

Tamil Nadu Cyclone Prone Area Special Building Rules, 1982

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In exercise of the powers conferred by section 191 and sub-section (1) of section 303 of the Tamil Nadu District Municipalities Act, 1920 (Tamil Nadu Act V of 1920), the Governor of Tamil Nadu hereby makes the following rules: -

1. Short title, extent and commencement.

- (a) These rules may be called the Tamil Nadu Cyclone Prone Area Special Building Rules, 1982.
- (b) They shall apply to the Municipalities, Townships and Town Panchayats to which Chapters IX and X of the Tamil Nadu District Municipalities Act, 1920 (Tamil Nadu Act V of 1920) have been extended and lying within the distance of twenty kilometres from the coast in the districts of Chengalpattu, South Arcot, Thanjavur, Pudukottai, Ramanathapuram, Tirunelveli and Kanniyakumari.
- (c) They shall apply to new construction, reconstruction, addition and alteration to an existing building. In the case of additions to an existing building, the rule shall apply to the entire building in so far as such additions affect the existing structure.
- (d) They shall apply in addition to the Tamil Nadu District Municipalities Building Rules, 1972 applicable for the area.
- (e) Notwithstanding anything contained in the Tamil Nadu District Municipalities Building Rules, these special building rules shall apply and in cases of inconsistency between these special building rules and the Tamil Nadu District Municipalities Building Rules, 1972, the special building rules shall prevail.
- (f) They shall come into force from the [date] [Published in T.N. Government Gazette dated. 22.9.1986.] of publication of the Notification in the Tamil Nadu Government Gazette.

2. Definitions.

- In these rules, unless there is anything repugnant in the subject or context, -

- (i) "Authority" means -
 - (a) in the case of Municipalities, the Commissioner or any other Officer to whom powers are delegated by the Commissioner; and
 - (b) in the case of Township or Town Panchayats, the Executive Officer of the Township or Town Panchayat, as the case may be;
- (ii) "Multi-storeyed building" means any building with more than four storeys or whose height is 15 metres or more;
- (iii) "Public building" means any building to which the public or any class or section of the public are granted access or any building which is open to the public or any class or section of the public and includes -
 - (a) any building used as a school (including a tutorial school) or a college (including tutorial college) or a University or other educational institution;
 - (b) any building used as a hostel;
 - (c) any building used as a library;

- (d) any building used as a hospital, a nursing home, dispensary, clinic, maternity centre or other like institution;
- (e) any building ordinarily used for public meetings or for celebrating marriage functions or holding parties;
- (f) any building used as a club or by any association;
- (g) any building used as a choultry or safety shelters;
- (h) any building used as a lodging house;
- (i) any building used as an eating-house, a coffee-house, boarding-house or hotel; and
- (j) any building ordinarily used by the public or any class or section of the public for religious worship or for religious congregation.

3. Land development.

- (a) Every person who intends to develop any land into building plots shall cause to lay the roads of 15 metres width and above aligning them to south-east or north-west direction or to local wind direction if it is different.
- (b) Roads with dead end, [***] *[Omitted by SRO A 44/87, dated 2nd January, 1987.]* shall not be provided.
- (c) In every residential layout designed to accommodate 5,000 or more inhabitants or with an extent of 25 hectares or more, a plot measuring not less than one thousand square metres shall be designated at suitable location as may be decided by the authority for construction of a [cyclone shelter] *[Substituted by SRO A 44/87, dated 2nd January, 1987.]*.
- (d) On either side of the major roads of 15 metres and above in width; the owner shall provide avenue trees at an interval of not more than 12 metres at suitable locations duly staggered, as may be directed by the authority. The trees so planted or transplanted shall be of seeds type whose height shall not exceed 10 metres.

4. Site suitability.

- (a) Site on or near tall hills is not suitable for construction of building. However, if a building is protected, it shall be designed to a wind pressure of 375 kilograms/square metre.
- (b) No site susceptible for abnormal high wind speeds shall be suitable for construction of building.
- (c) Every site for construction of building shall, as far as possible, be protected with natural wind-breakers to reduce the impact of prevailing winds.

Explanation. - Natural wind-breakers shall include the provision of small openings in the compound walls.

5. Orientation and shape of the building.

- (a) The building or group of buildings in a plot shall be oriented in such a manner that the location of building is duly staggered from the adjacent buildings so as to obstruct the free thorough flow of wind and reduce the wind effect on individual buildings as shown in Figure-1 of Appendix-B:

Provided that this rule shall not apply to construction, reconstruction, addition/alteration in the existing built-up area.

