

8.0 Best Practice

The insulation of pipes and ductwork is already common practice. The requirement of this regulation to use the type and amount of insulation detailed in a recognised Standard is already good practice in many countries.

9.0 References

British Standard BS5422-2009, Method for Specifying Thermal Insulating Materials for Pipes, Tanks, Vessels, Ductwork and Equipment. The standard can be obtained from: <http://www.bsi-global.com/en/>



| | | |
|-----|---|------------|
| 1.0 | Thermal Storage for District Cooling | 502.12 |
| | All new district cooling plants must incorporate a Thermal Energy Storage (TES) facility with a capacity of, at least, twenty percent (20%) of the design capacity of the plant. | |
| | | |
| | | Industrial |
| 2.0 | Intent/Goal <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – Conservation and Efficiency: Building Systems <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | |
| 3.0 | Background <p>District cooling plants are major providers of chilled water for air conditioning systems in Dubai's buildings. The peak demand for chilled water is during the afternoon, particularly in summer, which coincides with the overall Dubai demand for electricity. By incorporating thermal storage the district cooling plant can operate for longer periods including over night to store energy to meet the peak demand periods. This will result in less electricity being required during the afternoons and district cooling plant itself can be smaller.</p> | |
| 4.0 | Applicability <p>4.1 Type</p> <p>All water cooled chiller plants with size of 4,000 TR and above shall comply with this regulation regardless building typology.</p> | |
| 6.0 | Guidance <p>6.1 General</p> <p>District energy systems produce chilled water at a central plant and then distribute the energy through underground pipes to buildings connected to the system. Customers use the chilled water to meet their air-conditioning needs; Individual buildings do not need chillers or cooling towers. Once used in the buildings, the water is returned to the central plant to be re-chilled and then re-circulated through the closed-loop piping system.</p> <p>Thermal storage systems have become attractive by providing reduction in operational costs and avoidance or reduction of capital investment. Thermal storage systems provide reductions in operational costs by shifting electrical demand from on-peak to off-peak periods in order to reduce electrical costs. Capital investment for a chilled water thermal storage system has proven to be very cost competitive with conventional cooling systems of similar capacity. Many chilled water thermal storage systems have been in operation for several years and have proven savings as expected.</p> <p>6.2 Technical Data and Specifications</p> <p>The most common forms of thermal storage use ice (phase change) or chilled water (sensible heat). If producing ice there is less storage room required however more electricity is likely to be used than when producing chilled water.</p> <p>Designers and suppliers of HVAC equipment will be able to assist with the correct selection of heat recovery equipment</p> <p>Further information on District Cooling and Thermal Storage can be obtained from The International District Energy Association (IDEA), http://www.districtenergy.org/</p> | |



7.0 Compliance

7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP drawings and specifications |
| Construction | n/a |
| Commissioning/Completion | Completed Green Building Site File |
| Operation | Energy Consumption log |
| 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

The use of thermal storage for district cooling plants is now normal practice, particularly when off peak electricity tariffs are available.

9.0 References

The International District Energy Association (IDEA), <http://www.districtenergy.org/>



| 1.0 | Ductwork Air Leakage | 502.13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--|----------------------------|------------------------|-------------------------------|-----|----------|-----------------------|-----|----------|-------|--|---|--|--|--|--|----------------------------|-------------|--|--|------------|--|--|--|--|--|--|--|--|------------|---|--|--------|---|--|---------|---|--|---------|---|--|----------------------|---|--|--------------------------|---|--|-----------------------|---|--|--------------|---|--|------------------|-----------------------|---|--|----------------|---|--|------------------------|---|--|--------------|---|--|----------------------|---|--|-------|---|--|----------------|---|--|---------|---|--|-----------------|---|--|-----------------|---|--|---------------|---|--|-------------------------------|--|--|------------|-----------|---|--|--|--|--|-----------|---|--|--|--|--|------------|---|--|--|--|--|
| | <p>For all buildings, air ductwork must be designed, built and installed to ensure that air leakage is minimised.</p> <p>Ductwork, with equipment attached to it, with an external static pressure exceeding two hundred and fifty (250) Pascal (Pa) and all ductwork exposed to external ambient conditions or within unconditioned spaces must be pressure tested prior to occupancy in accordance with a method approved by Dubai Municipality (DM) and a compliant amount of air leakage achieved.</p> <p>Ductwork leakage testing must be carried out by a company approved by DM to conduct commissioning of buildings.</p> | Villas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Residential/ Commercial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Public Buildings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Industrial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | <p>Intent/Goal</p> <div><input type="checkbox"/> Ecology and Planning</div> <div><input type="checkbox"/> Building Vitality</div> <div><input checked="" type="checkbox"/> Resource Effectiveness: Energy – Conservation and Efficiency: Building Systems</div> <div><input type="checkbox"/> Resource Effectiveness: Water</div> <div><input type="checkbox"/> Resource Effectiveness: Materials and Waste</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.0 | <p>Background</p> <p>Poor quality workmanship in the manufacture or installation of ventilation ductwork leads to substantial air leakage requiring excessive energy use and the waste of conditioned air. The higher the internal pressure in the duct pressure the more serious is the potential for this loss of air. This regulation requires that certain classes of ductwork and associated equipment must be pressure tested to ensure that the maximum allowable amount of air leakage is not exceeded.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.0 | <p>Applicability</p> <table><tr><th>Main Typology Criteria</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th></tr><tr><td>Villa</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr><tr><td rowspan="6">Residential/ Commercial</td><td>Residential</td><td></td><td></td><td>Commercial</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Apartments</td><td>✓</td><td></td><td>Hotels</td><td>✓</td><td></td></tr><tr><td>Offices</td><td>✓</td><td></td><td>Resorts</td><td>✓</td><td></td></tr><tr><td>Labour Accommodation</td><td>✓</td><td></td><td>Restaurants/Food Outlets</td><td>✓</td><td></td></tr><tr><td>Student Accommodation</td><td>✓</td><td></td><td>Laboratories</td><td>✓</td><td></td></tr><tr><td rowspan="6">Public Buildings</td><td>Healthcare Facilities</td><td>✓</td><td></td><td>Retail Outlets</td><td>✓</td><td></td></tr><tr><td>Educational Facilities</td><td>✓</td><td></td><td>Post Offices</td><td>✓</td><td></td></tr><tr><td>Government Buildings</td><td>✓</td><td></td><td>Banks</td><td>✓</td><td></td></tr><tr><td>Worship Houses</td><td>✓</td><td></td><td>Museums</td><td>✓</td><td></td></tr><tr><td>Petrol Stations</td><td>✓</td><td></td><td>Cinema/theatres</td><td>✓</td><td></td></tr><tr><td>Shopping Mall</td><td>✓</td><td></td><td>Historical/heritage Buildings</td><td></td><td></td></tr><tr><td rowspan="3">Industrial</td><td>Workshops</td><td>✓</td><td></td><td></td><td></td><td></td></tr><tr><td>Factories</td><td>✓</td><td></td><td></td><td></td><td></td></tr><tr><td>Warehouses</td><td>✓</td><td></td><td></td><td></td><td></td></tr></table> | | 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 | ✓ | | | | |
| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Villa | | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Residential/ Commercial | Residential | | | Commercial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 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: Applies to Ductwork, with equipment attached to it, with an external static pressure exceeding two hundred and fifty (250) Pascal (Pa) and all ductwork exposed to external ambient conditions or within unconditioned spaces

5.0 Outcome / Benefit

This regulation will reduce air loss from air conditioning ductwork. Excessive leakage results in reduced efficiency of the air conditioning systems and increased energy use to provide additional volumes of conditioned air to compensate for losses. When ventilation ducts are manufactured and installed with minimum air leakage, the reduction of air leakage will reduce the waste of conditioned air; improve air quality in the building and yield economic and energy savings to the building operator.

6.0 Guidance

6.1 General

It is important that ductwork is manufactured and installed to minimise air leakage.

There are a number of internationally recognised codes which have been developed to detail suitable methods of performing and recording the testing of air leakage from ventilation ducts. Two possible means of testing for compliance with this regulation are listed to allow flexibility.

The Sheet Metal and Air Conditioning Contractors, National Association, HVAC Air Duct Leakage Test Manual (SMACNA 85) is the ductwork air leakage standard presently required to be applied in Dubai.

DW143 - A Practical Guide to Ductwork Leakage Testing and DW 144 - Specification for Sheet Metal Ductwork: Low, Medium and High Pressure/Velocity Air Systems 1998. Published by the Heating and Ventilating Contractors Association (HVCA), is now an alternative means of showing compliance to Dubai Municipality.

Pressure testing must be carried out before the ductwork is insulated unless it is pre-formed ductwork. After testing, the ducts should be insulated as per the Regulation 502.11 Pipe and Duct Insulation.

To ensure that the ductwork testing is carried out in accordance with the code used, certification must be done by pressure testing and witnessed by a suitably qualified person.

6.2 Technical Data and Specifications

The documents referred to provide all details of the testing regimes and also provide advice on how ductwork should be manufactured and installed.

