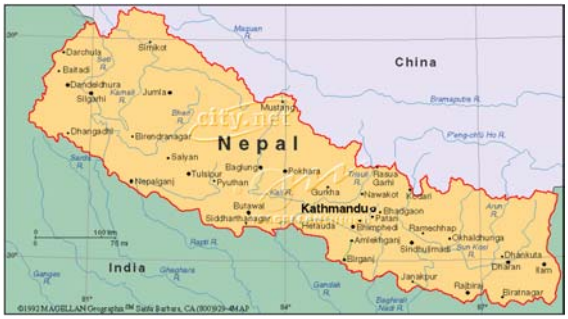
NEPAL NATIONAL BUILDING CODE

NBC 104 : 1994



WIND LOAD

Government of Nepal
Ministry of Physical Planning and Works
Department of Urban Development and Building Construction
Babar Mahal, Kathmandu, NEPAL
Reprinted : 2064

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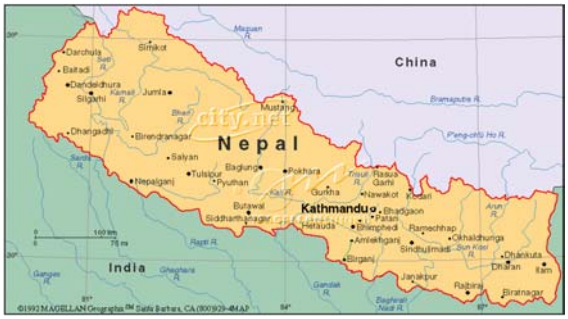

WIND LOAD

This publication represents a standard of good practice and therefore takes the form of recommendations. Compliance with it does not confer immunity from relevant legal requirements, including bylaws.

तत्कालिन श्री ५ को सरकार (मन्त्रिपरिषद्) को मिति २०६०।४।१२ को निर्णयानुसार स्वीकृत

Government of Nepal
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Babar Mahal, Kathmandu, NEPAL
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Preface

This Nepal Standard was prepared during 1993 as part of a project to prepare a National Building Code for Nepal.

In 1988 the Ministry of Housing and Physical Planning (MHPP), conscious of the growing needs of Nepal's urban and shelter sectors, requested technical assistance from the United Nations Development Programme and their executing agency, United Nations Centre for Human Settlements (UNCHS).

A programme of Policy and Technical Support was set up within the Ministry (UNDP Project NEP/88/054) and a number of activities have been undertaken within this framework.

The 1988 earthquake in Nepal, and the resulting deaths and damage to both housing and schools, again drew attention to the need for changes and improvement in current building construction and design methods.

Until now, Nepal has not had any regulations or documents of its own setting out either requirements or good practice for achieving satisfactory strength in buildings.

In late 1991 the MHPP and UNCHS requested proposals for the development of such regulations and documents from international organisations in response to terms of reference prepared by a panel of experts.

This document has been prepared by the subcontractor's team working within the Department of Building, the team including members of the Department and the MHPP. As part of the proposed management and implementation strategy, it has been prepared so as to conform with the general presentation requirements of the Nepal Bureau of Standards and Metrology.

The subproject has been undertaken under the aegis of an Advisory Panel to the MHPP.

The Advisory Panel consisted of :

Mr. UB Malla, Joint Secretary, MHPP	**Chairman**
Director General, Department of Building (Mr. LR Upadhyay)	**Member**
Mr. AR Pant, Under Secretary, MHPP	**Member**
Director General, Department of Mines & Geology (Mr. PL Shrestha)	**Member**
Director General, Nepal Bureau of Standards & Metrology (Mr. PB Manandhar)	**Member**
Dean, Institute of Engineering, Tribhuvan University (Dr. SB Mathe)	**Member**
Project Chief, Earthquake Areas Rehabilitation & Reconstruction Project	**Member**
President, Nepal Engineers Association	**Member**
Law Officer, MHPP (Mr. RB Dange)	**Member**
Representative, Society of Consulting Architectural & Engineering Firms (SCAEF)	**Member**
Representative, Society of Nepalese Architects (SONA)	**Member**

