

(PREVIEW)

HANDBOOK ON BUILDING CONSTRUCTION PRACTICES (Excluding Electrical Work)

INTRODUCTION

The National Building Code of India, 1983 (NBC) covers all the aspects of buildings. These aspects include building byelaws, development control rules, building materials and fire protection which are covered in Part I to Part V; Part VI covers the design of buildings using the building materials. Part VII is a compendium of Indian Standards on Construction Practices generally described as codes of good practices. Part VIII deals with building services, Part IX with plumbing services and Part X, the last part, deals with signs and outdoor display structures.

For implementation of the NBC, a broad decision was taken by all state governments and the central and public sector departments to incorporate the appropriate parts of the NBC into the relevant technical documents, such as, municipal building byelaws, PWD specifications, specifications of construction departments, etc.

Simultaneously it was felt that for easy understanding and implementation of various Parts of the NBC, handbooks be brought out on various Parts/Sections as relevant. In the light of this, S & T project was launched by BIS, the Bureau of Indian Standards to prepare such handbooks. This handbook on constructional practices is one of them. Some handbooks have been already prepared and reference is made to them as found necessary.

This handbook has been on the anvil for some time now. The NBC has broadly classified buildings into 9 groups based on use and occupancy; for convenience of this handbook, they have been grouped into three, namely, residential, commercial and industrial buildings. Therefore, a study was made of available Indian Standards on constructional practices of these three groups of buildings.

Within the BIS this work of standardization of the construction sector is spread over more than one technical division. Departmental programmes of civil, mechanical, metallurgical, chemical, river valley had to be checked up in this context.

Normally PWDs and other construction department largely cover the constructional practices relevant to residential and to some extent office buildings. Constructional practices relevant to commercial buildings and industrial buildings are not generally dealt with. Thus this handbook has a much wider coverage in dealing with constructional practices for residential, commercial and industrial buildings, than normal departmental specifications.

The approach to the handbook is to attempt to cover the 'how' of constructional practice with the 'why' of it. The current departmental specifications generally specify as to how an item of work has to be done. They do not explain the rationale for such specifications and therefore the user is not given enough information to decide, for the same work, use of alternate or more appropriate specifications among others

available in the country. For example a number of specifications for flooring are available; the choice of any of them according to the end use is not mentioned. Therefore the reasons or 'why' of a particular specification helps in choosing one of the many specifications available for an appropriate end use. Such information, it is hoped, would lead to a reasonably good decision on choice or selection of construction procedure in relation to its end use or performance on site.

A holistic approach to buildings bring out the interrelationship among building materials, design and construction of buildings using these materials. Therefore, construction practices have to be viewed in the light of quality of materials and appropriate designs. The BIS have already brought out a summary of Indian Standards on building materials; handbooks on design; and handbooks on some services. This handbook would therefore have to be looked at as filling a gap in the series of handbooks on the building as a whole. It is therefore felt that a close co-ordination be established between the design of an item/element and its construction in the field so that the intention of the designer is fully understood in the field.

To demarcate the contents of the handbook into individual chapters, available PWD handbooks have been studied; these include among others the CPWD specifications of 1991-92 and Tamil Nadu Building Practice 1983/1985. The main basis are the Indian Standards available up to March 1994. From a study of these, the chapters have been identified and arranged according to the sequence of construction as closely as possible, namely, planning of work, collection of materials, earthwork and related termite treatment, foundations, superstructure of masonry; wood, concrete and steel, flooring, wall finishes and roofing and then followed by waterproofing and damp-proofing. Finishing of surfaces, such as, masonry, concrete and plaster are then covered; finishes of wood and metal construction is also covered. Finally water supply and drainage systems are covered. Emphasis is then laid on special construction procedure particularly for earthquake forces. The last chapter deals with demolition of buildings.

For the use of materials not covered by Indian Standard Codes of Practice, the construction practices would be based on the principles enumerated in each section. For example in painting, the preparation of surface and application should be based partly on manufacturers recommendations and broadly on the principles of preparing a clean, dry surface to receive the paint; the actual finishing should be preceded by filling, staining where applicable and sealing particularly with respect to wood surfaces. Similar procedure could be worked out for other items of work using new materials, such as, for doors, roofing sheets and so on.