7.0 Compliance

7.1 Responsibilities Matrix

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



7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---------------------------|--|
| Design/permit application | <i>Green Building Declaration</i> <i>Completed Self Assessment</i> |
| Construction | <i>Green Building Site File</i> with orders and delivery notes for the correctly specified materials |
| Commissioning/Completion | Completed <i>Green Building Site File</i> |
| 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

The requirement that air conditioning ductwork be tested to reduce possible air leakage is becoming common or mandatory practice in many countries around the world.

9.0 References.

Sheet Metal and Air Conditioning Contractors, National Association, HVAC Air Duct Leakage Test Manual 1985 (SMACNA 85). This manual contains duct constructions leakage classification, expected leakage rates for sealed and unsealed ductwork, duct leakage test procedures, recommendations on use of leakage testing, types of test apparatus and test setup and sample leakage analysis. It is available from the SMACNA website at <http://www.smacna.org/>

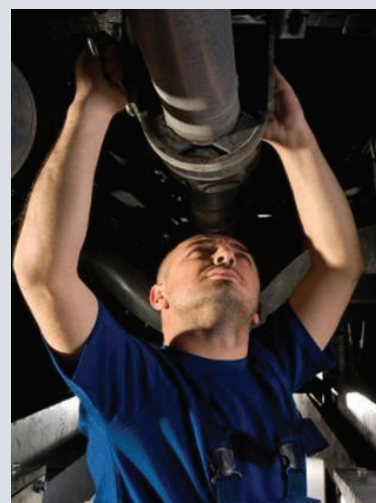
DW143 - A Practical Guide to Ductwork Leakage Testing, Published by the Heating and Ventilating Contractors Association (HVCA). The first section of this two part guide deals with the practical considerations of leakage testing and includes hints and tips as well as an example of a completed test sheet. The second section is for the most part extracted from DW144 and deals with ductwork classification and air leakage with an appendix to cover air leakage testing procedures.

DW 144 - Specification for Sheet Metal Ductwork: Low, Medium and High Pressure/Velocity Air Systems 1998. Published by the Heating and Ventilating Contractors Association (HVCA), DW144 is recognised throughout the UK as the Standard Specification for ductwork manufacture and installation.

They are available from the HVCA website at <http://www.hvca.org.uk/>



| 1.0 | Maintenance of Mechanical Systems | 502.14 |
|-----|--|--|
| | <p>For all new and existing air conditioned buildings, the mechanical-electrical and plumbing systems in buildings must be serviced and maintained regularly.</p> <ol style="list-style-type: none"> 1. To allow the mechanical services to be maintained, they must be installed so that adequate access is available to allow regular inspection, maintenance and cleaning of the equipment without the need to remove or dismantle any building components. 2. The building owner must ensure that a maintenance manual and schedule is developed for the building based on the instructions for preventative maintenance or service from the manufacturers or suppliers of equipment or according to Table 8.1 of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 62.1 – 2007 or equivalent as approved by DM. 3. The building owner must enter into a service contract with a maintenance company approved by Dubai Municipality (DM) or provide evidence that equipment will be properly maintained by competent members of their own staff. 4. Service records in the form of a service log book including details of both preventative and corrective maintenance must be kept onsite and be readily available for inspection by DM staff or their representatives. | <p>Villas</p> <p>Residential/ Commercial</p> <p>Public Buildings</p> <p>Industrial</p> |
| 2.0 | <p>Intent/Goal</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – Conservation and Efficiency: Building Systems <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | |
| 3.0 | <p>Background</p> <p>Mechanical systems in a building require regular maintenance to ensure that their full service life is achieved and that they operate efficiently with no excess energy use.</p> <p>Mechanical systems must be checked as detailed in the maintenance instructions, therefore it is important that easy access be provided to them.</p> <p>With the demand to maximise the amount of usable space in a building, there may be pressure on the designers to reduce the space used for the mechanical services which may impact the ability to carry out maintenance. It is important to ensure that adequate access is available.</p> <p>Maintenance is required once the building is operational. It is necessary to ensure that full details of the systems and their maintenance requirements are provided to the building owner by the design and construction teams.</p> <p>The requirement to enter into a service contract or to prove that equipment will be serviced by competent staff is intended to ensure that the prescribed maintenance will be carried out correctly and that maintenance will be performed by or under the supervision of competently trained personnel.</p> <p>The keeping of a log book is intended to record both programmed and corrective maintenance, to provide a history of work carried out and to allow the building owner or Dubai Municipality to check that the required level of maintenance is being achieved.</p> <p>This regulation reflects operational practices.</p> | |



4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|----------------------------|------------------------|-----|----------|--------------------------------|-----|----------|
| Villa | | ✓ | ✓ | | | |
| Residential/ Commercial | Residential | | | Commercial | | |
| | Apartment | ✓ | ✓ | 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

Maintaining all mechanical systems correctly will result in longer plant life, reduced energy use and a better indoor environment.

6.0 Guidance

6.1 General

The manufacturers of major mechanical equipment should provide full maintenance requirements for their plant. The mechanical design engineers should also provide guidance on the maintenance requirements of the systems that they have designed. This information will provide input into developing a maintenance manual.

At least the minimum maintenance activity and frequency requirements detailed in ASHRAE 62.1 – 2007 Table 8.1 must be carried out.



This table requires:

| ASHRAE 62.1 2007TABLE 8-1 Minimum Maintenance Activity and Frequency | | |
|--|---------------|---|
| Item | Activity Code | Minimum Frequency* |
| Filters and air-cleaning devices | A | According to O&M Manual |
| Outdoor air dampers and actuators | B | Every three months or in accordance with O&M Manual |
| Humidifiers | C | Every three months of use or in accordance with O&M Manual |
| Dehumidification coils | D | Regularly when it is likely that dehumidification occurs but no less than once per year or as specified in the O&M Manual |
| Drain pans and other adjacent surfaces | D | Once per year during cooling season or as specified in the O&M Manual subject to wetting |
| Outdoor air intake louvers, bird screens, mist eliminators, and adjacent areas | E | Every six months or as specified in the O&M Manual |
| Sensors used for dynamic minimum outdoor air control | F | Every six months or periodically in accordance with O&M Manual |
| Air-handling systems except for units under 2000 cfm (1000 L/s) | G | Once every five years |
| Cooling towers | H | In accordance with O&M Manual or treatment system provider |
| Floor drains located in plenums or rooms that serve as air plenums | I | Periodically according to O&M Manual |
| Equipment/component accessibility | J | |
| Visible microbial contamination | K | |
| Water intrusion or accumulation | K | |

ACTIVITY CODE:

- A. Maintain according to O&M Manual.
- B. Visually inspect or remotely monitor for proper function
- C. Clean and maintain to limit foaming and microbial growth.
- D. Visually inspect for cleanliness and microbial growth and clean when fouling is observed.
- E. Visually inspect for cleanliness and integrity and clean when necessary
- F. Verify accuracy and recalibrate or replace as necessary
- G. Measure minimum quantity of outdoor air. If measured minimum airflow rates are less than 90% of the minimum outdoor air rate in the O&M Manual, they shall be adjusted or modified to bring them above 90% or shall be evaluated to determine if the measured rates are in conformance with this standard
- H. Treat to limit the growth of microbiological contaminants.
- I. Maintain to prevent transport of contaminants from the floor drain to the plenums.
- J. Keep clear the space provided for routine maintenance and inspection around ventilation equipment.
- K. Investigate and rectify.



*Minimum frequencies should only be increased on the manufacturer's recommendation.

A service log book must be kept in the building by the maintenance contractor and be readily available for inspection by Dubai Municipality or their representative. The log book must show the dates when maintenance has been carried out, details of the work performed, and be signed by the person who has carried out the work or a responsible representative of the maintenance company. Separate logs may be kept for major items of plants such as chillers, cooling towers, and air handling units. Details of both programmed (preventative) and corrective maintenance must be included in the service log book which includes alterations to building layout and usage. Mechanical systems include but are not limited to: all fans, pumps, valves, chillers, filters, ducts, pipes, coils, sensors, dampers, fan coil units, air handlers and other mechanical plant. Note that system components such as ducts and valves must be maintained and cleaned, as well as the mechanical items of plant.

It is further recommended that the maintenance and operations manuals fully detail the operational intent of all equipment to describe how this contributes to the energy efficiency of the building and provide information on the safe storage of hazardous materials and the recycling/disposal thereof.

The wording "that adequate access is available" is used in this regulation as it is not possible to prescribe exact dimensions for every access panel.

6.2 Technical Data and Specifications

Maintenance is to be undertaken as specified by manufacturers at a minimum frequency detailed in ASHRAE 62.1 – 2007 Table 8.1

7.0

Compliance

7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP drawing sheet |
| Construction | Green Building Site File with orders and delivery notes for the correctly specified materials Operations manuals Manufacturers guidelines |
| Commissioning/Completion | Completed Green Building Site File Proof of a service contract Service records Maintenance manual |
| Operation | Service records |
| 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

While it is not common to regulate the maintenance of mechanical plant, it is widely accepted that such maintenance should be carried out.

