

Administrative Resolution No. (66) of 2003
Approving Regulations on the Technical Specifications for
Thermal Insulation Systems

and

Control of Energy Consumption for Air-conditioned Buildings in the Emirate of
Dubai

The Director General of the Municipality:

- Having reviewed the powers legally vested on us under the Decree Establishing Dubai Municipality;
- The provisions of Article (18) of Local Order No. (3) of 1999 Concerning Regulation of Building Works in the Emirate of Dubai issued on 15 November 1999;
- Administrative Resolution No. (77) of 2001 Approving the Directive Regulations for the Technical Specifications of the Thermal Insulation Systems for Buildings in the Emirate of Dubai issued on 21 April 2001.
- The Recommendations of the Committee of Application of Thermal Insulation for Buildings in the Emirate of Dubai Formed Pursuant to Administrative Resolution No. (330) of 2001 Issued on 28 November 2001.

Resolved the Following:

- Article (1): The "Regulations of Technical Specifications for Thermal Insulation Systems and Control of Energy Consumption for Air-conditioned Building in the Emirate of Dubai" attached hereto shall hereby be approved and shall be mandatory to apply by engineering consultant offices and building contracting companies as of the first day of April 2003.
- Article (2): This Resolution shall be attached to and shall be read with Local Order No. (3) of 1999 Concerning Organization of Building Works in the Emirate of Dubai.
- Article (3): The Building and Housing Department shall undertake control and follow-up of compliance by the engineering consultancy offices and the building contracting companies with the regulations approved by this Resolution.
- Article (4): This Resolution shall come into effect as of the date of issuance.

Qassim Sultan Al Banna
Director General of the Municipality

Issued on the twelfth day of March 2003
Corresponding to the ninth day of Muharram 1424 H.

**Regulations of Technical Specifications
for Thermal Insulation Systems and
Control of Energy Consumption for Air-conditioned Buildings
in the Emirate of Dubai**

Article (1): These regulations shall be called “Regulations of Technical Specifications for Thermal Insulation Systems and Control of Energy Consumption for Air-conditioned Building in the Emirate of Dubai”.

Article (2): The word Emirate shall, wherever used in these Regulations, mean “the Emirate of Dubai”, the word Municipality shall mean “Dubai Municipality and the term the Concerned Department shall mean the “Department of Buildings and Housing”.

Article (3): In the case of any dispute concerning the interpretation of any of the provisions hereof, the interpretation issued by the Concerned Department shall be final.

Article (4): All air-conditioned buildings for which building permit applications are submitted in the Emirate after the first day of April 2003 shall be governed by these Regulations.

Article (5): All engineering consultancy offices and building contracting companies shall comply with the provisions of these Regulations on making drawings and engineering designs and in the construction of building works for air-conditioned buildings.

Any party violating the provisions hereof shall be subject to the penalties stipulated by Local Order No. (3) of 1999.

Article (6): The Director of the Buildings and Housing Department shall issue the directives necessary for the implementation of the provisions of these Regulations.

Chapter One
Elements of Design

Section One
Building Design and Materials Selection

Article (7): In designing a building and selecting the materials forming its surfaces, the engineering principles aiming to reduce heat transmission from outside into the building shall be observed as follows:

a- **External Walls and Roofs:**

Heat resistant materials and thermal insulation materials locally available shall be used in the substances forming the roofs and external walls, such that the overall transmission coefficient- U does not exceed the following values:

Roof: U= 0.44 W/m ² .K. (0.078 Btu/h.ft ² .°F)
Wall: U= 0.57 W/m ² .K. (0.100 Btu/h.ft ² .°F)

b- Glass Openings:

- 1- If the glass area whether as openings or fixed glass without an insulated back wall is between (10%) to (40%) of the external wall area of the building, double glass or its equivalent must be used such that heat transmission coefficient (calculated in summer as per ASHRAE Specifications) does not exceed the following values:

Heat Transmission Coefficient (U)	U= 3.28 W/m ² .K. = (0.58 Btu/h.ft ² .°F)
Shading Coefficient (SC)	0.4

- 2- If the glass area whether as openings or fixed glass without a back insulated wall exceeds (40%) of the external wall area of the building or in case of having a sky light, double glass or its equivalent must be used such that the heat transmission coefficient (calculated in summer as per ASHRAE Specifications) does not exceed the following values:

Heat Transmission Coefficient (U)	U= 2.1 W/m ² .K. = (0.37 Btu/h.ft ² .°F)
Shading Coefficient (SC)	0.35

- 3- If the glass is for showrooms, double glass or its equivalent must be used such that heat transmission coefficient (calculated in summer as per ASHRAE Specifications) does not exceed the following values:

Heat Transmission Coefficient (U)	U= 2.5 W/m ² .K. = (0.44 Btu/h.ft ² .°F)
Shading Coefficient (SC)	0.76

This excludes glass of showrooms consisting of one ground floor only.

c- Aluminum Works:

Aluminum sections shall be thermally insulated by use of thermal break in the case where the area of glass openings exceeds (40%) of the external wall area of the building.

