Calculation and Selection of Expansion Tanks

Initial data

5000 liters	Volume of water in the heating system	**4.9 bar**	Static pressure in the heating system
80 °C	The average hot water temperature in the calculation mode	**10.0 bar**	Maximum pressure for the heating system at the connection point of the expansion tank

Calculation results

$1003 - 0.156 * 80 - 0.0029 * 80^2 = 972$ [kg/m3]	Water density in the heating system t=80°C
$(998 - 972)/998 = 0.026$ [liters/kg]	Specific increase in water volume when heated from 15 to 80°C
$1.1 * 0.026 * 5000 = 143$ [liters]	Useful capacity of the tank, taking into account 10% of the reserve
$0.025 * 5000 = 125$ [liters]	Reserve capacity to compensate for minor leaks in the heating system
$143 + 125 = 268$ [liters]	Total useful volume of the tank
$0.3 + 4.9 = 5.2$ [bar]	Initial gas pressure in the tank
$(10.0 + 1.0) / (1.0 + 143 / 268 * \{ [10.0+1] / [10.0-5.2] -1.0 \}) -1.0 = 6.8$ [bar]	Initial operating pressure
$143 * ((10.0+1.0) / (10.0-5.2)) = 328$ [liters]	Minimum tank volume
$268 * ((10.0+1.0) / (10.0-5.2)) = 614$ [liters]	The recommended volume of the tank, taking into account the reserve capacity

Selection result

Reflex : Reflex G

Germany

600 liters	Tank volume
1 pcs	Number of expansion tanks
10 bar	Maximum operating pressure
3.5 bar	Initial pressure of the gas space
740 / 1859 mm	Diameter / height of the tank
128 kg	The mass of the tank
DN 32 mm	Diameter of the connecting pipe

Pressure adjustment guide

1. Before connecting the tank to the heating system, set the initial pressure in the gas space to [5.2 bar]. Inflate the tank by using a compressor through the nipple in the housing.

2. Connect the tank to the heating system and slowly fill it with water until the pressure in the system equals the pressure in the expansion tank's gas space [5.2 bar].

3. Turn on the circulation pump and continue filling the system with water until the initial operating pressure is established at the connection point of the expansion tank [6.8 bar]. At this time, the expansion tank will receive a reserve operating water volume [125 liters].

4. After connecting the heat source and transitioning to maximum temperature operation, each kilogram of heat transfer fluid will increase in volume by the specific volume increase [0.026 liters/kg], and heat transfer fluid equal to the useful capacity of the tank 143 [liters] will enter the expansion tank. At this point, the pressure in the tank will increase to the maximum operating pressure [10.0 bar].