9. References

ASHRAE 62.1-2007 Ventilation for Acceptable Indoor Air quality



| 1.0 | Commissioning of Building Services – New Buildings | 503.01 |
|-----|---|--|
| | <p>For all new air conditioned buildings, with a cooling load of one (1) megawatt (MW) or greater, other than villas the commissioning of air distribution systems, water distribution systems, lighting, central control and building management systems, refrigeration systems and boilers must be carried out before a completion certificate will be issued.</p> <ol style="list-style-type: none"> Commissioning must be carried out in accordance with the CIBSE Codes listed below or any other commissioning Standard or Code approved by Dubai Municipality (DM). <ol style="list-style-type: none"> ‘The Chartered Institution of Building Services Engineers (CIBSE) Commissioning Code, Air Distribution Systems, Code A-2006’ ‘CIBSE Commissioning Code, Water Distribution Systems, Code W-2003’ CIBSE Commissioning Code, Lighting, Code L-2003’ ‘CIBSE Commissioning Code, Automatic Controls, Code C-2001’ for central control and Building Management System (BMS); ‘CIBSE Commissioning Code R: 2002 Refrigeration Systems; and ‘CIBSE Commissioning Code B: 2002 Boilers’. Work must be carried out by a company approved by DM to conduct commissioning of buildings. Commissioning results must be recorded and available for inspection by DM A systems manual, documenting the information required to allow future operations staff to understand and optimally operate the commissioned services, must be developed and provided to the building owner or facilities operator following commissioning. | <div>Residential/ Commercial</div> <div>Public Buildings</div> <div>Industrial</div> |
| 2.0 | Intent/Goal <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – Commissioning and Management <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | |
| 3.0 | Background <p>The systems installed in new buildings must be operating correctly before the building is occupied. A means of ensuring this is to commission the systems in accordance with an internationally recognised regime.</p> <p>The correct operation of the central control system is important as this is a means of ensuring that the proper environment is provided.</p> <p>Commissioning should be performed prior to occupation, once the building structure and mechanical systems have been completed and are fully operational.</p> | |



Testing air flow

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: All new buildings with air conditioning systems with a cooling load of one (1) megawatt (MW) or greater. It does not apply to villas

5.0 Outcome / Benefit

The systems in the building will operate as designed and will provide the correct conditions and services to suit the occupants.

6.0 Guidance

6.1 General

During building design, the Mechanical, Electrical, Plumbing and Lighting engineers will design equipment, systems and controls to meet the requirements of the building.

The manufacture and installation of the systems are complex procedures and it is important that full testing and commissioning be carried out to ensure the correct operation of the systems.

There are a number of internationally recognised codes which have been developed to detail suitable methods of performing and recording the testing and balancing procedure. This regulation requires that work be carried out in accordance with Commissioning Codes developed by the Chartered Institution of Building Services Engineers (CIBSE).

These Codes detail fully the process of commissioning for various services and provide templates and checklists to be used. The result and reporting template developed by CIBSE may be used to show that the required testing and balancing has been successfully completed.

Should there be a wish to use an alternative testing and balancing protocol (other than CIBSE), details must be submitted to Dubai Municipality for approval before the work is carried out. A possible alternative commissioning code is that used in the State of California: California Commissioning Guide: New Buildings



To ensure that the commissioning is carried out in accordance with the code used, work must be carried out by a company approved by DM to conduct commissioning of buildings.

Membership of Chartered Institution of Building Services Engineers (CIBSE), ASHRAE, BSRIA, the Commissioning Specialists Association, National Environmental Balancing Bureau (NEBB) or a similar professional organisation could be a means of demonstrating suitable qualification to perform this commissioning work. It should be noted that most of these institutions publish testing and balancing guidelines.

6.2 Technical Data and Specifications

The full commissioning process is detailed in the CIBSE Codes for the services which are installed in the building.

7.0 Compliance

7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP Drawings |
| Construction | n/a |
| 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

It is good practice in many countries to apply an internationally recognised commissioning code of practice from a body such as CIBSE or ASHRAE. LEED requires that a level of commissioning is required as mandatory. The State of California requires that all government funded building be commissioned.

9.0 References

The Chartered Institution of Building Services Engineers (CIBSE) Commissioning Code, Air Distribution Systems, Code A-2006;

CIBSE Commissioning Code, Water Distribution Systems, Code W;

CIBSE Commissioning Code, Lighting, Code L-2003;

CIBSE Commissioning Code, Automatic Controls, Code C;

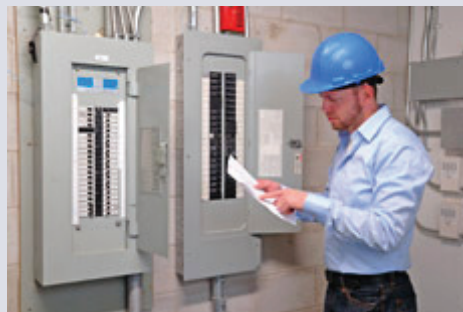
CIBSE Commissioning Code R: 2002 Refrigeration Systems;

CIBSE Commissioning Code B: 2002 Boilers.

These codes all published by The Chartered Institution of Building Services Engineers (CIBSE) and they are available from the CIBSE website www.cibse.org

California Commissioning Guide: New Buildings - California Commissioning Collaborative
<http://www.documents.dgs.ca.gov/green/commissioninguidenew.pdf>



| 1.0 | Re-Commissioning of Building Services – Existing Buildings | 503.02 |
|-----|--|---|
| | <p>For all existing air conditioned buildings, with a cooling load of two (2) megawatt (MW) or greater, other than villas the re-commissioning of ventilation, water systems central plant, lighting and control systems must be carried out at least once every five (5) years. Where possible the re-commissioning should be carried out in accordance with the requirements of Regulation 503.01 but at a minimum, systems are required to be re-commissioned to ensure that:</p> <ol style="list-style-type: none"> 1) The amount of fresh air supplied from each ventilation outlet is within plus or minus five percent (5%) of the design volume; 2) The volume of the chilled water supplied to any cooling coil is within plus or minus five percent (5%) of the design volume; 3) All mechanical devices, including but not limited to dampers, valves, fans, pumps, motors and actuators, operate freely and as required; 4) Filters and filter housings are sound and secure and that no unfiltered air bypasses the filter assembly; 5) Heat recovery systems are operating as designed; 6) Central plant equipment is tested to ensure that it operates through the full range of its capacity and that all design parameters are achieved; 7) All lighting systems and their controls operate as designed and that required levels of illumination are provided; 8) Controls are checked and re-calibrated for operation as designed and to ensure that any remote devices respond as required; and 9) Pipe and ducts are inspected to ensure there is no air or liquid leakage. <p>Commissioning results must be recorded and available for inspection by Dubai Municipality</p> <p>Work must be carried out by a contractor certified by Dubai Municipality to conduct commissioning of building services.</p> <p>Where original design requirements are not available, the contractor is to certify that, following re-commissioning, the systems are installed and operating correctly based on their experience and understanding of the systems.</p> | Residential/ Commercial Public Buildings Industrial |
| 2.0 | Intent/Goal <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – Commissioning and Management <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | |
| 3.0 | Background <p>While the systems installed in new buildings should be operating correctly when the building is occupied it is likely that over time the systems will no longer operate as designed. A means of returning the systems to their original standard is to re-commission the systems in accordance with the design parameters.</p> <p>The correct operation of the central control systems is important as this is a means of ensuring that the proper environment is provided.</p> <p>Re-commissioning should be performed at regular intervals during the life of the building.</p> |  |



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: All buildings with a cooling load of two (2) megawatt (MW) or greater. Does not apply to villas

5.0 Outcome / Benefit

The systems in the building should operate as designed and provide the correct conditions and services to suit the occupants. This regulation will help to ensure that all buildings with a cooling load of two (2) megawatt (MW) or greater will continue to operate as designed for all of their operating life.

6.0 Guidance

6.1 General

During building design, the Mechanical, Electrical, Plumbing and Lighting engineers will design equipment, systems and controls to meet the requirements of the building.

Manufacture and installation of the systems are complex procedures and it is important that full testing and commissioning be carried out to ensure the correct operation of the systems.

There are a number of internationally recognised codes which have been developed to detail suitable methods of performing and recording the testing and balancing procedure. This regulation requires that work be carried out in accordance with Commissioning Codes developed by the Chartered Institution of Building Services Engineers (CIBSE)

These Codes detail fully the process of commissioning for various services and provide templates and checklists to be used. The result and reporting template developed by CIBSE may be used to show that the required testing and balancing has been successfully completed.



Regulation 503.01 requires that new buildings with a cooling load of one (1) megawatt (MW) or greater must be commissioned in accordance with the CIBSE Commissioning Codes, or other approved method, before occupation.

This regulation requires that for all buildings with a cooling load of two (2) megawatt (MW) or greater must be re-commissioned to the same levels as required by 503.01, at least every five years. For existing buildings the first re-commissioning must be completed within five years of this regulation being implemented.

A 1994 study of 60 commercial buildings found that more than half suffered temperature control problems, 40% had problems with HVAC equipment and one-third had sensors that were not operating properly. And amazingly, 15% of the buildings were actually missing specified equipment. (Mary Ann Piette and Bruce Nordman, "Costs and Benefits of Utility Funded Commissioning of Energy- Efficiency Measures in 16 Buildings").

