



## Guidance Note 11 - Revision A

# Guidelines for Checking the Structural Design of Buildings

### Introduction

This Guidance Note provides guidance for members of the SER Scheme on how they should approach the management of risk with regard to the checking of structural designs.

It is the responsibility of the Certifier to determine the appropriate level of checking that should be applied to a particular design and the guidance contained in this document is intended to aid that decision. However, other considerations may apply such as more extensive checking standards arising through contractual requirements of a client or by a firm's in-house QA procedures.

Following the guidance given in this Note will be regarded as evidence of fulfilling the requirements of the scheme at any future audit.

### Background

A high proportion of building failures can be attributed to errors in the design. Research carried out in Europe and the USA have conservatively estimated that between 25% and 35% of construction failures can be attributed to design errors which can arise for a number of reasons that include:

- Lack of experience by the designer
- Human error
- Communication failure between members of the design team
- Contractual inhibitions
- Inappropriate application/use of the design codes
- Failure to translate design assumptions to the construction of the works

The Standing Committee on Structural Safety (SCOSS) in their 13<sup>th</sup> report stated that 'There is a general awareness of the possibility that individuals or organisations may introduce errors in design and construction through lack of competence or simply through a mistake or dishonesty', and in their 15<sup>th</sup> report SCOSS drew attention to the fact that design responsibilities are often allocated amongst a number of designers and suppliers, and to the design risks that can arise at the interfaces of these designers when contractual arrangements make designers unable or unwilling to take an overall view of the impact of their design input on the safety of the project.

All design codes are based upon a number of assumptions and limitations. ICE and SCOSS have jointly published a paper entitled Structural Eurocodes: The Importance of the Underlying Assumptions, in which they state that ‘It is important that these assumptions are not forgotten amongst the technical detail’ in the codes.

In particular, the assumptions relate to the competency of those using the code, the analysis and design process and the material itself.

The Building (Scotland) Act 2003 addresses these concerns by enabling suitably qualified people, Approved Certifiers of Design, to certify that certain design or work complies with the building regulations. Approved Certifiers of Design have specific responsibilities for the integrity of the design process which will include assessing the competence of those undertaking the design and checking work and reviewing the technical content of that work.

Checking of structural designs is at the heart of the certification process. Checking may be undertaken at a variety of levels, depending on factors such as the complexity of the design, and by more than one individual. It is the responsibility of the Certifier however to oversee this process and be satisfied that the manner in which checking has been undertaken provides an adequate level of design reliability with regard to the risks involved. It is the duty of the Certifier to assess the competence of the checker and determine the appropriate level of check that should be undertaken in a particular instance.

## Reliability Management

Guidance on achieving acceptable levels of design reliability is provided within BS EN 1990:2002 Eurocode - Basis of structural design.

SER have adopted four Design Check Levels as follows:

<b>Design Check Level (DCL)</b>	<b>Minimum requirement for checking drawings, calculations and specifications.</b>
DCL1 Self Check	A Certifier, who is also the designer, can check his/her own calculations
DCL 2 Simple Check	The design will be subject to a review by individuals who were not involved in the preparation of the design calculations. A Certifier who is not also the designer may undertake this check.
DCL 3 Intermediate Check	The design will be subject to a more detailed check of the calculations than would be the case for a Simple Check and may still be undertaken by individuals who are members of the design team but who were not involved in the preparation of the design calculations. A Certifier who is not also the designer may undertake this check.
DCL 4 Extended Check	Third party checking: a detailed check with reference to the drawings but not the original calculations to be undertaken by a person or team who have not been involved with any aspect of the original design.

SER have prepared a matrix, which classifies buildings into five risk groups and assigns a design check level to each group. This matrix is available separately as Guidance Note 12.

It is the responsibility of the Certifier to identify the appropriate level of check to be undertaken for a particular project, or part of a project, and to establish that this check has been undertaken by persons with the appropriate knowledge and experience.

As noted above, following this guidance will be regarded as evidence of fulfilling the requirements of the Scheme. However, there may be circumstances where the guidance is not appropriate, such as the need for an independent design check for minor alterations to buildings in Risk Group 3 or for a building which is structurally straightforward but falls into Risk Group 3 for other reasons. In these circumstances the Certifier may choose to accept a lower Risk Group for the purposes of checking and for the selection of Schedule 1 items, but not for determining the requirements for disproportionate collapse, which are to meet the requirements of Table 1.1 in the Technical Handbooks. In determining whether or not it is appropriate to accept a lower Risk Group, the Certifier should consider the consequences of failure of any of the elements being certified. It is important that the reasons for deviating from this guidance are recorded in both the project and certification records.

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