Deputy Director General, Department of Building,
(Mr. JP Pradhan) **Member-Secretary**

The Subcontractor was BECA WORLEY INTERNATIONAL CONSULTANTS LTD. of New Zealand in conjunction with subconsultants who included :

Golder Associates Ltd., Canada
SILT Consultants P. Ltd., Nepal
TAEC Consult (P.) Ltd., Nepal
Urban Regional Research, USA

Principal inputs to this standard came from:

Mr. YK Parajuli, TAEC
Mr. AS Arya, University of Roorkee, Roorkee, India
The Deputy Director- General, Metrological Department (IMD), India
Mr. S. Shrestha, TAEC
Mr. JK Bothara, TAEC
Dr. RD Sharpe, BECA (Team Leader)

Revisions and Updated to this code came from:

Mr. Purna P.Kadariya, DG, DUDBC
Mr. Kishore Thapa, DDG, DUDBC
Mr. Mani Ratna Tuladhar, Sr. Div. Engineer, DUDBC
Mr. Jyoti Prasad Pradhan, Ex. DG, DOB
Mr. Bhubaneswor Lal Shrestha, Ex. DDG, DOB
Mr. Uttam Shrestha, Architect, Architects' Module Pvt.Ltd.
Mr. Manohar Lal Rajbhandhari, Sr. Structural Engineer, MR Associates
Mr. Amrit Man Tuladhar, Civil Engineer, DUDBC

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0 Foreword

This Nepal Standard on **"Wind Load"** comprises the India Standard IS:875 (Part 3) 1987: **CODE OF PRACTICE FOR DESIGN LOADS (OTHER THAN EARTHQUAKE) FOR BUILDINGS AND STRUCTURES** (Second Revision) with amendments as set out herein.

These amendments have been necessary to ensure the requirements of Nepalese context. Particularly the wind zoning map of Nepal.

1. SCOPE

NEPAL AMENDMENTS TO BE: 875 (Part 3)-1987

0 Foreword Delete 0.1 to 0.3 and replace with:

Wind speed is monitored at only a few stations in Nepal. The average monthly wind speed data recorded at a particular time of the day is available from 40 stations distributed in various parts of the country. Of these, the station at Tribhuvan International Airport 1030) records the average daily wind speed, maximum hourly gust and maximum gust. The data from this station, however, is not continuous and this information is available only for the period 1971 to 1975 and 1985 to 1986. For the 1985-1986 periods, only the average monthly wind speed is available. This is published in book-form. The general data is available in a booklet published by the Department of Hydrology and Meteorology.

The Snow and Glacier Hydrology Project and the Kagbeni Wind Power Project are two projects which, at present, are measuring wind speed in some parts of the country. The former has established three anemometer stations in Upper Langtang Valley, Khumbu (Everest region) and Modi Khola Valley (Annapurna region) where the hourly wind speed and direction have been measured since 1987. The project has further plans to establish more stations in higher regions in the future. The latter was Nepal's first wind power generation project. Maximum, minimum and average daily wind records since 1989 for Kagbeni in Mustang district of West Nepal are available. It is proposed to establish eight more stations in various parts of the country.

The available data base is inadequate both in terms of spatial distribution and duration. Modern wind design codes are based on the peak gust velocity averaged over a short interval of about 3 seconds that has a 50 year return period. The available Nepalese wind data base is insufficient and irrelevant to prepare wind zone map.

The Indian Standard IS : 875 (part 3) –1987 Code of practice for Design Wind Load has presented a wind zoning of India based on an average peak gust velocity of 3 seconds with a 50 year return period. According to this map, the plains have a basic wind velocity of 47 meters per second and the hilly northern areas in Uttar Pradesh and Himanchal pradesh have a basic wind velocity of 39 meters per second-with a marginal adjustment for Dehra Dun for which the basic wind velocity is 47 meters per second. The basic wind speed for the Laddakh region, which has high hills and valleys all through it, is 55 meters per second.

