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RECOMMENDATIONS FOR
MODULAR CO-ORDINATION CONTROLLING DIMENSIONS

BUREAU OF CEYLON STANDARDS

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SLS 430:1977

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FOREWORD

This Sri Lanka Standard was prepared by the Committee for Modular Co-ordination under the authority of the Civil Engineering Divisional Committee of the Bureau of Ceylon Standards and was approved for adoption and publication by the Council of the Bureau on 1977-11-02.

With the increasing necessity for large scale building programmes the need for dimensional standardization of building and its components has been felt. In this connection the concept of modular co-ordination which is considered a basic approach, at achieving dimensional standardization in the building industry has received careful attention of those associated with this industry, and the advantages have been realised.

With a view to introducing these principles in the building industry in Sri Lanka the Bureau of Ceylon Standards has undertaken the formulation of recommendations connected with the subject. This recommendation which lays down some theoretical basis of modular co-ordination is one of a series of Ceylon Standards

prepared on this subject. Other recommendations published so far in the series are:

CS 129 Basic module to be used in the building industry.

CS 130 Horizontal multi-modules to be used in the building industry.

CS 131 Glossary of terms used in the building industry with special reference to modular co-ordination.

CS 132 Classification of building components for dimensional co-ordination.

SLS...* Recommendation for application of tolerances in the building industry.

In the preparation of this standard, the assistance derived from the publications of the British Standards Institution is acknowledged.

0 INTRODUCTION

0.1 General

The principal object of modular co-ordination is to assist rationalization and industrialization within the building industry and the associated industries by standardization in such a manner that the components may be manufactured on an industrial scale and erected efficiently on site; thereby improving the economics of building. The bases on which this system of dimensional co-ordination is built up are:

a) The use of basic module and multi-modules.

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* SLS .... under preparation.

b) The reference system used for defining the co-ordinating spaces and zones for building elements and for the components and controlling dimensions for buildings.

c) Rules for defining preferred sizes for building components and controlling dimensions for buildings.

d) Rules for erection of building elements and components in the reference system.

e) Rules for sizing building components so as to define the manufacturing sizes.

Some of the above aspects have been dealt with in the Ceylon Standards already published and referred to in the 'Foreword'. This recommendation lays down a reference system for defining the co-ordinating spaces and zones for building elements, as stated above.

0.2 The controlling reference system

The reference system which forms a basis for modular co-ordination is a system of points, lines and planes to which the sizes and positions of building components or assemblies relate. The distance between planes in this system is equal to the basic module, to a multiple of this module or to a multi-module. The planes form a basic system of reference for the elements of construction (which may be superimposed on a smaller grid reference system for components) and are therefore termed key reference planes. The zones for floors, walls, etc. lying between key reference planes are referred to as controlling zones. On plans, sections and elevations key reference planes are indicated by controlling lines. The entire framework of planes, zones and dimensions is described as the controlling reference system.

Key reference planes divide the volume of a building into controlling zones and usable spaces between them. They also indicate where joints between elements of construction are most likely to occur. The dimensions of these elements therefore will be directly related to controlling dimensions. The effect of this standard on the design of buildings as a whole is to impose a size discipline on the principal dimensions. The sizes for controlling dimension in this standard are based on the increments recommended in CS 130.

The vertical controlling dimensions are the depths of controlling zones, floor-to-ceiling heights, floor-to-floor heights and changes of level. The horizontal controlling dimensions are the widths and spacing of controlling zones. There are two principal methods of locating key reference planes on plan:

a) on the axes of load-bearing walls or columns.

b) on the boundaries of controlling zones.

Further explanation of these methods are given in 3.

0.3 Sub-division of the controlling reference system

The controlling reference system is a broad division used in planning the building layout. The controlling zones contain the main load-bearing elements which comprise structural components assembled with associated non-structural components. The remaining 'usable' spaces are largely unfilled, but may contain assemblies of non-structural components.

In order to study the relationship of particular assemblies to the controlling reference system, it is necessary to sub divide both the usable spaces and the controlling zones. This sub-division is based on the reference planes at which the joints between assemblies are most likely to occur (in addition to those at key reference planes).

0.3.1 Horizontal reference planes at head and sill level (window/door set)

The position of joints between assemblies at head and sill level are subject to the controlling reference system. The reference planes at which these joints are most likely to occur are known as intermediate key reference planes (shown in Fig. 4). The dimensions between these planes are known as intermediate controlling dimensions.

