

## Book review

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### Guidance on the use of stainless steel reinforcement

Concrete Society

*Concrete Society Technical Report No 51, 1998, £75.00, ISBN 0 946691 89 X*

The report aims to give engineers authoritative practical guidance on the design, specification and use of stainless steel reinforcement for concrete structures. One of the problems for the unwary is the multiplicity of types of stainless steels—the name refers to a class of materials rather than a single product. The first chapter leads us through the minefield of different designations used throughout the world, which is further complicated since the existing types specified in the UK standards, types 304 and 316, are being replaced, and slightly changed, by new types defined in European standards.

The second chapter relates to material properties, and not surprisingly, concentrates on the resistance to corrosion. Considerable attention is given to the effects of varying chloride content and the pH of the environment, leading to charts which can be used to select from the different types available. There is then a large section on possible galvanic effects when ordinary carbon steels are mixed with stainless steels. These sections suffer from being written as a series of separate facts rather than as a coherent whole. The objective of the book is presumably to encourage the use of stainless steel reinforcement where it is most appropriate, so some form of decision tree, possibly in the form of a flow chart, would have been useful. As it stands, the reader contemplating use of these steels would have to work through many clauses to see whether they were relevant in a particular case. There is a 'suggested applications' table in chapter four, which needs to be read in conjunction with this chapter.

The rest of chapter two looks at mechanical properties, and leaves out the strength data (which appears later in the design section). Brief mention is made of ductility, giving minimum elongations as specified in the current BS, but some comparative stress–strain curves with numerical values on them would have been useful, especially in the light of the ongoing debate about the reducing ductility of carbon steels and the

supposed lack of ductility of fibre composite reinforcement.

Design guidance is given in chapter four. It is a sign of the way that design has changed that they talk of the difficulty of changing the characteristic strength used in CAD/CAM packages to reflect the higher strength of stainless steels. Mention is made of the possibility of taking advantage of the corrosion resistance by reducing the cover, but otherwise the design is unchanged. This is stainless steel being used as a 'drop-in' replacement for carbon steels rather than as a material in its own right. What happened to engineers making use of their own judgement? If we just feed data into computer programs we hardly deserve the title 'professional'.

Commercial aspects are covered in chapter three and also in chapter six, which looks at case studies. A life-cycle cost study of the Schaffhausen Bridge in Switzerland compares a ten-fold increase in reinforcement costs (for about 14 t of reinforcement in critical areas), with savings of about £1 000 000 in consequential savings due to avoidance of repairs later in the life of the bridge. This is clearly a critical area—a decision to trade-off expenditure now on capital costs against expenditure in the future on revenue. Pointers to other references would have been useful here.

There are other brief sections on site handling (not a problem), welding (allowed in factory conditions but not on site) and the use of couplers (available, but what about crevice corrosion to which stainless steels are susceptible?).

Overall, the report will be useful to engineers contemplating the use of stainless steel reinforcement on a project. The slightly disjointed presentation of the material means it has to be read as a whole rather than being dipped into, and even in these commercial times, £75 for 55 pages, even if it is on glossy paper, seems rather excessive and will limit sales.

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