Purpose of the Energy Conservation Building Code (ECBC) is to provide minimum requirements for the energy-efficient design and construction of buildings.

Scope of the Code is applicable to buildings or building complexes that have a connected load of 100 kW or greater or a contract demand of 120 kVA or greater and are intended to be used for commercial purposes. Buildings intended for private residential purposes only are not covered by the Code.

Energy Efficiency Performance Levels:

(a) Energy Conservation Building Code Compliant Building (ECBC)
(b) Energy Conservation Building Code Plus Building (ECBC+)
(c) Super Energy Conservation Building Code Building (Super ECBC)

Building Systems:

The provisions of this code apply to:
(a) Building envelope,
(b) Mechanical systems and equipment, including heating, ventilating, and air conditioning, service hot water heating,
(c) Interior and exterior lighting, and
(d) Electrical power and motors, and renewable energy systems.

Building Classification:

Any one or more building or part of a building with commercial use. The key classification is as below:
(a) Hospitality: Star Hotel, No Star Hotel, Resort
(b) Educational: College, University, Institution, School
(c) Health Care: Hospital, Out Patient healthcare
(d) Shopping Complex: Shopping Mall, Stand-alone Retails, Open Gallery, Malls, Super Markets
(e) Business: Large Offices, Medium Offices, Small Offices
(f) Assembly: Multiplex, Theatre, Building used for Transport Services

Energy Performance Index of a building should be less than or equal to 1 to comply with code.

$$EPI = \frac{\text{Annual Energy Consumption in kWh}}{\text{Total built up Area (m}^2\text{) (Excluding unconditioned Basement)}}$$

Compliance Approaches:

Mandatory + Prescriptive Method
OR
Mandatory + Whole Building Performance Method

Compliance Requirements:

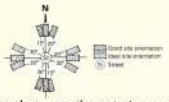
New Building Compliance

Additions to Existing Buildings where new connected load demand of the addition plus the existing building exceeds 100 kW or 120 kVA, the additions shall comply with the provisions of building systems mentioned earlier.

Alterations to Existing Buildings where new connected load demand of the existing building exceeds 100 kW or 120 kVA, part of the building and its systems that are being altered shall comply with the provisions of building systems mentioned earlier.

Building Orientation:

refers to the way a building is situated on a site and the positioning of windows, rooflines, and other features.



Building Envelope:

The building envelope is physical separator between the exterior and the interior of the building and fenestration systems.

Opaque Construction: components include walls, roofs, slabs on grade (in touch with ground), basement walls, and opaque doors. The U-Value of the wall and roof should meet the required value as per ECBC.


Solar Reflective Tiles


Wall Construction with Insulation


Over terrace

Fenestrations: systems include windows, skylights, ventilators, and doors that are more than one-half glazed. The U-Factor and SHGC of the fenestration should meet the required value as per ECBC.

Maximum allowable Window Wall Ratio (WWR) is 40%

Minimum allowable Visual Light Transmittance (VLT) is 0.27

The skylight area is limited to maximum of 5% of the total roof area.


Double Glazed Unit (DGU)


Vertical and Horizontal Shading

Daylighting: Above grade floor areas shall meet or exceed the useful daylight illuminance area requirements for 90% of the potential daylit time in a year. Compliance shall be demonstrated either through daylight simulation method or the manual method. Assembly buildings and other buildings where daylight will interfere with the functions or processes of 50% (or more) of the building floor area, are exempted.

➢ Comfort Systems and Controls:

All Heating , Ventilation, Air Conditioning equipment's and Systems and their controls are covered under Comfort Systems and Controls.

Ventilation spaces should be provided with outdoor air using one of the following:
I. Natural Ventilation
II. Mechanical Ventilation
III. Mixed Mode Ventilation

Space Conditioning Units:
I. Chillers
II. Unitary, Split, Packaged Air-Conditioners
III. VRF Systems

Controls (HVAC):

Time Clock: To start and stop system under different working schedules per week.

Temperature Controls: To control temperature automatically inside the conditioned zone.

Occupancy Controls: Control is installed to de-energize or to throttle to minimize the ventilation and/or air conditioning systems when there are no occupant.

Fan Controls: System should have fan controls based on wet Bulb logic.

Dampers: All air supply and exhaust equipment, having a Variable Frequency Drive, shall have dampers that automatically close/open.

Solar Water Heating: At least 20% of the total hot water capacity in building less than 20,000m² should be provided with solar water heating and 40% for area above 20,000m².

➢ Lighting & Controls:

Lighting includes all interior and exterior lighting in a building. Lighting Power Density (LPD) for interior can be met by any of the two methods:

- Building Area Method: The LPD shall be met for whole building as per the building type. For the specific LPD values refer ECBC 2017.
- Space Function Method: The Values of LPD are different for every space and function of the building. For the specific LPD values refer ECBC 2017.

Automatic Lighting Shutoff: 90% of the interior lighting fittings in building or space of building larger than 300m² shall be equipped with automatic control device.

