### T.2 SHORT TERM STORAGE

#### T.2.1 BUFFER STORAGE TANK

Buffer storage tanks are usually made out of structural steel. The cylindrical tank is provided with threaded connections for the different charging and discharging circuits. A thermal insulation of the buffer storage tank reduces the thermal losses to the environment (heat loss coefficients of about 4 W/K can be reached). The volume of buffer storage tanks varies between 0.3 and 50 m³. Greater volumes can also be realised if this is demanded. The buffer storage tanks are normally filled with the same heat or cold transfer medium that is used in the connected circuits. In normal applications water is the common medium so the tanks do not have to be manufactured by using stainless steel for the construction. Their main function is to buffer the heat or cold produced by a not adjustable generator (solar thermal unit, wood boiler etc.) for the later deliverance to the emission devices. Beside this they are also used for the hydraulic discoupling of the generation and the distribution/emission part of plants. Advanced buffer storage tanks are equipped with stratification devices to store the heat or cold in that height of the storage corresponding to their temperature and density.

**TECHNICAL RISKS/BENEFIT ANALYSIS**

**Risks:** Buffer storage tanks are used in a great number and many applications so that no technical risks have to be expected.

**Benefits:** If water is used as storage medium and closed systems are connected, the service life of buffer storage tanks can be estimated between 25 – 30 years. The use of water as storage medium leads also to low storage volumes due to the high thermal capacity. Furthermore water is not harmful to the environment so no expensive measures against leakage have to be taken.

**SPECIAL ADVANTAGES, DISADVANTAGES, LIMITATIONS OR SIDE EFFECTS**

**Advantages:** The integration of buffer storage tanks enables the possibility of the use of source components which deliver the heat or cold in a phase difference to the demand (e.g. solar heating or cooling). The storage volume makes it possible to reduce the necessary heating or cooling power of the components on the source side. Due to the simple technology no further technical equipment is needed.

**Disadvantages:** The installation of buffer storage tanks leads to a relatively high space demand and higher investment costs due to the number of connections to the source and the sink part of the system.

**Side effect** in heating systems is the hydraulic discoupling of the source (boiler, solar plant) and the sink side (radiators, floor heating systems) so the flows in the different parts of the system can be adjusted independently. Furthermore the terms of operation of the source components increase, which leads to a reduction of emissions and losses and the possibility of the sensible integration of wood boilers and heat pumps.
### T.2.2 Domestic Hot Water Tank

**DESCRIPTION**

Domestic hot water (DHW) tanks are available in a volume range from about 3 l for electrically heated tanks up to about 1500 l. Due to the avoiding of corrosion problems stainless steel or ceramic-coated structural steel (with additional anodes) are used as construction material. The little electrically heated tanks operate under ambient pressure what leads to low installation costs but high operating costs due to the use of electricity. Greater storage tanks operate under pressure of the cold water net. DHW tanks can be directly integrated in the boiler (problems with deposit of calcium carbonate) or can be installed beside, under or above the boiler. In one-, two- or small multifamily houses there is only one tank needed which is usually heated by the boiler for space heating. Also directly fired (gas) or electrically heated storage tanks are available on the market. A greater demand of domestic hot water leads to an increasing storage volume or to the installation of several connected storage tanks and usually to the integration of a circulation loop. The heat exchanger for the heating of the water can be directly integrated in the tank or be realised as an external heat exchanger (usually plate heat exchanger). As heat transfer medium steam, heating water or district heating water can be used. For the use of more than one heat source the storage tank has to be equipped with a corresponding number of heat exchangers (e.g. solar energy, boiler, heat pump).

**TECHNICAL RISKS / BENEFIT ANALYSIS**

**Risks:** Due to the well tested technology no technical risks have to be expected by the use of this storage device. If tanks made of ceramic-coated structural steel are used the condition of the additional anode has to be regarded continuously to avoid corrosion problems. To avoid a legionella problem the water inside the storage has to be heated up periodically on a temperature level above 60 °C.

**SPECIAL ADVANTAGES, DISADVANTAGES, LIMITATIONS OR SIDE EFFECTS**

**Advantages:** The advantage of this store system is the possibility to reduce the power of the connected heating system in

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**LITERATURE**


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**Application**

- [ ] for heating
- [x] for cooling

**State of the art**

- [x] Commercially available
- [ ] Prototype
- [ ] Innovative concept
- [x] System suitable for retrofit

Minimum store temperature (heating):

- 45 °C (typical range: 45-60)

Rel. mech. energy for operation:

- 0.0005 $W_{\text{mech}}/W_{\text{heat}}$

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**Diagram**

- Hot water out
- Cold water in
- Domestic hot water tank
- Heating system
- Boiler/Cooler
- DHW tank