In Nepal, the wind velocities in the lower valleys are smaller in magnitude than those in the higher valleys and mountain ranges. This is evident from the speeds observed in Kathmandu Valley and in Kali Gandaki Valley. It appears reasonable to classify broadly the country into different wind zones for the purpose of setting the basic wind speeds. For this purpose, the Indian map has been used as a guide.

The country has been divided into two regions : a) the lower plains and hills and, b) the mountains. The first zone generally includes the southern plains of the Terai, the Kathmandu Valley and those regions of the country generally below an elevation of 3000 meters. The second zone covers all sreas above 3000 meters. For the Nepalese plains continuous with the Indian plans, a basic velocity of 47 m/s has been adopted. In the higher hills, a basic wind velocity of 55 meters per second has been selected. The wind zoning map of Nepal prepared on this basis is presented in Figure 1.1. While preparing the map, the physical boundaries of the Districts have also been kept in mind.

Available wind data collected during the preparation of this standard is presented separately in Appendices **NBC 104: 1 to 5.**

Note:

A. ***Discussions with the Deputy Director General of India's metrological Department (IMD) by Dr AS Arya on the use of the available wind data for Nepal concluded that the various parameters which control the peak gust velocities are extremely variable in the hilly/mountainous regions of the Himalayas. In addition, any extrapolation from average daily wind velocities and hourly mean velocities to peak gust velocities will be meaningless and, therefore, should not be attempted.***

B. ***The design wind velocity for a structure depends on the following main parameters:***

- ***Probability factor,***
- ***Terrain, height and structure size factor, and***
- ***Topography factor***

These factors are fully described in IS:875 (Part 3)- 1987 and are easily discernable for areas in Nepal. Therefore, it will be reasonable to use the Indian Standard for the computation of wind forces on structures in Nepal, taking the wind velocities as suggested here above.

C. ***All organizations planning to build important light roof type structures or tall structures are advised to collect data on wind direction and speed with the help of appropriate instruments.***

D. ***Data and information collected during the course of preparing this Standard appear in a separate Appendix, NBC: 104-2250***

1.1.3 4th line, add "Indian" before codes.
5th line, replace "code" with "Standard"

4

4.2. **Delete** this clause inclusively.

4.8 **Add** new clause:

4.8.1 In this Standard the word " shall" indicates a requirement that must be adopted in order to comply with the Standard, while the word "Should" indicates recommended practice.

5.

5.2. 2nd line, replace " India" with " Nepal".
Delete the last sentence.

5.3. Last sentence on note, replace " speed" with " speed".

5.3.1. Delete the first sentence and substitute with:

Figure 1 gives the approximate basis wind speed for Nepalese topography based on the Indian territory. It is believed to be applicable for Category 2 at 10 m above the ground level, based on a 50 years mean return period.

5.3.2.1 (a) Delete the portion of note " Open sea coast land"

5.3.2.1 (b) Delete the last sentence of note.

Figure 1 Replace " the Map of India" with " the Map of Nepal".

Table 1 Delete k_1 factor, and A and B coefficients for basic wind speeds of 33, 39, 44 and 50 m/s.

5.3.2.1 (c) Note- 3, delete the sentences.

5.3.3. Delete the first two sentences and replace with:

The basic wind speed given in Figure 1 is generally estimated from the height of the places above the mean sea level. Special attention has been given to the Kali Gandaki River valley where the average wind velocity is extremely high. The boundaries of Districts have also been taken into consideration when demarcating the wind zones.

5.5. Delete this clause inclusively.

6

6.2.2.9. Last sentences, replace " windword" with "windward".

8.

8.2. 5th line, insert "factor" before "at".

Note- 3rd line, replace "India" with "Nepal" and

Note- 4th line, delete, "cyclone and".

APPENDIX D

4th paragraph, delete "likely to be found in India"