For economies in construction, planning of the entire work as covered in Chapter 1, is of importance. Crack control in buildings as covered in Chapter 13 which could be of use in planning of buildings is also of great importance.

For specialized construction work reference has been made to ISS wherever available.

It is therefore reasonable to assume that careful planning and meticulous observance of all the constructional practices elaborated herein would lead to a high quality building.

For ease of reading, each chapter is preceded by a table of contents. List of standards used and referred to are given at the end of the handbook. A summary of each chapter is given below to indicate its broad coverage.

LIST OF REFERRED INDIAN STANDARDS
(*Indicates Indian Standards Used in the Chapter)

CHAPTER 1

CONSTRUCTION PLANNING AND STORAGE OF MATERIALS

| <i>IS No.</i> | <i>Title</i> |
|----------------------------|--|
| 1141 : 1993 | Seasoning of timber — Code of practice (second revision) |
| * 4082 : 1977 | Recommendation on stacking and storage of construction materials at site (first revision) (Reaffirmed 1990) |
| 7969 : 1975 | Safety code for handling and storage of building materials (Amendment 1) (Reaffirmed 1991) |
| CHAPTER 2 | |
| EARTHWORK | |
| 883 : 1970 | Design of structural in building — Code of practice (third revision) |
| 1498 : 1970 | Classification and identification of soils for general engineering purposes (first revision) (Amendments 2) (Reaffirmed 1992) |
| 2682 : 1984 | Chlordane emulsifiable concentrates (second revision) (Amendment 1) (Reaffirmed 1994) |
| *3764 : 1992 | Excavation work — Code of safety (first revision) |
| 4081 : 1986 | Safety code for blasting and related drilling operations (Reaffirmed 1991) |
| 5878 (Part 2/Sec 1) : 1970 | Code of practice for construction of tunnel conveying water : Part 2 Underground excavation in rock, Section 1 Drilling and blasting (Amendment 1) (Reaffirmed 1990) |
| 6313 (Part 2) : 1981 | Code of practice for anti-termite measures in buildings : Part 2 Pre-constructional chemical treatment measures (first revision) (Amendments 3) (Reaffirmed 1991) |
| 6439 : 1978 | Heptachlor emulsifiable concentrates (first revision) (Amendments 2) (Reaffirmed 1993) |
| 8944 : 1978 | Chlorpyrifos emulsifiable concentrates (Amendment 2) (Reaffirmed 1993) |
| CHAPTER 3 | |
| FOUNDATIONS | |
| 269 : 1989 | 33 grade ordinary Portland cement (fourth revision) (Amendment 3) |
| 401 : 1982 | Code of practice for preservation of timber (third revision) (Amendments 2) (Reaffirmed 1990) |
| 432 (Part 1) : 1982 | Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement : Part 1 Mild steel and medium tensile steel bars (third revision) (Reaffirmed 1995) |
| 455 : 1989 | Portland slag cement (fourth revision) (Amendments 3) |
| 456 : 1978 | Code of practice for plain reinforced concrete (third revision) (Amendments 2) (Reaffirmed 1991) |
| CHAPTER 4 | |
| MASONRY | |
| Part 1 Mortars | |
| 269 : 1989 | 33 grade ordinary Portland cement (fourth revision) (Amendment 3) |
| 383 : 1970 | Coarse and fine aggregates from natural sources for concrete (second revision) (Reaffirmed 1990) |
| 455 : 1989 | Portland slag cement (fourth revision) (Amendments 3) |
| 456 : 1978 | Code of practice for plain reinforced concrete (third revision) (Amendments 2) (Reaffirmed 1991) |

