TARSHEED'S CODE

ENERGY & WATER CONSERVATION CODE 2025

KAHRAMAA
كهرماء
المؤسسة العامة القطرية للكهرباء والماء
Qatar General Electricity & Water Corporation
better living لحيـاة أفضـل

ترشيد
Tarsheed
البرنامج الوطني للترشيد وكفاءة الطاقة

Table of contents

Energy & Water Conservation Code 2024

1.0 Definition

Accessory: Any device, other than a lighting fitting, associated with the wiring and current-using appliances of an installation, such as, a switch, a fuse, a plug, a socket outlet, a lamp holder or a ceiling rose.

Adapter, Socket Outlet: An accessory inserted into a socket outlet containing metal contacts, to which one or more plugs may be fitted for the purpose of connecting portable lighting fitting or current-using appliances to the supply.

Ambient Temperature (For Cable): The temperature of the surrounding medium, under normal conditions, in which cables are installed or are to be installed, including the effect of any artificial heating used in the building by any local source of heat.

Apparatus: Electrical apparatus, including all machines, equipment and fittings in which conductors are used, or of which they form a part.

Appliance: Any device which utilizes electricity for a particular purpose, excluding lighting or independent motors.

Bonded (As Applied to Items of Metal Work): Connected electrically, not normally for the purpose of carrying current but to ensure a common potential.

Bunched: Cables are said to be 'bunched' when two or more are contained within a single conduit or trunking, or when they are not separated from each other.

Caravan: Any structure designed or adapted for human habitation which is capable of being moved from one place to another (whether by being towed or being transported on a motor vehicle or trailer) and any other motor vehicle designed or adapted. The regulations apply where supply is provided by mains electricity or by generator at a voltage exceeding 50 Volts between poles.

Channel (For Cables): A groove cut or formed in part of a building, intended to receive one or more cables. The groove has removable or hinged covers to allow the cables to be laid within it.

1.0 Definition

Circuit Breaker: A mechanical device for making and breaking a circuit under both normal operating conditions and abnormal conditions, such as overload or short circuits, which it interrupts automatically.

Circuit Conductor: A current-carrying conductor forming part of a circuit or final sub-circuit, excluding the earth continuity conductor.

Conductor (Of Core or Cable): The conducting portion, consisting of either a single wire or a group of wires in contact with each other. In earthed concentric wiring, the term may also denote the metal sheath of a cable.

Connector: A device intended for connection to a flexible core of flexible cable, containing protected current-carrying contact tubes similar to those of a socket outlet.

Customer's Installation: Wiring and apparatus located on the customer's premises and controlled or installed by the customer, excluding any supply undertaking switch gear that the customer may be permitted to use.

Customer Terminals: The point of incoming supply enters the customer's instillation.

Core (Of Cable): The conductor with its insulation but not including any outer covering provided for mechanical or other protection.

Damp And Dust Proof: Applied to apparatus and accessories to indicate that live and other component parts are enclosed or otherwise protected in such a way to prevent the ready ingress of dust and/or moisture.

Damp Situation: A situation in which moisture is permanently or intermittently present to such an extent that it is likely to impair the effectiveness of an installation for ordinary conditions.

Dead: At earth potential and disconnected from any live system.

Distribution Board: An assemblage of parts, including one or more fuses or circuit breakers designed and arranged for the distribution of electrical energy.

1.0 Definition

Duct (For Cables): A closed passageway formed underground or within a structure, intended to receive one or more cables that may be drawn thought it.

Earth Continuity Conductor: The conductor, including any clamp, that connects the customer's earthing terminal, or to the frame terminal of a voltage operated earth leakage circuit breaker, to all parts of an installation required to be earthed.

It may be the metal sheath and /or armoring of a cable, or the special earth continuity conductor of a cable or flexible cord incorporating such a conductor.

Earth Electrode: A metal rod (or rods), a system of underground metal pipes, or other conducting objects, providing an effective connection to the general mass of the earth.

Earthed: Effectively connected to the general mass of the earth.

Earthed Concentric Wiring: A sheath-returns wiring system in which one or more insulated conductors carrying the line current are surrounded throughout their length by a conductor that serves as the earth continuity conductor.

Earthing Lead: The final conductor that provides the connection to the earth electrode or other means of earthing.

Electric Discharge Lamp: An electric lamp comprising a hermetically sealed bulb or tube containing gas and/or metal intended to be vaporized during operation and fitted with electrodes between which a discharge of electricity takes places, the useful light being emitted either by the discharge through the gas or vapor or by the fluorescence of a translucent coating which may be on the inner surface of the outer tube or bulb.

