## 1.0 Local Species

302.01

Villas
Residential/ Commercial
Public Buildings
Industrial

**For all new buildings, a minimum of twenty five percent (25%) of the total planted area of a building plot, including vegetated roofs, must utilise plant and tree species indigenous or adapted to Dubai's climate and region.**
**For all new villas at least one palm tree must be planted.**

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Ecology and Landscaping**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

The provision of landscaped and vegetated areas can help to provide attractive and comfortable outdoor spaces for residents and users of many types of buildings. However, Dubai's hot and arid climate makes the wise use of water resources a key element of sustainable development. Landscape irrigation constitutes a high percentage of the total water used in Dubai.

Plants vary in their water needs. Turf and several non-native plants consume a large amount of water. By using plants which are better adapted to Dubai's climate (and hence which require less water), the volume of water required for irrigation will be considerably reduced. There are large potential savings to be made in water consumption by using low water demand plants.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | ✓ | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

## 5.0 Outcome/ Benefit

The intent is to reduce the use of water by using plants which require minimal water supply. A reduction in the amount of water for landscape irrigation will result in cost savings (lower water/utility bills). In addition, this requirement will contribute to enhancing local biodiversity by encouraging the use of plant species that are indigenous to the region. The culture and heritage of Dubai are reflected in the use of native plantings.

## 6.0 Guidance

### 6.1 General

This regulation requires that a minimum of 25% of the total planted area of a building plot utilises plant and tree species appropriate for Dubai's climate. The total planted area is defined as the total external landscaped area of a building plot, including landscaped areas on roofs (vegetated roofs). Landscaped areas are those with trees, shrubs, grasses, or planted beds, including xeroscape areas, i.e. landscaping that is designed specifically to minimise water use.

This regulation recognises that, in Dubai, grass (turf) forms a large part of the planted area around buildings. In order to reduce the amount of irrigation water needed, turf areas should be limited due to its high water requirement. Turf should be used primarily for functional benefits, such as recreational areas. Landscaping design must include plant and tree species appropriate for Dubai's climate and region. These include native (indigenous) plants, desert adapted plants, foreign drought resistant plants and salt tolerant plants suitable for use in Dubai. The use of such species contributes to water savings. Planting trees is encouraged, since the shade from trees helps to lower air and soil temperatures, which in turn reduces the moisture loss of nearby plants and soil. Table 303.01(1) lists some examples of plants that can be used in water efficient landscaping in Dubai.

**Table 303.01 (1) Examples of Water Efficient Plants**

| Scientific Name | English Name | Arabic Name | Growth Form | Indigenous/ Introduced |
|---|---|---|---|---|
| *Acacia tortillis* | Umbrella thorn | Samr, salam | Tree | Indigenous |
| *Aerva javanica* | Kapok bush | Alara', twaim, efhe, tirf | Bush | Indigenous |
| *Cenchrus ciliarus* | Foxtail grass, buffel grass, sand burr | Sabat, khadir, thumum, gharaz, drab, labaytad | Grass | Indigenous |
| *Chloris virgata* | Featherfinger grass | Khazamzam | Grass | Indigenous |
| *Cistanche tubulosa* | Desert hyacinth | Thanoon, tartooth, basul, dhamin | Parasitic flower | Indigenous |
| *Citrillus colocynthis* | Desert squash, bitter gourd | Shary, handhal, murrah, serew, hanzal, suri, hedeg | Ground cover | Indigenous |
| *Convulvulus virgatus* | Morning glory family | Hub alrisha, adlam | Bush | Indigenous |
| *Cymbopogon commutatus* | Incense grass | Alklathgar, sakhbar, hamra, idhkhir, khasaab | Grass | Indigenous |
| *Euphorbia larica* | Euphorbia | Isbaq, ibiq | Bush | Indigenous |
| *Leptadenia pyrotechnica* | Firemaker / broom bush | Markh, ma'aleet | Bush | Indigenous |
| *Nerium oleander* | Oleander | Defla, haban | Tree | Indigenous |
| *Phoenix dactylifera* | Date palm | Nakhl, amm-amm | Palm | Indigenous |

| | | | | |
|---|---|---|---|---|
| *Prosopis cineraria* | Mimosa family | Ghaf, harb,awd,hadheeb, shibhan | Tree | Indigenous |
| *Reseda aucheri* | Mignonette family | Dhaub-nabmm, zinban | Bush | Indigenous |
| *Stipagrostis plumosa* | Plumose triple awned grass | Nussi, sabat, rahim, bathoot, tubaynee, thighaam, dawit | Grass | Indigenous |
| *Sporobolus spicatus* | Drop seed grass | Dhafrem, defera, sakham, rashad, halfa barri | Grass | Indigenous |
| *Sueda vermiculata* | Sea blite | Suweda,meliah, tuwaim, girm, hamd, tahmar | Bush | Indigenous |
| *Tamarix nilotica/ arabica* | Tamarisk | Tarfa, athl | Tree | Indigenous |
| *Zizyphus spina cristi* | Christ thorn | Sidr, ber, 'ilb, zaqa. Fruit: Nabaq, dum | Tree | Indigenous |
| *Zygophyllum qatarense* | Bean caper | Haram, rotreet, balbal, theromet | Bush | Indigenous |

Native plants, desert adapted plants, foreign drought resistant plants and salt tolerant plants listed in the following publication are also acceptable choices for landscaping in Dubai:

*The Comprehensive Guide to the Wild Flowers of the United Arab Emirates. Marijcke Jonbloed, Environmental Research and Wildlife Development Agency (ERWDA) Abu Dhabi. First Published April 2003.*

Local landscape consultants and gardeners are also able to provide advice on the water requirements of plants and can recommend low water use varieties.

Note:

1. When calculating the area planted with local species, the area of the trunk of local trees planted in a grassed space is to be used in the calculation not the area covered by the tree's branches. This is because the grass under the tree will still need irrigation at a higher volume than local plants would require.
2. Regulation 601.04 requires that all irrigation be with non-potable water or by drip or sub-surface irrigation systems.

The following are additional recommendations for the management of a water efficient landscape.

**Soil Improvement**

- Routine soil cultivation and adding organic matter (such as compost) improves the soil's ability to retain moisture.
- Heavy or compacted soil around trees should be loosened and aerated by manual digging.
- Organic mulches include shredded bark or chips, wood grindings, compost, aged sawdust, or even low-growing ground cover. Organic mulches improve the organic matter content of the soil as they decay. This may be undesirable, however, for plants that require excellent drainage and dislike wetter soil conditions. Inorganic mulches, such as gravel or rock, let the most water in and are frequently used with plants susceptible to crown rot. A 5-10cm layer of mulch can help to even out temperature extremes and keep soil cooler on hot days. It also prevents soil from crusting, allowing better water penetration. By mulching around trees and planting beds, moisture is retained in the soil and weeds are discouraged.

**Landscape Maintenance**

- Correct maintenance keeps plants healthy and helps conserve water. For example, by weeding regularly, landscape plants do not have to compete with weeds for water.
- Fertility requirements of the plants should be considered. An adequate amount of nutrients is necessary, but over applying fertilizers may create excessive growth and increase in maintenance requirements. Excessive fertilisation may also leave plants more susceptible to insects and diseases.

### 6.2 Technical Data and Specifications

Plants and tree species appropriate for Dubai's climate and region are defined as native plants, desert adapted plants, foreign drought resistant plants and salt tolerant plants. Examples of suitable plants are listed in table 302.1 (1) and in;

*The Comprehensive Guide to the Wild Flowers of the United Arab Emirates, by Marijcke Jonbloed (Environmental Research and Wildlife Development Agency (ERWDA) Abu Dhabi. First Published April 2003).*

## 7.0 Compliance

### 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | ✓ | |
| **Operation** | | ✓ | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

### 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | *Green Building Declaration*<br>*Completed Self Assessment* |
| **Construction** | *Green Building Site File* with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed *Green Building Site File* |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

## 8. Common Practices / Solutions

This regulation has been developed specifically for Dubai and can not be compared directly to other countries. However, the approach is similar is that adopted in other regions with hot and arid climates. The percentage of vegetated area that has to be planted with indigenous species or those adapted to Dubai's climate could be increased if appropriate grass for lawns becomes available.

