Definition of the use cases for Activity 1.3 in the IEA EBC Annex 60-Project:

New generation computational tools for building and community energy systems based on the Modelica and Functional Mockup Interface standards

Name: BoilerGasRadiatorDomesticHotWater_VDI6020

Identifier: 1.2

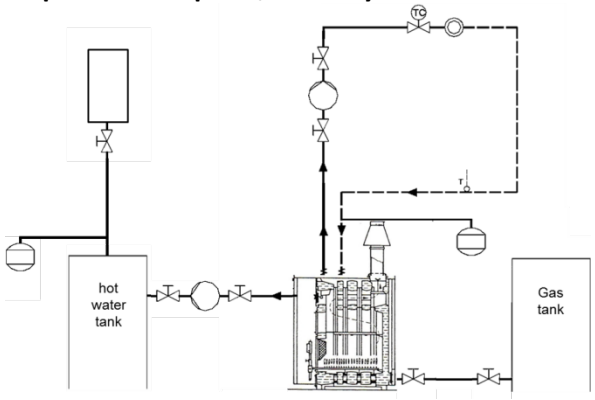
Short identification:
Single thermal zone, one room according to the German guideline VDI 6020.
The HVAC-system consists of a gas-boiler for generation, pipes for distribution, and a radiator for emission. Furthermore the system contains an expansion vessel and a PID controlled valve. In addition, this use cases contains a dispensing point for domestic hot water, including a hot water tank.

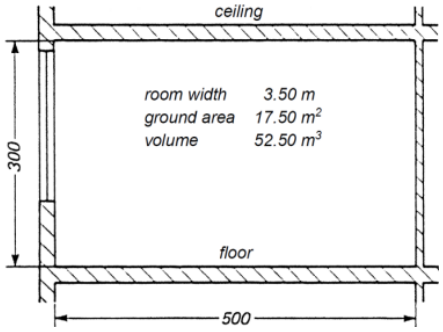
Objective:
This use case focuses on the HVAC system rather than the envelope, since this generic use case is used to investigate the needed data structure of a Modelica model compared to an ifc-file. Based in these models we establish the requirements for the dataflow from BIM to Modelica (depending on the information needed for the components of the specific library). Hence we highlight the difference between the different models and the gap of information that is needed to simulate.

Technical description thermal zone, according to the VDI 6020:
- One room with a window, on the second floor of a three storey-building:
  - Window area: 10,5 m²
  - Room type: S "difficult"
- Adiabatic (no heat transfer through) internal walls and slabs. Heat transfer only through the outer wall and the window (directed to the south)
- Inner Loads: Occupancy, Plug loads, Lighting
- Weather-data: TRY_dataset for Germany, zone 5 (Aachen)

Technical description HVAC-system:
- Heating loss: 1300 W (Θ_i= 21°C, Θ_e= -12°C)
- A gas-boiler for heat-generation
- Pump with night on off signal
- Variable pump for water flow, with a maximum head of 5m
- Radiator for heat transfer into the zone
- A PID controlled valve, coupled with the room air temperature and the set temperature (Θ_i= 21°C)
- Additional valves, a pipe and expansion vessel for the domestic hot water system
- A general hot water dispensing point
- Hot water tank for storing the hot water and hygienic issues

Graphical description, HVAC-system and thermal zone:





HVAC components needed in the specific BIM/Modelica library to build this use case:

- Gas-/ Oil-boiler
- Expansion Vessel
- Variable Pumps
- Valves
- Radiator
- Pipes for supply and return
- Hot water tank
- Additional expansion vessel on the hot water side
- Tap for hot water

Some components listed above are not necessary to run a simulation, but are needed to represent a realistic use case.