- (b) The building in a plot shall be so oriented that the depth or length of such building shall lie, as far as possible, parallel to the direction of the wind;
- (c) Multi-storeyed and public buildings shall be located in such a way that the distance between any two opposite buildings, shall be not less than one and a half times the total height of two opposite buildings.
- (d) The corner of the walls of the building facing the wind directions shall be rounded off to minimise wind pressure. Long buildings with a ratio of more than 2:1 between length and breadth, building of zig zag shape and internal courtyards, buildings of large disparities in height of different parts of same building, independent towers and projection shall not be permitted in buildings more than single storey or 4 metres height.
- (e) The general shape of public buildings shall be circular, square or short rectangular as shown in Figure-2 of Appendix-B:

Provided that if other shapes are adopted, the building shall be designed to the wind load as mentioned in sub-rule (a) of rule 7.

6. Height of building.

- The height of the building shall not exceed one and a half times the width of the street immediately abutting it or four times the shorter dimension of the building whichever is less.

7. Part of the building.

- (a) The design wind load given in the National Building Code shall be increased by 15 per cent for buildings up to 15 metres height and by 20 per cent for buildings more than 15 metres in height. The extract from National Buildings Code on "Wind load" is appended in Appendix-A.
- (b) Plinth - All public buildings shall be plinth to a height of 5 metres above the highest flood level.
- (c) Superstructure - (i) Burnt brick stones, concrete blocks or similar durable materials shall only be used for superstructure.
- (ii) The superstructure shall be anchored solidly to the foundation using enforcing bars, tie rods or other connectors suited to the material. The anchorage should be embedded at least 25 cubic metres into the foundation footing. Such rods shall be 16 millimetre diameter and spaced not more than 2 metres apart as shown in Figure-3 of Appendix-B.
- (iii) If the floor is raised off the ground and supported on posts, piers or pilings, the comers shall be anchored to the ground using galvanised steel anchor pipes as shown in Figure-4 of Appendix-B.
- (iv) The intersecting walls shall be made continuous by means of tie bars and/or horizontal reinforcement that shall extend into neighbouring walls and partitions as shown in Figure-5 of Appendix-B.
- (v) All masonry building shall have bond connecting all load-bearing masonry elements as shown in Figure-6 of Appendix-B.
- (d) Roof. - (i) In the case of pitched roof, the slope of roof shall be between 30 degrees and 40 degrees to the horizontal plane.
- (ii) The roof frame shall be connected with the masonry wall by extending the fastener strap around the roof joint and the ends duly embedded in the concrete or masonry to a depth of 25 cubic metres or braced diagonally with timber brace nailed to wall studs, joint and rafter as shown in Figures-7 and 8 of Appendix-B.
- (iii) In the case of pitched roof with tiles, states, asbestos sheets or other light roofing materials, as the case may be, it shall be ensured that the roofing materials, is sufficiently anchored to the roof structure, and the connections shall be checked for the uplift of the roof due to wind or punching as shown in Figure-9 of Appendix-B.
- (iv) The regions of the roof like eaves, junction and ridges liable for higher uplift force shall be provided with reinforcing bond as shown in Figure-10 of Appendix-B.
- (v) Slots shall be provided at the ridge of large assembly, industrial and godown buildings with pitched roof ventilation as shown in Figure-11 of Appendix-B.
- (e) Overhangs. - (i) No overhangs in the pitched roof shall exceed 30 centimetres beyond the outer surface of the wall. The end of the tile or other roofing materials shall be securely fixed at the eaves by means of tile clips nailed to the eave board or rafters as shown in Figure-12 of Appendix-B.
- (ii) No sunshade, balcony or other projections attached to the wall shall project beyond 60 centimetres from the outer surface of the wall. If the projection exceeds 60 centimetres, it shall be designed to prevent uplift due to wind. Continuous sunshade whether board and similar structure shall not be provided with. No sunshade or other projections in the vertical direction shall be permissible.
- (f) Parapet. - A parapet wall of not less than 75 centimetres height shall be provided over the outer wall of the building of flat roof.
- (g) Opening. - (i) Openings in an outer wall shall be located away from the corner of the building by a clear distance of not less than 8th the height of such opening or 6 metres whichever is higher and they shall be provided with proper shutters which can be securely closed during cyclone.
- (ii) The horizontal distance between two openings in an outer wall shall not be less than half the height of the larger opening.
- (iii) Between two openings, there shall be not less than 75 centimetres measured vertically.
- (iv) No vent holes just beneath roof shall be permitted in the outer walls of a building so as to avoid internal pressure.
- (v) Windows and ventilators in buildings whose height exceeds 15 metres or four storeys shall be firmly secured to the superstructure. Glazed windows shall be protected with louvers or other means to avoid breakage.

