حكومة دبي
GOVERNMENT OF DUBAI

هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

Regulations for Implementation of Executive Order No. 27

Table of Contents

1. Introduction

The executive order No. 27 is an essential step taken by Dubai Government towards energy and water conservation to support the environmental green movement witnessed in Dubai in the past years and to minimize water and electricity consumption rate in the emirate of Dubai.

The purpose of these regulations is to ensure proper implementation of the executive order No. 27. The implementation of these regulations will encourage efficient and proper design, installation and operation of thermal energy storage systems and non desalinated water makeup systems in compliance with executive order No. 27.

2. Definitions & Abbreviations

ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers

CHW: Chilled Water

Cooling Load Profile: Hour by Hour sequence of cooling loads delivered by a district cooling plant over a specified period of time (day, month or a year)

Charging: Storing cooling energy by removing heat from a cool storage device through cooling equipment (See definition of storage device)

Cooling Tower Makeup Water: Non desalinated water source to be used as makeup for water evaporation, drift and blow down in cooling towers operation

Cognizant Authority: An agency or organization that has the expertise and jurisdiction to establish and regulate concentration limits for dissolved solids' concentrations; or an agency or organization that is recognized as authoritative and has the scope and expertise to establish guidelines, limit values, or concentrations levels for dissolved solids.

Discharging: Removing usable cooling energy by adding heat to a cool storage device (See definition of storage device)

DC: District Cooling plant or scheme.

DC Provider – District cooling provider responsible for building, operating and maintaining a district cooling plant in a development.

Design Peak Cooling Load: instantaneous Peak design load that should be delivered by a district cooling plant

Ice storage: Latent Thermal energy storage system in which energy is stored as a form of phase change between ice and chilled water

Load Leveling Strategy: a partial storage operating strategy that operates with refrigeration equipment running at full capacity for 24 hours on the design day. When the load is less than the chiller output, excess cooling is stored. When the load exceeds chiller capacity, additional requirement is discharged from storage

Load Shifting Strategy: a storage operating strategy that meets the entire on-peak cooling load from storage (See definition of on-peak period)

MBH: used to measure rate of energy transfer; 1 Ton = 12 MBH

Off-Peak period: the period of time when electric (and cooling) usage is relatively low.

On-Peak period: the periods of time when electric (and cooling) usage is relatively high.

Phase Change Material: Substance that undergoes a change of state while absorbing or rejecting thermal energy at constant temperature

Partial Load Shifting Strategy: a storage operating strategy that meets a portion of the on-peak cooling load from storage with the remainder of the load met by operation of the chilling equipment (See definition of on-peak period)

Storage Device: Container plus all contents of the container used for storing thermal energy in sensible or latent form

Thermal Energy Storage (TES): it is a technology allowing the storage of cooling/heating energy in a thermal medium.

TES Capacity: Energy that must be stored or delivered by a TES system during charging or discharging cycle in a given period of time. TES Capacity is expressed in Ton-Hrs

Temporary Plant: Plant providing chilled water on temporary basis until the final district cooling plant is ready. Temporary plant is intended to operate for a maximum of 5 years; however, the duration might be revised based upon project development and loads delivery schedules subject to DEWA's approval. In addition, the capacity of the temporary plant should not exceed 50% of total permanent plant capacity.

Ton or TR: Ton of refrigeration unit used to measure instantaneous cooling capacity

Ton-Hours: Unit used for delivered cooling energy and is the product of delivered Tons by the number of operating hours

TSE: Treated Sewage Effluent Water.

Emergency cases: cases in which there is a shortage in TSE or grey water.

