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THE COMPARATIVE ANALYSE OF THE RESULTS OBTAINED AFTER THEORETIC AND EXPERIMENTAL ANALYSE FOR THE GEOTHERMAL THERMIC POINT FROM UNIVERSITY OF ORADEA

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Abstract. After we analyzed the theoretic and experimental rezultes we found the folowing: there were deferences but not semnificative. The looks of graphics was different in some cases, but the variation was in the limits of ±2°C. In conclusions the theoretic calcules were correct and the machine heat change were correct sized.

The role of the thermal point from the cadre of the university (fig. 1) is to heat the buildings of the university (**DH**-district heating) and to provide them with domestic hot water. (**DHW**-domestic hot water).

These two processes of heating are being made indirectly, that is that the geothermal water is used indirectly in mutables of warmth in plates, place in wich they cede the thermal energy.

The thermic used geothermal water issued from bouth heating processes leaves the station in just one pipe and it is let go in the river Peta, with the possibility of being dispensed to other consumers wich in this instant are not plant.

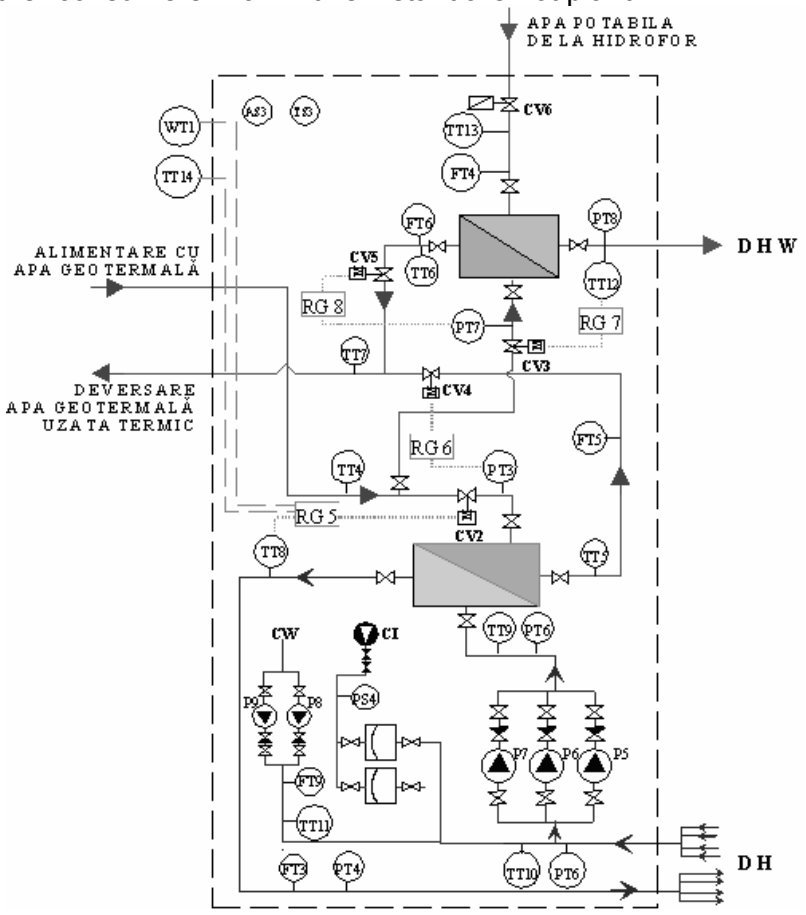


Figure 1. The constructive- functional scheme of the thermic point from the University of Oradea where it was notedt: DH – district heating, DHW – domestic hot water

The constructive – functional characteristics

- the temperature of geothermal water: 85°C
- for the heating circuit :
  - primordial agent: geothermal water
    - debit: 120 m^3/h (33,5 l/s)
    - temperatures (tur/retur): 85°/45°C
    - pressures (tur/retur): 2,5/0,8 bar
  - secondary agent: hot water
    - debit: 120 m^3/h
    - temperatures (tur/retur): 80°/40°C
    - pressures (tur/retur): 3,5/1,5 bar
- for the circuit of the domestic hot water preparation:
  - primary agent: geothermal water
    - debit: 15 m^3/h (4 l/s)
    - temperatures (tur/retur): 85°/45°C
    - pressures (tur/retur): 2,5/1,6 bar
  - secondary agent: hot water
    - debit: 15 m^3/h (4 l/s)
    - temperatures (tur/retur): 60°/10°C
    - pressures of delivery: 4 bar.