Space Control: Enclosed space with ceiling-height partitions shall have at least one control device to independently control the general lighting within the space.

Control in Daylight Areas: Luminaires, within day lighting extent from the window shall be equipped with either manual or automatic control device to shut off the luminaires.

Exterior Lighting Control: All exterior lights to be controlled by photo sensor or astronomical time switch.

Exit Signs shall not exceed 5 watts per face.

➢ Electrical & Renewable Energy Systems:

All electric and renewable energy equipment and systems are covered under this section.

Transformers selected should be of proper Ratings and Design as per ECBC 2017.

Maximum Allowable Power Transformer Losses as per ECBC 2017.

Voltage Drop for feeders shall not exceed 2% at design load. Voltage drop for branch circuit shall not exceed 3% at design load.

Energy Efficient Motors: Three phase induction motors shall conform to Indian Standards (IS) and should have efficiency of IE 2 class or above. Motor horsepower ratings shall not exceed 20% of calculated maximum load being served.

Design Generator (DG) Sets: Minimum 3 star rated DG set should be used in all compliant buildings.

Check-Metering and Monitoring: Metering and Monitoring shall be done by installing permanent electric metering to record Demand (kW), Energy (kWh), Total Power factor (kVARh), Voltage, Current and total harmonic distortion (THD).

Power Factor Correction: All 3 phase shall maintain their power factor 0.97 or above.

Power Distribution Systems: Power cabling shall be sized so that the losses do not exceed 3% of total power usage.

Renewable Energy Systems: All buildings shall have provisions for installing of renewable energy systems in the future on rooftops or the site. Renewable energy generating zone is free of any obstructions or shadows and is equivalent to at least 25% of roof area or area required for generation of 1% of total peak demand.

Basic Requirements for ECBC Compliance

Building Envelope

Min. U-Value for wall	0.40 W/m².K
Min. U-Value for Roof	0.33 W/m².K
Max. U-Factor for vertical Fenestration	3 W/m².K
Max. SHGC for vertical Fenestration	0.27
Max. Skylight	5% of total roof area
Max. U-Factor for Skylight	4.25 W/m².K
Min. SHGC for Skylight	0.35

Comfort Systems and Controls:

Min. COP for Water Cooled Chillers	4.7
Min. COP for Air Cooled Chillers	2.8
Min Requirement for Air Cooled Split Air Conditioners	3 Star
Min EER for VRF	4.36
Min. R-Value for Piping	0.9 W/m².K

Note: The ECBC requirement mentioned are for common building types/ systems. The requirements may differ for specific building type/ system. Please refer ECBC 2017 for specific values.

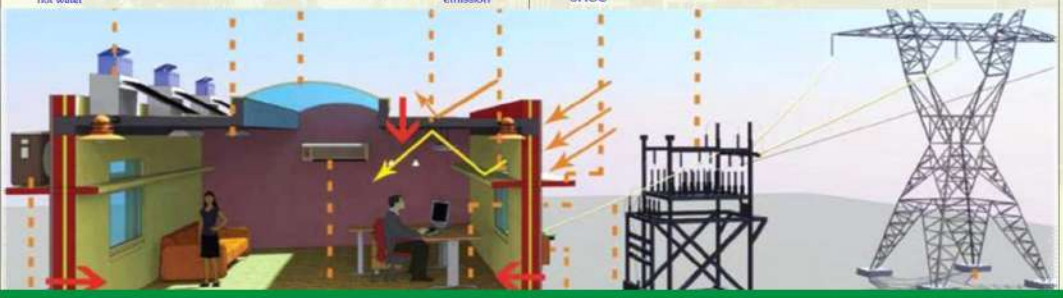
Solar water heaters or the use of heat recovery to meet at least 20% of the hot water

Energy efficient luminaries with Lighting controls

Skylights with low conduction and low Solar Heat gain material

Roof with low conduction, high reflection and high emission

Daylight glazing with high emission



Thermal Conductivity (k-Value) of Common Building Materials

Solid burnt clay brick	0.589 W/mK	Glasswool	0.035 W/mK
AAC Block	0.184 W/mK	EPS	0.033 W/mK
Fly Ash Brick	0.639 W/mK	XPS	0.032 W/mK
Cement Plaster	0.721 W/mK	PUF	0.037 W/mK
RCC	1.411 W/mK	Clay Tile Cladding	0.632 W/mK
Cement Screed	1.208 W/mK	Brick Tile	0.589 W/mK
Mud Phuska	0.519 W/mK	Ceramic Tile	1.372 W/mK
Tar Felt	0.479 W/mK	Gypsum Board	0.253 W/mK
Rockwool	0.045 W/mK	Clear Glass	1.052 W/mK

ECBC 2017 APP

A certified Android App is available for users. It is a tool developed for users to calculate U-values on the regular basis. The ECBC 2017 Code is also available on this App.

Shading to reduce effective SHGC

Efficient Transformer with low power losses

Energy Conservation Building Code - 2017 Technical Tips

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