## 9. References.

The Comprehensive Guide to the Wild Flowers of the United Arab Emirates. Marijcke Jonbloed, Environmental Research and Wildlife Development Agency (ERWDA) Abu Dhabi. First Published April 2003.

## 1.0 Exterior Light Pollution and Controls

303.01

Villas

Residential/ Commercial

Public Buildings

Industrial

**For all new buildings, permanently installed exterior lighting must comply with the following:**

1. **All exterior light fixtures on the building site, other than architectural accent lighting and Civil Aviation safety lighting, must be shielded so that all of the light emitted by the fixture, either directly or indirectly by reflection or refraction from any part of the fixture, is projected below the horizontal plane passing through the lowest part of the fixture;**
2. **Architectural accent lighting must be aimed or shielded to prevent the lighting of the night sky. Wall washing lights must spill no more than 10% of the lighting past the building façade;**
3. **Downward directed lighting must be used for lighting of signage; and**
4. **All exterior lighting must be fitted with automatic controls to ensure that lights do not operate during daylight hours.**

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Neighbourhood Pollution**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

Light pollution (also called photopollution and luminous pollution) arises from the loss or reflection of excess light upwards in built-up areas. This results in the occurrence of what is known as 'sky glow' which lessens the contrast between the night sky and the urban development. Sky glow has aesthetic implications in the inability to distinguish stars on otherwise clear nights. While parts of Dubai are known to have a vibrant night life and many iconic buildings are illuminated, there is a need to ensure that the use of exterior lighting is controlled to reduce the impact from over lighting. Excessive use of exterior lighting is also a waste of electricity.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | ✓ | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

## 5.0 Outcome/ Benefit

This regulation will help to reduce light pollution and night sky glow with associated benefits including allowing people to enjoy the view of the night sky. Light pollution also disrupts many of the natural cycles, such as feeding, of nocturnal wildlife. In addition, the use of sensors, timers and appropriate selection of light fittings can reduce expenditure on exterior lighting and bring increased energy efficiency. By reducing the amount of wasted lighting and using controls to ensure lights do not operate when they are not necessary, energy consumption and costs will be reduced.

## 6.0 Guidance

### 6.1 General

This regulation should be considered together with Regulation 504.02 which specifies the maximum lighting power density which can be used for exterior lighting. Exterior lighting should use the lowest possible illumination to provide adequate light for safety and security.

Unless it is required for safety or security, direct lighting must not extend past property boundaries.

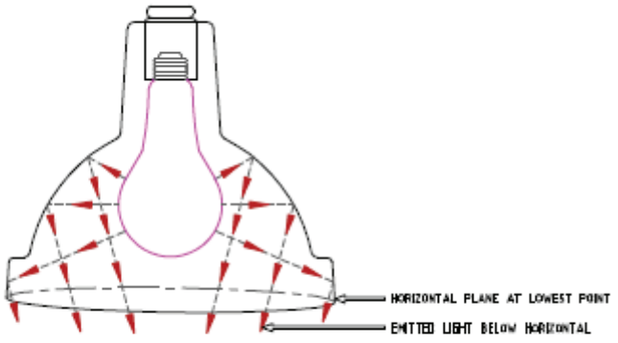



FIGURE SHOWS A PROTOTYPE OF AN OUTDOOR LIGHTING FIXTURE

In order to comply with the requirement that exterior lighting, must be shielded so that all of the light emitted by the fixture, either directly or indirectly by reflection or refraction from any part of the fixture, is projected below the horizontal plane passing through the lowest part of the fixture, a full cut-off light fixture must be used. This is a lighting fixture where no light is emitted above the horizontal and shall be shielded to direct all light towards the ground so that the lighting elements are not exposed to normal view by or do not create or constitute a hazard or nuisance to motorists, pedestrians or neighbouring residents

Daylight sensors or timers must be used to ensure that exterior lighting is not operating during daylight hours. Spotlights may only be used for special occasions and only with the written permission of Dubai Municipality.

The use of motion sensors, timers, photocells or other means of activating lighting when it is needed is encouraged to conserve energy and avoid light pollution.

### 6.2 Technical Data and Specifications

The maximum lighting power density allowable for outdoor lighting is specified in Regulation 504.02

# 7.0 Compliance

## 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | ✓ | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

## 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | *Green Building Declaration*<br>*Completed Self Assessment* |
| **Construction** | *Green Building Site File* with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed *Green Building Site File* |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

# 8. Common Practices / Solutions

This issue is addressed in a number of ways in building rating systems and codes in other countries. LEED specifies light levels at the boundary of building plots and restricts the percentage of lights shining upwards. BREEAM uses the 'Institution of Lighting Engineers, Guidance for Reduction of Obtrusive Light' which requires less shielding of lights and allows signs to be lit from below if there is no spill over of light. The proposed Dubai regulation is stricter.

# 9. References.

Guidance for Reduction of Obtrusive Light' , 'Institution of Lighting Engineers, England

## 1.0 Urban Heat Island Effect

304.01

Villas

Residential/ Commercial

Public Buildings

Industrial

**For all new buildings:**

1. **All opaque external roofing surfaces must comply with a minimum Roof Solar Reflective Index (SRI) value according to Table 304.01(1) for a minimum of seventy five percent (75%) of the roof area:**

Table 304.01 (1) – Roof SRI Requirements

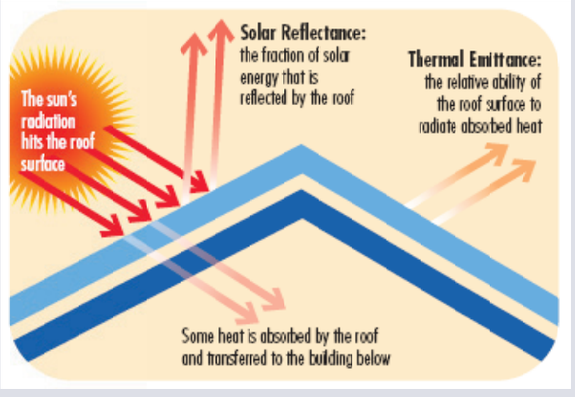
| Type of Roof | Minimum Roof SRI |
|---|---|
| Steep Sloped Roofs (slopes steeper than 1:6) | ≥ 29 |
| Flat and Low Sloped Roofs | ≥ 78 |

2. **Individual heat rejection equipment, with a power rating greater than 4.0 kilowatt (kW), and which exhausts externally, must be installed not less than 3.0 meters above the ground level of the building**

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Microclimate and Outdoor Comfort**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background




The Urban Heat Island (UHI) effect is the temperature difference between urban and undeveloped areas. The UHI effect occurs due to the amount of high thermal mass materials present in built up areas, such as concrete and tarmac, which are commonly used in the construction of roads, sidewalks, parking lots, buildings and roofs. These materials absorb solar radiation during the day and then re-radiate some of it, leading to temperature differences of up to 3°C between urban and the surrounding undeveloped areas.

The properties of the materials which determine how much heat is absorbed and re-radiated are their solar reflectance, heat capacity and thermal emissivity.

Solar reflectance (or reflectivity) indicates how well a material reflects solar radiation. Surfaces with a low solar reflectance are usually dark in colour and absorb a high fraction of solar radiation. The amount of energy absorption also depends on a material's specific heat capacity -- how much heat they can store. The absorbed energy is then re-radiated by the material. Thermal emittance (or emissivity) indicates the ability of a material to radiate heart that it has absorbed. Surfaces with low emissivity cannot effectively radiate energy and therefore heat up.

The SRI, defined by ASTM E 1980-01 (Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces), incorporates both reflectivity and emissivity. The combination of these factors means that light-coloured polymeric roof membranes and coatings, which are good emitters of heat, tend to perform better than metallic surfaces, which can be more reflective but which heat up because of metallic surfaces' low emissivity. Materials with higher SRIs absorb less heat and reduce the UHI effect.

In addition to the contribution of the sun to the heat island effect, the rejection of heat from air conditioning units at the ground level of buildings also contributes to increased temperatures. By requiring that such heat rejection can only be carried out at the first floor level of a building or higher the heat island effect will be reduced.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | ✓ * | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

**Note: Part B does not apply to villas**

## 5.0 Outcome/ Benefit

Designing buildings that use materials with higher SRI values will help to reduce both absolute urban temperatures and reduce the day time temperature range. This will improve pedestrian and building occupant comfort and is likely to reduce cooling demand within some building typologies. The mounting of heat rejection equipment on higher floors will also provide increased pedestrian comfort.