$Q_{inc} = 5.600\,kW$, the warmth flow for the heating,

$Q_{acm} = 870\ kW$, the warmth flow for domestic hot water,

$\Delta t_{med} = 10°C$, for heating,

$\Delta t_{med} = 30°C$, for the preparation of the domestic hot water

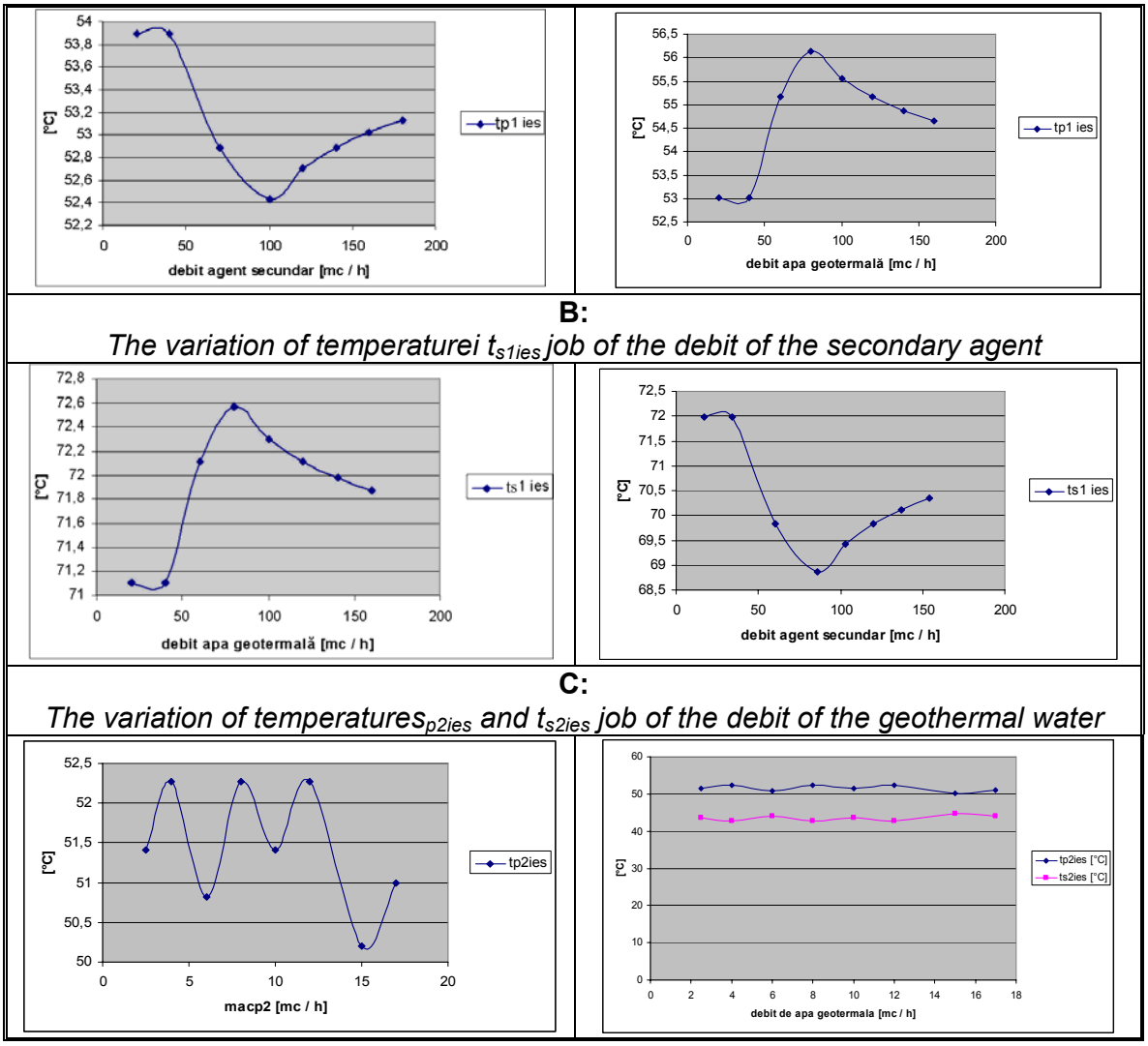
The thermal point from the University of Oradea is endowed with 6 mutables of warmth in plates machines, type SCP-AG-1, made by S.C. Tehnofrig S.A. Cluj-Napoca, installed in parallel.