Unhealthy buildings are an even greater risk. A recent study in USA reported that 20-30% of commercial buildings suffer from indoor air quality problems. (Building Commissioning Guidelines: A source book on building systems performance. Energy Design Resources (a joint project of Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison)).

Should there be a wish to use an alternative testing and balancing protocol (other than CIBSE), details must be submitted to Dubai Municipality for approval before the work is carried out. A possible alternative commissioning code is that used in the State of California: California Commissioning Guide: Existing Buildings

To ensure that the commissioning is carried out in accordance with the code used, work must be carried out by a company approved by DM to conduct commissioning of buildings.

Membership of Chartered Institution of Building Services Engineers (CIBSE), ASHRAE, BSRIA, the Commissioning Specialists Association, National Environmental Balancing Bureau (NEBB) or a similar professional organisation could be a means of demonstrating suitable qualification to perform this commissioning work. It should be noted that most of these institutions publish testing and balancing guidelines.

6.2 Technical Data and Specifications

When possible the re-commissioning must be carried out in accordance with the full commissioning process as detailed in the CIBSE Codes for the services which are installed in the building.

If the original design parameters are not available, re-commissioning must be carried out, at a minimum, as detailed in the regulation.

7.0 Compliance

7.1 Responsibilities Matrix

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

7.2 Consultant Document Requirements

| Lifecycle Stage | Document Requirements |
|---------------------------|-----------------------|
| Design/permit application | n/a |
| Construction | n/a |
| Commissioning/Completion | n/a |
| Operation | Commissioning report |
| Refurbishment | Commissioning report |
| Demolition | n/a |



8.0 Common Practices/ Solutions

LEED for Existing Buildings required re-commissioning of the building services.

9.0 References

The Chartered Institution of Building Services Engineers (CIBSE) Commissioning Code, Air Distribution Systems, Code A-2006;

CIBSE Commissioning Code, Water Distribution Systems, Code W;

CIBSE Commissioning Code, Lighting, Code L-2003;

CIBSE Commissioning Code, Automatic Controls, Code C;

CIBSE Commissioning Code R: 2002 Refrigeration Systems;

CIBSE Commissioning Code B: 2002 Boilers.

These codes all published by The Chartered Institution of Building Services Engineers (CIBSE) and they are available from the CIBSE website www.cibse.org

California Commissioning Guide: Existing Buildings - California Commissioning Collaborative
<http://www.documents.dgs.ca.gov/green/commissioningguideexisting.pdf>

Building Commissioning Guidelines: A source book on building systems performance. Energy Design Resources (a joint project of Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison).

A number of reports have detailed the savings achieved by the re-commissioning of existing buildings, these include:

Portland Energy Conservation, Inc., "Commissioning for Better Buildings in Oregon", Oregon Office of Energy, March, 1997.

(Mary Ann Piette and Bruce Nordman, "Costs and Benefits of Utility Funded Commissioning of Energy-Efficiency Measures in 16 Buildings").



| 1.0 | Electricity Metering | 503.03 |
|-----|---|--|
| | <p>For all new buildings, meters must be fitted to measure and record electricity demand and consumption of the facility as a whole and to provide accurate records of consumption,</p> <p>For all new buildings, meters must be fitted to measure and record electricity demand and consumption of the facility as a whole and to provide accurate records of consumption,</p> <p>A. For all buildings with a cooling load of at least one (1) megawatt (MW) or gross floor area of 5,000 sq.M or greater , additional electrical sub-metering (of tariff class accuracy) must be installed to record demand and consumption data for each major energy-consuming system in the building. At a minimum, all major energy consuming systems with a load of hundred (100) kilowatts (kW) or greater must be sub-metered.</p> <p>B. The building operator shall be responsible for recording details of the energy consumption for the building and ensuring that major electricity uses are sub-metered. Records must be kept for five years.</p> <p>C. Each individual tenancy in the building must have a sub-meter installed when a building tariff meter is not present. These sub-meters should only be for demand management and electricity cost allocation purposes.</p> <p>D. Where a Building Management System (BMS) or Central Control and Monitoring System (CCMS) is installed, metering must be connected to allow real-time profiling and management of energy consumption.</p> <p>E. All meters must be capable of remote data access and must have data logging capability and complying with DEWA specifications. All meters should be approved by DEWA.</p> <p>F. Virtual meters using run-hours are not acceptable as sub-meters.</p> | <p>Residential/ Commercial</p> <p>Public Buildings</p> <p>Industrial</p> |
| 2.0 | <p>Intent/Goal</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – Commissioning and Management <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | |
| 3.0 | <p>Background</p> <p>For buildings with multiple tenants premises, it is sometimes difficult to monitor the energy consumption of a building as a whole. If this data is available it can be used as an aid in determining a building's overall energy performance.</p> <p>This regulation will result in the metering infrastructure being in place to allow this data to be obtained.</p> <p>Regular recording of the energy performance of the building as a whole and of the major areas of energy consumption in the building will provide a record of how these areas are performing. By monitoring energy use, it will be possible to identify any poorly performing areas and take steps to identify and remedy any issues arising.</p> | |



4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|------------------------|------------------------|-----|----------|--------------------------------|-----|----------|
| Villa | | | | | | |
| Residential/Commercial | Residential | | | Commercial | | |
| | Apartment | ✓ | | 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: Sub-metering is required for all buildings with a cooling load of at least one (1) megawatt (MW).

5.0 Outcome/ Benefit

Metering helps building occupiers to understand the energy consumption status, and enables them to identify and monitor patterns of energy use. It will also potentially enable tenants in multi occupancy buildings to be billing for electricity on the basis of their actual consumption, which will give them an incentive to use electricity more efficiently.

6.0 Guidance

6.1 General

Metering strategies should be considered at the design stage to ensure that the requirements of this regulation are met.

Sub-meters must be used to measure the energy consumed by individual large loads. A reasonable provision of sub-metering is for 90% of the estimated annual energy consumption of the building to be metered. This avoids the cost of installing sub-meters on systems that make only a minor contribution to the total building electricity demand.

If a DEWA tariff meter is to be installed for the complete building, an addition meter is not required. Meters are not required to measure third party tenancy (sub-let) areas.

The requirement that meters shall be approved by DEWA and must be capable of remote data access and must have data logging capability is so that, should a mandatory electricity usage reporting scheme be introduced in the future, the data will be easily recorded and reported.

Examples of major energy-consuming system in the building which should be sub-metered include, but are not necessarily limited to common areas, lifts, chillers, HVAC equipment e.g. fans and pumps and sub-distribution boards



The meters should be read on a monthly basis and the readings recorded in a building log book to compile the annual usage data. The log book must be available for inspection and the building owner may be required to provide this to DEWA or its representatives.

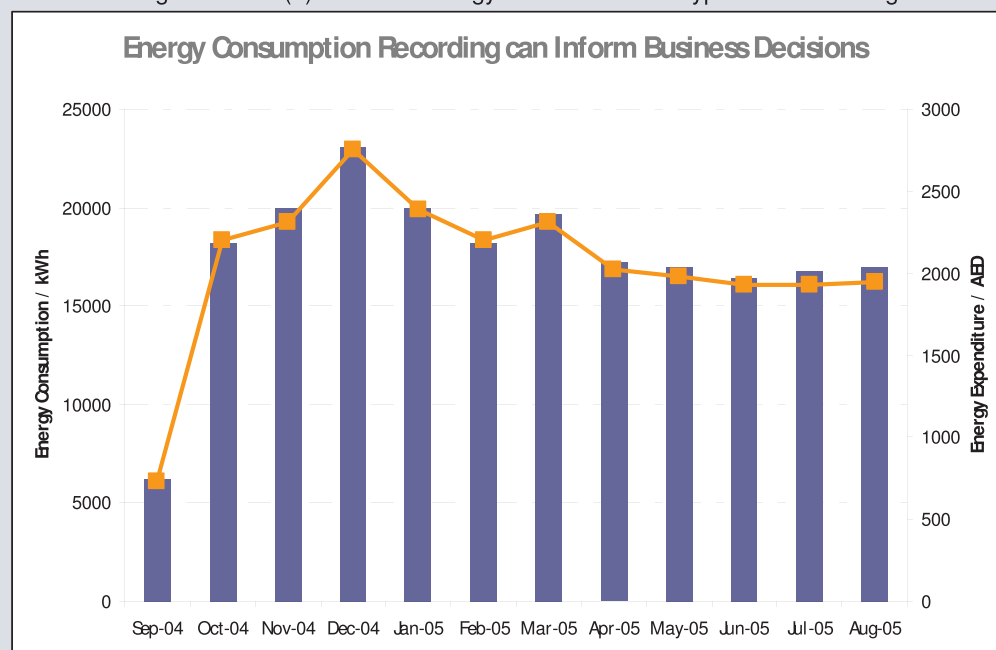
The information obtained can be exported to a suitable spreadsheet or data management system for analysis and report generation, or may be read manually, and the data recorded in a suitable log book.