## 6.0 Guidance

### 6.1 General

The thresholds and values included in this regulation have been chosen as being both representative of international best practice and applicable to Dubai's conditions. As some buildings in Dubai are being built to meet the requirements of international sustainability rating schemes, similar SRI values have been specified in this regulation.

SRI values relate to materials (not location), and the values included in this regulation are for materials that are appropriate for Dubai's hot and arid climate. SRI values apply to the values for new materials.

Roofing products are now available that meet the required SRI in nearly any standard colour. Cool roof products help to reduce heat gain indoors. The extent of heat gain reduction also depends on how well the roof or ceiling is insulated.

The following will qualify as meeting the required SRI values:

- Any roof area covered by photovoltaic panels or solar hot water collectors.

The calculation of the total roof area does not include the area required for heating, ventilation, and air conditioning (HVAC) equipment, renewable energy generating equipment, building maintenance units, walkways for access to plant equipment and storage tanks. Walkways must be provided to allow service access to any

equipment located on the roof.

Manufacturers and suppliers of proprietary roofing products should be able to provide Material Specification Data Sheets (MSDS) which detail the SRI value of their products. An indication of the SRI for some common roofing materials is given in the table below.

| Roofing Materials | Typical SRI Value |
|---|---|
| Grey EPDM (enthlene propylene diene monomer) | 21 |
| Unpainted Cement Tile | 25 |
| Red Clay Tile | 36 |
| Light Gravel on Built-up Roof | 37 |
| Aluminium | 56 |
| White Ceramic Tile | 90 |
| White Coating | 100 |
| Light Beige Concrete Tile | 76 |
| Light Brown Concrete Tile | 48 |
| Pink and Grey Concrete Tile | 63 |
| Off White Concrete Tile | 92 |

Dark hard surfaces with high heat retention increase the overall temperature of the area and should be avoided where possible. The use of dark materials around buildings leads to an increase in temperatures at ground level and is discouraged.

For buildings other than villas and small units, heat rejection from air conditioning must not be made at low levels to ensure that UHI is not increased by the hot air. This means that units such as window air conditions and the condensers of split units with a power rating of 4 kilowatts or greater cannot be mounted at ground level.

**6.2 Technical Data and Specifications**

Materials for opaque external roofing surfaces must have a minimum SRI as indicated in the Regulation. Material Specification Data Sheets (MSDS) provided by manufacturers should detail the SRI value of the products.

The SRI is a measure of the surface's ability to reflect solar heat, as shown by a temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. For example, a standard black surface has a temperature rise of 90°F (50°C) in full sun, and a standard white surface has a temperature rise of 14.5°F (8.1°C). Once the maximum temperature rise of a given material has been computed, the SRI can be computed by interpolating between the values for white and black.

SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

A calculation method, using the solar reflectance value and thermal emittance as inputs, to determine the SRI of a product has been developed by the Lawrence Berkeley National Laboratory and can be accessed from the internet at: http://coolcolors.lbl.gov/assets/docs/SRI%20Calculator/SRI-calc10.xls

Roofing product information can also be found in the Cool Roof Rating Council website, at www.coolroofs.org

# 7.0 Compliance

## 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | ✓ | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

## 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | Green Building Declaration<br>Completed Self Assessment<br>Prepare materials and coating specification |
| **Construction** | Green Building Site File with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed Green Building Site File |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

# 8. Common Practices / Solutions

The approach taken in this regulation is similar to that suggested in some building rating systems. For example, LEED specifies the limits for Solar Reflective Index for flat and sloped roofs.

# 9. References.

ASTM E1980-01 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces This standard covers the calculation of the SRI of horizontal and low-sloped opaque surfaces at standard conditions. The method is intended to calculate SRI for surfaces with emissivity greater than 0.1

ASTM C 1549 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer

ASTM E408-71(1996)e1 Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques

ASTM C1371 - 04a Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

It is expected that these documents would only be used by the manufacturers of materials, it can be obtained from the ASTM website: http://www.astm.org/Standard/index.shtml

Lawrence Berkeley National Laboratory SRI calculator is available free on line at:
http://coolcolors.lbl.gov/assets/docs/SRI%20Calculator/SRI-calc10.xls

| 1.0 | Green Roofs | 304.02 |
|---|---|---|
| | **For all new buildings, the requirements of Part 1 of Regulation 304.1 are waived, if the roof of the building provided with vegetated roof (green roof) for at least thirty percent (30%) of the total roof area** | Villas<br>Residential/ Commercial<br>Public Buildings<br>Industrial |

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Microclimate and Outdoor Comfort**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

Green roofs act as insulation and reduce the amount of heat absorbed by, and then re-radiated from, the building roof. They may also provide pleasant outdoor social areas. Careful consideration must be given to the irrigation requirements for a vegetated roof. For plant types suitable for Dubai's climate, refer to regulation 302.01 Local Species.

In addition to providing aesthetic benefits, green roofs provide protection of roof elements, resulting in operational lifetimes which can be twice as long as some conventional roofs. Cooling costs will be reduced as less heat as absorbed by the roof and transferred into the building.

Furthermore, green roofs provide significant acoustic insulation through the absorption, reflection and deflection of noise. The substrate of a green roof tends to block noise in the lower frequency range while plants block noise at higher frequencies. A green roof with a 12cm substrate can be expected to reduce noise transmission by 40 dB, while a 20cm substrate can reduce noise transmission by between 46 and 50 dB.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | ✓ | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

## 5.0 Outcome/ Benefit

Green roofs improve the appearance of the cityscape and encourage biodiversity. In addition, green roofs provide thermal and acoustic insulation, reducing the heat and noise transmitted through the roof. Tangible economic benefits are realised through increasing the operational lifetimes of protective roof elements as well as reducing energy costs associated with the provision of rooftop thermal insulation. Green roofs may also serve as an attractive outdoor social area.

## 6.0 Guidance

### 6.1 General

Installing a green roof requires special attention during the design, installation and subsequent maintenance phases. Green roof design must consider structural implications as they are heavier than conventional roofing systems. Waterproof membranes or layers must be installed between the roof and the soil bed of the green roof

to prevent surface runoff, or leaks, from damaging the building elements. A tough and impermeable layer is required to prevent the plants' roots from damaging of the supporting structure. Plants used must be suitable for Dubai's climatic conditions as detailed in Regulation 302.01.

Water consumption is a significant consideration when using green roofs, especially in Dubai. The use of potable water needs to be kept to a minimum or even eliminated. Properly recycled grey water or water recovered from machinery condensate can be used effectively for green roof irrigation purposes. Therefore, Consideration should be given to the use of condensate recovery to assist in the irrigation of green roofs. Irrigation must use drip or sub surface systems or use non potable water.

### 6.2 Technical Data and Specifications

A number of companies in Dubai have developed experience with green roofs and their use is becoming more common. These companies can provide all the technical information required.

Refer to Practice Guide 304.01 Urban Heat Island Effect for information on Solar Reflectance Index (SRI)

Roofing product information can also be found in the Cool Roof Rating Council website, at www.coolroofs.org

## 7.0 Compliance

### 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | ✓ | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

### 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | Green Building Declaration<br>Completed Self Assessment<br>Prepare Roof floor plan |
| **Construction** | Green Building Site File with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed Green Building Site File |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

## 8. Common Practices / Solutions

LEED is an example of a building rating scheme that encourages the adoption of green roofs by awarding credits for 50% vegetated roof.

## 9. References.

Dubai Green Building Regulations, Practice Guide 304.01

## 1.0 Light Colours on Outside of Buildings

304.03

**For all new buildings, at least seventy five percent (75%) of the area of externally painted walls must have a minimum Light Reflective Value of forty five percent (45%).**

Villas

Residential/ Commercial

Public Buildings

Industrial

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Microclimate and Outdoor Comfort**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

Passive building design and material choices that avoid absorbtion of the sun's heat to promote thermal comfort and energy conservation, are traditional methods used by early inhabitants of Dubai, who constructed their homes and buildings from light coloured and white materials.