Electrode Boiler (Or Electrode Water Heater): Apparatus for the electrical heating of water by the passage of an electric current between electrodes immersed in the water.

Excess Current Protection Close: Excess current protection that operates within Four Hours at 1.50 times the designed load current of the protected circuit.

CFL: Compact fluorescent lamp.

Color rendering: A term expressing the effect of an illuminant on the color of an object, in conscious comparison with its color as seen under a reference illuminant (e.g., daylight).

Color Rendering Index (CRI): A quantitative measure of the effect of light on the perceived color of objects. A low CRI indicates that some colors may appear unnatural when illuminated by the lamp.

1.0 Definition

Coefficient Of Performance (COP): The ratio of net refrigeration affects the rate of energy input. The numerator and denominator should be in the same units.

Energy Efficiency Ratio (EER): The ratio of the net cooling capacity, in Btu/h, to the total electric input, in Watts, under designated operating conditions. The total input power shall include power input to the compressor(s) and fan(s) plus controls and other items included as part of the designated model.

Integrated Part - Load Value (IPLV): A single number figure of merit based on part load EER, COP, or kW/ton, expressing part-load efficiency for air-conditioning equipment, on the basis of weighted operation at various load capacities of the equipment.

LED: Light-Emitting Diode

Lumen: The SI unit of luminous flux; the flux emitted within a unit solid angle by a point source with a uniform luminous intensity of one candela. One LUX is equal to one lumen per square meter.

Lux: The SI unit of illuminance of a surface. Average maintained illuminance is the average of LUX levels measured at various points in a defined area. One LUX is equal to one lumen per square meter.

Luminous efficacy: The Quantity of light (lumens) emitted for each unit of electrical power (watts) consumed. The unit is 'lumens per watt' (lm/W).

Luminaire: A complete lighting unit, consisting of a lamp or lamps together with the parts designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply.

Solar Heat Gain Coefficient (SHGC): The fraction of incident solar radiation admitted through a window, both directly transmitted and absorbed, and subsequently released inward.

U Value (Overall Heat Transfer Coefficient): The rate of heat transmission, per unit time through a unit area of construction material and the boundary of air films, induced by a unit temperature difference between the environments on each side. Units of U are W/m2 ºC (Btu/h.ft2 ºF).

Visible Transmittance (VT): The fraction of visible light transmitted through the glazing material.

Window Wall Ratio (WWR): The ratio of vertical fenestration area to gross exterior wall area. The fenestration area is roughly open, including the frame, sash, and other non-glazed window components. The gross exterior wall area is measured vertically from the top of the floor to the bottom of the roof.

2.0 Energy Conservation Measures

2.1 Energy Efficient Lamps

The following types of energy efficient lamps (Some or all as Applicable) shall be used for buildings/facilities as detailed below:

- Compact Fluorescent Lamps (CFL).
- Light Emitting Diode (LED) type Lamps.
- High Intensity Discharge like High Pressure Sodium Vapor Lamps and Metal Halide Lamps.

LED lighting should be the priority for lighting in all applications

1. Residential building: LED lighting for all new buildings, CFL is allowed in existing buildings only.
2. Commercial building: LED lighting for all new and existing buildings.
3. Governmental: - LED lighting for all new and existing buildings.
4. Industrial: - LED lighting for all new and existing Industries
5. Flood lighting External- LED lighting for all new areas and HPS and metal halide are allowed to continue in existing areas until retrofitted by LED.

Additional requirements:

- LED lights shall be used in luminaires for all external lighting.
- Timers or Photocells control shall be used for external lighting control.
- Under no circumstances shall external lighting remain operational between 7:00 am to 4:30 pm during daytime.
- LED exit-lighting luminaires shall be used for egress indication, illuminated signs, and other feasible applications.
- For existing residential applications, good-quality CFLs Lamps should be used to avoid or minimize harmonic currents, improve power factor, and extend lamp life.

2.2 Lighting Control Systems:

- For building with large built-up areas, presence detectors or occupancy sensors shall be used in common areas such as corridors, lobbies, Office & meeting rooms, washroom and pantry area these devices shall control switching of lighting depending on the occupancy of respective area.
- Presence detectors shall not control emergency egress illumination or direction indicators. All emergency lights must switch on during an emergency, as required by safety regulations.
- Access key cards or key tags used for hotel rooms, shall also control electrical activation in the respective rooms Ensuring that room utilities are switched off when the occupant leaves.
- Depending on the layout of large hallways and office areas, local switching of luminaires should be provided.

