DIAPHRAGM TANK VOLUME CALCULATION (Vmt)

*The purpose of using balance tanks is to observe the allowable number of switching per hour (z) for pump motors in a booster system under pressure, and compensating pressure shocks likely to emerge in the installation.

*Pressure tanks may be equipped with air-cushions or diaphragm.
In air-cushioned types, there is no clear separation between water and air. Because some portion of the pressurized air mixes with the water, air should be supplied with a compressor or air loading unit.

*In diaphragm types, there is no need for air loading units or a compressor. Because, a flexible diaphragm exists on air-water contact surfaces. Therefore, use of diaphragm tanks is preferred.

*The following calculation method is used in the volume calculation of vertical or horizontal tanks.

*For calculation of volume, consider only one of the main pumps in the booster set.

Correlations between allowable numbers of motor switching per hour, pump flow rate and pump operating pressure should be established.

Vmt = Diaphragm pressure tank volume (m^3/h)
Qp = Mean pump flow rate (m^3/h) (Qmin + Qmax/2 = Qp)
Pmax = Max. pressure setting (mSS)
Pmin = Min. pressure setting (mSS)
Z = Allowable number of motor switching per hour

$$Vmt = \frac{Qp}{4xZ} \times \frac{1}{1 - \frac{(Pmin - 2)}{Pmax}}$$

EXAMPLE

For 2K 25-8/75 Booster Unit;

Pmax. = 80 mSS
Pmin. = 60 mSS
Qmax. = 24 m^3/h
Qmin. = 16 m^3/h
Z = 30 (found from the table)

$$Qp = \frac{24 + 16}{2} = 20\ m^3/h$$

$$Vmt = \frac{20}{4x30} \times \frac{1}{1 - \frac{60 - 2}{80}} = 0.60\ m^3/h$$

min. requires a 600-lt diaphragm tank.

For the Selected Tank;

***Strength pressure** should be selected according to the pump's Hmmmax (pressure where Q=0) value. According to the above example, as Hmmax. of the pump is 110 mSS, the tank should be of class PN16.

***Tank pressure setting**; a quantity of air, which is 10% less than the lower pressure setting of the pump that is activated last, should be pumped. As for the above example, air at a pressure of 5.4 bar should be pumped, which is 10% less than the lower pressure setting of the pump, i.e. 6 bar (60mSS).

The maksimum starts for surfece pumps electrical motors	
1.5 kW and less	max. 80
2.2 - 3 and 4 kW	max. 60
5.5 and 7.5 kW	max. 30
11 and 15 kW	max. 20
18.5 kW and up	max. 15

The maksimum starts for submersible pumps electrical motors	
5.5 kW and less	max. 20
7.5 kW and up	max.15