3. Executive Order (Arabic Version)

حكومة دبي
GOVERNMENT OF DUBAI

المجلس التنفيذي
THE EXECUTIVE COUNCIL

قرار المجلس التنفيذي رقم (٢٧) لسنة ٢٠٠٨
بشأن
استخدام التخزين الحراري والمياه غير المحلاة
في أجهزة التكييف المركزي العام في إمارة دبي

نحن حمدان بن محمد بن راشد آل مكتوم ولي عهد دبي رئيس المجلس التنفيذي

بعد الاطلاع على القانون رقم (٣) لسنة ٢٠٠٣ بشأن إنشاء المجلس التنفيذي لإمارة دبي،
وعلى القانون رقم (١٠) لسنة ٢٠٠٣ بإنشاء مؤسسة الإمارات لأنظمة التبريد المركزي،

قررنا ما يلي :

المادة (١)

على جميع مؤسسات وشركات التكييف المركزي العام العاملة في إمارة دبي الإلتزام بما يلي:

١- استخدام آليات التخزين الحراري في عمليات التبريد المركزي في جميع المنشآت الجديدة التي يجري إقامتها في الإمارة.

٢ عدم استخدام المياه المحلاة في عمليات التبريد المركزي العام والإلتزام باستخدام البدائل المائية الأخرى كمياه البحر والمياه الداكنة ومياه الصرف الصحي المعالجة.

المادة (٢)

تكلف لجنة البنية التحتية والبيئة بالمجلس التنفيذي بوضع الآليات والقواعد التنظيمية اللازمة لتنفيذ أحكام هذا القرار، وذلك بالتنسيق مع بلدية دبي والمطورين الرئيسيين والجهات ذات العلاقة.

المادة (٣)

ينشر هذا القرار في الجريدة الرسمية، ويعمل به من تاريخ نشره.

حمدان بن محمد بن راشد آل مكتوم
ولي عهد دبي
رئيس المجلس التنفيذي

صدر في ٤ سبتمبر ٢٠٠٨
الموافق ٢٩ رمضان ١٤٢٩ هـ

4. **Executive Order (English Version)**

Government Of Dubai

The Executive Council

The Executive Council's Order No. (27) of 2008

On

Using Thermal Storage and Non-Desalinated Water

In General Central Air Conditioning Systems in the Emirate of Dubai

We, Hamdan Bin Mohammed Bin Rashid Al Maktoum, Crown Prince of Dubai and Chairman of The Executive Council,

After perusal of Law No. (3) of 2003 regarding the setting up of the Executive Council of the Emirate of Dubai; and

Law No. (10) of 2003 regarding the setting up of the Emirates Central Cooling Systems Corporation, have decided the following:

Article (1)

All corporations and companies of general central air conditioning based in the Emirate of Dubai have to comply with the following:

1. Using the mechanisms of thermal storage in central cooling operations in all the new establishments set up in the Emirate of Dubai.

2. Not using desalinated water in general central cooling operations, and complying with the use of other water alternatives such as sea water, dark water, and processed drainage water.

Article (2)

The Infrastructure and Environment Committee at the Council shall be delegated to set the required mechanisms and regulations to implement the provisions of this order, in coordination with Dubai Municipality, master developers and the concerned authorities.

Article (3)

This Law shall be published in the Official Gazette and shall become effective on the date of its publication.

Hamdan Bin Mohammed Bin Rashid Al Maktoum

Crown Prince of Dubai

Chairman of The Executive Council

5. Regulations for Implementation of Executive Order No. 27

5.1 Thermal Storage System Regulations

A. All new permanent district cooling plants above or equal the capacity of **10,000 TR** shall implement a thermal energy storage system in their plants whether it is ice storage, chilled water or chilled fluid storage, or phase change material storage technology based on project's specific conditions. For special cases where the application of thermal storage system is not possible, Evidences and related technical studies/justifications shall be submitted to the concerned department/authority for review and approval/rejection.

B. All new temporary plants supplying chilled water for partial loads until a permanent district cooling plant is ready are not requested to install a TES system. Maximum allowed capacity for temporary plants is 50% of total design district cooling load. Temporary plants are those meant to operate for a maximum of five (5) years, however, the duration might be revised based upon project development and loads delivery schedules subject to DEWA's approval.