2.0 Energy Conservation Measures

2.3 AC Control Systems:

- Air Conditioners with capacity of 5 TR and above, used for large offices and commercial establishments, shall be controlled by programmable timers.
- Air Conditioners serving IT rooms, server rooms or any other rooms operating 24 hours a day shall be segregated.
- The use of AC controls is optional for residential flats and villas.

2.4 BMS (Building Management system)

- Centralized Control of the entire facility is required for all installations with a demand load above 1MW, except for dedicated residential facilities.

2.5 Flood Lighting:

- Areas of application for flood lighting include gymnasiums, sports arena, warehouses, large public areas, football stadiums, outdoor activity areas, roadways, parking lots and pathways.
- For flood lighting applications, the selection of lamps shall be strictly based on achieving the best luminous efficacy for the required color-rendering properties.
- For applications such as street lighting and security lighting, where faithful color rendition is not critical, sodium vapor lamps (HPS and LPS) may be used, but only in = existing facilities.
- For sporting event applications, the design parameters- such as LUX level, uniformity ratio and color rendering index etc., shall comply with the relevant international norms.

2.6 Lighting Levels

For design purpose of LUX levels for building areas and external areas, the following standards are acceptable.

- IESNA LUX levels
- CIBSE Standard

Requirements:

The adopted standard for lighting design, and the corresponding lux levels, shall be clearly indicated in all lighting drawings.

For sports facilities the lighting levels shall be as per clause 2.4 above. Standards adopted shall be uniform across the entire project.

Adoption of any other standard shall be subject to KAHRAMAA's approval**.**

3.0 Electric Motors, Circuits and Controllers

- Polyphase motors, that are not part of packaged unit equipment and are intended for continuous operation and long-term use, shall be energy efficient motors, tested to international standards IEC 60034 - 2 – 1: 2014.
- The efficiency class of the motors to be used shall be minimum IE2 (High Efficiency) as detailed in IEC 60034 – 30-1-2014.

- Note: Energy-efficient motors provide higher performance due to key design improvements and more precise manufacturing tolerances. Measures such as Lengthening the core, and using lower-loss electrical steel, and employing thinner stator laminations help reduce electrical losses. Improved bearings and smaller, more aerodynamic cooling fans further increase efficiency, making these motors 2 to 8% More Efficient than Standard Motors.

For further details, refer to Section 8 of Regulation of the KAHRAMAA wiring code.

- Variable speed drives (VSDs) shall be adopted for motors in applications such as air-conditioning system drive motors, water pumping systems, and other variable-demand applications to achieve demand-controlled operation where the output requirement varies.

4.0 Power Factor Correction

Every installation shall maintain a power factor within the range of 0.9 lagging to unity.
A Lagging power factor of less than 0.9 shall be corrected through the installation of suitable factor correction equipment.

For further Details and applicable standards, refer to Section 9 of KAHRAMAA wiring regulations for Electrical Installation.

5.0 Thermal Insulation of Building

All Air-conditioned new buildings, as well as addition to existing buildings, shall be provided with thermal insulation as specified below:

5.1 Wall And Roof Assembly Maximum U-Value:

Thermal insulation material used in the building's external walls and roof shall not result in U-Values exceeding the following limits:

- Roof: 0.437 W/m²°C (0.077 BTU/hft² °F)
- External Wall: 0.568 W/m2 ºC (0.100 BTU/hft² °F)

5.2 Window Requirements:

The total glass area in the building shall be kept reasonable to minimize heat transmission and solar gain through the glazing.

For different Window-to-Wall ratios, the overall U-Value and Solar Heat Gain coefficient (SHGC)of the glass assembly shall not exceed the following values.

Window Wall Ratio (WWR)	Maximum U value- W/m²°C (BTU/hft² °F)	Maximum Solar Heat Gain Coefficient (SHGC)
5 - 40 %	3.30 (0.58)	0.3
Above 40 %	2.10 (0.36)	0.25
Show Room	2.10 (0.36)	0.3

For showroom building:

Double glazing shall be used with the following performance requirements:

- maximum U value 2.10 (0.36) W/m²ºC (Btu/ft²h F).
- Maximum Solar Heat Gain Coefficient (SHGC): 0.3

minimum Visible Transmittance (VT): 0.3.U-Value calculation and certification:

U-Value shall be calculated for summer conditions in accordance with ASHRAE specifications.

Both the U-Value and the Solar Heat Gain Coefficient (SHGC) shall be certified by the manufacturer or other responsible authority.

