



FAKULTA

ÚSTAV

FACULTY  
INSTITUTE

VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

BRNO UNIVERSITY OF TECHNOLOGY

STAVEBNÍ

POZEMNÍHO STAVITELSTVÍ

OF CIVIL ENGINEERING  
OF BUILDING STRUCTURES

## 1.4.1 - ENVIRONMENT OF BUILDINGS

DIPLOMOVÁ PRÁCE

MASTER'S THESIS

AUTOR PRÁCE  
AUTHOR

BC. DANIEL NIESNER

VEDOUCÍ PRÁCE

doc. Ing. JIŘÍ SEDLÁK, CSc.

SUPERVISOR  
BRNO 2014

## CONTENT

1.	INTRODUCTION.....	3
1.1.	<i>List of sources</i> .....	3
1.2.	<i>Design values</i> .....	3
2.	BASIC CONCEPTUAL SOLUTION .....	3
2.1.	<i>Energetic sources</i> .....	4
3.	DESCRIPTION OF TECHNICAL SOLUTION .....	4
3.1.	<i>Conception of ventilation devices</i> .....	4
4.	MEASUREMENT AND REGULATIONS .....	4
5.	DEMAND FOR RELATED PROFESSIONS .....	4
5.1.	<i>Construction work modification</i> .....	4
5.2.	<i>Heavy current</i> .....	5
5.3.	<i>Heating</i> .....	5
6.	NOISE CONTROL MEASURES.....	5
7.	INSULATION AND COATING.....	5
8.	FIRE SOLUTION .....	5
9.	CONCLUSION.....	5

## **1. Introduction**

Objective of the documentation for construction realization is designed ventilation system with recuperation unit for energy passive block of apartments.

### **1.1. List of sources**

- Project documentation
- Technical lists of producers
- ČSN 12 7010 Navrhování větracích a klimatizačních zařízení
- Law č. 258/2000 o ochraně veřejného zdraví
- ČSN 73 0872 Ochrana staveb proti šíření požáru vzduchotechnickým zařízením a technické podklady výrobců vzduchotechnických zařízení.

### **1.2. Design values**

Exterior

- place : Frýdek-Místek
- elevation above sea level : 300 m n m
- normal air pressure : 99 kPa
- air temperature : summer: + 30 °C, winter -15 °C
- enthalpy: summer 53,2 kJ/kg s.v.
- relative humidity: summer: 40%, winter 84% °C

Interior

- air temperature : summer: 25 °C, winter 20 °C
- relative humidity: summer: 45%, winter 60% °C

Amount of exchanged air:

Inlet: 1240 m<sup>2</sup>/h

Outlet: 1240 m<sup>2</sup>/h

The amount of exchange air was calculated to satisfy minimal 0.5\*volume of ventilated area.

## **2. Basic conceptual solution**

The forced ventilation is designed separately for each apartment. Inlet and outlet of air will be provided by separate HVAC unit placed in service room (0.01) located in under ground floor. The forced ventilation is designed only for exchange of air.

## **2.1. Energetic sources**

The voltage supply for fan and recuperation motors and for regulator - 3NPE 50 Hz, 400V/230V

For reheating of air in heat exchangers will be used heating water 80/60°C

## **3. Description of technical solution**

### **3.1. Conception of ventilation devices.**

All designed HAVAC systems are low pressure. Will be used modular unit Remark AeroMaster XP. The unit will be placed in indoor environment. Distribution of air will be provided by squared ducts from galvanized steel. Supply duct will be insulated with PUR insulation (th. 100mm) according to project documentation.

The efficiency of the recuperation unit is 82%

HAVAC units will be situated in service room 0.01

The unit was designed in software Remark AeroCad

For the design of dimension of ventilation ducts and pressure losses was used web interface ramak.cz

## **4. Measurement and regulations**

Not solved

## **5. Demand for related professions**

### **5.1. Construction work modification**

- installation openings for transport of HAVAC units to installation site
- there must be floor drain for dewatering in service room
- ceilings must have sufficient load bearing capacity
- installation openings for duct

## **5.2. Heavy current**

- Connection of electro motors of units, fans and others electric devices
- Protection against injury from electricity
- Connection of exhaust head to lightning conductor
- Socket for 230V and 400V in service room

## **5.3. Heating**

- Connection of heating to heating water

## **6. Noise control measures**

To the distributions element will be insert attenuator section behind HAVAC unit. Duct behind attenuator section has to be insulated against noise to prevent spreading of noise in inner environment through ducts. Rotated machinery will be placed on elastic pads to eliminate vibrations.

## **7. Insulation and coating**

Thermal insulation will be located according project documentation. Sound proofing insulation will be used inside of service room to avoid spreading of sound from machinery to surrounding ducts.

## **8. Fire solution**

Into air ducts going through construction divided fire sectors will be placed fire dampers. The openings for air duct through fire construction have to be filled with special sealing material.

## **9. Conclusion**

The documentation was processed according valid norms and directives. List of elements, calculation and technical specification of devices is included in appendix.