Section Two
Calculation of Heat Load

Article (8): Heat Load for buildings shall be calculated in view of the following factors:

a- Outdoor condition of the building:

Dry bulb temperature	DB: 46° C (115° F)
Wet bulb temperature	WB: 29° C (85° F)
Dubai City location Latitude	(North Latitude) 25° N
Extent of variation in the temperature on the day of design (Outdoor Daily Range)	13.8° C (25° F)

Heat load shall be calculated for each air-conditioned space at the heat peak hour of such space.

b- Indoor Condition of the Building

1- Residential and Governmental Buildings:

Dry bulb temperature	DB: 24° C (75° F)
Relative humidity	RH: 50 ± 5%

2- Commercial Buildings:

Dry bulb temperature	DB: 25° C (77° F)
Relative humidity	RH: 55 ± 5%

3- Buildings of Industrial Facilities:

Indoor temperature and humidity of this type of buildings vary according to the activity carried on in them. Accordingly, in this respect reference shall be made to schedules of standards in ASHRAE Fundamentals.

c- Heat transmission coefficients through roofs, walls and glass set out in Article (7) hereof.

d- Ventilation:

Proper ventilation must be provided in the building in order to ensure healthy proper atmosphere. To accurately calculate the required ventilation ratios reference shall be made to the recommended ventilation table in:

(ASHRAE Standard 62 - Recommended Values - the latest version or any other references accepted by Dubai Municipality).

e- Storage Load and Diversity Factors:

On specifying the storage load and diversity factors relating to the calculation of heat load for glass, lighting and persons, the coefficients set out in ASHRAE Fundamental shall be taken into consideration.

f- Safety Factor:

Which shall be calculated as follows:

Sensible heat	Max 10%
Latent heat	Max 5%

Section Three
Design of Air-conditioning System

Article (9): For the purposes hereof, air-conditioning system shall mean the components thereof used in air handling, transmission and distribution.

The design of this system shall take into consideration the following:

- a- To prevent, to the extent possible, hot fresh air from entering into the air-conditioned building by taking the following precautions:
 - 1- Placing the air-conditioned areas always under positive pressure.
 - 2- Preferably, installing air curtains at the entrances and exits of public and commercial buildings.
- b- To provide air-conditioning units with heat recovery units in accordance with (ASHRAE Standard 90.1 & 90.2) & (ASHRAE Standard 62).
- c- To ensure that the duct leakage does not exceed the values mentioned in Smacna.85. Appendix -A and ASHRAE Fundamentals, latest version.
- d- To provide the central air conditioning units with a controlling device for reducing the fresh air quantity when unneeded, specially when relatively large quantities of fresh air are required.
- e- To select units having energy efficiency ratio - EER in accordance with ASHRAE Standard No. (90.1 & 90.2), latest version, in the case of using central air conditioning systems.

Chapter Two
Thermal Insulation Materials

Section One
Specifications of Thermal Insulation Materials

Article (10): Thermal insulation materials used in the external walls and roofs shall have the following properties:

- a- To be of homogeneous structure.
- b- To be water, humidity and vapor proof.
- c- To be of a durable high insulation efficiency.
- d- To be of a good mechanical ability.
- e- To be corrosion and prevailing environmental circumstance resistant.
- f- To have fixed dimensions with low expansion and shrinkage ability.
- g- To be thermal shock resistant and capable of bearing swift diversity of the temperature under which they exist without sustaining a physical damage.
- h- To be fire retardant in walls, and to be fire resistant if installed in a manner that directly exposes it to fire.
- i- To be fungi resistant and not suitable for bacteria, pest or insect growth.
- j- To be resistant to chemical reactions or change.