5.3 Compliance:

The Consultant shall submit U-Value calculations for the walls, roof, and Windows for KAHRAMAA approval.

Sample building envelope compliance forms are provided in the Appendix 02.

Buildings failing to comply with minimum insulation requirements will not be considered for supply of electricity.

The thermal insulation material used shall be approved by Qatar General Electricity and Water Corporation (KAHRAMAA) prior to installation, and in accordance with the approval giving on the building permit application form.

6.0 Heating, Ventilation and Air Conditioning

All heating, ventilation, and Air-conditioning equipment serving new buildings and additions to existing buildings shall comply with following requirements.

6.1 Minimum Equipment Efficiency:

- Cooling equipment shall meet or exceed the minimum efficiency requirements mentioned in the table 06.1 to 06.3
- Equipment not listed shall comply with ASHRAE 90.1 - 2019, 6.4.1
- The efficiency shall be verified through certification under an approved certification program or if no certification program exists the equipment efficiency ratings shall be supported by data furnished by the manufacturer.

- Package Air- Conditioners Minimum Efficiency

Equipment Type	Minimum EER (Btu/Wh)	Rating Outdoor Condition	Test Standard
Single Package Air Conditioners < 19.05 kW (5.41 Tons)	9.0	35 °C (95 °F) DB	ARI 210/240
Single Package Air Conditioners ≥19.00 and < 39.56 kW (≥5.41 and < 11.25 Tons)	8.9	35 °C (95 °F) DB	ARI 340/360
Single Package Air Conditioners ≥39.56 kW (≥11.25 Tons)	8.6	35 °C (95 °F) DB	ARI 390

Table 6.1: Package Air-Conditioner Minimum Efficiency

6.0 Heating, Ventilation and Air Conditioning

- Window type and Split Air- Conditioners Minimum Efficiency

Air Conditioner Appliances type	Cooling Capacity limit(CC) (Btu/h) At test condition (T1)	(EER) Value (Btu/h)/watt		Test Standard
		T1 (35°C)	T3 (46°C)	
Window Type	18000 > CC	9.8	7.06	GSO 5151
	18000 ≤ CC < 24000	9.7	6.98	
	CC ≥ 24000	8.5	6.12	
Split Type	All Capacities	11.5	8.28	GSO 13253

Table 6.2: Window and Split Air-Conditioner Minimum Efficiency

- Water Chiller Minimum Efficiency.

Equipment Type	Minimum COP	Minimum IPLV	Test Standard
Air Cooled Chiller All Capacities	2.80	3.05	ARI 550/590
Centrifugal Water-Cooled Chiller < 530 kW (150 Tons)	5.00	5.25	ARI 550/590
Centrifugal Water-Cooled Chiller ≥530 and < 1050 kW (≥150 and < 300 Tons)	5.55	5.90	ARI 550/590
Centrifugal Water-Cooled Chiller ≥1050 kW (300 Tons)	6.10	6.40	ARI 550/590
Reciprocating Compressor Water Cooled Chiller All Capacities	4.20	5.05	ARI 550/590
Rotary Screw and Scroll Compressor Water Cooled Chiller < 530 kW (150 Tons)	4.45	5.20	ARI 550/590
Rotary Screw and Scroll Compressor Water Cooled Chiller ≥530 kW and < 1050 kW (≥150 and < 300 Tons)	4.90	5.60	ARI 550/590
Rotary Screw and Scroll Compressor Water Cooled Chiller ≥1050 kW (300 Tons)	5.50	6.15	ARI 550/590

Table 6.3: Water Chiller Minimum Efficiency

Note: For centrifugal chiller operates at temperatures different from the ARI 550/590 rating condition, refer ASHRAE 90.1- 2019/6.4.1.2

6.0 Heating, Ventilation and Air Conditioning

6.3 Controls:

6.3.1 All Cooling Systems Shall Be Controlled by A Time Clock That:

- Can start and stop the system under different schedules for three different day types per week.
- Can retain programming and time settings during loss of power for a period of at least 10 hours.
- Include an accessible manual override that allows temporary operation of the system for up to 2 hours.

  Exception to 06.3.1: Cooling system capacity less than 17.5 kW (5 Ton).

6.3.2 Outside Air and Exhaust Damper Control.

- Outdoor air supply and exhaust systems shall be equipped with motorized dampers that automatically close when the systems or spaces are not in use.
- Exception to 06.3.2: Gravity (non-Motorized) dampers are acceptable in residential buildings and systems with design outdoor air intake or exhaust capacity of 141 L/s (300 cfm) or less.

