

**NATIONAL ANNEX
TO
CYS EN 1991-1-1:2002 Eurocode 1: ACTIONS ON
STRUCTURES**

**PART 1.1: GENERAL ACTIONS – DENSITIES, SELF-
WEIGHT, IMPOSED LOADS FOR BUILDINGS**

Public Enquiry Draft

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Readers are advised that this is a draft document and subject to change

**Prepared by: Eurocodes Committee
Ministry of Interior / Technical Chamber of Cyprus**

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National Annex to CYS EN 1991-1-1:2002 Eurocode 1: Actions on Structures
Part 1.1: General Actions – Densities, Self-weight, imposed loads for buildings

INTRODUCTION

This National Annex has been prepared by the Eurocodes Committee of the Technical Chamber of Cyprus which was commissioned by the Ministry of Interior of the Republic of Cyprus

NA 1 SCOPE

This National Annex is to be used together with CYS EN 1991-1-1:2002.

This National Annex gives:

- (a) Nationally determined parameters for the following clauses of CYS EN 1991-1-1:2002 where National choice is allowed (see Section NA 2).
- 2.2 (3)
 - 5.2.3(1) to 5.2.3(5)
 - 6.3.1.1 (Table 6.1)
 - 6.3.1.2 (1)P (Table 6.2)
 - 6.3.1.2 (10) & (11)
 - 6.3.2.2 (1)P (Table 6.4)
 - 6.3.2.2 (3)
 - 6.3.3.2 (1) (Table 6.8)
 - 6.3.4.2 (Table 6.10) and
 - 6.4 (1)(P) (Table 6.12)
- (b) Guidance on use of the Informative Annexes A and B (see Section NA 3).
- (c) References to non-contradictory complementary information applicable to buildings and civil engineering works (see Section NA 4).

NA 2 NATIONALLY DETERMINED PARAMETERS

NA 2.1 Clause 2.2 (3) 'Dynamically susceptible structures'

The following outlines the procedure to be used for structures that are susceptible to dynamic excitation. In such cases, the design should take account for the load-structure interaction and dynamic characteristics of the structure, e.g. natural frequency, mass, damping and mode shapes. Furthermore, for structural design with oscillation or vibration as a serviceability criterion, separate consideration is necessary, e.g. operation of the equipment and comfort of the users and occupiers of the building.

Three cases of dynamic loading conditions and structural types are illustrated in the following clauses NA 2.1.1, NA 2.1.2 and NA 2.1.3.

NA 2.1.1 'Synchronised rhythmical movements'

Structures with elements subject to dancing and jumping are liable to inadvertent or deliberate synchronized movement of occupants, sometimes accompanied by music with a strong beat, such as occurs at pop concerts and aerobics events. These activities generate dynamic effects that can result in enhanced vertical and horizontal loads. If a natural frequency of a structure matches the frequency of the synchronized movement, or an integer multiple of it, then resonance can occur that greatly amplifies the dynamic response.

Two procedures are recommended for such design situations:

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- (a) In addition to design with dead and static imposed loads, as given in category C4 of Table 6.1 (CYS) (see clause NA 2.3) resonance of the structure should be avoided by limiting its natural frequencies so that the vertical frequency is greater than 8,4 Hz and the horizontal frequency is greater than 4,0 Hz. These frequencies should be evaluated for the appropriate mode of vibration of an empty structure; or
- (b) Structural elements subject to dancing and jumping should be designed to resist the anticipated dynamic loading. The deformation should not exceed limits appropriate to the structure type. Detailed design should be carried out accounting for dynamic response of the structure and a range of load frequencies and types, and with the help of specialist advice and/or specialist guidance documents, e.g. BRE Digest 426 (The response of structures to dynamic crowd loads, BRE, October 1997).

NA 2.1.2 ‘Dynamic loads from machinery’

Dynamic effects caused by the operation of machinery depend on the type of machinery and the structural form. Designers should seek specialist guidance and consider dynamic loads and potential resonant excitation of such structures. For actions induced by cranes and machinery see EN 1991-3 (in preparation).

NA 2.1.3 ‘Lightweight structures and Long-span structures’

Where these structures are used as concourses and public spaces, they are likely to be subject to inadvertent or deliberate synchronized movement by people, causing dynamic excitation. The design provisions should take account of the nature and intended use of the structure, the potential number of people and their possible behaviour. Structural design should be carried out with the help of specialist advice and/or specialist guidance documents.

NA 2.2 Clause 5.2.3 Additional provisions specific to bridges

No additional provisions specific to bridges are specified.

NA 2.3 Clause 6.3.1.1 Categories

Table 6.1 (CYS) provides the categories of use as given in Table 6.1 of CYS EN 1991-1-1:2002.