A large amount of heat can be reflected away from a building through the use of reflective exterior surfaces. The amount of energy absorbed and retained by a building is affected by surface colour. Light colours reflect a greater proportion of the solar energy whilst darker colours retain more solar energy resulting in the heating of the object and the surrounding air.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | ✓ | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/ Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/ Theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

## 5.0 Outcome/ Benefit

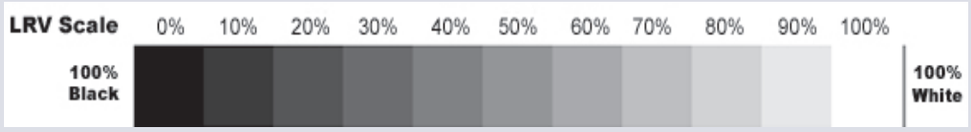
Outdoor finishes with high solar reflectance help to reduce the internal temperature of buildings, and associated cooling demand, and help reduce the overall UHI effect.

As an Arabic city, Dubai's buildings have traditionally had light coloured exterior finishes. This regulation will encourage the continuation of this traditional building characteristic while reducing energy use within the Emirate.

## 6.0 Guidance

### 6.1 General

Final surface finishes applied to external walls of buildings must have a minimum Light Reflectance Value (LRV) of 45%.The light reflectance value (LRV) of surface finishes applied to internal walls of building shall be declared by the manufacturer/ supplier based on the test results from Dubai central laboratory. LRV is a measure of the total quantity of useable and visible light reflected by a surface in all directions on a scale from 0% to 100%. Zero percent is assumed to be an absolute black and 100% represents an assumed perfectly reflective white. The blackest achievable wall finish has a LRV of approximately 5% and the whitest available finish approximately 85%.



The LRV of surface finishing materials are often stated by manufacturers on colour sample sheets or within material specification and data sheets and in laboratory test results for individual products.

The LRV value is measured when the coating is applied to a test surface. The value does not change when applied to different t surfaces.

Light reflectivity is often confused with the term light intensity. Intensity deals with the brightness or dullness of a colour, or how clear or muted a colour is. Reflectance strictly defines the lightness or darkness of a colour.

The intent of this regulation is to use paints which reflect more light and heat. Increasing the LRV will increase the solar reflectivity.

### 6.2 Technical Data and Specifications

Paint manufacturers will specify LRV values on colour sample sheets or within material specification and data sheets. These should be based on laboratory test results for individual products.

## 7.0 Compliance

### 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | ✓ | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

### 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | *Green Building Declaration*<br>*Completed Self Assessment*<br>*Prepare materials and coating specification* |
| **Construction** | *Green Building Site File* with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed *Green Building Site File* |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

## 8. Common Practices / Solutions

This regulation is well known worldwide and easy to apply.

## 9. References.

No references.

| 1.0 | Orientation of Glazed Façades or External Shading | 304.04 |
|---|---|---|
| | **For new buildings, other than villas and industrial buildings, one of the following must be achieved:**<br><br>**1. At least sixty percent (60%) of the total glazed surface area of the building, excluding glazed areas with back insulated panels, must have a predominantly north orientation.**<br><br>**For the purpose of this regulation, a 'predominantly north orientation' means façades facing within forty five degrees (45o) of due North.**<br><br>**2. South and west glazed areas, excluding glazed areas with back insulated panels, must be treated environmentally.** | **Residential/ Commercial**<br>**Public Buildings** |

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Microclimate and Outdoor Comfort**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

The angle of the sun as it appears in the sky when viewed from a particular location is dependent on the latitude of that location. At near-equatorial latitudes, such as in Dubai, the sun appears at higher polar angles with a more even irradiance of the south, east, and west quadrants of the sky than it would be at higher latitudes. In Dubai, the total amount of annual incident solar radiation in Dubai falling on the north facing vertical surfaces is circa 50% lower than on any other façade.

As a result of this, the direct solar heat gains (i.e. heat arising from sunlight penetration through glazing) will be significantly lower in buildings where most of the unshaded glazing has a predominantly north orientation.

Direct solar radiation through glazing substantially increases the cooling load of buildings. In densely occupied building types in Dubai such as offices and other commercial buildings, the demand for cooling tends to be high already without solar loads, due to the internal heat gains generated by lighting, equipment and the occupants themselves. Therefore, it is important to minimise any additional solar load to the cooling demand of buildings. The most effective way of reducing solar gains in buildings is by external shading. Another means of reducing solar gains, is to restrict the amount of glazing which faces the sun.

This regulation allows the choice of providing external shading or orientating the glazing.

Note that there are two compliance routes for energy performance in buildings. The standard method is referred to as the Elemental Method; the alternative method is referred to as the Performance Method. Details are given in Chapter 100 of the Green Building Regulations

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | | | | | |
| | Factories | | | | | |
| | Warehouses | | | | | |

## 5.0 Outcome/ Benefit

Successful implementation of this regulation will help to address energy efficiency right at the front end of the design process. It requires designers to take early consideration of building form, orientation and rationalization of the use of glass in buildings which ultimately will help reduce the demand for cooling in buildings. By reducing cooling requirements this regulation will result in energy savings.

By positioning the larger proportion of unshaded glazing areas on north facing facades which receive less amount of direct sunlight, it is estimated that a 3% reduction of the sensible cooling load and 1.5% reduction in the total energy used for cooling can be achieved compared with 40% glazed area on all walls.

By positioning horizontal shading fixtures with a Vertical Shadow Angle (VSA) of $70^{o}$ on a building with a glass surface area of 40% of that of the façade, the reduced direct solar radiation corresponds to a 7% reduction of the building's cooling demand.

## 6.0 Guidance

### 6.1 General

This regulation provides two alternative options to provide passive design features to a building. Either option may be selected but both are not required for compliance. It is however recommended that both means of reducing solar heat gain be considered**.**

Unprotected glazing in Dubai is not recommended and where practical it is always preferable to use external shading or reduce the amount of glazing facing the sun. External shading will remove the restriction of glazing orientation meaning glazing can be used in any orientation providing it incorporates an external shading device.

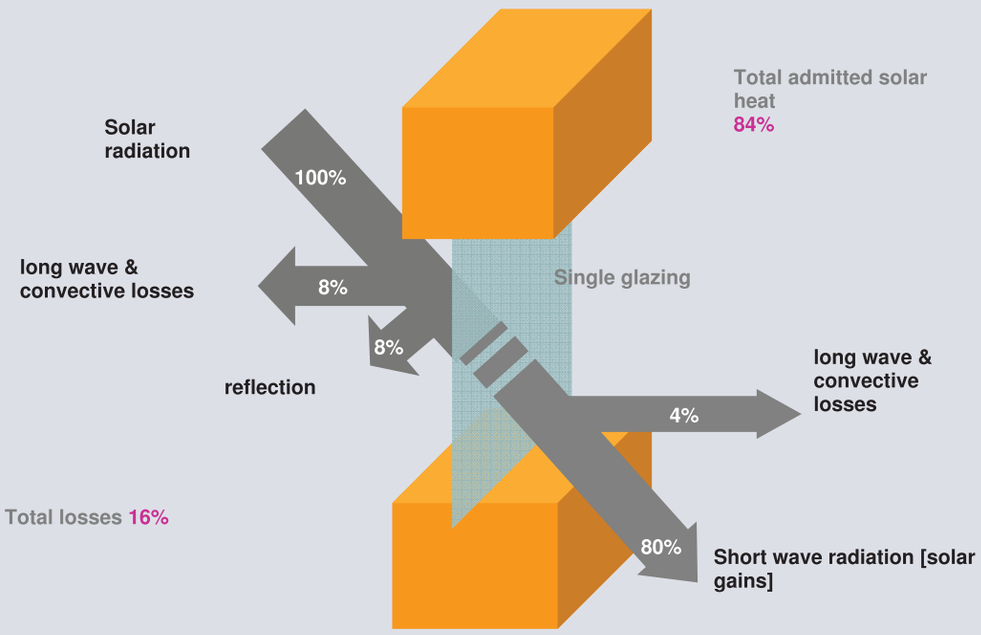
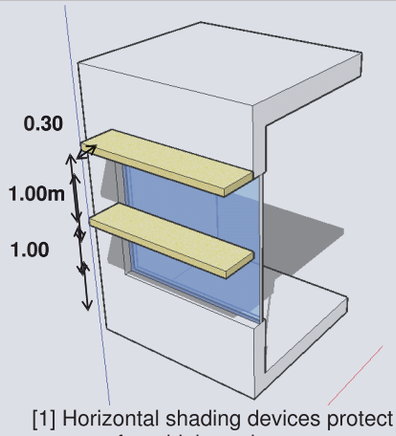



**Diagram illustrating how solar radiation is distributed after reaching a vertical glazed surface.**

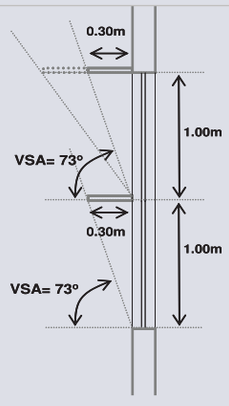
Tinted glass and internal blinds which are directly exposed to solar radiation absorb large amounts of heat which is then transferred into the building by conduction and convection. This results in additional cooling loads but the greatest negative effect is that it increases the internal surface temperature of the windows. This increases the mean radiant temperature of the room, making occupants feel uncomfortable, even when the air temperature is within comfortable levels. With external shading, direct solar radiation is intercepted before it reaches the glass.

