

## Intermediate vessels

Intermediate vessels protect the diaphragms of expansion vessels from impermissible temperature loads. According to DIN 4807 T3 and EN 13831, the continuous temperature on the diaphragms must not exceed 70 °C. In a cooling water systems, temperatures  $\leq 0$  °C should be avoided.

### In heating systems

As a rule, heating systems are operated at return temperatures of  $\leq 70$  °C. The installation of intermediate vessels is not necessary. In the case of older systems and industrial plants, return temperatures  $> 70$  °C are sometimes unavoidable.

No general formula exists for calculating the intermediate vessel. The decisive factor is the water quantity heated to over 70 °C. This will generally be around 50 % of the system volume. For systems with heat reservoirs, up to 100 % is possible.

$$V_n = \frac{\Delta n}{100} V_s \quad (0.5 \text{ to } 1.0)$$

- $\Delta n$  see 'Properties and auxiliary variables' p. 6
- $V_s$  system volume

### In cooling circuits

If the temperature drops to  $\leq 0$  °C, we recommend that the intermediate vessel be dimensioned as follows.

$$V_n = 0.005 V_s$$

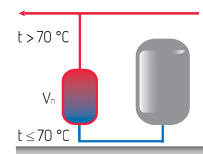
### In solar energy systems

Without evaporation

$$V_n = \frac{\Delta n}{100} V_s$$

With evaporation

$$V_n = \frac{\Delta n}{100} V_s + V_c$$



- 0.5 if return 50 % of  $V_s$
- 1.0 in case of heat reservoir with 100 %  $V_s$
- Use factor 1 for safety reasons