6.3.3 Cooling Tower Fan Control.

All cooling towers shall have either: two speed motors, pony motors or variable speed drives (VSDs).

6.4 Energy Recovery:

Energy recovery ventilation systems shall be provided where individual fan systems have a design supply air capacity of 2360 L/s (5000 cfm) or greater, and have minimum outdoor air supply of 70% or greater of the design supply air quantity.
Energy recovery systems should have at least 50% recovery effectiveness.

Exception to 06.4:

1. Laboratory systems, systems exhausting toxic, paint or corrosive fumes or dust, commercial kitchen hoods.
2. Exhaust air flow rates are less than 75% of the design outdoor air flow.

6.5 Load Calculation:

The designer shall perform cooling load calculations before selecting and sizing the equipment. Cooling load shall be calculated using “Engineering standards and handbooks acceptable to the KAHRAMAA Engineers” or any computer method utilizing ASHRAE-certified computer routines.

6.0 Heating, Ventilation and Air Conditioning

6.6 System Selection:

The air-conditioning system for the main cooling plant shall be selected to minimize the total power input required for the A/C equipment.

6.7 Compliance:

Drawings and specifications shall show equipment and systems in sufficient detail to permit KAHRAMAA to verify compliance with section 6.

A cooling load summary sheet along with a cooling equipment schedule, shall be submitted to KAHRAMAA Engineer for verification.

Sample Equipment compliance forms are provided in Appendix 02.

7.0 Energy Management System for Customers

7.1 Introduction

- The establishment of an Energy Management System (EMS) by an organization is essential to define the systems and processes necessary to improve energy performance.
- As per ISO 50001:2018, Energy Management Systems (EMS) stipulates: An energy policy, planning and performance indicators, proper monitoring and control for installations.
- The Implementation of EMS is mandatory for all existing and new customers with power demand of 2.5MW and above.
- For all new Customers, EMS shall be defined and submitted for approval to the Conservation and Energy Efficiency Department before effective operation / energizing of the premises.
- The date of energization shall be deemed as the date of starting normal operation.

7.2 Essential Features of EMS to be implemented

- The organization shall define and document the scope of EMS for the installation and determine how it will meet the requirement of International Standard to achieve continual improvement in energy performance.
- The top management of the organization shall define establish and implement the energy policy.
- A management representative shall be appointed to act as an Energy Manager, who will oversee the implementation of the EMS.
- All retail outlets located within a parent bulk commercial customer shall be governed by the EMS of the parent bulk customer. The Bulk Customer shall notify the retailers of the summary requirements of the procedures for compliance within their premises, to ensure implementation of the EMS and thereby effective energy conservation.
- Energy performance indices shall be defined to aid the organization for long-term energy planning.
- The energy policy shall include a commitment to comply with KAHRAMAA regulations and other requirements to which the organization subscribes related to energy use, consumption and efficiency.
- The procurement of energy services, products or equipment shall be clearly defined to ensure energy efficiency considerations are applied.

7.0 Energy Management System for Customers

7.3 Energy review and reporting

The energy review procedures shall cover the following aspects

- Analysis of energy use and consumption based on measurement and other relevant data.
- Identification of current energy sources.
- Evaluation of past and present energy use and consumption.
- Analysis of potential energy usage areas.
- Assessment of methods for efficient operation.
- Identification of potential areas for improving energy performance.

7.4 Energy baseline

The organization shall establish an energy baseline.

The data period for establishing energy baseline and for review shall be the respective calendar year from January to December. Energy performance indicators (EnPIs) shall be established based on appropriate criteria (e.g., kWh per unit area, kWh per unit product, etc.)

Energy performance indicators shall be compared to the energy baseline as appropriate.

7.5 Reporting

The summary of energy review, including all relevant policies and implementation measures, shall be reported to KAHRAMAA on an annual basis.

The report should include, at a minimum, the full load schedule of the premises, with linear and non-linear load segregated.

Consumers may refer to the KAHRAMAA Guideline for Implementation of Energy Management System for further details.

The report for a given calendar year shall be submitted to KAHRAMAA before 31st March of succeeding Year.

7.6 Internal Audit for EMS

The organization shall conduct internal audits at planned intervals to ensure the effective implementation of the EMS, in conformance with ISO 50001:2018, established procedures, and applicable normative reference.

Audits may be conducted by qualified internal or external auditors.

The Energy Manager (or Management Representative) shall serve as the focal point for conducting audits.

