

Calculation and Selection of Expansion Vessels

Initial data

25 m	The height from the connection point of the tank to the highest water collection point	4.5 bar	The maximum water pressure at the connection point of the expansion vessel
3.0 kW	Electric power of one pump	3 pcs	The number of pumps in the pressure boosting station
5000 l/h	Maximum hourly water consumption	Priority:	Optimum frequency of switching on the pump

Calculation results

$0.0981 * 25 + 1 = 3.5$ [bar]	Pump start-up pressure
$3.5 - 0.7 = 2.8$ [bar]	Initial gas pressure in the tank
$P_{max}[4.5] = 4.5$ [bar]	The pump shutdown pressure is equal to the maximum pressure (must be at least 0.5 bar higher than the start-up pressure)
20 [starts per hour]	The maximum number of pump starts per hour
$0.33 * 5000 * [(4.5 + 1) / \{ (4.5 - 3.5) * 20 * 3 \}] = 151$ [liters]	Estimated volume of the expansion vessel
$151 / \{ (3.5 + 1) * (4.5 + 1) / (2.8 + 1) * (4.5 - 3.5) \} = 23$ [liters]	The stored volume of water

Selection result

Elbi : AF

Italy

150 liters	Tank volume
1 pcs	Number of expansion tanks
10 bar	Maximum operating pressure
1.5 bar	Initial pressure of the gas space
500 / 1030 mm	Diameter / height of the tank
DN 32 mm	Diameter of the connecting pipe



Pressure adjustment guide

Before connecting the Expansion Vessel to the water supply system, an initial pressure in the gas space must be established at 2.8 [bar]. Creating the initial pressure in the tank can be achieved by inflating it through the nipple in the tank's casing using a compressor.

The pump station is configured for the switch-on pressure 3.5 [bar] and the switch-off pressure 4.5 [bar]. After the pump is turned on, the system fills with water, but water will only enter the tank when the water pressure exceeds the initial pressure in the gas space. When the switch-on pressure 3.5 [bar] (minimum operating pressure for the water supply system) is reached, there will already be a water reserve of 23 [liters] in the tank. This water reserve in the tank is necessary to cover the water consumption during the time elapsed from the moment the pump is turned on until the water is supplied from the pump to the plumbing system. In the absence of a reserve, an unstable water supply mode with interruptions is possible when all the water has been expelled from the expansion Vessel, and the pump has not yet had time to turn on.