TECHNICAL NOTE NO. 1 – CODES, GRADES AND ENGINEERS

There are statutory regulations and guideline codes, which all consulting civil and structural engineers must follow in design work regardless of the size of the project. I will try here to provide clarity on understanding the codes and bring you up to date with changes. If you ever need to employ an engineer, surveyor or architect to perform services for you, this article may help explain the rules and perhaps even correct the occasional error in coding. The Building Regulations 2000 require buildings to be stable, loadings assessed and structurally sound. This may appear rather obvious and even flippant but in reality it is a very serious statement.

Civil and structural project management, design, specification and supervision work should only be performed out by a civil or structural engineer who will be designated under the Royal Charter as a Chartered Engineer (CEng). This rank indicates a high level of professional expertise, supervised training, excellent qualifications and high moral values with a strict code of conduct. The engineer will in almost all cases at least have a batchelor's (BSc/BEng) or even a master's (MSc/MEng) university degree and either be a Member or Fellow of the learned Institutions of Civil Engineers (MICE/FICE) or Structural Engineers (MIStructE/FIStructE). Finally all engineers should carry professional indemnity insurance if they wish to practise.

In this article, I will try to cover the changes and differences in simple terms between the present and incoming or new codes and their implications. It is and never will be a simple subject so please bear with me. In small works design and construction, as far as property owners are concerned, timber and steel will remain the main structural materials; with of course bricks and concrete playing their part.

Previous structural timber stress grades were called SC3 and SC4 for the two grades mostly used. But now those grades have been replaced in the latest standard BS 5268 by C16 and C24 respectively. Grade C16 refers to the typical timber supplied if no grade is requested. Grade C24 indicates timber is of better quality than C16, e.g. with less knots, warping, splits, etc. Personally I prefer to specify the C24 grade if and wherever I can. Like the SC3/SC4 grades the C16/C24 timbers are stress graded.

It will often be seen on architect's, surveyor's and even some engineer's drawings that Grade SC3 is still referred to and specified. This is clearly incorrect and may indicate the designer's lack of knowledge in relation to the latest codes and regulations and in keeping up to date with changes.

Material	**Existing Code**	**New Eurocode**
Basis of Design	No Particular Existing UK Code	EC0
Loadings & Weights	Various: BS 6399, BS 648	EC1 - Actions on Structures
Concrete	BS 8001, BS 5400, BS 8007	EC2
Steel	BS 5950, BS 5400, BS 8100 BS 2853, BS 449, BS 499	EC3
Composite Steel and Concrete Structures	BS 5950, BS 5400, BS 5940	EC4
Timber	BS 5268	EC5
Masonry	BS 5628	EC6
Earth Retaining Structures and Foundations	BS 8002, BS 8004, BS 6031, BS 8081, BS 8006, BS 8008, BS 5930	EC7 - Geotechnical Design
Structures for Earthquake Resistance	No Particular Existing UK Code	EC8
Aluminium Structures	BS 8118	EC9

Steel members over openings are often called RSJ's by clients and most builders or even just 'steels'. I do not like that casual description 'steels'. It belies an inherent lack of respect for a complex material. The correct term is steel beam. An RSJ means a rolled steel joist. It is an old section and not specified or used anymore really. You can detect an RSJ by the internal sloping flange, thicker at the web.

Nowadays we use universal beams, columns, channels, etc. providing more modular sizes and shapes for universal use. The reason we do that is very simple and as much to do with making connections easier as with other factors. Many aspects of engineering come down to connections or how to fix two items together, viz. welding, bolting, screwing, reinforcing, fusing, etc. The concept of squaring off the flange cross section has enabled us to connect steel members so much more easily into some now complex shapes. But more importantly it has simplified fabrication, reduced installation time and costs and also provides for a confidence in the connection.

The old steel material grades such as Grades 43 and 50, still unfortunately specified by many people in the construction industry, were replaced some time ago by Grades S275 and S355 respectively for mild steel and high tensile steel materials. The latter two should be specified and referred to on drawings and in calculations. In EC2 compressive concrete strengths for foundations are now characterised using two numbers for example C25/30, meaning 25N/mm^2 for cylinder strength and 30N/mm^2 for cube strength.

The Eurocodes shown in the table above, with their present counterpart, came into full force in April 2010, by which time most if not all civil and structural engineers will have gained some knowledge of how to use them. You can see the obvious changes by the general reduction of several existing codes into one single code. But the underlying changes are profound. They are research based and have relied on a probabilistic approach. The designer has an array of choices not seen before. New load and strength factors play an important part. Building Control departments in local councils can still accept the old codes but a changeover will inevitably come. The codes will be used by engineers across Europe in all 27 EU countries and some non-EU members. An enormous effort is being made by everyone in the profession to become as familiar as possible with the new codes. There are books out, codes to be bought, courses on how to understand them and what to do and computer programs to be re-written. The new Eurocodes are complicated of course but then engineering always was and always will be.