CHAPTER 5

PLAIN AND REINFORCED CONCRETE

| | |
|---------------------|--|
| 269 : 1989 | 33 grade ordinary Portland cement (fourth revision) (Amendment 3) |
| 383 : 1970 | Coarse and fine aggregates from natural sources for concrete (second revision) (Reaffirmed 1990) |
| 432 (Part 1) : 1982 | Mild steel and medium tensile steel bars and hard-drawn steel wires for concrete reinforcement : Part 1 Mild steel and medium tensile steel bars (third revision) |
| 875 (Part 2) : 1987 | Code of practice for design loads (other than earthquake) for buildings and structures : Part 2 Imposed loads (<i>second revision</i>) (Reaffirmed 1992) |
| 875 (Part 3) : 1987 | Code of practice for design loads (other than earthquake) for buildings and structures : Part 3 Wind loads (<i>second revision</i>) (Reaffirmed 1992) |
| 875 (Part 4) : 1987 | Code of practice for design loads (other than earthquake) for buildings and structures : Part 4 Snow loads (<i>second revision</i>) (Reaffirmed 1992) |
| 875 (Part 5) : 1987 | Code of practice for design loads (other than earthquake) for buildings and structures : Part 5 Special loads and load combinations (<i>second revision</i>) (Reaffirmed 1992) |

CHAPTER 6

ANTI-TERMITE MEASURES

| | |
|-----------------------|--|
| 216 : 1991 | Coaltar pitch (<i>first revision</i>) (Reaffirmed 1991) |
| 401 : 1982 | Code of practice for preservation of timber (<i>third revision</i>) (Amendments 2) (Reaffirmed 1990) |
| 1141 : 1993 | Seasoning of timber --Code of practice (<i>second revision</i>) |
| *6313 (Part 1) : 1981 | Code of practice for anti-termite measures in buildings : Part 1 Constructional measures (<i>first revision</i>) (Reaffirmed 1991) |
| *6313 (Part 2) : 1981 | Code of practice for anti-termite measures in buildings : Part 2 Pre-constructional chemical treatment measures (<i>first revision</i>) (Amendments 3) (Reaffirmed 1991) |
| *6313 (Part 3) : 1981 | Code of practice for anti-termite measures in buildings : Part 3 Treatment for existing buildings (first revision) (Amendments 3) (Reaffirmed 1991) |

CHAPTER 7

DOORS AND WINDOWS (WOOD AND METAL)

| | |
|----------------------|---|
| 208 : 1987 | Door handles (<i>fourth revision</i>) (Reaffirmed 1992) |
| 287 : 1993 | Permissible moisture content for timber used for different purposes — Recommendations (<i>third revision</i>) |
| 303 : 1989 | Plywood for general purposes (<i>third revision</i>) (Amendment 1) (Reaffirmed 1993) |
| 399 : 1963 | Classification of commercial timbers and their zonal distribution (<i>revised</i>) (Amendment 1) (Reaffirmed 1990) |
| 401 : 1982 | Code of practice for preservation of timber (<i>third revision</i>) (Amendments 2) (Reaffirmed 1990) |
| 419 : 1963 | Putty, for use on window frames (<i>first revision</i>) (Amendments 3) (Reaffirmed 1992) |
| 1003 (Part 1) : 1991 | Timber panelled and glazed shutters : Part I Door shutters (<i>third revision</i>)(Amendment 1) |
| 1003 (Part 2) : 1983 | Timber panelled and glazed shutters : Part2 Window and ventilator shutters (<i>second revision</i>) |
| 1038 : 1983 | Steel doors, windows and ventilators (<i>third revision</i>) (Amendment 1) (Reaffirmed 1991) |
| *1081 : 1960 | Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators (Amendment 1) (Reaffirmed 1991) |
| 1141 : 1993 | Seasoning of timber - Code of practice (<i>second revision</i>) |

CHAPTER 8

STEEL CONSTRUCTION

| | |
|------------|---|
| 104 : 1979 | Ready mixed paint, brushing, zinc chrome, priming (<i>second revision</i>) (Amendment 1) (Reaffirmed 1993) |
| 123 : 1962 | Ready mixed paint, brushing, finishing, semi-gloss, for general purposes to Indian Standard Colours No. 445,446,448,449,451,473 and red oxide (colour unspecified) (<i>revised</i>) (Amendment 1) (Reaffirmed 1991) |

456 : 1978 Code of practice for plain and reinforced concrete (*third revision*) (Amendment 2) (Reaffirmed 1991)

