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**Autor:** Gulvanessian, Haig  
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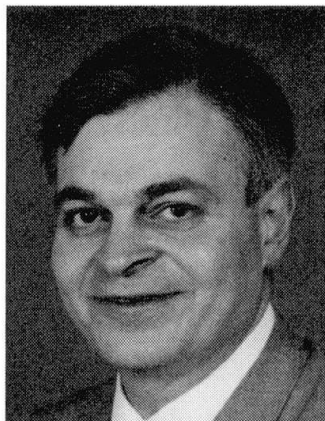
## **EC 1: Gravity Loads and Densities of Building and Stored Materials**

EC 1: Charges de gravité et densités des matériaux permanents  
et entreposés

EC 1: Schwere Lasten und Dichte von Baustoffen und Lagergütern

### **Haig GULVANESSION**

Civil Eng.  
Build. Res. Establ.  
Garston, UK



Haig Gulvanessian, born 1941, is a graduate of the Universities of London and Wales. Before being appointed to his present post he was at the Departments of Transport and Environment UK, where he was concerned with the design of bridges, elevated roadways, and buildings.

### **SUMMARY**

This paper describes the background against which Eurocode 1: Part 2.2: Gravity Loads and Densities of Building and Stored Materials is being drafted. It identifies some of the problems in achieving a fully harmonised code and discusses future development of the Code as other CEN standards become available.

### **RESUME**

Cet article décrit l'esprit dans lequel l'Eurocode 1: partie 2.2 «Gravity Loads and Densities of Building and Stored Materials» a été écrit. Il souligne les difficultés à réaliser un code adapté harmonieusement aux besoins de tous les pays et présente quelques suggestions pour remédier au problème. L'article aborde aussi les développements futurs du code au fur et à mesure que d'autres codes CEN entreront en vigueur.

### **ZUSAMMENFASSUNG**

Der Beitrag beschreibt die Grundlagen, auf denen der Entwurf zu Eurocode 1, Teil 2.2, über Eigengewichtsannahmen beruht. Er streicht einige der Probleme heraus, die sich aus der angestrebten Harmonisierung ergeben und diskutiert die zukünftige Entwicklung im Zuge der Einführung weiterer CEN-Normen.



## SUMMARY

This paper describes the background against which Eurocode 1 : Part 2.2 : Gravity Loads and Densities of Building and Stored Materials is being drafted. It identifies some of the problems in achieving a fully harmonised code and discusses future development of the Code as other CEN standards become available.

## INTRODUCTION

In developing this part of Eurocode 1, consideration was given to the contents of the National Codes of the CEN Member States and the International standard ISO 9194<sup>1</sup>

There are however differences in the scopes and specifications of the codes of the CEN Member States relating to Gravity Loads and Densities of Building and Stored Materials. For example National Codes of particular countries provide considerable detail, with much of this detail based on comprehensive supporting Standards; while other countries offer little guidance. Additionally the guidance that is available is at times somewhat contradictory. These differences have imposed restraints and limitations to the content of Eurocode 1 : Part 2.2:

The Project Team drafting this part of Eurocode 1 are the Technical Secretary of CEN/TC/250/SC1, Mr H Gulvanessian, Mr J Nielsen (Denmark) and Mr J Tory (UK)

## SCOPE AND FIELD OF APPLICATION

This part of Eurocode 1 applies to the weights of

- materials used in construction;
- individual structural elements;
- parts of structures and of whole structures;
- some fixed non-structural items; and
- materials used in construction

As special cases, it also covers the weight of certain movable light weight partitions,

materials for bridge construction, services and earth and soil pressures. The code provides specific advice for the determination of the weight of the following structural elements; floors and walls, claddings and finishes and roofs.

The Code gives,

- i) representative values for the Bulk Weight Densities of building materials;
- ii) representative values for the Bulk Weight Densities for a range of stored materials relating to building and construction, agriculture, liquids, solid fuel and industry;
- iii) the angle of repose for particular stored materials; and
- iv) methods for the assessment of the representative values of permanent actions due to gravity.

## **BASIS OF BULK WEIGHT DENSITY VALUES**

There is in general little statistical basis for the load values given in current National and International Codes and no new research has been carried out for this Eurocode. It is not therefore possible to describe the load values included in this Eurocode as either mean or characteristic values since both of these terms imply some understanding of the underlying statistical distribution of the load values. Loads in this part of EC1 are therefore described as representative values. For materials where the bulk weight density has significant variability according to its source a range of values is provided in the Code.

## **EVALUATION OF ACTIONS DUE TO GRAVITY**

Unless more reliable data is available (ie from product standards, the producer or by weighing), the Code recommends that the weights of individual elements (eg. beams or columns) be estimated from their dimensions and the densities of their constituent materials; the weights of parts of structures (eg. whole floors or whole storeys) and of non-structural elements (eg. plant) be determined from the weights of the elements of which they are composed. It recommends that dimensions used should be intended values of geometric properties (in general taken from the drawings).

For situations where more accurate values are required (eg. where a design is likely to be particularly sensitive to variations in dead load) the code recommends that a



representative sample of the materials to be used, at representative moisture contents, be tested.

When the self-weight of a component or element is likely to be significantly influenced by time-dependent effects (eg. moisture, dust accumulation etc.) the code recommends that appropriate allowance should be made.

For certain situations the code recommends that upper and lower values for the permanent actions on structures should also be considered. Account shall also be taken of possible variations in the thickness of finishes; eg. when the thickness depends on the deflection of the structural component to which the finish is applied. Examples of these situations are

- thin concrete members
- when there is uncertainty about the precise value of the dead load; and
- where dimensional alternatives and the exact materials to be used remain open at the design stage.

## **FUTURE DEVELOPMENT**

The draft being developed at the present time will be presented in a 'final' form to CEN/TC/250/SC1 for submission for voting as a prENV by 31 January 1993.

In drafting the Code, a particular problem has been the lack of harmonised specifications and descriptions for many of the building and stored materials. CEN Standards on many of these items are expected to become available in the future and after the ENV stage amendment of this part of the Eurocode can be expected to reflect consideration of such standards as they become available.

## **CONCLUSIONS**

This paper has described the basis of Eurocode 1 : Part 2.2 : Gravity Loads and Densities of Building and Stored Materials, the first steps to produce a fully harmonised Code.

## **REFERENCES**

1. ISO 9194 : 1987 "Basis of Design of Structures - Actions Due to Self-Weight of Structures, Non-Structural Elements and Stored Materials".