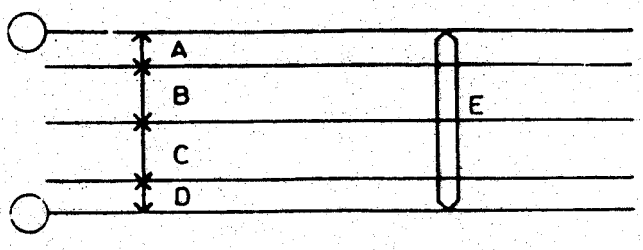
0.3.2 Vertical reference planes within usable spaces

Vertical joints between assemblies within usable spaces are not subject to the controlling reference system, other than at key reference planes. At intermediate positions, the reference planes at which joints occur will be selected from either 3M or M increments. Where assemblies less than M (100 mm) thick intersect at right angles, joint reference planes may occur on 50 mm or 25 mm increments.

0.3.3 Reference planes sub-dividing controlling zones

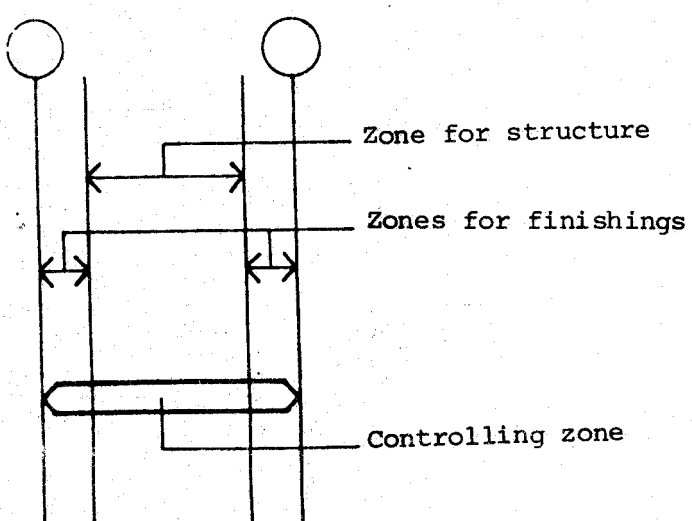
Controlling zones can be sub-divided into zones for structure, finishings, services, etc., as applicable (see figure on page 8). The zones for various functions are separated by reference planes within the controlling zones. The sizes of these zones, and hence the positions of the reference planes reflects the functions of the components contained between them.

Zones may be omitted, combined or transposed within the controlling zone as appropriate.



A- Zone for finishings
B- Zone for structure
C- Zone for services
D- Zone for ceiling
E- Controlling zone

Controlling zone for floor or roof



Controlling zone for load-bearing wall or column

1 SCOPE

This Sri Lanka Standard provides a framework of controlling dimensions for use in the design of buildings and for assistance in the derivation of basic sizes of dimensionally co-ordinated components. It gives recommendations for floor-to-floor heights; floor-to-roof heights; floor-to-ceiling heights; changes in level; horizontal spacing between load-bearing walls and columns; limits of zones for floors, roofs, load-bearing walls and columns; and heights for door and window heads and sills.

2 TERMS AND DEFINITIONS

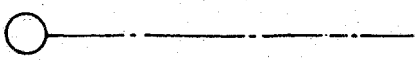
For the purpose of this standard the following definitions shall apply. For terms not defined below, definitions as given in CS 131 shall apply.

2.1 *controlling dimension* : A dimension between key reference planes, for example: floor-to-floor height.

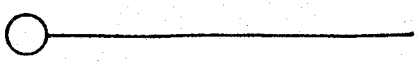
Controlling dimensions provide a framework within which buildings may be designed and to which building components and assemblies may be related. Intermediate controlling dimensions are sub divisions of the main controlling dimension framework.

2.2 *controlling line* : A line representing a key reference plane. Controlling lines for vertical dimensions represent the boundaries or the axes of load-bearing walls and columns or the boundaries of zones.