External shading is more effective than improving the glass alone because it avoids incident radiation heating up the glass and transferring additional heat into the buildings. Where external shading can be integrated into the design in the form of balconies, canopies and other façade structures, further design efficiencies can be achieved. The smaller the Vertical and Horizontal Shadow Angles, the better the shading effect. However careful design will also have to balance effective shading with other façade design requirements such as the need for views and daylight.

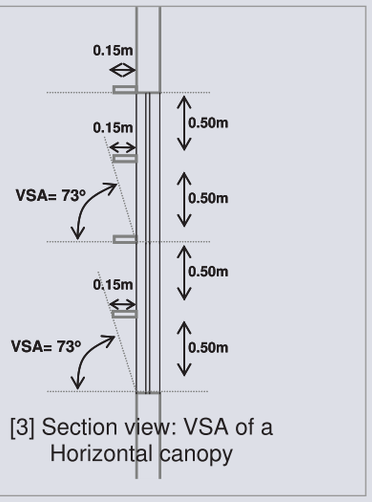
The use of external shading devices with a VSA of 70° is introduced here as a minimum requirement. Further shading will increase the benefit and this can be achieved simply by decreasing the VSA for horizontal shading systems. A VSA of 70° for a horizontal shading device represents an overhang of approximately 35cm deep for every 1m of glazing. However, the same VSA can be achieved by several combinations of shading design with the same effect, as illustrated below.



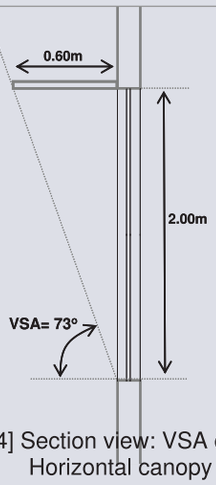

[1] Horizontal shading devices protect from high-angle sun




[2] Elevation view: VSA of a pair of horizontal fins



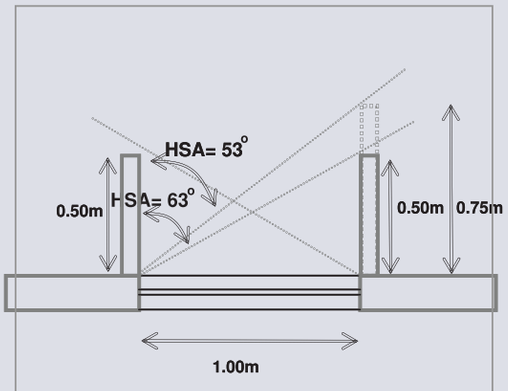

[3] Section view: VSA of a Horizontal canopy



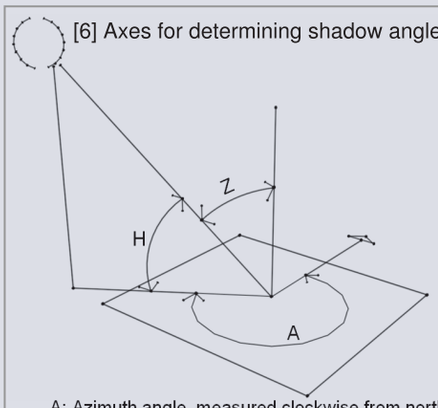

[4] Section view: VSA of a Horizontal canopy

In addition to horizontal shading systems, vertical fins can also be used to further reduce direct solar gains. These are measured using the Horizontal Shadow Angle (HSA). Vertical fins are particularly effective on East and West facades to increase solar protection from the lower sun angles of mornings and afternoons.

The smaller the HSA, the more effective the shading will be and like the VSA, the same HSA can be achieved through several design combinations.




[5] Plan view: HSA of a pair of vertical fins




[6] Axes for determining shadow angle

A: Azimuth angle, measured clockwise from north
H: Height angle, measured up from horizon
Z: Zenith angle, measured from vertical

## 6.2 Technical Data and Specifications

For the orientation option, calculate the total area of glazing on each façade and confirm that the north façade has at least 60% of the total area of glazing.

For the external shading option, install horizontal external shading devices with a minimum Vertical Shadow Angle (VSA) of seventy degrees (70°).

# 7.0 Compliance

## 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| Design/permit application | ✓ | | ✓ | | | |
| Construction | ✓ | | ✓ | | | |
| Commissioning/Completion | ✓ | | ✓ | | | |
| Operation | | | | | | |
| Refurbishment | ✓ | | ✓ | | | |
| Demolition | | | | | | |

## 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | *Green Building Declaration*<br>*Completed Self Assessment* |
| **Construction** | *Green Building Site File* with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed *Green Building Site File* |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

# 8. Common Practices / Solutions

Similar approaches are adopted in other countries although the details vary depending upon the specific climatic conditions of the region. Some cooler countries want to maximise heat gain through windows and hence encourage larger areas of glazing in certain circumstances. Conversely, Singapore recommends that total glazed area of a building should not exceed 40% but can be increased to 50% if external glazing is used.

# 9. References.

No references.

## 1.0 Hardscape

304.05

Villas

Residential/ Commercial

Public Buildings

Industrial

**For all new buildings, fifty percent (50%) of the Hardscape of the development must:**

1. **Demonstrate a Solar Reflective Index (SRI) of at least twenty nine (29), or**
2. **Use an open grid pavement system, or**
3. **Be shaded by vegetation or**
4. **Be shaded by materials with an SRI equal to or greater than those specified in Table 304.01 (1), or**

**A combination of the above.**

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Microclimate and Outdoor Comfort**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

The Urban Heat Island (UHI) effect is the temperature difference between urban and undeveloped areas. The UHI effect occurs due to the amount of high thermal mass materials present in built up areas, such as concrete and tarmac, which are commonly used in the construction of roads, sidewalks, parking lots, buildings and roofs. These materials absorb solar radiation during the day and then re-radiate some of it, leading to temperature differences of up to 3°C between urban and the surrounding undeveloped areas.

The properties of the materials which contribute to the Urban Heat Island effect are their solar reflectance, heat capacity and thermal emissivity.

Solar reflectance (or reflectivity) indicates how well a material reflects solar radiation. Surfaces with a low solar reflectance are usually dark in colour and absorb a high fraction of incoming solar radiation. The amount of energy absorption also depends on a material's specific heat capacity – how much heat they can store. The absorbed energy is then re-radiated by the material. Thermal emittance (or emissivity) indicates the ability of a material to radiate heart that it has absorbed. Surfaces with low emissivity cannot effectively radiate energy and therefore heat up.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | Applies to | Typology Subdivisions | Applies to |
|---|---|---|---|---|
| **Villa** | Private | ✓ | | |
| | Investment | ✓ | | |
| | | | | |
| **Residential/Commercial** | **Residential** | ✓ | **Commercial** | ✓ |
| | | | | |
| | Apartments | ✓ | Hotels | ✓ |
| | Offices | ✓ | Resorts | ✓ |
| | Labour Accommodation | ✓ | Restaurants/Food Outlets | ✓ |
| | Student Accommodation | ✓ | Laboratories | ✓ |
| | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | Retail Outlets | ✓ |

| | | | | |
|---|---|---|---|---|
| | Educational Facilities | ✓ | Post Offices | ✓ |
| | Government Buildings | ✓ | Banks | ✓ |
| | Worship Houses | ✓ | Museums | ✓ |
| | Petrol Stations | ✓ | Cinema/theatres | ✓ |
| | Shopping Mall | ✓ | Historical/heritage Buildings* | ✓ |
| | | | | |
| **Industrial** | Workshops | ✓ | | |
| | Factories | ✓ | | |
| | Warehouses | ✓ | | |
| | | | | |
| * to be discussed in more detail at later stage | | | | |

## 5.0 Outcome/ Benefit

Hardscaped areas with greater Solar Reflective Indices (SRIs) and shading will lower absolute urban temperatures. This will result in a reduction in energy requirements for the provision of cooling. In addition, improved pedestrian comfort will be achieved.