A computerized spreadsheet system is acceptable but regular backup copies of the data should be kept. The reporting template to be used must clearly show the meter reference number, location, and the monthly meter readings and consumption. This is to ensure that there is no confusion over the readings from any specific meter. These meters will not be used as DEWA tariff meters and must be read by the building owner's representative.

Accurate energy consumption data will enable the building owner to see:

- Whether the current energy consumption has changed from previous levels;
- Trends in energy consumption that reflect season, weekly, and other operational parameters;
- How much the near-future energy use is likely to vary if aspects of the business change;
- Specific areas of wasted energy;
- Comparison with other business having similar characteristics (this "benchmarking" process will provide valuable indications of the effectiveness of the building, as well as the energy use);
- How the building has reacted to changes in the past; and
- How to develop performance targets for an energy management program.

Figure 503.01(1) – Annual Energy Performance of Hypothetical Building



6.2 Technical Data and Specifications

Two useful guides to metering and establishing a monitoring and target scheme for analysis of electricity consumption is:

GENERAL INFORMATION LEAFLET 65, Metering energy use in new non-domestic buildings, published by the UK Carbon Trust, and

CIBSE TM 22 Energy Assessment and Reporting Methodology:



7.0 Compliance

7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP drawings |
| Construction | Green Building Site File with orders and delivery notes for the correctly specified materials |
| Commissioning/Completion | Completed Green Building Site File |
| Operation | Energy consumption log |
| 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

Many European countries, including the United Kingdom, require electricity recording and reporting.

9.0 References

GENERAL INFORMATION LEAFLET 65, Metering energy use in new non-domestic buildings, published by the UK Carbon Trust, available on-line from www.carbontrust.co.uk

CIBSE TM 22 Energy Assessment and Reporting Methodology, available from The Chartered Institution of Building Services Engineers



| 1.0 | Air Conditioning Metering | 503.04 |
|-----|---|--|
| | <p>For all new buildings other than villas, which are supplied by a central air conditioning source (such as a chiller plant or district cooling), and where cooling energy is delivered individually to several consumers, meters must be fitted to measure and record chilled water supply to air conditioning units and to provide accurate records of consumption:</p> <p>A. Energy meters designed to measure the supply of chilled water must be installed for each dwelling unit, office, or tenant. The measuring device must measure the water flow and supply and return temperatures to determine the temperature differential and calculate the amount of cooling energy consumed.</p> <p>B. Where a Building Management System (BMS) or Central Control and Monitoring System (CCMS) is installed, metering must be connected to allow real-time profiling and management of energy consumption.</p> <p>C. Meters used must be specifically designed for the measurement of chilled water rather than for hot water.</p> <p>D. All meters must be capable of remote data access and must have data logging capability.</p> <p>E. Virtual meters using run-hours are not acceptable as sub-meters.</p> <p>F. The meter readings and actual consumption details should only be for demand management and cost allocation purposes.</p> | <p>Residential/ Commercial</p> <p>Public Buildings</p> <p>Industrial</p> |
| 2.0 | <p>Intent/Goal</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – Commissioning and Management <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | |
| 3.0 | <p>Background</p> <p>When the cost of air conditioning is included in the rental cost or allocated on the basis of floor area, this does not give the individual user any incentive to reduce their use of air conditioning as there is no financial gain. The electricity used by air conditioning systems may be charged directly to the user but the supply of chilled water is the main component of the air conditioning charge.</p> <p>If the supply of chilled water is metered and billed to the user based on actual consumption there would be a financial incentive for the user to manage the use of air conditioning; especially when parts of the building are unoccupied.</p> <p>This regulation will result in the metering infrastructure being in place to allow a charging method based on actual consumption to be introduced.</p> | |



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: Sub-metering is required for all buildings with a common source of chilled water.

5.0 Outcome/ Benefit

The infrastructure will be in place to allow building managers to bill users for chilled water on the basis of actual consumption. This would provide an incentive for the user to reduce their use of air conditioning and result in lower overall electricity use.

6.0 Guidance

6.1 General

Metering strategies should be considered at the design stage to ensure that the requirements of this regulation are met.

A typical modern, heated/chilled water metering system usually consists of several components:

- Flow Meter installed in the line
- A temperature transmitter mounted in the supply line to measure the supply temperature
- A temperature transmitter to measure return temperature
- A Flow Computer that will compute the energy flow
- An optional Data Logger/Modem that will monitor the customer site and provide trend information

NOTE: If remote metering is required, a remote PC, modem, and remote metering software may be used in conjunction with this.

Some energy meters are promoted as suitable for both hot and chilled water but meters designed specifically for use with chilled water must be used to comply with this regulation.



6.2 Technical Data and Specifications

DEWA issues separate metering specifications and guidelines, from time to time

7.0 Compliance**7.1 Responsibilities Matrix**

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP drawings |
| Construction | Green Building Site File with orders and delivery notes for the correctly specified materials |
| Commissioning/Completion | Completed Green Building Site File |
| Operation | Energy consumption log |
| 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

Provision of sub-metering of Chilled Water


9.0 References

No references.



| | | |
|-----|---|--|
| 1.0 | Central Control and Monitoring System | 503.05 |
| | <p>For all new buildings with a cooling load of one (1) megawatt (MW) or gross floor area of 5,000 sq.M or greater, the building must have a central control and monitoring system capable of ensuring that the building's technical systems operate as designed and as required during all operating conditions, and that the system provides full control and monitoring of system operations, as well as diagnostic reporting.</p> <p>At a minimum, the system must control the chiller plant, heating, ventilation and air conditioning (HVAC) equipment, record energy and water consumption and monitor and record the performance of these items</p> | <div>Residential/ Commercial</div> <div>Public Buildings</div> <div>Industrial</div> |

| | |
|-----|--|
| 2.0 | Intent/Goal <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – Commissioning and Management <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste |
|-----|--|

| | |
|-----|---|
| 3.0 | Background <p>The ability to use centralized control systems to ensure integrated performance of the mechanical systems in a building should result in efficient use of energy while providing an internal environment suitable for building occupants.</p>  |
|-----|---|

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 | ✓ | | Museums | ✓ | |



| | | | | | | |
|-------------------|-----------------|---|--|-------------------------------|---|--|
| | Houses | | | | | |
| | Petrol Stations | ✓ | | Cinema/theatres | ✓ | |
| | Shopping Mall | ✓ | | Historical/heritage Buildings | ✓ | |
| Industrial | Workshops | ✓ | | | | |
| | Factories | ✓ | | | | |
| | Warehouses | ✓ | | | | |

Note: All new buildings with a cooling load of one (1) megawatt (MW) or gross floor area of 5,000 sq.M or greater

5.0 Outcome / Benefit

The ability to fully control the operation of the air conditioning and other mechanical systems allows the most suitable internal environment to be provided in buildings. This will save energy while ensuring that the occupants have safe and comfortable conditions.

6.0 Guidance

6.1 General

Good controls are essential for the safe and efficient operation of a modern building. A control system must not only keep the inside of a building comfortable for the occupants, it must also keep the HVAC plant operating efficiently, and be capable of two-way communication with personnel charged with its operation. The complexity of systems varies, but whatever the size of the structure, good controls maximize energy conservation and reduce harmful emissions.

Central control and monitoring systems (CCMS) have various levels of sophistication; the simplest system allows an operator to check the operational status of the heating, ventilating and air conditioning (HVAC), fire and security systems and to control various equipments remotely from a central console. The most complex system ("Direct Digital Control" - DDC) has a digital computer to perform most of the work normally done by the operator, as well as other optimization and control functions. A CCMS is often also referred to as a Building Management System (BMS)

The following programs are indicative of the types of actions which the control system can perform to save money and energy in buildings. There are many other control and monitoring functions which the system can perform.

Start/Stop Program

This represents the simplest yet most effective energy saving program. It is designed to start and stop different HVAC equipment automatically according to a pre-determined schedule.

Reset Program

The actual cooling load is calculated in various zones and the supply air temperature is reset so that minimum cooling and reheating will occur. This action saves energy by matching the system to the actual building load during off-design conditions.

Start and Stop Time Optimisation Program

Comfort conditions are restored in time for occupancy in buildings where the air-conditioning equipment is shut down during the unoccupied hours, and the air conditioning systems are shut off earlier than the actual occupancy times if the required comfort conditions can be maintained.

Chiller Load Optimisation Program

This program is designed to maximize the cooling plant efficiency during all operating conditions and ensure minimum energy consumption. The overall cooling plant efficiency varies with the imposed cooling load. Interactive calculations determine the most efficient operating conditions.

Preventive Maintenance Program

Tantalization of machine running time enables maintenance personnel to service different equipment properly, based on total accumulated running time.



Light Control Program

This program is used to control lights in various zones of a building or group of buildings.

Fire Alarm and Life Safety Program

A computerized system for life safety, fire alarm, and smoke control operations can be designed to work in parallel with HVAC systems. Smoke control routines include control of special fans and air-handling units.

At a minimum, the system must control the chiller plant, ventilation and air conditioning equipment, record energy and water consumption and monitor and record the performance of these items. The utility consumption data must be exported into a suitable spreadsheet or data file on a monthly basis and be backed up accordingly.

The CCMS system is required to be commissioned at the time of the building becoming operational. Consideration must be given to the re-commissioning of the system at regular interval which should be no longer than three years.