For the purpose of this standard a controlling line is indicated by a circle at the end of the line, thus,



Axial lines

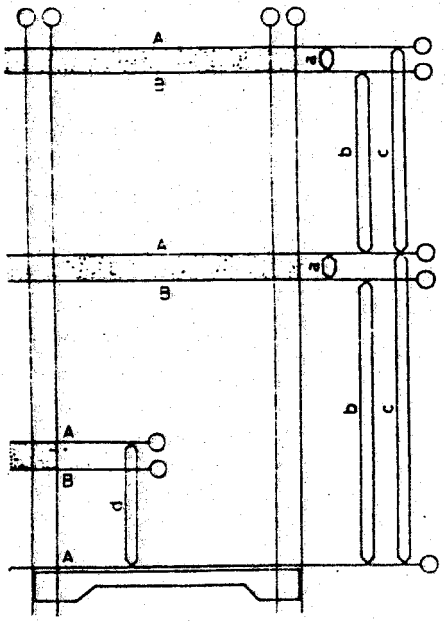


Boundary line

2.3 *zone* : A space between vertical or horizontal reference planes which is provided for a building component or a group of building components which do not necessarily fill the space.

Zones for floors and roofs contain the structure, and may also include finishes, services, suspended ceiling etc., and where appropriate allowances for camber and deflection.

Provided the use of co-ordinated components is not thereby inhibited a building component or a group of building components, for example: of a roof, may extend beyond the boundaries of the zone, and finishes may be placed outside the zone boundaries.



Dimension	Reference to Table
a	Table 2
b	Table 1
c	Table 3

A - Floor finish key reference plane

B - Ceiling key reference plane

FIGURE 1 - Vertical controlling dimensions

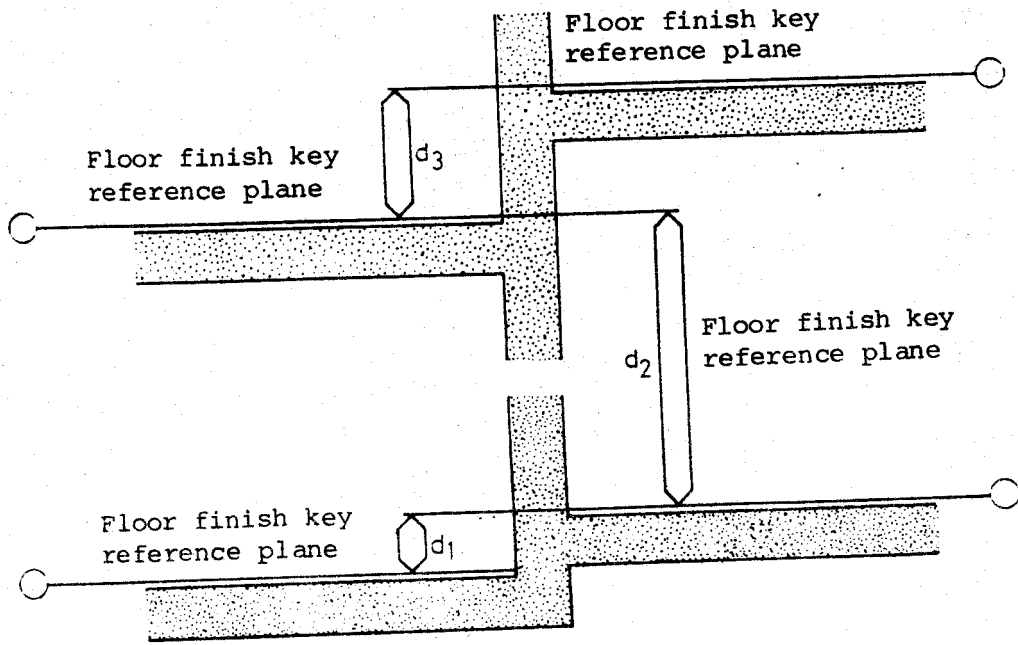
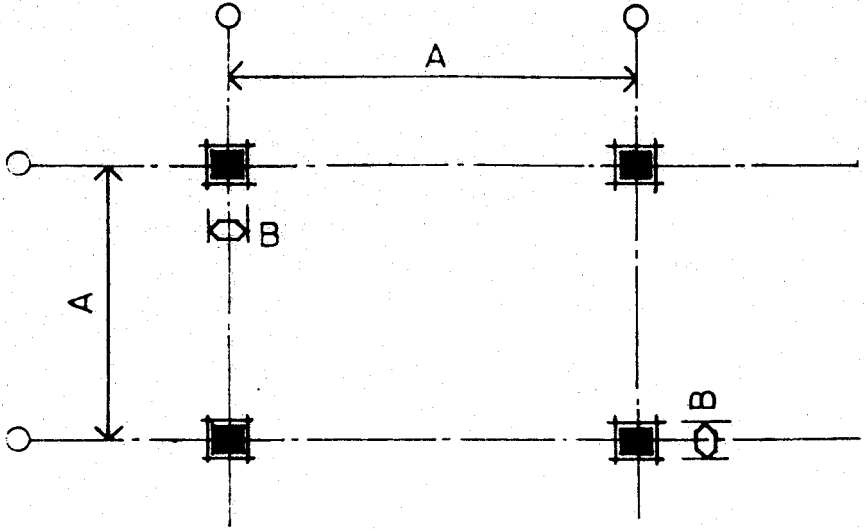
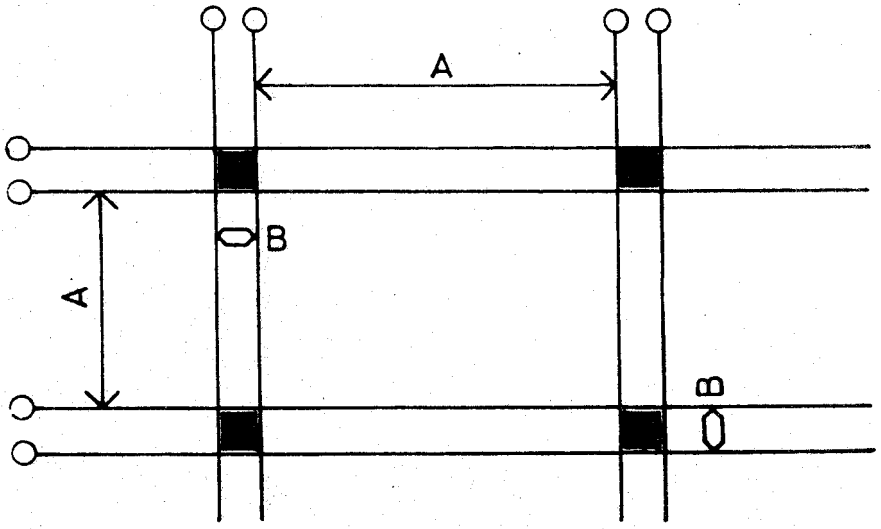


