
- new existing road

Plot 289

- new existing pavement

List of plots influenced by construction:

Parc. No.	Area m <sup>2</sup>	Ownership	Type of plot	Utilization	Type of protection
109/1	3163	GEMO OLOMOUC, spol. s r.o., Dlouhá 562/22, Olomouc, Lazce, 772 35	other area	different area	monument protection zone
109/7	4443	GEMO OLOMOUC, spol. s r.o., Dlouhá 562/22, Olomouc, Lazce, 772 35	other area	different area	monument protection zone
105/60	1741	Statutární město Olomouc, Horní náměstí 583, Olomouc, 771 27	other area	other communication	monument protection zone
105/78	587	Statutární město Olomouc, Horní náměstí 583, Olomouc, 771 27	other area	other communication	monument protection zone
282	6806	Statutární město Olomouc, Horní náměstí 583,	other area	other communication	monument protection zone

		Olomouc, 771 27			
289	2521	Statutární město Olomouc, Horní náměstí 583, Olomouc, 771 27	other area	other communication	monument protection zone
290/1	7761	Statutární město Olomouc, Horní náměstí 583, Olomouc, 771 27	other area	green	none
101/40	572	1/8 - Brezovská Marcela, Černochova 305/14, Olomouc, Lazce, 779 00; 7/8 - SJM Brezovský Miroslav Ing. a Brezovská Marcela, Černochova 305/14, Olomouc, Lazce, 779 00	garden		monument protection zone, agricultural land resources
101/54	525	SJM Vodák Jiří MUDr. a Vodáková Alena PaedDr., Jabloňová 4235/19, Kroměříž, 767 01	garden		monument protection zone, agricultural land resources
98/9	1386	Statutární město Olomouc, Horní náměstí 583, Olomouc, 771 27	other area	other communication	monument protection zone
285	16641	Statutární město Olomouc, Horní náměstí 583, Olomouc, 771 27	other area	green	monument protection zone

#### D) DATA ABOUT SURVEYS PERFORMED AND ACCESS TO THE ROUTES, TO THE TECHNICAL INFRASTRUCTURE

In preparation phase the engineering geological survey and the radon survey were carried out.

The building is situated in a quiet location with good links to the city centre. Transportation is available from the road connected to Dlouhá Street. Along the north-western and north-eastern boundary of the plot pedestrian walkways are designed. These walkways connect surrounding roads - Demlova Street and Hanušova Street. The bus stops are available within walking distances.

The complex will be connected to water-piping, sewerage, heat pipeline, low-voltage connection, telephone and other low-voltage networks.



#### E) INFORMATION ABOUT THE FULFILMENT OF REQUIREMENTS OF TOUCHED AUTHORITIES

Chapter will be completed by the standpoints of relevant administrative authorities. The mandatory statement of Municipality of Olomouc, Department of conservation, approves the construction. The designed residential building does not exceed the permissible construction height of 14m.

#### F) INFORMATION ABOUT COMPLIANCE WITH GENERAL REQUIREMENTS FOR CONSTRUCTION

The project complies with the applicable general technical requirements for construction and valid legislation of the Czech Republic.

Mainly:

Decree No. 268/2009 Coll. The technical requirements for buildings

Decree of the Ministry for Regional Development No. 398/2009 Coll. The general technical requirements ensuring the use of buildings by persons with limited mobility.

#### G) DATA ABOUT FULFILMENT OF PLANNING PERMISSION

In view of valid land plan designed residential building is a part of functional area 78KA – “Administrative, administrative-commercial and multi-functional complex”. Objects for housing are in the mentioned area defines as exceptionally allowable.

#### H) SUBJECT AND TIME LINKS OF CONSTRUCTION ON THE SURROUNDING BUILDINGS AND OTHER MEASURES IN THE RELATED AREA

Before starting of construction of residential building (BO 01, BO 02, BO 03, EO) the preparation works will be carried out.

Site preparation (BO 03) will consist mainly of engineering relocations, felling, removal of objects on parc.no.109/7 (drainage, fencing, electrical and removal of topsoil, soil). The engineering relocations of gas pipeline STL (EO 06. 1), gas NTL (EO 06. 2), water-pipeline (EO 07), relocation of heavy current NN (EO 08.2) and relocation of public lighting (EO 08.1).