## 6.0 Guidance

### 6.1 General

The Solar Reflective Index (SRI) as defined by ASTM E1980 (Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces), incorporates both reflectivity and emissivity. Standard black (reflectivity 5%, emissivity 90%) has an index of 0, and standard white (reflectivity 80%, emissivity 90%) has an index of 100. Materials with higher SRI absorb less heat and reduce the UHI effect. Shading of the hardscape by permanent structures or plantings will also reduce the UHI effect, however the shading material must have a high SRI.

This regulation requires the use of materials having an SRI of 29 or higher for at least 50% of the hardscape of any building development, including paving materials and vehicle parking spaces. SRI values relate to materials, not locations and the values specified in this regulation relate to materials appropriate for Dubai's hot and arid climate.

Hardscape includes parking areas, roadways, paved courtyards and paths. Open grid pavement systems are pavement surfaces composed of structural units with void areas that are filled with pervious materials such as sand or grass turf.

The use of an open grid structure reduces the amount of material which absorbs heat and so is a suitable means of reducing the UHI effect.. Open grid paving systems have been used successfully in Europe for more than 30 years and are now available and being used in Dubai.
Trees and vegetation can be used to shade buildings and pavements and also provide some natural cooling. The planting of trees which will provide adequate shading within 36 months of building occupancy will meet the requirements of this regulation for the shaded area.

If planting is to be used to achieve compliance with this regulation, a declaration will be required from the landscape designer as to the amount of shading which will be provided to the hardscape area within 36 months.

Manufacturer suppliers of proprietary paving products should be able to provide Material Safety Data Sheets (MSDS) which detail the SRI value of their products. An indication of the SRI for some common paving materials is given in the table below.

**Table 305.07(1) – Solar Reflective Indices for common paving materials**

| Material | SRI |
|---|---|
| New Asphalt | 0 |
| New Grey Concrete | 35 - 50 |
| New White Concrete | 80 - 90 |

Note: To meet these requirements, the SRI value for new material should be used.

The SRI value of 29 has been chosen for this regulation as it allows the use of most types of concrete and concrete pavers but excludes asphalt. As many buildings in Dubai are presently being built to meet the requirements of international sustainability rating schemes, using materials with these SRI values is likely to also meet the requirements of various rating schemes.

### 6.2 Technical Data and Specifications

Materials for paving and vehicle parking spaces should be specified with SRI as indicated in the Regulation. Material Specification Data Sheets (MSDS) should detail the SRI value of the products.

Refer to Practice Guide 304.01 Urban Heat Island Effect for information on Solar Reflectance Index (SRI)

Open grid (porous pavers) pavement systems are defined as pavement that is less than 50% impervious. The system is typically composed of concrete or masonry units where at least 50% of the surface area consists of holes or openings that are filled with sand, gravel, other porous material, or vegetation.

Landscaping should utilise Local Species as detailed in 302.01.

## 7.0 Compliance

### 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

### 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | Green Building Declaration<br>Completed Self Assessment<br>Site plan drawings |
| **Construction** | Green Building Site File with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed Green Building Site File |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

## 8. Common Practices/ Solutions

The approach taken in this regulation is similar to that suggested in some building rating systems. For example, LEED credits shading or low SRI materials for 50% of hardscape.

## 9. References.

Dubai Green Building Regulations, Practice Guide 304.01

| 1.0 | Shading of Public Access Areas | 304.06 |
|---|---|---|
| | **For all new buildings, other than villas, all pedestrian linkages within the plot area must be shaded using materials with a Solar Reflectance Index (SRI) equal to or greater than those specified in Table 304.01 (1).** | Residential/ Commercial<br>Public Buildings<br>Industrial |

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Microclimate and Outdoor Comfort**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

Dubai's hot and humid climate makes it uncomfortable for pedestrians to walk for any significant distance in the summer months. Therefore, this regulation aims to provide a more comfortable outdoor environment for building users moving from car parking to the building entrances and along adjacent street pavements during the summer months through the provision of shading.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

## 5.0 Outcome/ Benefit

This regulation will improve conditions for pedestrians around and between buildings which will encourage spending more time outside and to reduce short distance vehicle use. The shading will also reduce the Urban Heat Island (UHI) Effect.

## 6.0 Guidance

### 6.1 General

The main pedestrian routes between parking areas and building entrances should be identified and a means of providing shading along the route identified. The shaded routes should extend into the parking areas as much as practicable but must, at least, be to the boundary of the parking area. A shaded route is required from a parking building that is located separately from the main building.

The shaded pedestrian route must lead to and from the building entrance closest to the building.

Where there is a pedestrian route on the building plot which runs alongside a public road the route is to be shaded. Shading of the public road is not required by this regulation.

### 6.2 Technical Data and Specifications

Where a roof structure is used to provide shading, the materials to be used will be dependent on the angle of the roof used.

Refer to Practice Guide 304.01 Urban Heat Island Effect for information on Solar Reflectance Index (SRI)

Table 304.01 (1) – Roof SRI Requirements

| Type of Roof | Minimum Roof SRI |
|---|---|
| Steep Sloped Roofs (slopes steeper than 1:6) | ≥ 29 |
| Flat and Low Sloped Roofs | ≥ 78 |

## 7.0 Compliance

### 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | ✓ | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

### 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | Green Building Declaration<br>Completed Self Assessment<br>Site Plan drawings |
| **Construction** | Green Building Site File with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed Green Building Site File |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

## 8. Common Practices / Solutions

The cover of pedestrian routes is commonly used to provide shelter from rain and hence the thermal properties (reflectance and emissivity) of the materials used are not a consideration. In Dubai where the intent is to provide a more pedestrian friendly route and to reduce Urban Heat Island the SRI of materials becomes important.

## 9. References.

Dubai Green Building Regulations, Practice Guide 304.01

## 1.0 Impact of Construction, Demolition and Operational Activities

305.01

Villas

Residential/ Commercial

Public Buildings

Industrial

**All new buildings must comply with all related regulations, local orders and their executive orders, technical guidelines and guides applied in the emirate and the following is required:**

1. **Neither the construction activity nor the operation of the building may cause land disturbances, surface runoff, soil erosion or sedimentation on any other property beyond the boundary of the plot.**
2. **Drainage must avoid pollution of watercourses and groundwater. Discharges made directly to ground, storm or marine waters must comply with the requirements of Dubai Municipality**
3. **Dust suppression techniques must ensure that dust generated by construction and demolition activities must meet the requirements of Code of Construction Safety Practice issued by Dubai Municipality.**
4. **Construction waste materials generated on site must be segregated and stored on site prior to collection. Segregation must, at a minimum, include labelled storage for inert aggregates, metals, timber, dry recyclables and hazard material.**
5. **For the disposal of hazardous waste, permit must be prepared and obtained from Dubai Municipality Environment Department . The hazardous waste must be transported in accordance with the requirements of DM Technical Guidelines and DM Code of Construction Safety Practice.**
6. **With the exclusion of drinking, toilet activities and concrete works, potable water cannot be used for construction activities on any project site**
7. **Construction and demolition noise must be no greater than that detailed in DM Technical Guidelines and DM Code of Construction Safety Practice.**
8. **Chemicals, fuels, solvents or hazardous wastes must be stored in accordance DM Technical Guidelines and DM Code of Construction Safety Practice.**
9. **Light pollution from the construction site must be minimised by ensuring that light sources are directed inwards and angled down so that no light is emitted above the horizontal plane. Lux levels should meet the DM Code of Construction Safety Practice.**

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Responsible Construction**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

This regulation addresses many aspects of the demolition, construction and operation of buildings which must be considered to ensure safe working conditions and to minimise impact on property, people and the environment.