- (h) Chimneys and flues. - Chimneys and flues, separated from the main building, shall be constructed to the height exceeding 10 metres by reinforced cement concrete.
- (i) Compound wall. - Compound wall of height more than one metre shall be strengthened by adequate number of plasters at intervals of not more than 3 metres and also be provided with reinforced concrete ties at plinth.
- (j) Staircase. - Staircase, landings, ramps in a multi-storeyed building shall be so designed as to form integral part of the main building and in rub case shall they project beyond the external wall of the building.
- (k) Huts and pole type construction. - (i) The foundation shall be firmly connected to the wall or pole as shown in Figure-13 of Appendix-B.
- (ii) The wall or pole shall be firmly connected with the roof frame shown in Figure-14 of Appendix-B.
- (iii) The number of poles in a roof frame shall be firmly secured as shown in Figure-15 of Appendix-B.

Appendix-A

Source: National Building Code of India, 1970.

Wind Load

1. General. - Wind is air in motion relative to the surface of the earth. Very strong winds (greater than 80 kilometres per hour) are generally associated with cyclonic storms over the Indian area is that they rapidly weaken after crossing the coasts and make as depressions in land. The influence of a severe storm after striking the coast does not in general, exceed 60 to 70 kilometres, though sometimes, it may extend even up to 120 kilometres. A building is liable to wind pressures depending upon the geographical location, proximity to air flow and the type of structure.

2. Basic Wind Pressure. - The basic wind pressure 'p' shall be decided by the authority having the local meteorological data, local condition and duration of wind flow. In the absence of meteorological data, the basic pressure as given below may be adopted.

Pressure in kg/m ² up to a zone height of 30 meters above the main retarding surface	Pressure in kg/m ² at height (in meters) of			
30	40	45	50	
60	70	80	100	
120	150			
Local bodies as per Schedule Appended in these rules (vide rules 1.2)	200	208	210	217 222
230	236	244		
254	264	276		

Note 1. - The relationship between wind pressure and velocity is $P: KV^2$ where P is the pressure, V the velocity and K is co-efficient which is to be assumed as 0.006. Pressure is expressed in kg/m² and V in Km/h.

Note 2. - The basic wind pressures indicated above are the maximum ever likely to occur in the respective areas under fully exposed conditions. In the case of mountainous areas, the values indicated above should be modified according to the local conditions (see rule 4).

3. Wind load on a building. - 3.1. The effect of wind shall be calculated on the basis of basic pressure mentioned above, for entire height of the building and any projections thereof, having due regard to the level of mean retarding surface and variation in wind, regard shall also be given to shape factors and internal air pressures.

3.2 For structures of various plan shapes, other than rectangular plan shape, the external pressures acting on the projected area in the plan perpendicular to the wind shall be the product of basic pressure as given in Table -1 (given above) and the factors given in Table-2 (given below).

3.3 Calculation shall be made for the effect of wind on the design of individual components of the building. If adequate stiffening is provided by walls, or floors and walls, calculations, for the effects of wind, except in regard to wall panels, roofs, and foundations, need not be made on:

- (a) a building whose height "h" does not exceed twice the effective width;

- (b) a portion in between two parts of an adequately stiffened by if the height of that portion does not exceed twice its width and the length of that portion does not exceed four times its width; and
- (c) a wing of a building if it does not project more than twice its own width.

Sl. No.	Shape (in plan) Plan shape of the structure	Factors		
		Ratio of height to base width 0.4	Factor ratio of height to base width 4.8	Ratio of height to base width 8 or over
(1)	(2)	(3)	(4)	(5)
1.	Circular	0.7	0.7	0.7
2.	Octagonal	0.8	0.9	1.0
3.	Square (wind perpendicular to diagonal)	0.8	0.9	1.0
4.	Square (wind perpendicular to face)	1.0	1.15	1.3

Note 1. - In the case of projections above the general roof level, the base width shall be taken as the width of the construction where it rises from the surface of the roof and the height governing the ratio of height to base width shall be that from the roof surface to the top of construction.

Note 2. - The division of wind load into that acting on windward and leeward sides shall be the same as that for rectangular buildings as effected by the openings.

- 3.4 Internal air pressure in a building depends on the permeability to the flow of air and may be either positive or negative depending on the direction of flow of air as detailed below.

Building having low degree of permeability. - Buildings where the cladding is such that the flow of air through the cladding is practically negligible, the internal air pressure may be neglected.

