Calculation of a Water Heater Tank for DHW

Initial data

500 [liters]	A water reserve is necessary	**10 => 45 [°C]**	Temperature of heated water at the inlet and outlet of the tank
30 [kW]	Thermal power of the heat source	**80 => 60 [°C]**	Heating water temperature at the inlet and outlet of the tank

Calculation results

500 [liters] / 0.9 = 556 [liters]	The volume of the tank is increased relative to the given storage of hot water, since the water in the lower part of the tank under the heat exchanger is always underheated
[(60-10) -(80-45)] / log[(60-10) / (80-45)] = 42.1 [°C]	Logarithmic temperature difference for the specified temperature mode of operation of the heat exchanger
660 [W/m2*°C]	Coefficient of heat transfer of the heat exchanger
3.5 [m2]	Surface area of the heat exchanger
660 [kW/m2*°C] *3.5 [m2] *42.1 [°C] = 97 251 [W]	Thermal capacity of the heat exchanger built into the tank at the specified temperature mode

The thermal power of the heat source 30 000 [W] is less than the heating power of the heat exchanger 97 251 [W].
Due to the deficit of heat generation for further calculation of the long-term heating power and time for heating, we use the thermal power of the heat source 30 000 [W]

1003 -0.156 *45 -0.0029 *45^2 = 990 [kg/m3]	Water density in the tank t=45°C
(3.6 *30 000)/(4.187 *(45 -10) *990) = 0.744 [m3/h]	Long-term heating capacity
(800 [liters] *60)/(0.744 [m3/h] *1000 *0.85) = 76 [min]	The time of heating the entire volume of the tank

Selection result

Hot water heater (DHW)

Flamco : Duo 800

Netherlands

800 [liters]	Volume of the tank
PN 10 [bar]	Nominal pressure for the tank
Tmax 95°C	Maximum temperature for tank
295 [kg]	The mass of the tank
D 750 / H 2300 [mm]	Diameter / height of the tank
steel	Tank body material
80 [mm]	Thickness of tank insulation
one smooth tube	Heat exchanger S1 = 3.5 [m2] | PN 16 bar