C. In the case of load leveling or peak shaving operation strategy, the TES system peak instantaneous delivered load should be sized for a minimum of 20 % of the design peak instantaneous cooling load of the plant. For example a 10,000 TR district cooling plant should be designed based on 2,000 TR peak instantaneous load delivered by TES system.

D. In all TES operation strategies (i.e. load leveling, full or partial load shifting strategies), Tank capacity in Ton-Hrs and storage device volume should be determined based on the predicted load profile, process design parameters, storage type and the required on-peak hours of operation which should be studied and investigated by the DC provider to provide a technically sound and feasible solution.

E. TES tanks shall be designed with a maximum heat gain of 1% of tank capacity in 24 hours at 46 Deg. C of ambient temperatures.

5.2 Non-Desalinated Water Makeup Use Regulations

A. Non desalinated water shall be used as water makeup for cooling towers in permanent district cooling plants regardless of plant capacity. DC providers shall seek different alternatives based on project specifics such as sea water makeup, treated sewage effluent water (TSE) makeup or grey water recycling makeup solutions. Potable water shall be used for closed loop chilled water make up, plant domestic use and for the cooling tower makeup to be used in case of emergency only. Temporary plants are not requested to use a non-desalinated water as water make-up for cooling towers.

B. Potable water makeup for cooling towers can be provided as an Emergency source of water and shall be permanently used only if TSE water is not available and other water alternatives are not feasible for the project (to be confirmed by official correspondence) until TSE is provided.

C. Emergency potable water shall be used in case of shortage in TSE or grey water sources only.

D. Environmental Assessment Study shall be conducted to ensure compliance with environmental standards and local regulations for plant supply and discharge.

E. District cooling providers shall inject or apply proper water treatment to control bacterial growth in the system. Proper treatment and care shall be taken for the higher level of chlorides, ammonia, phosphates and other dissolved solids if TSE water is used as a makeup water supply.

F. Proper acceptable water quality shall be monitored and maintained throughout the operation of the district cooling plant using continuous automatic monitoring of water quality parameters and monthly visits by an independent chemical treatment specialist (minimum once a month). Monthly water quality reports should be prepared to ensure compliance with environmental and health requirements. On condenser circuit which is an open circuit bleeding to DM network; water quality concentrations shall meet DM requirements in accordance with Clause 5.2 k. For chilled water circuit which is closed circuit; water quality concentrations shall not exceed limit values established by a cognizant authority.

G. DC Providers shall follow the requirements set forth in ASHRAE Standard 12-2000-Minimizing the Risk of Legionellosis Associated with Building Water Systems (or equivalent recognized standard) and local requirements for Legionella prevention in cooling towers.

H. Minimum water parameters to be recorded as per requirements of Clause 5.2 f are:

Condenser Water

(i) pH
(ii) Conductivity
(iii) Legionella
(iv) Bacterial count
(v) Calcium/ total hardness
(vi) Chloride
(vii) M alkalinity
(viii) Iron
(ix) Calcium balance
(x) Inhibitor level

Parameters (i) to (vi) shall also be carried out on the makeup water.

Chilled water

(i) pH

(ii) Conductivity
(iii) Inhibitor level
(iv) Iron

I. Dedicated tanks and pumps should be provided for the non-desalinated makeup supply to cooling towers with proper measures to prevent contamination with any potable water tank. Separate pump sets should be provided for potable plant use and closed loop chilled water makeup.

J. Minimum 12 hours storage for the cooling towers makeup water shall be provided for district cooling plants based on estimated peak water consumption of the plant.

K. Blow down water from the DC plants should comply with related Dubai Municipality requirements.

L. If grey water is to be used for DC plants within buildings or hotels, grey water shall be collected to be used as cooling tower makeup water. A proper treatment and control for water quality should be carried out as per Dubai Municipality requirements.