The rectification of non-conformities, as well as the implementation of corrective and preventive actions and Management reviews, shall be carried out in accordance with the procedures set forth in ISO50001:2018.

8.0 Maximum Demand and Diversity

The Consultant/Contractor shall consider the actual load of equipment such as air conditioners, Water heaters, cookers and lighting equipment.

The same load shall also be applied during the construction stage.

The actual load shall be evaluated in accordance with the above as per KAHRAMAA Wiring code guidelines.

For further details, refer to the Regulations for Electrical Installation.

9.0 Water Conservation Regulations

9.1 Water Conservation:

A considerable amount of energy is consumed to deliver and treat the water used every day. By reducing water use through efficient means, both water consumption and the energy required for distribution and treatment will be reduced.

When designing plumbing systems, new techniques and options should be utilized to maximize water efficiency and water savings.

The plumbing systems for new buildings, as well as additions to existing buildings by all consultants, customers and developers shall comply with the requirements of section 1.1 A & B of this chapter.

Water pipe layouts shall be designed to avoid using 90-degree bends. Instead, radial bends should be adopted to reduce pressure loss, which in turn minimizes energy loss.

9.2 A) Maximum Allowable Flow Rates for Plumbing Fixtures:

1. Water Closets:

The flush rates of single-flush Water WCs, whether using a flush tank, flushometer tank or flushometer valve, shall not exceed 4.9 L/flush (or 1.28 gpf).

For dual-flush WCs:

Full flush: shall not exceed 6.0 L/flush (or 1.6 gpf)

Reduced flush: shall not exceed 4.2 L/flush (or 1.1 gpf).

A control valve shall be installed on the inlet line to the flush tank/flush valve to allow shutoff in case of leakage.

WCs shall conform to the requirements of Section 425, International Plumbing Code (IPC) 2021. Compliance shall be verified by laboratories accredited by international institutions.

2. Urinals:

The flush rates for all types of urinals shall not exceed 1.9 L/flush (0.5 gpf).

Urinal systems shall be designed to flush only after usage.

Urinals shall conform to the requirements of Section 424, International Plumbing Code (IPC) 2021. Compliance shall be verified by laboratories accredited by international institutions.

9.0 Water Conservation Measures

3. Faucets:

#	Plumbing Fixtures/ Fixture fittings	Maximum allowable flow rate
1	Lavatory Faucet- Residential occupancy (Residential, hotel—Guest rooms only, hospital-patient rooms)	5/L/min (or 1.5 gpm) at an operating pressure of 4 bar (60 PSI)
2	Lavatory Faucet – Nonresidential occupancy	3.8/L/min (or 1 gpm) at an operating pressure of 4 bar (60 PSI)
3	Kitchen Sinks	8.3/L/min (or 2.2 gpm) at an operating pressure of 4 bar (60 PSI)

Table 9.1: Maximum allowable flow rate for faucets

Exclusion:
Bathtub taps, or any other taps where a pre-quantified amount of water must be filled, are excluded from requirements of Table 9.1.
Lavatories & sinks shall conform to the applicable requirements of Section 419 and Section 422,
International Plumbing Code (IPC) 2021.
Compliance shall be verified by laboratories accredited by international institutions.

4. Showers:
The flow rate of showerheads or handheld showers shall not exceed 9.5 L/min
(2.5 gpm) at an operating pressure of 5.5 bar (80 psi).
Showers shall conform to the applicable requirements of Section 421, International Plumbing Code (IPC) 2021.
Compliance shall be verified by laboratories accredited by international institutions.

9.0 Water Conservation Measures

B) Irrigation:

1. **Type of Irrigation System**

Consumers with an irrigation water requirement exceeding 1 m3 per day and/or with irrigated area greater than or equal to 100 m2 shall comply with the following requirements:
Flood irrigation is prohibited.

Irrigation systems such as drip irrigation or sprinkler systems, or bubblers shall be used along with timers or weather-based controllers.

2. **Separate Irrigation Tanks** Restricted Potable Water Usage for Irrigation

Consumers shall not use potable water for irrigation if the irrigation water requirements exceed 85 m^3 per day and/or the irrigated area is greater than or equal to 7000 m^2
Consumers shall use treated water, treated grey water, condensate recovery, or any other non-potable water resources to meet irrigation requirements.
Treated water used for irrigation shall comply with the applicable health and safety standards of the State of Qatar prescribed by competent authority.