For the circuit intended for heating spaces 4 machines have been installed (1 for back-up), and for the circuit intended for the preparation of domestic hot water 2 machines have been installed (1 for back-up).

In chart 1 are illustrated some representatives diagrams acqiured in spot of the theoretical calculations and results acquired in spot of the experiments.

Chart 1. Comparison between the diagrams acquired in spot of the theoretical calculations and the results acqiured in spot of the experiments.

A:
The variation of temperature t_{p1ies} job of the debit of geothermal water



B:

The variation of temperaturei t_{s1ies} job of the debit of the secondary agent

C:

The variation of temperatures$_{p2ies}$ and t_{s2ies} job of the debit of the geothermal water

As a succession of the relative analysis realised between the results obtained in spot of the simulation and the results obtained in spot of the experiments, adds up the next:

- The processes of exchange of heat for the two who use the geothermal energy are comparable: (*District Heating DH* and *Domestic Hot Water DHW*) :
  - for the DH system:
    simulation:
    the temperature of exit of the secondary agent 70°C,
    the temperature of exit of the geothermal water 50°C,
    the stabilization time 120minutes at start,
    14minutes in transitory regime .
    experimentsi:
    the temperature of exit of the secondary 68°C,
    the temperature of exit of the geothermal water 47,5°C,
    the stabilization time 42minutes in transitory regime
  - for the DHW system:
    simulation:
    the temperature of exit of the domestic hot water 60°C
    the temperature of exit of geothermal water 50°C,

the stabilization time 200secundes at start,
400secundes in transitory regime.

experimentsi:

the temperature of exit of the secondary agent 61,5°C,
the temperature of exit of the geothermal water 52°C,
the stabilization time 22minutes in transitory regime

- The processes of automation for the two users of geothermal energy (*District Heating DH* şi *Domestic Hot Water DHW*) presents the following aspects :
  - for the DH system:

simulation:

the temperature of exit of the secondary agent 70°C,
the temperature of exit of the geothermal water 50°C,
the stabilization time 120minutes at start,
14minutes in transitory regime.

experiments:

the temperature of exit of the secondary agent 68°C,
the temperature of exit of the geothermal water 47,5°C,
the stabilization time 42minutes in transitory regime;

Also, it can be noticed that the system is hardly stabilized, with pretty big oscillations, at the apparation of perturbation (the modification of the outside temperature). This thing is owed to the fact that, at the respective date, the thermal point from Oradea was endowed with two timers for the DH system : the *RG5* timer for the control of temperature and the RG6 timer for the control of pressure(see figure 3.56). This two timers used to work in parallel, and the effects of their actions were overlaping. For the elimination of this shortcoming was put out the RG6 timer as the figure 3.75.

- for the DHW system:

simulation:

the temperature of exit of the domestic hot water 60°C,
temperature of exit of the geothermal water 50°C,
the stabilization time 200secundes at start,
400secundes in transitory regime.

experiments:

the temperature of exit of the secondary agent 61,5°C,
the temperature o exit of the geothermal water 52°C,
the stabilization time 22minutes in transitory regime;

Also it can be noticed is hardly stabilized, with pretty big oscillations, at the apparation of perturbation (the modification of the debit of domestic hot water) (figure.3.75). This thing is owed to the fact that , at the respective date, the thermal point from Oradea was endowed with two timers for the DHW system and that is the RG7 timer for the control of the exit temperature of domestic hot water and the RG8 timer fot the control of pressure. These two timers worked in parallel, and the effects og their actions were overlaping. For the elimination of this shortcoming was put out the RG8 timer and the pad vessel for domestic hot water was introduced: *VTacm*.

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