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Table 6.1 (CYS): Categories for use

Category	Specific Use	Example
A	Areas for domestic and residential activities	Rooms in residential buildings and houses; bedrooms and wards in hospitals; bedrooms in hotels and hostels, kitchens and toilets.
B	Office areas	
C	Areas where people may congregate (with the exception of areas defined under category A, B, and D ¹)	<p>C1: Areas with tables, etc. e.g. areas in schools, cafés, restaurants, dining halls, reading rooms, receptions (see NOTE 1)</p> <p>C2: Areas with fixed seats (see NOTE 2) e.g. areas in churches, theatres or cinemas, conference rooms, lecture halls, assembly halls, waiting rooms, railway waiting rooms.</p> <p>C3: Areas without obstacles for moving people, e.g. areas in museums, exhibition rooms, etc. and access areas in public and administration buildings, hotels, hospitals, railway station forecourts.</p> <p>C4: Areas with possible physical activities, e.g. dance halls, gymnastic rooms, stages (see NOTE 3).</p> <p>C5: Areas susceptible to large crowds, e.g. in buildings for public events like concert halls, sports halls including stands, terraces and access areas and railway platforms (see NOTE 3).</p>
D	Shopping areas	<p>D1: Areas in general retail shops</p> <p>D2: Areas in department stores</p>

¹Attention is drawn to 6.3.1.1 (2), in particular for C4 and C5. See CYS EN 1990 when dynamic effects need to be considered. For Category E, see Table 6.3 (CYS)

NOTE 1. Where these same areas may be subjected to loads due to physical activities or overcrowding e.g. a hotel dining room used as dance floor, imposed loads should be based on sub-category C4 or C5 as appropriate. Reference should also be made to NOTE 3

NOTE 2. Fixed seating is seating where its removal and the use of the space for other purposes is improbable.

NOTE 3. For structures that may be susceptible to resonance effects reference should be made to Section NA 2.1 of this National Annex.

NA 2.4 Clause 6.3.1.2 Values of actions

Table 6.2 (CYS) provides values for the symbols of Table 6.2 of CYS EN 1991-1-1:2002.

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Table 6.2 (CYS): Imposed loads on floors, balconies and stairs in buildings

Categories of loaded areas	q_k [kN/m ²]	Q_k [kN]
Category A		
- Floors	2,0	2,0
- Stairs	3,0	2,0
- Balconies	4,0	2,0
Category B	3,0	4,0
Category C		
- C1	3,0	4,0
- C2	4,0	4,0
- C3	5,0	4,0
- C4	5,0	7,0
- C5	5,0	4,5
Category D		
- D1	5,0	7,0
- D2	5,0	7,0

NA 2.5 Clause 6.3.1.2 (10) & (11) Values of actions

The equations (6.1) and (6.2) proposed in CYS EN 1991-1-1:2002 for the calculation of the reduction factors α_A and α_n , respectively, are adopted.

NA 2.6 Clause 6.3.2.2 (1)P Values for actions

Table 6.4 (CYS) provides values for the symbols of Table 6.4 of CYS EN 1991-1-1:2002.

Table 6.4 (CYS): Imposed loads on floors due to storage

Categories of loaded areas	q_k [kN/m ²]	Q_k [kN]
Category E1	7,5	7,0

NA 2.7 Clause 6.3.3.2 (1) Values for actions

Table 6.8 (CYS) provides values for the symbols of Table 6.8 of CYS EN 1991-1-1:2002.

Table 6.8 (CYS): Imposed loads on garages and vehicle traffic areas

Categories of loaded areas	q_k [kN/m ²]	Q_k [kN]
Category F Gross vehicle weight: ≤ 30 kN	2,5	20
Category G 30 kN < gross vehicle weight ≤ 160 kN	5,0	90

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NA 2.8 Clause 6.3.4.2 (1) Values of actions

Table 6.10 (CYS) provides the values for the symbols of Table 6.10 of CYS EN 1991-1-1:2002.

Table 6.10 (CYS): Imposed loads on roofs of category H

Categories of loaded areas	q_k [kN/m ²]	Q_k [kN]
Category F	0,4	1
NOTE 1. The whole area of the roof must be considered NOTE 2. See also 3.3.2 (1) of CYS EN 1991-1-1:2002		

NA 2.9 Clause 6.4(1) Horizontal loads on parapets and partition walls acting as barriers

Table 6.12 (CYS) provides the values for the symbols of Table 6.12 of CYS EN 1991-1-1:2002.

Table 6.12 (CYS): Horizontal loads on partition walls and parapets

Loaded areas	q_k [kN/m]
Category A	0,5
Category B and C1	0,5
Categories C2 to C4 and D	1,0
Category C5	3,0
Category E	2,0
Category F	See Annex B of CYS EN 1991-1-1:2002
Category G	See Annex B of CYS EN 1991-1-1:2002

NA 3 GUIDANCE ON USING INFORMATIVE ANNEXES A AND B

NA 3.1 Annex A

Annex A may be used

NA 3.2 Annex B

Annex B should be used.

NA 4 REFERENCES TO NON-CONTRADICTORY COMPLEMENTARY INFORMATION

None