1. **Metering of Irrigation Water Use**

Consumers with irrigation water demand exceeding 25 m^3 per day shall:

- Submit an irrigation plan detailing species type and irrigation system.
- Provide a separate meter for irrigation water consumption.
- Track water consumption monthly.
- Submit water consumption data to KAHRAMAA upon request.

C) Water Conservation Plumbing Guidelines

In addition to plumbing practices stipulated in other sections of this regulation, the following guidelines shall be implemented:

- Water tanks exposed to direct sunlight shall be insulated or shaded to reduce heat gain.
- Water supply pipes exposed to direct sunlight shall be insulated.
- The length of hot water pipes from heaters to tap/faucets and showers shall be minimized to reduce the heat loss.

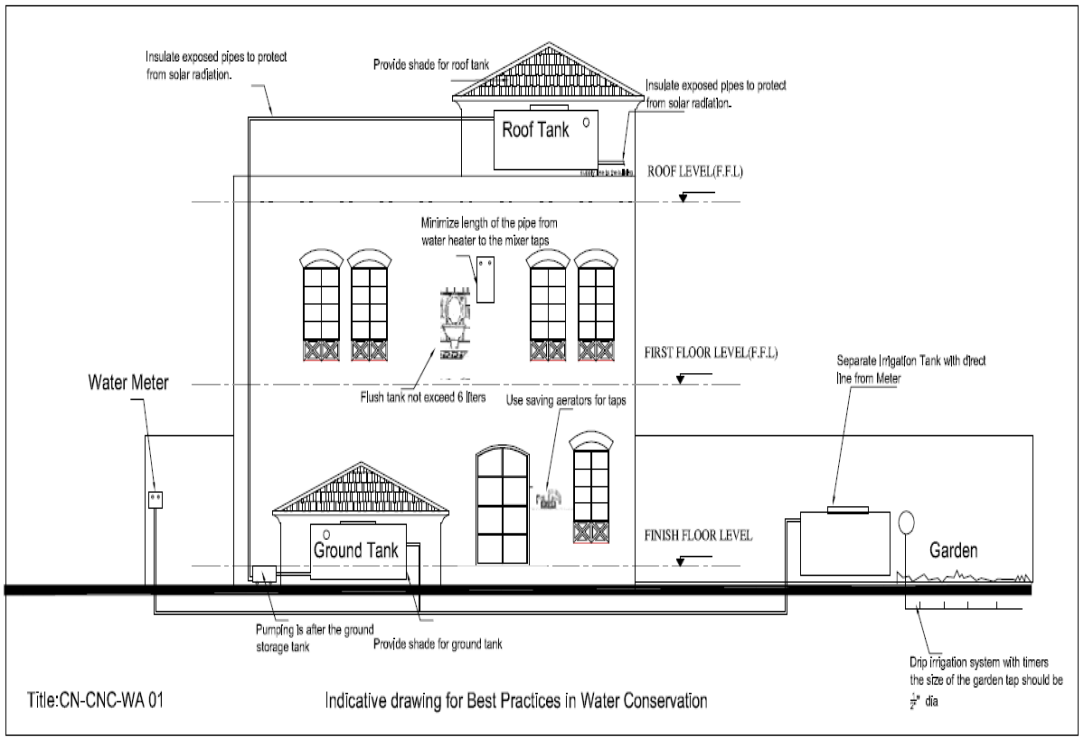
D) Water Recycling in Vehicle Wash Facilities

All vehicle wash facilities are encouraged to implement a water recycling system to enable the reuse of water in pressure washing operations.

9.0 Water Conservation Measures

E) Non-Conventional Energy for Plumbing Applications:

The use of non-conventional energy sources, such as solar water heating systems, is encouraged for plumbing applications in all new and existing facilities wherever feasible. The best practices for the implementations of such systems are demonstrated in the drawing CN-CNC-WA 01.



Appendix No. 01: Building Envelope Compliance Forms

PROJECT: LOCATION/AREA: PIN NUMBER: CONSULTANT: CONSULTANT CONTACT PHONE NUMBER:			**EXTERNAL WALL /ROOF-U VALUE CALCULATION**		REV: DATE:
EXTERNAL WALL					
LAYER NO	LAYER DESCRIPTION	THICKNESS (mm)	DENSITY (kg/m^3)	R VALUE (m^2 C / W)	WEIGHT (kg/m^2)
	TOTAL				
OUTSIDE COLOR (LIGHT/MEDIUM/DARK)		**OVERALL U VALUE (W/m^{2}C)**			
	MAXIMUM U VALUE (W/m2 C) MENTIONED IN KM REGULATION FOR ELEC & A/C SECTION			**0.568**	
ROOF					
LAYER NO	LAYER DESCRIPTION	THICKNESS (mm)	DENSITY (kg/m^3)	R VALUE (m^2 C / W)	WEIGHT (kg/m^2)
	TOTAL				
OUTSIDE COLOR (LIGHT/MEDIUM/DARK)		**OVERALL U VALUE (W/m^2 C)**			
	MAXIMUM U VALUE (W/m2 K) MENTIONED IN KM REGULATION FOR ELEC & A/C SECTION			**0.437**	

Appendix No. 02: HVAC Equipment Compliance Forms

- Window/ Split Air Conditioner Schedule.