6.2 Technical Data and Specifications

CIBSE Guide H: Building control systems covers all the key areas of control systems including:

- Introduction: the need for controls
- Control fundamentals
- Components and devices
- Systems, networks and integration
- Control strategies for subsystems
- Control strategies for buildings
- Use of BMS-derived data
- Management issues

7.0 Compliance**7.1 Responsibilities Matrix**

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP drawings and specifications |
| Construction | n/a |
| Commissioning/Completion | Completed Green Building Site File |
| Operation | Energy consumption log |
| 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

While it is common for buildings to use central control systems, there is little evidence of their use being mandated.

9.0 References

CIBSE Guide H: Building control systems: Published by The Chartered Institution of Building Services Engineers



| 1.0 | On-Site Renewable Energy – Small to Medium Scale Embedded Generators | | | | | 504.01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|---|-----|----------|--------------------------|-----|---|------------------------|-----------------------|-----|----------|-----------------------|-----|----------|-------|--|---|--|--|--|--|----------------------------|-------------|---|--|------------|---|--|------------|---|--|--------|---|--|---------|---|--|---------|---|--|----------------------|---|--|--------------------------|---|--|-----------------------|---|--|--------------|---|--|------------------|-----------------------|---|--|----------------|---|--|------------------------|---|--|--------------|---|--|
| | <p>For all new buildings:</p> <p>Where a building incorporates on-site generation of electricity from small or medium scale embedded generators using renewable energy sources; the equipment, installation and maintenance of the system must be stand-alone (off-grid) and therefore not connected to the Dubai Electricity and Water Authority (DEWA) network and DEWA will provide electricity supply to the building when needed without parallel connection</p> | | | | | Villas Residential/ Commercial Public Buildings Industrial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | Intent/Goal <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – On-site Systems: Generation and Renewables <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.0 | Background <p>There is growing interest in producing electricity from renewable sources. The most common of these is using solar input such as photovoltaic cells or concentrating solar thermal systems or harnessing wind. Whilst much of this will be done on a large scale some electricity can be produced at building level by small scale embedded generators (SSEG).</p> <p>These energy generation systems can be connected to an electricity grid or be standalone with suitable means of storage. This Practice Guidance only considers the connection of on site renewable energy systems to the DEWA electricity grid.</p> <p>It is likely that a majority of SSEGs in Dubai will be solar photovoltaics. This technology converts the sun's energy to DC electrical energy which is then connected to the AC grid via an inverter. There are many issues associated with connecting systems such as these to the electrical grid which this Practice Guidance addresses.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.0 | Applicability <table border="1"> <thead> <tr> <th>Main Typology Criteria</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th></tr> </thead> <tbody> <tr> <td>Villa</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr> <tr> <td rowspan="5">Residential/ Commercial</td><td>Residential</td><td>✓</td><td></td><td>Commercial</td><td>✓</td><td></td></tr> <tr> <td>Apartments</td><td>✓</td><td></td><td>Hotels</td><td>✓</td><td></td></tr> <tr> <td>Offices</td><td>✓</td><td></td><td>Resorts</td><td>✓</td><td></td></tr> <tr> <td>Labour Accommodation</td><td>✓</td><td></td><td>Restaurants/Food Outlets</td><td>✓</td><td></td></tr> <tr> <td>Student Accommodation</td><td>✓</td><td></td><td>Laboratories</td><td>✓</td><td></td></tr> <tr> <td rowspan="2">Public Buildings</td><td>Healthcare Facilities</td><td>✓</td><td></td><td>Retail Outlets</td><td>✓</td><td></td></tr> <tr> <td>Educational Facilities</td><td>✓</td><td></td><td>Post Offices</td><td>✓</td><td></td></tr> </tbody> </table> | | | | | | 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 | ✓ | |
| 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 | ✓ | | | | |

If on-site renewable energy generating systems are installed in existing buildings the same requirements must be complied with.

5.0 Outcome/Benefit

The intent is to increase the contribution from renewable energy with in Dubai and the built environment has significant potential to contribute to this. Small and medium scale renewable energy systems are becoming more feasible both technically and financially for integration into buildings. They also offer many benefits including distribution of energy, energy efficiency, reduced CO2 emissions and can also contribute to a building's rating when assessed by one of the many sustainability assessment tools such as LEED.

6.0 Guidance

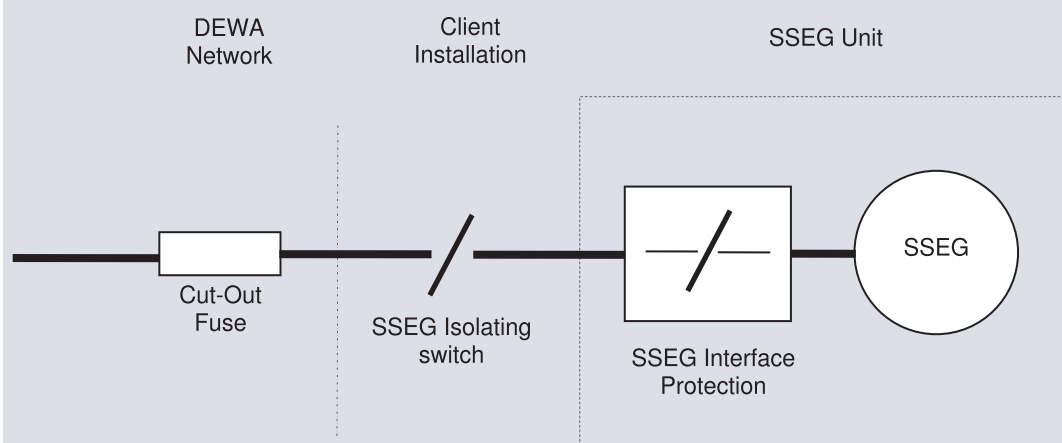
6.1 General

There is no single global grid connection standard or regulation although there are calls for many parts of the renewable energy industry to have one. Therefore, the standard selected for Dubai should be based on the standard from a country with the same grid operation voltage, frequency and characteristics so that it is technically viable and therefore more easily applicable. The UK Engineering Recommendation G83/1 meets these criteria and is therefore a good choice for small scale building integrated renewable up to 16 Amps per phase. Engineering Recommendation G59/1 should be followed for medium scale building integrated renewable up to 5 MW up to 5 MW. Therefore, all equipment that will be installed will have to be compliant with ER G83/1 or G59/1.

ER G83/1 recommends that for a single connection there is no need to inform the District Network Operator (DNO) but is required for multiple connections. For Dubai however, all installations must be notified to DEWA.

It is recommended that the Engineering Recommendations G83/1 and G59/1 is used as the basis for the implementation of renewables in the built environment of Dubai. The documents provide guidance on the technical requirements for the connection of small scale embedded generators (SSEG) in parallel with public low voltage distribution networks.

The following diagram details a connection of an SSEG into the DEWA electricity grid.



There are many other international Standards for the connection of small and medium sized electricity generators

and these may be used if approved by DEWA.

6.2 Technical Data and Specifications

Consideration should also be taken of the requirements of:

BS Wiring regulations BS 7671 – <http://www.bsi-global.com>

Guidance on the Electricity, Safety, Quality and Continuity Regulations 2002 (ESQCR) – <http://www.berr.gov.uk>

7.0 Compliance

7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP drawings and specifications |
| 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 |

8.0 Common Practices/ Solutions

The use of renewable electricity generation at the building level has grown dramatically in the last decade. This has required the development of suitable guidelines and regulations to control the quality of equipment and the impact on existing electricity grids.

9.0 References

G83/1 Recommendations for the Connection of Small-Scale Embedded Generators (up to 16 A per phase) in parallel with Public Low-Voltage Distribution Networks

G59/1 Recommendations for the Connection of Embedded Generating Plant to the Public Electricity Suppliers' Distribution Systems

Energy Networks Association – <http://2009.energynetworks.org/distributed-generation>