Thereafter, according to the project of organization principles of construction the site will be set up and construction of BO 01, BO 02, BO 03, EO, will start. As due to the realization of relocations and connections and by the setting of the site and ensuring of construction pit is assumed occupation of public land.

#### I) SUPPOSED TIME-LIMIT OF CONSTRUCTION INCLUDING DESCRIPTION OF CONSTRUCTION PROCESS

The basic equipment of construction site will be set up after its preparation including its marking, fencing and the realization of temporary object of construction site. The area of temporary work will be protected by placing of road panels.

After completing the site fencing and realization of protection sidewalk and roadway in the area of temporary works removal of paved areas will be done.

After completing the removal of paved areas the securing of foundation pit and ensuring of neighbouring buildings will be done, followed by the excavation of the foundation pit. Excavation pit will be done through the levels from which will be done anchoring and shoring of the foundation pit.

The structure of foundation will be done after completing the excavation of the foundation pit. A tower crane will be used for vertical transport and handling of elements of formwork placed in the object of new building. The concrete mixture during concreting of columns will be transported by crane, for concreting of walls and floor slabs will be used concrete mix pumparc.

After completing the bearing structure of the object other works will be done, roof and cladding, internal construction and assembly work, then finishing and completion work.

Realization of peripheral and roof decking construction will be done immediately after the completion of the bearing structure of the object. Brickwork of the peripheral decking will be done in the continuation of formwork stripping. Building elevator will be used for vertical transport located at the facade of the building.

Internal works and installations in the building will start in individual floors after formwork stripping and demounting of supporting posts of ceiling construction.

Finally the finishing works will be done.

The detailed working processes of construction and assembly works in various stages of construction are provided by selected construction contractor.

Pavements and roads used temporarily for construction will be brought back to the initial state in the continuation of building realization.

The building will be handed over to use after completing of construction works and assembly works including quality testing and verifying the overall functionality of the installed equipment, acceptances and after the approval process.

## J) STATISTICAL DATA

Number of dwelling units	23
Number of parking spaces	19
Height of residential building	13,340 mm
Clear height of 1.NP	2,900 mm
Clear height of 2.NP, 3.NP, 4.NP	2,650 mm
Plot area	4443,00 m <sup>2</sup>
Built-up area	804,200 m <sup>2</sup>
Surface area	1894,550 m <sup>2</sup>

## **CONCLUSION:**

The main aim of master's thesis is to design new residential building which will comply with the national standards. The results of calculations that were done are in accordance with valid standards. Compositions of constructions satisfy all requirements as thermal property of building, load bearing capacity, strength, fire protection and building acoustics requirements.

## **SOURCES:**

### **Legislation:**

Act. No. 183/2006 Coll., Building Act

Public Notice 499/2006 Coll., about structure documentation, change 62/2013 Coll.

Public Notice 268/2009 Coll., about technical requirements for construction

Public Notice 398/2009 Coll., about general technical requirements ensuring barrier-free use of buildings

Regulation No. 23/2008 Coll., about technical conditions for fire protection of buildings

Regulation No. 268/2011 Coll., about which change regulation No. 23/2008 Coll.

Regulation No. 246/2011 Coll., about Ministry of Interior determine fire safety conditions and state fire supervision (Regulation about fire prevention)

### **Standards:**

ČSN 73 4301 Residential buildings

ČSN 01 3411 Large scale maps – Drawings and marks

ČSN 01 3420 Construction drawings – Presentation of general arrangement drawings

ČSN 01 3495 Building drawings – Fire protection drawings

ČSN 73 0540 Thermal protection of buildings

ČSN 73 0525: 1998 Acoustics – Acoustical design of rooms - General principles

ČSN 73 0532: 2010 Acoustics – Protection against noise in buildings and evaluation of acoustic properties of building elements – Requirements

ČSN 73 4130 Stairways and sliding ramps – Basic requirements.