Building of normal permeability. - Buildings where the cladding permits the flow of air but where there are no large openings, an internal positive pressure or suction of 0.2 p. acting normal to the wall and roof surface shall be considered in addition to the external wind pressures.

Buildings with high degree of permeability. - Buildings with large openings, i.e., openings larger than 20 per cent of the wall area such as hangers and sheds, as internal positive pressure or suction of 0.5 p. acting normal to the wall and roof surface shall be considered in addition to the external wind pressures.

Buildings of open type. - Buildings with roofs but no walls, the roofs will be subjected to pressures from both inside and outside and the recommendations given shall be followed.

4. Wind load on structural framework. - 4.1. In arriving at the wind, loads only the average values of pressure as indicated in 5.2 for walls and 4.3 for roofs need be considered and no account need be taken of the local effects.

- 4.2 The resultant wind loading on a structural framework shall be arrived at on the basis of the average values of pressures simultaneously acting on the structure having due regard to the direction of wind. Thus, for example, when a total pressure of 0.7 p. is being considered on the windward cladding, the corresponding wind load on the leeward cladding should be 0.6 p. and vice versa.

- 4.3 The effect of wind drag on roofs may be taken at -

- (a) 0.05 p. measured on the plan area of the roof where the direction of wind is normal to the ridge; and
- (b) 0.025 p. measured on the total area of roof ignoring openings where the direction of wind is parallel to the ridge;
- (c) Where the wind direction is parallel to a wall, the effect of wind drag on the wall may be taken at 0.025 p. measured on the total area of wall ignoring openings.

5. Wind pressure on walls. - 5.1. The external wind pressure acting on a wall which is perpendicular to the assumed direction of wind may be considered as consisting of two parts, corresponding to an average positive pressure of 0.5 p. on the leeward face. A wall which is exposed to wind on both of its faces would, therefore, be subjected to a total average pressure of "p" acting in the direction of the wind.

- 5.2 When the walls form an enclosure, there will be a positive pressure of 0.5 p on the windward wall and a suction of 0.5 p on the leeward wall in addition to the internal air pressures as given in 3.4. Thus, a wall of

any building should be strong to resist a total average p. inwards of: -

- 0.5 p. for building having a low degree of permeability;
- 0.7 p. for buildings of normal permeability; and
- p. for buildings with large openings and walls exposed to wind on both faces.
- 5.3 The value specified above shall be increased by 0.1 p, if local effects demand them.

6. Wind pressure on roofs. - 6.1. The design wind pressure on roofs shall be determined as the resultant effect of average external wind pressures as given in 6.2 and the internal air pressure as given in 3.4. Since the algebraic sum of the value determined from the above values represent average values of the positive pressures on the roof, due consideration should be given to local effects as given in 6.5.

- 6.2 Flat and pitched roofs. - For flat and pitched roofs, the wind pressures normal to the surface, due to wind flowing at right angles to the in terms of basic wind pressure 'p', shall be as given below in Table-3, ridge.

Sl. No.	Slope on roof on wind-ward side (x)	External wind pressure	
		Windward slope	Leeward slope
(1)	(2)	(3)	(4)
1.	0	(-) 1.00 P	(-) 0.50 P
2.	10	(-) 0.70 P	(-) 0.50 P
3.	20	(-) 0.40 P	(-) 0.50 P
4.	30	(-) 0.10 P	(-) 0.50 P
5.	40	(+) 0.10 P	(-) 0.50 P
6.	50	(+) 0.30 P	(-) 0.50 P
7.	60	(+) 0.40 P	(-) 0.50 P
8.	70 to 90	(+) 0.50 P	(-) 0.50 P

Note 1. - In the above Table, plus (+) means an external positive pressure on the roof normal to the surface of the roof and minus (-) means an external suction on the roof normal to the surface of the roof.

Note 2. - Wind pressures for intermediate slopes may be interpolated.

Note 3.- In the case of flat roof, windward slope means windward half of the roof and leeward slope means leeward half of the roof.

- 6.3 Pressure on roofs of butterfly structures having roof indications of + 10° and + 30° are given in the sketch below. For slopes other than those given in the figures below, the pressures shall be deducted by linear interpolation.
- 6.4 When the direction of wind is normal to gable-ends, unless otherwise specified by engineer in charge on the basis of experimental data, the average external wind pressure on the roofs may be assumed as:
- 0.6 p. on the both slopes of the roof over a length from the gable end usual to the mean height of the roof from the surrounding ground level; and
 - 0.4 p. over the remaining length of the roof on both slopes.
- 6.5 The pressures and suctions specified in 6 above are average and may exceed locally in which case, they shall be increased numerically by 0.3 p.