BS Wiring regulations BS 7671 – <http://www.bsi-global.com>

Guidance on the Electricity, Safety, Quality and Continuity Regulations 2002 (ESQCR) – <http://www.berr.gov.uk>



| 1.0 | On-Site Renewable Energy – Outdoor Lighting | | | | | 504.02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--|-----|----------|--------------------------------|-----|----------------------------|------------------------|-----------------------|-----|----------|-----------------------|-----|----------|-------|--|---|--|--|--|--|----------------------------|-------------|---|--|------------|---|--|------------|---|--|--------|---|--|---------|---|--|---------|---|--|----------------------|---|--|--------------------------|---|--|-----------------------|---|--|--------------|---|--|--|--|--|--|--|--|---------------------|-----------------------|---|--|----------------|---|--|------------------------|---|--|--------------|---|--|----------------------|---|--|-------|---|--|----------------|---|--|---------|---|--|-----------------|---|--|-----------------|---|--|---------------|---|--|--------------------------------|---|--|------------|-----------|---|--|--|--|--|-----------|---|--|--|--|--|------------|---|--|--|--|--|
| | <p>For all new buildings:</p> <p>Where the light power density of external lighting exceeds that specified in Regulation 502.05, Lighting Power Density – Exterior, any additional lighting load must be powered entirely through renewable electricity sources such as photovoltaic systems.</p> | | | | | Villas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Residential/ Commercial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Public Buildings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Industrial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | Intent/Goal <ul style="list-style-type: none"> <input type="checkbox"/> Ecology and Planning <input type="checkbox"/> Building Vitality <input checked="" type="checkbox"/> Resource Effectiveness: Energy – On-site Systems: Generation and Renewables <input type="checkbox"/> Resource Effectiveness: Water <input type="checkbox"/> Resource Effectiveness: Materials and Waste | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.0 | Background <p>Regulation 502.05 specifies the maximum energy that can be used for lighting in external areas of new buildings. Additional outdoor lighting will be allowed if powered from renewable energy sources.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.0 | Applicability <table border="1"> <thead> <tr> <th>Main Typology Criteria</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th></tr> </thead> <tbody> <tr> <td>Villa</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr> <tr> <td rowspan="6">Residential/ Commercial</td><td>Residential</td><td>✓</td><td></td><td>Commercial</td><td>✓</td><td></td></tr> <tr> <td>Apartments</td><td>✓</td><td></td><td>Hotels</td><td>✓</td><td></td></tr> <tr> <td>Offices</td><td>✓</td><td></td><td>Resorts</td><td>✓</td><td></td></tr> <tr> <td>Labour Accommodation</td><td>✓</td><td></td><td>Restaurants/Food Outlets</td><td>✓</td><td></td></tr> <tr> <td>Student Accommodation</td><td>✓</td><td></td><td>Laboratories</td><td>✓</td><td></td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td rowspan="6">Public Buildings</td><td>Healthcare Facilities</td><td>✓</td><td></td><td>Retail Outlets</td><td>✓</td><td></td></tr> <tr> <td>Educational Facilities</td><td>✓</td><td></td><td>Post Offices</td><td>✓</td><td></td></tr> <tr> <td>Government Buildings</td><td>✓</td><td></td><td>Banks</td><td>✓</td><td></td></tr> <tr> <td>Worship Houses</td><td>✓</td><td></td><td>Museums</td><td>✓</td><td></td></tr> <tr> <td>Petrol Stations</td><td>✓</td><td></td><td>Cinema/theatres</td><td>✓</td><td></td></tr> <tr> <td>Shopping Mall</td><td>✓</td><td></td><td>Historical/heritage Buildings*</td><td>✓</td><td></td></tr> <tr> <td rowspan="3">Industrial</td><td>Workshops</td><td>✓</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Factories</td><td>✓</td><td></td><td></td><td></td><td></td></tr> <tr> <td>Warehouses</td><td>✓</td><td></td><td></td><td></td><td></td></tr> </tbody> </table> | | | | | | 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 | ✓ | | | | |
| 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 | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 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 offers a sustainable alternative to those building owners who wish to have more than the regulated level of outdoor lighting.

6.0 Guidance

6.1 General

Regulation 502.05 specifies maximum lighting power density levels for exterior lighting as below:

Table 502.05(1) – Building Exterior Lighting Power Density

| Building Area | Maximum Watts per square metre or linear metre |
|--|--|
| Uncovered parking lots and drives | 1.6 W/m ² |
| Walkways less than 3 metres wide | 3.3 W/linear metre |
| Walkways 3 metres wide or greater | 2.2 W/m ² |
| Outdoor Stairways | 10.8 W/m ² |
| Main entries | 98 W/linear metre of door width |
| Other doors | 66 W/linear meter of door width |
| Open sales areas (including vehicle sales lots) | 5.4 W/m ² |
| Building Facades | 2.2 W/m ² for each illuminated wall or surface or 16.4 W/linear metre for each illuminated wall or surface length |
| Entrances and gatehouse inspection stations at guarded facilities | 13.5 W/m ² |
| Drive-up windows at fast food restaurants | 400 W per drive-through |

Lighting Power Densities for exterior areas not listed in Table 502.05 (1) should be no greater than those values given in ASHRAE 90.1-2007 Table 9.4.5.

Lights powered by photovoltaic cells provide an option when a building owner wishes to exceed the approved LPD. These lights also have the advantage that they can be self contained and do not require the expense of being connected to a mains source of electricity.



6.2 Technical Data and Specifications

Lighting suppliers will be able to provide all technical support required.

7.0 Compliance

7.1 Responsibility Matrix

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



7.2 Consultant Documents

| Lifecycle Stage | Document Requirements |
|---------------------------|--|
| Design/permit application | Green Building Declaration Completed Self Assessment MEP drawings and specifications (if required) |
| Construction | n/a |
| 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

The technology of solar powered lighting is advancing rapidly and their use is growing.

9.0 References.

No references



| | | |
|-----|--|--------------------------------------|
| 1.0 | On-Site Renewable Energy – Solar water Heating System | 504.03 |
| | <p>For all new villas and labour accommodations, a solar water heating system must be installed to provide seventy five (75%) of domestic hot water requirements. Solar water heating installations must be fitted with insulated storage tanks and pipes, sized and fitted in accordance with the solar panel manufacturer's requirements for each specific application. The supplementary heating system shall be controlled so as to obtain maximum benefit from the solar heater before operating.</p> <p>Where solar water heaters are being installed, the equipment, installation, operation and maintenance of the system must be:</p> <p>A. Designed and installed by an installation company approved by Dubai Municipality (DM);</p> <p>B. Equipment must be approved by DM; and</p> <p>C. Regularly cleaned and maintained to ensure continuous efficient operation.</p> | Villas Residential/ Commercial |

2.0 Intent/Goal

- ☐ Ecology and Planning
- ☐ Building Vitality
- ☒ **Resource Effectiveness: Energy – On-site Systems: Generation and Renewables**
- ☐ Resource Effectiveness: Water
- ☐ Resource Effectiveness: Materials and Waste

3.0 Background

Dubai has very high solar resources and Solar Hot Water (SHW) systems are the most cost effective means of using the power of the sun. With their high roof to gross floor area ratio and consistent need for hot water, villas and labour accommodation are the most suitable type of building for the application of this technology.

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: All new villas and labour accommodation only.

5.0 Outcome/ Benefit

The use of Solar Heating systems will have a significant impact on reducing electricity use in Dubai.

6.0 Guidance

6.1 General

If a solar water heating system is designed to provide a building's entire hot water requirement it would be oversized for most of the year. This regulation recognizes that it is likely to be most cost effective if the solar water heating system is supplemented by other forms of heating for 25% of the time. Normally the additional heating would be provided by an electric element in the solar water heating system storage tank. The supplementary heating should only be used if the solar input is not adequate. In Dubai this is most likely to be at night. Modern controllers are able to ensure the maximum use of solar resources.

The installation and commissioning of solar water heating systems must be installed and commissioned by a company approved by Dubai Municipality.

The Dubai conditions, with high dust content in the air plus high humidity, result in a build up of dust on the solar collector panels. This requires regular cleaning as the dust reduces the efficiency of the system,

While this regulation only covers the use of solar water heating at villas and labour accommodation, the technology can be used with many other buildings.

6.2 Technical Data and Specifications

Approved solar water heating system installers will be able to provide all technical support required.

7.0 Compliance

7.1 Responsibility Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP Drawings |
| Construction | n/a |
| 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 |

9.0 Common Practices / Solutions

Solar water heating systems have been used for more than eighty years and in some countries with climates such as UAE, up to 90% of households use such systems. With increased demand for using energy from renewable sources solar hot water is one of the leading technologies.

10 References.

There are many Standards and Code of practice relating to solar water heating systems. An example is The Code of Practice for the Manufacture and Installation of SWH Systems available from the New Zealand Solar Industries Association website. www.solarindustries.org.nz





600

Resource Effectiveness: Water

- Conservation and Efficiency
- Commissioning & Management
- On-Site Systems: Recovery & Treatment

