# CHAPTER 2 - CONSERVATION AND EFFICIENCY: BUILDING SYSTEMS



## 502.12 THERMAL STORAGE FOR DISTRICT COOLING

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### INTENT

**To reduce the chiller plant capacity and size, increase chiller plant efficiency and reduce greenhouse gas emissions by integrating thermal energy storage systems.**

### REQUIREMENT

All new district cooling plants must incorporate a Thermal Energy Storage (TES) facility. TES shall be designed with a capacity of at least 20% of the designed plant capacity.

### SIGNIFICANCE

District cooling systems produce chilled water in centralised energy plant and distribute it through underground pipes to multiple buildings. One of the main aspects of Thermal Energy Storage (TES) is to reduce the peak energy demand and thereby reducing the utility grid stress.

Thermal Energy Storage acts as demand-side energy management by maintaining a balance between energy supply and energy demand. Integrating TES to district cooling systems reduce the capacity of the plant, thereby reducing environmental footprint associated with the central plant system sizing and construction. During the peak demand when the demand for chilled water is higher than the chiller plant capacity, chilled water can be obtained from TES. During night when ambient temperature is lower, cooling energy produced get stored in TES, thereby increasing the chiller plant efficiency.

### APPLICABILITY

This regulation is applicable to all district cooling plants. Refer to Table 101.07(1) in Section One - Administration for detailed applicability levels.

### IMPLEMENTATION

This regulation requires sizing of TES to meet at least 20% of the plant cooling load capacity.

Thermal energy can be stored in various methods. Sensible TES – where the temperature of storage material is increased; Latent TES – where phase transformation occurs to store and discharge energy and; Thermo-chemical energy storage – which uses reversible chemical reactions to store and release energy. Type of technology to be used depends on the project requirements and the condition at which the energy to be delivered to the end user. Fig 502.12(1) details the different TES systems.