PROJECT NAME	
LOCATION/AREA PIN	
NUMBER CONSULTANT	
NAME	
CONSULTANT DETAILS	
OWNER NAME:	
BUILDING TYPE	A. RESIDENTIAL o B.COMMERCIAL o C.INDUSTRIAL o
PROJECT DESCRIPTION: **Brief description about mechanical system type, features and energy conservation measures.**	
EQUIPMENT SCHEDULE	

WINDOW/SPLIT AIR CONDITIONER SCHEDULE.

Equipment Tag No	Equipment Type	Selection @ outdoor temperature 35 ℃				Selection @ outdoor temperature 46 ℃				Manufacturer and Model No
		Cooling Capacity (Btu /H)	Power input (Watts)	E E R (Btu/h /W)	Min E E R required as per KM Regulation section 6.2	Cooling Capacity (Btu /H)	Power input (Watts)	E E R (Btu/h /W)	Min E E R required as per KM Regulation section 6.2	
	Window	18000 > CC			9.8				7.06	
		18000≤CC<24000			9.7				6.98	
		CC≥24000			8.5				6.12	
	Split	All			11.5				8.28	

Appendix No. 02: HVAC Equipment Compliance Forms

- Package Air Conditioner Schedule.

PROJECT NAME	
LOCATION/AREA PIN	
NUMBER CONSULTANT	
NAME	
CONSULTANT DETAILS	
OWNER NAME:	
BUILDING TYPE	A. RESIDENTIAL o B.COMMERCIAL o C.INDUSTRIAL o
PROJECT DESCRIPTION: **Brief description about mechanical system type, features and energy conservation measures.**	
EQUIPMENT SCHEDULE	

PACKAGE AIR CONDITIONER SCHEDULE.							
Equipment Tag No	Equipment Type	Rated Cooling Capacity (Btu /H)	Power input (Watts)	E E R (Btu/W h)	Minimum E E R required as per KM Regulation section 6.2Table 6.2	Test standard	Manufacturer and Model No

Appendix No. 02: HVAC Equipment Compliance Forms

- Air Cooled Chiller schedule.

PROJECT NAME	
LOCATION/AREA PIN	
NUMBER CONSULTANT	
NAME	
CONSULTANT DETAILS	
OWNER NAME:	
BUILDING TYPE	A. RESIDENTIAL o B.COMMERCIAL o C.INDUSTRIAL o
PROJECT DESCRIPTION: **Brief description about mechanical system type, features and energy conservation measures.**	
EQUIPMENT SCHEDULE	

AIR COOLED CHILLER SCHEDULE.											
Ref No	Model Number	Condenser Entering Air temperature °C	Entering Chilled water temperature °C	Leaving Chilled water temperature °C	Rated Equipment Capacity (ton)	Power Input (kW)	COP	IPLV	Minimum efficiency (KM Regulation section 6.2 Table 6.3)		Test Standard
									COP	IPLV	

Appendix No. 02: HVAC Equipment Compliance Forms

- Water Cooled Chiller schedule.

PROJECT NAME	
LOCATION/AREA PIN	
NUMBER CONSULTANT	
NAME	
CONSULTANT DETAILS	
OWNER NAME:	
BUILDING TYPE	A. RESIDENTIAL o B.COMMERCIAL o C.INDUSTRIAL o
PROJECT DESCRIPTION: Brief description about mechanical system type, features and energy conservation measures.	
EQUIPMENT SCHEDULE	

WATER COOLED CHILLER SCHEDULE.												
Ref No	Model Number	Condenser Entering Water temperature (°C)	Condenser Water Flow rate (L/s per Kw)	Entering Chilled water temperature (°C)	Leaving Chilled water temperature (°C)	Equipment Capacity (ton)	Power Input (kW)	COP	IPLV	Minimum efficiency (KM Regulation section 6.2 Table 6.3)		Test Standard
										COP	IPLV	