| 1.0 | Water Efficient Fittings | 601.01 | | | | | | | | | | | | |
|--------------------|--|----------------------------|-------------------|-------------|---------------------|------------------|---------------------|---------------|---------------------|--------------------|--|--------|--------------------------------|--------|
| | <p>For all new buildings:</p> <p>A. Water-conserving fixtures must be installed meeting the criteria in Table 601.01 (1):</p> <p>Table 601.01 (1)</p> <table><tr><th>Fixture Type</th><th>Maximum Flow Rate</th></tr><tr><td>Showerheads</td><td>8 Litres Per Minute</td></tr><tr><td>Hand wash basins</td><td>6 Litres Per Minute</td></tr><tr><td>Kitchen sinks</td><td>7 litres per minute</td></tr><tr><td>Dual Flush Toilets</td><td>6 Litres Full flush 3 Litres Part flush</td></tr><tr><td>Urinal</td><td>1 Litre per flush or waterless</td></tr></table> | Fixture Type | Maximum Flow Rate | Showerheads | 8 Litres Per Minute | Hand wash basins | 6 Litres Per Minute | Kitchen sinks | 7 litres per minute | Dual Flush Toilets | 6 Litres Full flush 3 Litres Part flush | Urinal | 1 Litre per flush or waterless | Villas |
| | Fixture Type | Maximum Flow Rate | | | | | | | | | | | | |
| | Showerheads | 8 Litres Per Minute | | | | | | | | | | | | |
| | Hand wash basins | 6 Litres Per Minute | | | | | | | | | | | | |
| | Kitchen sinks | 7 litres per minute | | | | | | | | | | | | |
| Dual Flush Toilets | 6 Litres Full flush 3 Litres Part flush | | | | | | | | | | | | | |
| Urinal | 1 Litre per flush or waterless | | | | | | | | | | | | | |
| | | Residential/ Commercial | | | | | | | | | | | | |
| | <p>B. Dual flush toilets must be used;</p> <p>C. Automatic (proximity detection) faucets / push button faucets must be installed in all public facilities;</p> <p>D. Cisterns serving single or multiple urinals in public, commercial, and industrial buildings must be fitted with manual or automatic flush controls that are responsive to usage patterns. Only sanitary flushing is acceptable during building closure or shutdown (including overnight); and</p> <p>E. Faucets installed as a component of a specialised application may be exempt from the flow rates upon application to Dubai Municipality.</p> | Public Buildings | | | | | | | | | | | | |
| | | Industrial | | | | | | | | | | | | |
| 2.0 | <p>Intent/Goal</p> <div><input type="checkbox"/> Ecology and Planning</div> <div><input type="checkbox"/> Building Vitality</div> <div><input type="checkbox"/> Resource Effectiveness: Energy</div> <div><input checked="" type="checkbox"/> Resource Effectiveness: Water – Conservation and Efficiency</div> <div><input type="checkbox"/> Resource Effectiveness: Materials and Waste</div> | | | | | | | | | | | | | |
| 3.0 | <p>Background</p> <p>Restricting the design and flow rates of water fittings is an increasingly acceptable means of restricting water use. It is important that when introducing low flow water fittings an education policy also be introduced to change water users' habits and to make them more aware of the need to reduce water.</p> | | | | | | | | | | | | | |



4.0 Applicability

| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing |
|----------------------------|------------------------|-----|----------|--------------------------------|-----|----------|
| Villa | | ✓ | | | | |
| Residential/ Commercial | Residential | | | Commercial | | |
| | Apartment | ✓ | | Hotels | ✓ | |
| | Offices | ✓ | | Resorts | ✓ | |
| | Labour | ✓ | | Restaurants/Food | ✓ | |
| | Accommodation | | | 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 reduce the amount of water used in Dubai. Reduced water use and conservation of resources will have a direct economic benefit. There will be energy savings resulting from less desalination and pumping of water being required.

6.0 Guidance

6.1 General

Water-conserving fixtures specified must meet the criteria detailed in the regulation. Any other water fixtures used must meet the requirements of an internationally recognized water efficiency rating system such as:

- U.S. Energy Policy Act of 1992, Section 123, administrated by the U.S. Department of Energy;
- Water Efficiency Labelling and Standards (WELS) Scheme of Australia; or
- Water Technology List developed by the Department for Environment, Food and Rural Affairs (Defra), England.
- European Standard EN817, Sanitary tapware – General technical specifications

Another internationally recognized water efficiency rating system can be used if approved by Dubai Municipality and DEWA

Most of these schemes have an on-line database of approved fixtures.

Note that the flow rates specified are those which must not be exceeded in test conditions. Because the water pressure in buildings varies so will the actual flow rates in use. Flow rates of fixtures must be stated by the manufacturers and samples of the fixtures must have been tested by certified laboratories. The maximum flow rate is to be tested at a water pressure of 3 bar (43.5 PSI). An example of a suitable testing regime is outlined in European Standard EN817.



Where it can be proven that the use of low flow fixtures will create health and safety problems or affect specific processes, application may be made to DM or DEWA for special dispensation to use alternative fixtures.

An indication of the low flush option on a dual flush toilet should be provided.

6.2 Technical Data and Specifications

There are devices now available which can be retro-fitted to taps to reduce flow rates. These are normally aerators which introduce air to the water which creates the impression of a larger flow of water than is actually delivered.

7.0 Compliance

7.1 Responsibilities Matrix

| | Consultant or Contractor | User / Operator | DM | DEWA | Other Government Department | 3 rd 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 Completed Self Assessment MEP specifications |
| Construction | n/a |
| 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

It is common practice for standards and rating systems to encourage the use of low flow fittings. ASHRAE, GreenStar, and California credit the use of fittings in the ranges of: Shower flow rate 5 – 9 Liters per second (l/min); Hand basin taps 2 - 6 l/min; Sink taps 4 - 8 l/min; urinals 0.5 - 1.5 liters per flush. And the use dual flush toilets.

Many countries are now using customer educations programmes or legislation to control the flow rate of water fittings. The EN817 Standard applies to all member countries of the European Union.

9.0 References

U.S. Energy Policy Act 1992 fixture specifications.

Water Efficiency Labelling and Standards (WELS) Scheme of Australia - <http://www.waterrating.gov.au/>

Water Technology List by the Department for Environment, Food and Rural Affairs (Defra), England.

European Standard EN817-June 2008. Sanitary tapware – Mechanical mixing valves (PN 10) – General technical specifications



| 1.0 | Condensate Drainage | | | | | 601.02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | For all buildings, including existing buildings, at all points where condensate is produced by the operation of air conditioning equipment, there must be a means of collecting and disposing of the water. Condensate collection pans and drainage pipes must be installed to prevent standing water and to provide drainage. A minimum air break of twenty five (25) mm must be provided between the condensate piping and the wastewater pipe. If the condensate is not to be reused, it must be discharged to the wastewater system through a properly sized water trap. | | | | | Villas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Residential/ Commercial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Public Buildings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Industrial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.0 | Intent/Goal <div><div><input type="checkbox"/> Ecology and Planning</div><div><input type="checkbox"/> Building Vitality</div><div><input type="checkbox"/> Resource Effectiveness: Energy</div><div><input checked="" type="checkbox"/> Resource Effectiveness: Water – Conservation and Efficiency</div><div><input type="checkbox"/> Resource Effectiveness: Materials and Waste</div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.0 | Background <p>The high humidity in Dubai results in significant amounts of condensate being produced by air conditioning equipment. If this condensate is not collected and disposed of correctly there is potential for damage to the building and also health hazards as standing water can be a breeding place for mosquitoes or promote mould growth.</p> <p>The condensate can be pumped, collected and reused in irrigation or flushing of toilets, although there is no requirement for reuse under this regulation. Condensate reuse is addressed by Regulation 601.03 Condensate Recovery.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.0 | Applicability <table><tr><th>Main Typology Criteria</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th><th>Typology Subdivisions</th><th>New</th><th>Existing</th></tr><tr><td>Villa</td><td></td><td>✓</td><td></td><td></td><td></td><td></td></tr><tr><td rowspan="6">Residential/ Commercial</td><td>Residential</td><td></td><td></td><td>Commercial</td><td></td><td></td></tr><tr><td>Apartments</td><td>✓</td><td></td><td>Hotels</td><td>✓</td><td></td></tr><tr><td>Offices</td><td>✓</td><td></td><td>Resorts</td><td>✓</td><td></td></tr><tr><td>Labour Accommodation</td><td>✓</td><td></td><td>Restaurants/Food Outlets</td><td>✓</td><td></td></tr><tr><td>Student Accommodation</td><td>✓</td><td></td><td>Laboratories</td><td>✓</td><td></td></tr><tr><td>Public Buildings</td><td>Healthcare Facilities</td><td>✓</td><td></td><td>Retail Outlets</td><td>✓</td><td></td></tr><tr><td>Educational Facilities</td><td>✓</td><td></td><td>Post Offices</td><td>✓</td><td></td></tr><tr><td>Government Buildings</td><td>✓</td><td></td><td>Banks</td><td>✓</td><td></td></tr><tr><td>Worship Houses</td><td>✓</td><td></td><td>Museums</td><td>✓</td><td></td></tr><tr><td>Petrol Stations</td><td>✓</td><td></td><td>Cinema/theatres</td><td>✓</td><td></td></tr><tr><td>Shopping Mall</td><td>✓</td><td></td><td>Historical/heritage Buildings</td><td>✓</td><td></td></tr><tr><td rowspan="3">Industrial</td><td>Workshops</td><td>✓</td><td></td><td></td><td></td><td></td></tr><tr><td>Factories</td><td>✓</td><td></td><td></td><td></td><td></td></tr><tr><td>Warehouses</td><td>✓</td><td></td><td></td><td></td><td></td></tr></table> | | | | | | | 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 | ✓ | | | | |
| Main Typology Criteria | Typology Subdivisions | New | Existing | Typology Subdivisions | New | Existing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | Apartments | ✓ | | Hotels | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Offices | ✓ | | Resorts | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Labour Accommodation | ✓ | | Restaurants/Food Outlets | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Student Accommodation | ✓ | | Laboratories | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Public Buildings | Healthcare Facilities | ✓ | | Retail Outlets | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Worship Houses | ✓ | | Museums | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Petrol Stations | ✓ | | Cinema/theatres | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shopping Mall | ✓ | | Historical/heritage Buildings | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | Factories | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Warehouses | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