Section Two
Installation of Thermal Insulation Materials

Article (11): The following terms and conditions shall be observed in the preparation and installation of the thermal insulation materials:

- a- To cover the roof insulation materials from both sides and to place a barrier on the top side and a water proof barrier on the bottom side.
- b- To store the insulation materials in dry covered places, and to preserve them from breakage.
- c- To cover the external wall insulation materials with a vapor retardant.
- d- To take due precaution in the storage of insulation materials in order to avoid breakage of the same during building works or installation.
- e- To ensure that all the insulation material surfaces are dust and grease free before using them.
- f- To install insulation materials with good thermal capacity in the internal side of walls and roofs, and to install a layer of light

insulation material in the middle in order to get the best results of thermal insulation.

g- To follow the following steps in using soft organic thermal insulation materials in various fields of building:

1- Lower floors

The bottom concrete layer must be completely dry before placing the insulation material panels on it.

2- Cavity Walls

In case of using the insulation layer in wall cavities, the cavities must be sealed against air leakage.

h- If the building regulations require not less than one hour fire resistance for building members, the lower layer bearing the insulation panels must be noncombustible.

i- To store the polystyrene panels for not less than (6) weeks before using them in the external walls for insulation.

j- To follow the following steps to be taken on using mineral fiber as an insulation layer in the buildings:

1- To know the type, properties and components, including the bonding materials and others, of the insulation material before use in order to ensure the proper installation of the insulation material at the proper place.

Knowing that the organic bonding materials limit the operational temperatures of the insulation materials.

2- To avoid access of water to the panels by wrapping each of them with polyethylene bags or bags made of any other water proof material.

3- To maintain the thickness of the original thermal insulation material and not to expose it to pressure during installation in the building. In cases where pressure can not be avoided, the final thickness after installation shall be considered.

Chapter Three **General Guidelines**

Article (12): The values of heat transmission coefficients set out in Article (7) hereof represent the maximum permitted limits. Such values should be preferably reduced by use of the best thermal insulation methods or by use of more heat resistant materials, provided that such materials are

available in the Emirate at proper prices, for the purpose of energy saving and reduction of material cost.

- Article (13): Heat load calculations shall be submitted for approval by the Concerned Department at the Municipality on reference of the engineering design of the building to be constructed.
- Article (14): Thermal bridges in the buildings must be insulated as they represent passage for flow of heat from outdoors into the building, such as the connection points between concrete beams and the external walls and the columns.
- Article (15): A slope shall be provided for rain water drainage in all the details of the roof insulation.
- Article (16): The area of glass surfaces should be reduced to the extent possible in the sides receiving higher heat quantities at the peak hours due to direct sun ray, which are respectively (west, north west, south west). In the case of necessity of making big openings in such sides, external shading shall be made by either vertical sun breakers or by trees and climbing trees. It is preferred to use installations and materials assisting in breaking direct ray and preventing it from entering through glass openings, such as sun shades, screens, louvers, shutters, awning.
- Article (17): Inverted section shall be used in the order of insulation layers of the external roof of the building. Such layers may be installed in the normal order in case of adding layers of finish materials, such as tiles and similar materials, on the water proof insulation.
- Article (18): Preferably, plant items (ever-green trees and climbing trees) should be used on west sides and trees with (falling leaves) should be used on south sides, in addition to (vertical sun ray breakers) on the west sides and (horizontal sun ray breakers) on the south sides in order to provide proper shading for the building.
- Article (19): Ideal utilization of the direction of the building should be observed to the extent possible, specially with respect to the direction of the windows, knowing that the ideal direction in the Emirate is north/south generally. West openings should be avoided to the extent possible.
- Article (20): Paved places of the garden should be preferably located at the north area of the building in order to reflect sun ray away from the building.
- Article (21): The entrance of the building should be preferably void in order to reduce thermal loss and to achieve comfort, specially in the public areas.
- Article (22): To take all the precautions necessary for preventing air leakage into the building through the slits, doors and windows, weather strips should be installed for this purpose.

Article (23): The outdoor paints of the building should be generally in light colors, the texture of the walls and the external surfaces should be soft to increase heat reflectivity of such walls. In the case of using dark colors, a heat outcome equivalent to the outcome of using light colors should be observed.

Article (24): In installation of the walls thermal insulation materials which need fixing fasteners. Such fixing fasteners should be rust proof.

Article (25): Programmed thermostat should be preferably used in governmental buildings, schools, hospitals and clinics through which the indoor temperature of such buildings can be increased when they are abandoned.