CHAPTER 9

FLOORS AND FLOOR COVERINGS

77 : 1976 Linseed oil, boiled for paints (*second revision*) (Reaffirmed 1993)
269 : 1989 33 grade ordinary portland cement (*fourth revision*) (Amendments 3)
303 : 1989 Plywood for general purposes (*third revision*) (Amendment 1) (Reaffirmed 1993)

CHAPTER 10

WALL AND CEILING FINISHES AND COVERINGS AND WALLING

269 : 1989 33 grade ordinary portland cement (*fourth revision*) (Amendments 3)
303 : 1989 Plywood for general purposes (*third revision*) (Amendment 1) (Reaffirmed 1993)

CHAPTER 11

ROOFS AND ROOFING

158 : 1981 Ready mixed paint, brushing, bituminous, black lead-free, acid alkali and heat resisting (*third revision*) (Amendment 1) (Reaffirmed 1988)
217 : 1988 Cutback bitumen (*second revision*)
269 : 1989 33 grade ordinary Portland cement (*fourth revision*) (Amendments 3)

CHAPTER 12

DAMP-PROOFING AND WATERPROOFING

73 : 1992 Paving bitumen (*second revision*)
269 : 1989 33 grade ordinary Portland cement (*fourth revision*) (Amendments 3)
383 : 1970 Coarse and fine aggregates from natural sources for concrete (*second revision*) (Reaffirmed 1990)

CHAPTER 13

JOINTS IN BUILDINGS (CONTROL OF CRACKS IN BUILDINGS)

1834 : 1984 Hot applied sealing compound for joint in concrete (*first revision*) (Reaffirmed 1990)
1838 (Part 1) : 1983 Hot applied sealing compound for joint in concrete (*first revision*) (Reaffirmed 1990)

CHAPTER 14

WHITEWASHING, COLOUR WASHING AND PAINTING OF MASONRY, CONCRETE AND PLASTER SURFACES (CALCAREOUS SURFACES)

44 : 1991 Iron oxide pigments for paints (*second revision*)
55 : 1970 Ultramarine blue for paints (*first revision*) (Amendments 2) (Reaffirmed 1991)
109 : 1968 Ready mixed paint, brushing, priming, plaster, to Indian Standard Colour No. 361 and 631 White and off white (*first revision*) (Amendments 3)(Reaffirmed 1993)
133 : 1993 Enamel, interior : (a) undercoating, (b) finishing (*third revision*)

CHAPTER 15

PAINTING, VARNISHING AND ALLIED FINISHES (WOOD AND METALS)

102 : 1963 Ready mixed paint, brushing, red lead, non-settling, priming (*revised*) (Amendments 2) (Reaffirmed 1991)
110 : 1983 Ready mixed paint, brushing, grey filler, for enamels for use over primers (*first revision*) (Reaffirmed 1990)

CHAPTER 16

WATER SUPPLY AND DRAINAGE

404 (Part 1) : 1993 Lead pipes : Part 1 For other than chemical purposes (*third revision*)
407: 1981 Brass tubes for general purposes (*third revision*) (Reaffirmed 1991)

CHAPTER 17

SPECIAL CONSTRUCTION PROCEDURES EARTHQUAKE EFFECTS, Etc

1893 : 1984 Criteria for earthquake resistant design of structures (*fourth revision*) (Amendment 1) (Reaffirmed 1991)
4326 : 1993 Earthquake resistant design and construction of buildings — Code of practice (*second revision*)

CHAPTER 18

DEMOLITION OF BUILDINGS

| | |
|----------------------|---|
| 2190 : 1992 | Selection, installation and maintenance of first-aid fire extinguishers - Code of practice (<i>second revision</i>) (Amendment 1) (Reaffirmed 1990) |
| 2925 : 1984 | Specification for industrial safety helmets (second revision) (Amendment 1) (Reaffirmed 1990) |
| 3696 (Part 2) : 1991 | Safety code of scaffolds and ladders : Part 2 Ladders |
| *4130 : 1991 | Demolition of buildings - Code of safety (second revision) |
| 4912 : 1978 | Safety requirements for floor and wall openings, railings and toe boards (first revision) (Reaffirmed 1991) |