HANDBOOK NO. 7

THE NATIONAL BUILDING CODE, 2024

QUALITY AND WELLNESS IN CONSTRUCTED BUILDINGS

NATIONAL CONSTRUCTION AUTHORITY

OVERVIEW

This handbook only covers Part X the of the National Building Code on Lighting and Ventilation

2.0 PART X - LIGHTING AND VENTILATION

This part comprises paragraphs 133 to 170 of the Code.

There is need for adequacy of lighting and ventilation in buildings which is fit for purpose depending on the use of each room or space

The provision of natural lighting and ventilation is to ensure the rooms do not cause detriment to health, safety or cause nuisance to occupants. Standards for artificial lighting and ventilation are also set out clearly in the Building Code.

On ventilation and air quality, Paragraph 163 specifies these overarching requirements: -

1. Good ventilation of both habitable and non-habitable rooms
2. Air intakes for artificial ventilation located so as to prevent cross-contamination from building exhausts
3. Control of use of chemicals on premises to prevent adverse effects on indoor air quality
4. Material used in constructing spaces not to adversely affect indoor air quality
5. Use of low solvent or water-based paints, varnishes and glues
6. Consider use of indoor landscaping to improve indoor air quality

Prohibitions on back-to-back buildings that do not have cross-ventilation is also premised on having acceptable indoor air quality

2.0 KEY POINTS

Some of the major provisions include: -

1. At least one (1 no.) opening for purposes of natural light and ventilation.
2. If artificial ventilation is to be used, it will be in accordance with the design and certification to an approving entity and undertaken by an engineer registered to provide such expertise. Rooms for which natural ventilation is not possible should have means of artificial ventilation.
3. Artificial ventilation plant should be serviceable, tamper-proof and discharge condensate in a safe and environment friendly manner.
4. Corridors, lobbies or staircases accessing rooms should have means of artificial lighting. Tests on plant to be conducted annually and filed with the approving authority {para 135(4)}
5. Windows and vents should face or ventilate to external air {para 134} without prejudicing the standards required for lighting, ventilation or health of the occupiers of the building.

6. In order to light a space, the opening should be place on an external wall or at a suitable position in the roof. The glazing for such an opening should be transparent or translucent. For enclosed spaces such as basements, tubular daylight devices may be used if they provide adequate light intensity to the space they serve.
7. Ensuring sufficient ingress of natural air and light. Calculation of sufficiency of space beyond the walls for sufficiency is given in the code.
8. Calculation of minimum size of openings for lighting is stated in para 136 (4) as 10% of the floor area or the room or rooms it serves or 0.2 m2, whichever is more.
9. For each opening on external wall, a zone of space for lighting is required on the outside of the building in the horizontal and vertical planes as per Para 137(1) of the BC as read with Figures 9 and 10 of the Second Schedule. When the plane bounding the opening is not at right angles with the plane of the opening in either vertical or lateral directions, refer to para 137(5) on how to calculate the zone lengths.
10. Zone space dimensions limits are to be calculated as per sub-paragraphs 136(8-10) as read with Table 19 in the First Schedule.
11. For natural ventilation of rooms, the opening (door, window or vent) on external wall or roof should relate to internal or other external openings in a manner that allows ventilation.
12. Openings in garages are to be in a manner that keeps noxious fumes to within safe limits.
13. For ventilation through doors or windows on external walls and / or windows and vents on roofs, the minimum size of openings is 5% of the floor area or 0.2 m2, whichever is greater. The openings can also be at the top of an external or internal wall or in ceiling and connected to a vertical ventilating flue in which case the sizing should be at least 2% of the room's floor area.
14. Allow a 10mm gap under the door for non-habitable room.
15. Air changes per hour for naturally ventilated rooms are set out in Table 20 of the First Schedule {refer to sub-para 138(7)}
16. When rooms open to balconies, galleries, verandahs or courtyards, the following should be considered for natural lighting and ventilation purposes: -

    - Transparent or translucent glazed openings {136(3)}should be a minimum 10% of room plus adjoining open element area.
    - Door or openable area not less than 5% of such combined area.
    - The portion of external wall of the element in which the opening is formed should have zone of space as defined in sub-para 137(3).
    - For opening into fully or partially covered courts, provide adequately translucent covers. In addition not more than 1/3 of court area should be covered but if that is exceeded, it can be compensated by total area of openings from the court being at least 2/3 of the court area. In case the court is to be used for any purpose, the cover should be translucent and the court be artificially ventilated.

17. Artificial lighting is to be guided by ISO 8995-1 and ISO 8995-3.
18. Artificial ventilation shall be dealt with as per Para 141. The calculations should be prepared by or under the supervision of an engineer and should meet the requirements set out in Table 22 of the First Schedule cross-referenced with Institution of Heating and Ventilation Engineers Guide B or the Chartered Institute of Building Services Engineers, Guide B. Some ways to undertake this may include: -