FIGURE 2 - Changes in level



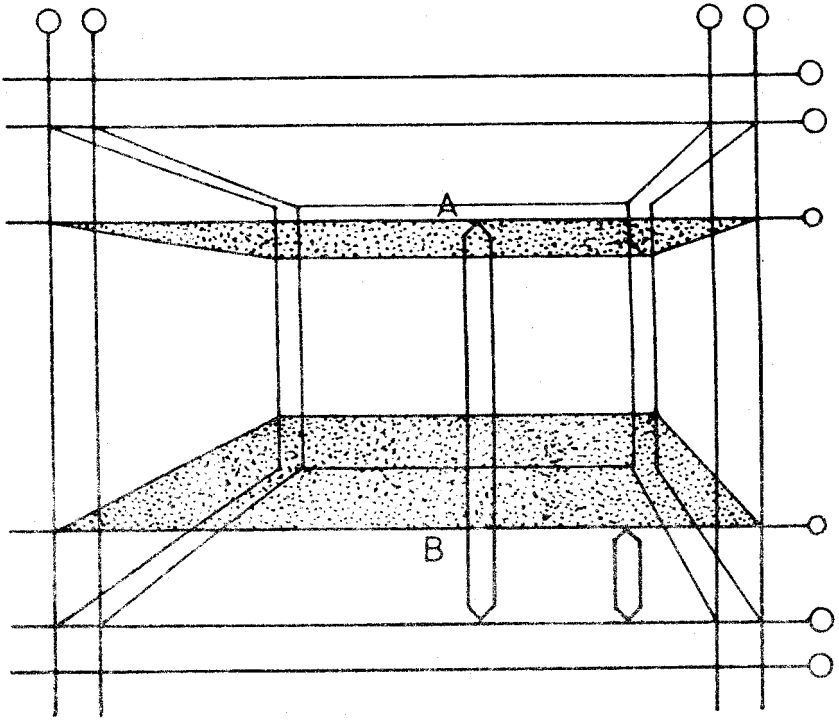
Method A - Controlling lines on the axial lines of load-bearing walls and columns



Method B - Controlling lines on the boundaries of zones

A - Controlling dimension **B** - Zone

FIGURE 3 - Horizontal controlling dimensions



A - Window/door set head intermediate key reference plane

B - Window sill intermediate key reference plane

FIGURE 4 - Intermediate key reference planes and dimensions

2.4 *controlling zone:* A zone whose size is in accordance with Table 2 or Table 4 of this standard.

