Aalto-yliopisto
Insinööritieteiden
korkeakoulu

Fundamentals of HVAC Design EEN-E4004

Lecture 6.3.2019

Starting HVAC Design work

Heating systems

M.Sc Vikke Niskanen

Starting HVAC design work

Find out the needs and demands of client and set target values:

- Quality of HVAC systems and target values for indoor environment
- Investment budget for project
- Energy efficiency and sustainability
- Maintenance, reliability and target of lifetime for HVAC systems
- Municipal networks, heat production options and criterias for AHU
- Fireplace as part of heat production
- Locations of HVAC appliances
- Heat delivery and heat release, taps and sinks, galleys etc
- Routes for ducting and plumbing
- Use profile: occupancy, normal operating times, water consumption habits (number of persons)
- Other wishes

Starting HVAC design work

Find out requirements of local authorities

- Building Control Department controls the competence of designers
- Delivering design documents to Building Control Department (ventilation, sewer and plumbing)
- Other authorities f. ex. energy company and Fire brigade.
- Other documents needed for building permit (energy certification)

Basic documents needed

- Architect ja structural drawings
- Connection point documents (district heating, water and sewage), guidelines from local authorities, soil studies etc.
- In renovation projects as built documents (if found)

Visiting in site

- Location of house in site
- Connection points to municipal networks (public works map), preliminary locations of HVAC premises (f.ex geothermal wells)
- Surface of site, storm water handling
- Inspection of present HVAC in renovation projects

HVAC Preliminary design of one family house, heating design

Heat loss calculations (Task 1)

- U-values of structures, envelope areas etc.
- Heat loss calculations for each space
- Heating demand of house.

Connections to municipal networks

- District heating

Setting indoor target values

- Temperatures

HVAC Preliminary design of one family house

Choice of heat production (covered in lecture 3)

Choice of heating methods

- Water based systems
  - Radiators, heating panels, floor heating
- Air based systems
- Electric systems

Choice of heat piping

- In residential buildigns most typically copper or composite pipes
  - Plastic in floor heating
- In commercial buildings most typically steel

HVAC Preliminary design of one family house

Heat delivery systems

- Dimensioning based on heat load calculations (HLC)
- Power demand = HLC+10% (+20% in corner rooms)
- Installed power with accuracy 10/50W (eg. 330 W, 350 W), minimum 200-300 W due to balancing the heating network

Objective of task 1 is to calculate heat losses in each room. This data is used for the sizing and selection of heating devices (radiators / floor heating)