With the many construction activities being undertaken in Dubai, this regulation has been drafted to detail some of the areas where special care should be taken to reduce the impact on other properties, people or the environment. Many of these issues are already addressed by existing Dubai Municipality (DM) requirements and, where appropriate, these have been detailed. Particular note should be taken of the DM publication, 'Code of Construction Safety Practice' which is available from DM in both Arabic and English. This Code details actions which should be followed to ensure safety on construction sites and should be consulted before demolition or construction starts on any site.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | ✓ | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | | **Commercial** | ✓ | |
| | | | | | | |
| | Apartments | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | |
| | Educational Facilities | ✓ | | Post Offices | ✓ | |
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

## 5.0 Outcome/ Benefit

Preventing erosion, sedimentation, and dust generation during construction activities will contribute to improved air quality, water quality, water habitat, and maintenance of drainage infrastructure. Preventing air and water pollution will avoid environmental damage and any potential human health impacts.

Reusing existing building materials, directly or indirectly will result in reduced construction waste volumes and also reduce environmental impacts associated with raw materials extraction, manufacturing and transportation.

Mitigating construction impacts is critical to the development of a sustainable city so that both the resident population and visitors can enjoy a high quality of life.

## 6.0 Guidance

### 6.1 General

Dubai Municipality has produced Technical Guideline No. 53 for undertaking an Environmental Impact Assessment (EIA) and Technical Guideline No. 56 to help develop an Environmental Development Plan. If either of these actions is taken the requirements of this regulation will be considered to have been met.

Construction activities must include measures to:

- Prevent the loss of soil during construction by stormwater runoff and/or wind erosion.
- Ensure that any stormwater drainage system is protected so that during any rain event, there will be no restriction to water flow. Drainage points must not be blocked by sand or other debris.
- Construction activities must prevent polluting the air with dust and particulate matter.

Where wastewater and stormwater is conveyed to a public drainage system, collection point, gutter or similar disposal method, water discharge limits, retention design and water quality must comply with DS 96 – DM Sewerage and Drainage Design Criteria and Local Order No. 61/1991 – Article 19. .

A dewatering permit must be obtained from Dubai Municipality prior to all dewatering activities. Any discharges of groundwater from construction sites must follow the conditions and requirements included in a groundwater discharge permit obtained from Dubai Municipality.

Dust control measures recommendations include:

- Soil compaction or stabilisation of all roadways using gravel or crushed concrete waste;
- Use of defined, established and restricted roadways;
- Restriction of vehicle movements to those that are strictly necessary;
- Limiting vehicle/equipment speed on site to no more than 5km/h;
- Use of suitable light water spray;
- Coordination of earthworks so as to minimise open excavation and work surfaces;
- Windrow all stockpiles and rubble so as to minimise wind surface effects;
- Minimisation of height and form of stockpiles; and
- Use of wind screens to slow surface wind movements.

While there are a number of temporary alternatives for dust control during construction, the project may opt to permanently modify the site to eliminate dust generation. Modifications could include measures such as covering exposed areas with vegetation, stone, or concrete.

There are a variety of documents that can be used as references for construction activities. These include:

- Dubai Municipality Technical Guidelines 29 and 48.
- Dubai Municipality Building Department's circular papers for construction and demolition activities C 77, C 89, C 108, C 117, C 139, C 154, C 158, C 161; and,
- Dubai Municipality's Building Department's 2008 Code of Construction's Safety Practice.

### 6.2 Technical Data and Specifications

Additional Dubai Municipality (DM) documents which may provide guidance on managing the impact of construction activities are listed in the references section below.

## 7.0 Compliance

### 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | ✓ | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

### 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | *Green Building Declaration*<br>*Completed Self Assessment* |
| **Construction** | *Green Building Site File* with orders and delivery notes for the correctly specified materials |
| **Commissioning/Completion** | Completed *Green Building Site File* |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

## 8. Common Practices / Solutions

It is normal for regional building regulators to require measures to ensure that the construction of a building does not adversely affect any neighbouring sites, the local infrastructure or surrounding environment.

## 9. References.


- UAE Federal Law 24 – 1999, Protection and Development of the Environment
- Dubai Municipality Local Order No. 61 of 1991 on The Environment Protection Regulations in the Emirates of Dubai
- Dubai Municipality's Technical Guidelines:
    - Technical Guideline No. 12 – Requirements for Gravity Oil-water Separator
    - Technical Guideline No. 26 - Requirements and Procedures for the Disposal of Hazardous Wastes
    - Technical Guideline No. 29 - Requirements for the Discharge of Waste Gases, Fumes, and Dusts to the Atmosphere
    - Technical Guideline No. 44 - Requirements for the Reduction of Construction / Demolition Noise (Article 42, of Administrative Order No. 211/91)
    - Technical Guideline No. 48 - Safety in Handling Asbestos
    - Technical Guideline No. 50 Requirements for the Transport of Hazardous Wastes
    - Technical Guideline No. 53 - Environmental Impact Assessment Procedures
    - The objectives of Dubai's EIA process are to predict and determine significant environmental impacts; to identify and incorporate into the project, appropriate abatement and mitigation measures; and to identify and incorporate safety and health plans.
    - Technical Guideline No. 56 (Amended March 1998) Establishment of Environmental Management Systems- Implementation of ISO 14001 in Dubai
    - This guideline has been produced to help all companies in Dubai seeking to develop an environmental management system. It is also intended as a guide to the approved certification bodies as means of ensuring consistent auditing policies.
    - Technical Guideline No. 57 – Bunding of Storage Tanks and Transfer Facilities
- Dubai Municipality's Building Department:
    - Circular No. 77, Concerning the Perennial Trees within the Existing Plots of Land and Farms
    - Circular No. 93 – Ref:812/02/19931 – Rainwater Drainage Orifices
    - Circular No. 89, Concerning the regulations of Noise Pollution Prevention
    - Circular No. 108-2001, Concerning the Special Protocol Control Procedures of Ozone Depleting Substances
    - Circular No. 117, Concerning Security and Safety Stipulations
    - Circular No. 139, Concerning Application of "Activation" Project to Strengthen the Role of Consulting Offices in the Supervision and Control of Construction Sites
    - Circular No. 154, Concerning Public Hygiene Requirements at Construction Sites and the Surrounding Environment, Addressed to the Consultancy Firms, Construction Companies, and Ready-mixed Concrete Plants in Dubai
    - Circular No. 158, Concerning Public Cleansing Organization and Improvement of the Visual Image of Construction Sites
    - Circular No. 161—2008, Concerning the Implementation of Green Building Standards in Dubai
- Dubai Municipality Information Bulletin, Environmental Standards and Allowable Limits of Pollutants on Land, Water, and Air Environment. May 2003.
- Dubai Municipality's Building Department 2008 Code of Construction's Safety Practice
- DS 96 – DM Sewerage and Drainage Design Criteria.

## 1.0 Environmental Impact Assessment

306.01

Villas

Residential/ Commercial

Public Buildings

Industrial

**For all new buildings, an Environmental Impact Assessment (EIA) and/or a Construction Environmental Management Plan (CEMP) is required to be submitted to Environment Department of Dubai Municipality and obtain approval, if one of the following criteria is applicable**

1. **If the building design has gross floor area of more than 10,000 square meter;**
2. **If the building has an occupancy of more than 1000 people;**
3. **If the building has a water usage of more than 100,000 litres/day;**
4. **If the building is located within or close to environmentally sensitive areas, such as, coastal area, creek, national park, historical park or wildlife conservation areas;**
5. **If the building is intended as industrial building;**
6. **If the building is intended as hospital or polyclinics; or**
7. **If the building has the potential to generate hazardous or toxic wastes such as laboratories, waste recycling or waste treatment.**

**The Dubai Municipality Environment Department's relevant Technical Guidelines for the Environmental Impact Assessment Procedure must be followed.**

## 2.0 Intent/Goal

- ☑ **Ecology and Planning – Environmental Impact Assessment**
- ☐ Building Vitality
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

All new buildings will have an impact on the environment of Dubai but some will have a much greater impact than others. This will depend of size, use, location and other factors.

Dubai Municipality (DM) Technical Guideline No 4 requires that all new industrial facilities submit an Environmental Impact Assessment (EIA) before gaining municipality approval. Technical Guideline No 53 details the procedures for preparing an EIA.