2.5 *neutral zone:* A zone which interrupts the regular spacing of a modular reference system.

In certain circumstances, during the transition to the general use of dimensionally co-ordinated components, it may for strong economic or practical reasons be necessary to use a neutral zone in a dimensionally co-ordinated project; zones for floors or for load-bearing walls are examples of this.

3 VERTICAL CONTROLLING DIMENSIONS

3.1 Selection of sizes for various dimensions should be made as indicated below (also see Figure 1).

Floor-to-ceiling heights - Table 1

Heights of zones for floors - Table 2

Floor-to-floor and floor-to-roof heights - Table 3

Changes in level - in multiples of 3 M.

3.2 The following considerations should be taken into account when selecting sizes from Tables 1 to 3.

a) The user requirements for floor-to-ceiling height,'b'

b) The space required within the -zone for floor and roofs, 'a' for finishes structure, services and suspended ceilings,with due allowances for camber and deflection.

c) In selecting heights for dimensions 'a' and 'b' first preference should be given to those that add up to the heights 'c' in Table 3, since this will facilitate the maximum use of dimensionally co-ordinated components.

NOTE - A roof may extend beyond the upper limit of the zone provided that it does not affect the controlling dimensions of any part of the building above this level.

TABLE 1- Floor-to-ceiling heights (room heights)

Heights in multiples of	
3M	**M**
21M*	23M
24M	25M 26M
27M	28M 29M
30M	

where

M = 100 mm (basic module)

**Applies only to domestic and lock-up garages, multi-storey car parks, cellares, basements and corridors.*

TABLE 2 - Heights of zones for floors and roofs

Heights in multiples of	
3M	**M**
	M
	2 M
3M	
	4 M
	5 M
6M	
9M	
12M	
15M	
18M	
21M	

TABLE 3 - Floor-to-floor and floor-to-roof heights

Heights in multiples of	
3M	**M**
	26M
27M	
	28M
30M	
33M	

3.3 For full use to be made of dimensionally co-ordinated components both dimensions d_2 and d_1 or d_3 should also add up to a height given in Table 3.

4 HORIZONTAL CONTROLLING DIMENSIONS

There are two principal methods of locating controlling lines in relation to load-bearing walls and columns:

a) on the axial lines of load-bearing walls or columns:

b) on the boundaries of zones.

The two methods are not exclusive if zones are multiples of 3M since in such cases the controlling dimensions both between axes and between boundaries will be multiples of 3M. If the two methods are combined and zones are not multiples of 3M, either the dimension between axes or that between boundaries of zones will be a multiple of 3M, and the other is unlikely therefore to be a controlling dimension. To ensure the maximum use of co-ordinated components, the dimension that is not a controlling dimension should be a multiple of M.

4.1 Controlling dimensions for zones

The sizes of controlling zones should be selected from Table 4. These sizes refer to the distances between the boundaries of zones and to both horizontal dimensions of column zones.

4.2 Controlling dimensions for the spacing of zones

Selection of sizes should be made from Table 5, whether Method A (the distance between axial lines) or Method B (the distance between boundaries of zones) is adopted. It should be noted that the space between load-bearing walls and columns will vary according to which of these methods is used for locating controlling lines. The sizes refer to the horizontal distances between controlling lines.

TABLE 4 - Spacing of zones for columns and load-bearing walls

Widths in multiples of 3M	Widths in multiples of M
	M
	2M
3M	
	4M
	5M
6M	

5 INTERMEDIATE CONTROLLING DIMENSIONS

Intermediate controlling lines indicate where joints are most likely to occur between and within building components and assemblies. In the case of vertical dimensions the sizes given are the vertical distances from the controlling line bounding the top of the floor zone.

5.1 Window sill heights

The height of the controlling line for a window sill should be *n x 3M** as first preference and *n x M* as second preference.

5.2 Window head heights

The height of the controlling line for window head should be *n x 3M* as first preference and *n x M* as second preference.

**where n is a positive integer and M = 100 mm.*

5.3 Door set head heights

The first preference for the heights of the controlling line for a door set head should be 21 *M*. Other heights if required should be *n x 3M* and *n x M* in order of preference.

TABLE 5 - Spacing of zones for columns and load-bearing walls

Range	Sizes of spacings to be in multiplies of
9M	3M

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