ČSN EN ISO 6946 Building components and building elements – Thermal resistance and thermal transmittance – Calculation method

ČSN 73 4301: 2004 Residential buildings

ČSN 1991-1-1 Eurocode 1: Actions on structures

ČSN 73 0804 Fire protection of building - Industrial buildings

ČSN 73 0802 Fire protection of building - Non-industrial buildings

ČSN 73 0810 Fire protection of building - General requirements

ČSN 73 0818 Fire protection of building - Person/surface rate in buildings

ČSN 73 0833 Fire protection of building - Buildings for dwelling and lodging

ČSN 73 0873 Fire protection of building - Equipment for fire water supply

**Literature:**

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[www.geofond.cz](http://www.geofond.cz)

## LIST OF ABBREVIATIONS AND SYMBOLS

No. – number

Coll. – collection

th. – thickness [mm], [m]

Rdt – bearing capacity of soil [MPa]

$\lambda$  – thermal conductivity [W/m·K]

R – thermal resistance [m<sup>2</sup>·K/W]

HT – total heat transmission losses [W/K]

U<sub>em,N</sub> – mean required coefficient of heat transfer [W/(m<sup>2</sup>·K)]

U<sub>em,rec</sub> – mean recommended coefficient of heat transfer [W/(m<sup>2</sup>·K)]

CI – class index

p<sub>v</sub> – calculated fire load [kg · m<sup>2</sup>]

BPV – height systeme used in Czech Republic

## **LIST OF APPENDIXES:**

### FOLDER B1 – REPORTS

1. ACCOMPANYING REPORT
2. SUMMARY TECHNICAL REPORT
3. TECHNICAL REPORT

### FOLDER B2 – PROJECT DRAWINGS

1. SITUATION – URBAN PLAN, 1:2000
2. SITUATION – COORDINATION, 1:500
3. FLOOR PLAN – FOUNDATIONS, 1:50
4. FLOOR PLAN – 1<sup>ST</sup> FLOOR, 1:50
5. FLOOR PLAN – 2<sup>ND</sup> FLOOR, 1:50
6. FLOOR PLAN – 3<sup>RD</sup> FLOOR, 1:50
7. FLOOR PLAN – 4<sup>TH</sup> FLOOR, 1:50
8. FLOOR PLAN OF THE 1<sup>ST</sup> FLOOR – CEILING, 1:50
9. FLOOR PLAN OF THE 2<sup>ND</sup> FLOOR – CEILING, 1:50
10. FLOOR PLAN OF THE 3<sup>RD</sup> FLOOR – CEILING, 1:50
11. FLOOR PLAN OF THE 4<sup>TH</sup> FLOOR – CEILING, 1:50
12. FLOOR PLAN – ROOF, 1:50
13. SECTION A-A', 1:50
14. SECTION B-B', 1:50
15. NORTHEAST VIEW, 1:100
16. SOUTHEAST VIEW, 1:100
17. SOUTHWEST VIEW, 1:100
18. NORTHWEST VIEW, 1:100
19. DETAIL – OUTLET, 1:5
20. DETAIL – TYPICAL ROOF EDGE, 1:5
21. DETAIL – LIFT SHAFT, 1:5
22. DETAIL – TYPICAL WINDOW SILL, WINDOW HEAD, WINDOW JAMB, 1:5
23. DETAIL – TYPICAL WINDOW SILL, WINDOW HEAD, 1:5



## FOLDER B3 – TABLES OF BUILDING COMPONENTS

1. FLOOR COMPOSITIONS
2. WALL COMPOSITIONS
3. ROOF COMPOSITIONS
4. WINDOWS
5. DOORS
6. JOINERY PRODUCTS
7. LOCKSMITH PRODUCTS
8. TINSMITH PRODUCTS
9. OTHER PRODUCTS

## FOLDER C – CALCULATIONS

1. FOUNDATIONS
2. CONCRETE MEMBERS
3. STAIRCASE
4. BUILDING PHYSICS
  - ACOUSTICS
  - THERMAL PROTECTION OF BUILDINGS
5. DESIGN OF OUTLETS
6. PARKING SPACES
7. MUNICIPAL WASTE

## FOLDER D – FIRE SAFETY

1. FIRE SAFETY REPORT
2. DRAWINGS
  - FIRE PREVENTION DISTANCES, 1:500
  - LAYOUT OF THE 1ST FLOOR, 1:100
  - LAYOUT OF THE 2ND FLOOR, 1:100
  - LAYOUT OF THE 3RD FLOOR, 1:100
  - LAYOUT OF THE 4TH FLOOR, 1:100