    - Mechanical extraction, open flued heating appliances and passive stack ventilation.
    - Passive stack ventilation: natural stack or wind-assisted through ventilation cowls, roof ventilators or mechanical extract ventilation.
    - Passive downdraught evaporative cooling in hot and arid climates.
    - Ensure that uncontaminated outside air is brought into an inlet of the artificial ventilation system. Where this is not achievable, filters to reduce contamination to an acceptable level and prevent discharge of dust or fluff accumulated in ducts should be used
    - Outlets for air used in the artificial ventilation system to be protected by a substantial grille or screen through which a 12 mm diameter sphere cannot pass.
    - If the use of a room for which the artificial ventilation system is connected to can easily pass contaminants of germs, the resultant air is not to be allowed into any other room but is to pass directly to the outside.
    - Where the source of heat, dust, gas, vapour or volatile matter is localized within an area in a room that is meant to be artificially ventilated, these should be directly discharged to the outside air.
    - Design extract facility to take care of how condensate is discharged.
    - Separate artificial ventilation system for parking garage from the rest of the building. Heat and contaminants ought to be extracted from resultant air before discharging it to the outside air. Outlet and inlets arrangement in the garage should ensure noxious fumes are contained within safe limits.
    - When extracting heat or vapour in a kitchen extract system, remove grease in suspension using an air filter. If filter cannot be fitted, use of an accessible trap or settling chamber in the duct leading from the facility is required in the Code (sub-para 141(19)). Such a duct shall have provisions for inspection and cleaning at every change of direction.
    - All extraction and artificial ventilation systems fitted in kitchens should be constructed or lined with non-combustible material all through. Such a system should also be separate from any in any other part of the building.
    - If the artificial ventilation system terminates at a wall that abuts a public road or place it shall be installed and operated to ensure the condensate either vaporizes or is channeled into a storm water drain.
    - The inlets and outlets in an artificially ventilated rooms should be so arranged as to ensure uniform distribution and circulation of air throughout the occupied zone of the room, while ensuring that the air velocity does not

exceed 0.5 m/s.

- Outside air should be supplied at rates meeting or exceeding those specified in the second and third columns of Table 21 in the First Schedule and in accordance with the type of occupancy stated therein. If air change rates are not stated in Column 2, then Column 3 rate will be used. Treatment for spaces where smoking is either allowed or not is stipulated in the table.
- Allowance for using borrowed air is listed in Para 141(24)(d).
- Negative pressure requirement for some spaces located in buildings classified as G1 in Table 1 of the First Schedule, refer to sub-para 141(24)(e).
- Fume cupboards to be provided in laboratories for removal of fumes, gas, vapour or volatile matter.
- Positive pressure for ticket kiosk within a parking garage.

19. A habitable room to have at least one window opening directly to external air and having total minimum area of at least 1/10 of the floor area of the room. However, if the window is on an external wall abutting a verandah, or falling directly below a balcony or canopy, an increase of 5% area should be factored for every 300 mm increase in depth of such an element.
20. Each window in a habitable room shall not be less than 1/20 of the floor area. The window shall open to external air and the top of it shall be at least 1.75 metres above the floor level.
21. Outside space for the window of a habitable room in a courtyard or to boundary and neighbouring property is to be as per Para 144 and Figure 10 of the Second Schedule. Minimum should be 4.5 metres to boundary while the minimum lateral distance to other obstruction is to be 2.4 metres.
22. For back-to-back dwellings, owners are to ensure that there is cross-ventilation.
23. Ventilation and lighting of various classes of buildings and spaces is as follows: -

- Habitable rooms (Para 146) must have at least one permanent vent placed either on or venting to external wall. Corridors venting habitable rooms must vent to external air. Air vents to be at minimum of two-thirds of room height above the floor.
- Pantries – para 147
- Staircases or passages– para 148
- Shops – para 149
- Garages connected to habitable rooms – para 150
- Warehouse class buildings – para 151 which stipulates lighting to be as per ISO 8995-1
- Public buildings – para 152 which states that foyers should be vented via openings equivalent of minimum 2% of floor area, among other provisions.
- Spaces designated for specialized activities – para 156. It provides for ventilation of, among other spaces: schools or educational institutions; hospitals; building services plant rooms; restrooms with permitted smoking; commercial kitchens; carparks situated at sixth basement or lower and multi-storey car parks.

- Mechanical ventilation and air conditioning plant rooms – para 157.
- Roof spaces – Para 158.
- Any floors meant for use as office, bank, consulting rooms or similar should conform to Sub-paragraph 164(1).
- Rooms used for habitation, office or kitchen shall have natural lighting and ventilation conforming to Para 165

24. Flues, flue pipes and chimneys used in space heating systems shall remove smoke and noxious fumes and conform to Paragraphs 153, 154. Para 154 details the fire quality of material used in construction and lining of chimneys. The dimensional tolerances for projection above the roof vis-à-vis lateral dimensions of chimney and relation to roof ridge are stated therein.
25. Hearths or fireplaces that use solid fuel appliances should conform to Para 155.
26. Apart from natural lighting and ventilation, consideration should be taken of thermal comfort and energy efficiency as per para 160. Passive cooling and prevention of heat gains via planning and design is explained in the same paragraph
27. Environment conscious and sustainable design is stipulated 161 which deals also with green certification
28. Provisions with regard to windows include: -

    - Sub-paragraph 165(2) that stipulates minimum areas for the entire window, opening sashes and that facing directly to external air.
    - For purposes of being deemed to provide natural ventilation – paragraph 166. Sub-para (1) deals with unobstructed area about the window. Sub-para (2) deals with minimum sizes of projection outside the window while sub-para (3) defines the terminology dealing with measuring unobstructed area around walls.
    - Maximum depth of 9 metres from a wall for a window to serve a room.
    - Windows opening to enclosed verandah.

29. Circumstances under which ventilation or lighting may be supplemented by artificial systems are stipulated in Para 169 and 170.
30. Rooms containing soil water or waste fitments shall have window or lantern lights in accordance with Paragraph 171. Provisions include sizing of the overall opening and the size that should open directly to outside air. It also gives 2.1 metres as the minimum top height for the window or lantern hung.

3.0 CONCLUSION

The Building Code 2024 if adhered to will result in suitable indoor built environment is energy-efficient and sustainable with minimal life-cycle cost. Built environment professionals as well as owners of buildings should make every effort to ensure adherence to the requirements, especially as pertains to Lighting and Ventilation

9th Floor, KCB Towers Kenya P.O.Box 21046-00100

+254 709 126 102/172/173

info@nca.go.ke