This regulation will require that for all new buildings application must be made to the Environmental Department of DM for them to determine whether an EIA or Construction Environmental Management Plan (CEMP) will be required for that specific building.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | Applies to: | Typology Subdivisions | Applies to: |
|---|---|---|---|---|
| **Villa** | Private | ✓ | | |
| | Investment | ✓ | | |
| | | | | |
| **Residential/Commercial** | **Residential** | ✓ | **Commercial** | ✓ |
| | | | | |
| | Apartments | ✓ | Hotels | ✓ |
| | Offices | ✓ | Resorts | ✓ |
| | Labour Accommodation | ✓ | Restaurants/Food Outlets | ✓ |
| | Student Accommodation | ✓ | Laboratories | ✓ |

| | | | | |
|---|---|---|---|---|
| **Public Buildings** | Healthcare Facilities | ✓ | Retail Outlets | ✓ |
| | Educational Facilities | ✓ | Post Offices | ✓ |
| | Government Buildings | ✓ | Banks | ✓ |
| | Worship Houses | ✓ | Museums | ✓ |
| | Petrol Stations | ✓ | Cinema/theatres | ✓ |
| | Shopping Mall | ✓ | Historical/heritage Buildings* | ✓ |
| **Industrial** | Workshops | ✓ | | |
| | Factories | ✓ | | |
| | Warehouses | ✓ | | |

## 5.0 Outcome/ Benefit

By requiring all new building to be assessed as to their level of impact to the environment, DM will be able to ensure that projects which may have a high impact are identified and suitable assessments are carried out if required.

## 6.0 Guidance

### 6.1 General

Upon application from the building developer, the Environmental Department of DM will decide whether an EIA or CEMP is required for a new building or whether neither will be required. An EIA is required for all industrial developments and is also likely to be required if a building is may have significant environmental effects by virtue of its characteristics, location and the nature of the potential impact and whether it is in an environmentally sensitive area.

The objectives of Dubai's EIA process are to predict and determine significant environmental impacts; to identify and incorporate into the project, appropriate abatement and mitigation measures; and to identify and incorporate safety and health plans. DM Technical Guideline No 53 details the procedures for preparing an EIA.

### 6.2 Technical Data and Specifications

DM Technical Guideline No 53 details the information required for an Environmental Impact Summary in Table 1 and Table 2 details the information required for an Environmental Impact Report (i.e. EIA)

## 7.0 Compliance

### 7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3rd party |
|---|---|---|---|---|---|---|
| **Design/permit application** | ✓ | | ✓ | | | |
| **Construction** | ✓ | | ✓ | | | |
| **Commissioning/Completion** | ✓ | | ✓ | | | |
| **Operation** | | | | | | |
| **Refurbishment** | ✓ | | ✓ | | | |
| **Demolition** | | | | | | |

### 7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---|---|
| **Design/permit application** | *Green Building Declaration*<br>*Completed Self Assessment*<br>*EIA submission (as per DM Environment Department's requirements)* |
| **Construction** | Environmental records as per EIA requirements |
| **Commissioning/Completion** | Completed *Green Building Site File* |
| **Operation** | n/a |
| **Refurbishment** | Any works requiring a building permit from DM are required to comply with the Green Buildings Regulations for Dubai. |
| **Demolition** | n/a |

## 8.0 Common Practices / Solutions

There is increasing understanding of the need to mitigate the impact of buildings on the environment both during construction and operation. The use of EIA's and CEMP's are commonly used to tools to control environmental impact. However, most countries have found it difficult to prepare and agree a standard checklist of conditions that determines whether or not a project requires an EIA. Most countries place the responsibility for determining this on the judgement of the relevant regulatory body, supported by guidance.

## 9.0 References.

Dubai Municipality (DM) Technical Guideline No 4 - Guidelines for Preparation of Environmental Impact Statements for New Industrial Premises

DM Technical Guideline No 53 - Environmental Impact Assessment Procedures.

# 400

## Building Vitality

- Ventilation and Air Quality
- Thermal Comfort
- Acoustic Comfort
- Hazardous Materials
- Daylighting & Visual Comfort
- Water Quality

## 1.0 Minimum Ventilation Requirements for Adequate Indoor Air Quality

401.01

Villas

Residential/ Commercial

Public Buildings

Industrial

**A All new and existing air conditioned buildings must be mechanically or mixed mode ventilated and must comply with the minimum requirements of ASHRAE Standard 62-2007.**

**Occupancy density for each space is determined based on its activity in accordance with the requirements of Dubai Municipality if available or using the default occupancy density values in ASHRAE 62-2007**

## 2.0 Intent/Goal

- ☐ Ecology and Planning
- ☑ **Building Vitality – Ventilation and Air Quality**
- ☐ Resource Effectiveness: Energy
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

## 3.0 Background

To ensure a suitable indoor air quality in buildings there must be an adequate ventilation system which introduces outside air. The minimum amount of outside air which is required is detailed in the references specified. Different requirements are specified for villas and for other types of buildings.

Due to the hot temperatures and humidity in Dubai, all buildings require air conditioning and mechanical ventilation to be installed. Mixed mode systems combining natural and mechanical ventilation may be used.

## 4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|---|---|---|---|---|---|---|
| **Villa** | | ✓ | | | | |
| | | | | | | |
| **Residential/ Commercial** | **Residential** | ✓ | ✓ | **Commercial** | ✓ | ✓ |
| | | | | | | |
| | Apartments | ✓ | ✓ | Hotels | ✓ | ✓ |
| | Offices | ✓ | ✓ | Resorts | ✓ | ✓ |
| | Labour Accommodation | ✓ | ✓ | Restaurants/Food Outlets | ✓ | ✓ |
| | Student Accommodation | ✓ | ✓ | Laboratories | ✓ | ✓ |
| | | | | | | |
| **Public Buildings** | Healthcare Facilities | ✓ | ✓ | Retail Outlets | ✓ | ✓ |
| | Educational Facilities | ✓ | ✓ | Post Offices | ✓ | ✓ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Government Buildings | ✓ | | Banks | ✓ | |
| | Worship Houses | ✓ | | Museums | ✓ | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings* | ✓ | |
| | | | | | | |
| **Industrial** | Workshops | ✓ | | | | |
| | Factories | | | | | |
| | Warehouses | ✓ | | | | |

## 5.0 Outcome/ Benefit

A minimum ventilation rate to maintain an adequate level of indoor air quality is critical to provide a safe environment for occupants' comfort, which minimises the potential for adverse health effects, and enhances occupants' productivity.

## 6.0 Guidance

### 6.1 General

ASHRAE Standards 62.1 and 62.2 are widely used standards for ventilation design and have been the design requirement for buildings in Dubai since 2003. The 2007 version of these standards has upgraded ventilation guidelines and must now be used for any new and existing air conditioned buildings. The building must comply with the standards listed below.

**Active Ventilation (Mechanical and mixed mode Ventilation):** ASHRAE 62.1-2007 Section 5-7 covers systems, equipment, procedures, construction, and system start up. Section 6 specifically establishes procedures for determining the minimum required ventilation rates for various uses. The ventilation rates will be determined using the Ventilation Rate Procedure (ASHRAE 62.1-2007 Section 6.2).

The Ventilation Rate Procedure determines the outdoor rate intake based on space type/application, occupancy level and floor area. Minimum rates are based on contaminant sources and source strengths that are typical for the listed space types.

If outdoor air quality is considered unacceptable, each ventilation system that provides outdoor air through an air supply fan shall comply with ASHRAE 62.1-2007 Section 6.2.1.

ASHRAE 62.1-2007 includes information regarding "Minimum Ventilation Rates in Breathing Zone" in Table 6.1.

Ventilation systems will be designed to be capable of providing the required ventilation rates in the breathing zone, whenever the zones served by the system are fully or partially occupied.

ASHRAE 62.2.2007 defines "Low rise residential buildings" as any residential building three stories or less than three stories. Thus, this standard is to be applied to Villas. Mechanical ventilation systems in Villas must comply with all the requirements included in ASHRAE 62.2.2007 Section 4.

### 6.2 Technical Data and Specifications

Buildings are required to comply with the relevant ASHRAE standards specified.

Note that the values specified are for the minimum volume of outside air required to provide a safe environment. Some research has shown that increased levels of outside air may provide a healthier environment and this regulation does not stop the use of higher volumes of air. Increased levels of ventilation may result in increased equipment and energy costs and therefore there is a balance to be struck.