

NEXT GENERATION EUROCODE 2

Tony Jones of **The Concrete Centre** looks at the revision process of Eurocode 2, highlighting some of the changes and explaining what is left to do before the revised Code can be used.

EN 1992-1-1⁽¹⁾ and EN 1992-1-2⁽²⁾ for *The Design of Concrete Structures* (EC2) were formally published in 2004. In the UK, the National Annexes for the documents were published at the end of 2005. While there have been amendments since, these have either been editorial or to address specific problems, rather than significant revisions to the Code. The documents are therefore 18 years old and in need of an update. Nothing happens quickly in Standard development and plans to update the document started in 2010; work on technical changes began in 2015.

THE REVISION PROCESS

The first activity in the revision process was to carry out a 'systematic review', in which the CEN member nations were asked to provide comments on the current Code. This review then provided the background for updating the current clauses. In addition to this, proposals were made for new topics to include in the revised Codes. The work was split between ten voluntary task groups, who in turn handed their initial work to three project teams. The first project team worked on improving the current content of EN 1992-1-1; the second project team worked on the fire part, EN 1992-1-2, and the third project team developed clauses for the new topics proposed for EN 1992-1-1. Once the project teams had finished their work, the texts were passed back to the main European Standards Committee for Structural Concrete where they were discussed and further edited after national comments.

In July 2021, a draft of EC2 was published for CEN enquiry. This is a formal part of the process and is meant to be the last opportunity for technical comments. The enquiry stage was passed in December 2021 and current work is focused

on addressing the nearly 5000 comments received.

THE TECHNICAL UPDATE

The current EN 1992-2⁽³⁾ covering concrete bridges, has been incorporated into the main part, as has EN 1992-3⁽⁴⁾ on liquid-retaining and containment structures. It was felt that most of the information in these parts could also be applied to other types of structures. Once this information was removed, the remainder did not warrant a separate document and is instead included in annexes in the main document.

The systematic review clearly highlighted shear, cracking and anchorage and lap lengths as being areas for improvement. The work on shear has led to the proposal of completely new

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models for members without shear reinforcement and for punching shear; these models are mechanically based and therefore offer more flexibility in use. While the beam shear model retains the basic approach of the current Code, there are various more rigorous options to improve the efficiency of the design. The comments on cracking were largely on the simplified approaches and these are likely to be moved to an 'informative' annex. As with the current EC2, nations can choose to use, to modify or to simply not use informative annexes. There is now a simplified approach for laps and anchorages,



which is similar to that previously used in BS 8110⁽⁵⁾ and a more detailed method is given when the situation is outside of typical cases.

There has been an attempt to reduce the number of different concrete 'efficiency' factors used within the Code; this is achieved by introducing a so-called 'brittleness' factor within the design concrete strength. This also has the advantage of simplifying the section design for higher strength concretes. Headed studs and headed bars have been fully incorporated into the detailing rules, recognising that they are now commonly used. There is a new annex that covers restraint cracking in a similar framework to CIRIA C766⁽⁶⁾, although there are some significant differences.

One of the changes to EC2 is the introduction of exposure resistance classes (ERCs) for durability. The UK does not currently use the method of durability design given in EC2, as this is subject to a National Annex and we refer to BS 8500⁽⁷⁾. The new approach can be matched more closely to that in BS 8500, in that for a concrete with a defined ERC, a minimum cover for durability is given. It is likely that initially the

Exterior of The Marshall Building, LSE, London.
(Photo: Techrete/Gary Britton.)



typical concretes given in BS 8500, in terms of cement type, cement content and water:cement ratio, will be allocated an ERC. In future, the aim is that new and novel, potentially low-carbon, concretes can be given an ERC based on a set of accelerated tests thus enabling their easier introduction.

NEW TOPICS

The draft Eurocode now includes annexes on non-linear analysis procedures, assessment of existing structures, strengthening of existing structures with CFRP, embedded FRP reinforcement, steel-fibre-reinforced concrete structures, recycled aggregate concrete and stainless reinforcing steel. With the exception of stainless reinforcing steels, all of these annexes are 'informative'. There are various reasons for this informative status; sometimes this was because of differences in national approaches, but often it was due to the lack of harmonised material Standards or execution Standards. In some cases, such as assessment of existing buildings, it is recognised that a nation's building stock reflects the Codes it was previously designed to, so there is clearly a place for additional local guidance.

WHERE TO FROM HERE?

Currently, the work to address the comments received during enquiry continues. This is due to be completed by August this year, at which point the document is handed to CEN to be translated into the CEN official languages. The document should then go to formal vote at the beginning of January 2023 and, assuming it passes that vote, be made 'available' in October 2023. At this point it is down to the national Standards body to decide when to publish. Discussions continue as to the best way of publishing the next generation Eurocodes – all together, in packages, or as each part becomes available. Depending on the conclusion to these discussions, the earliest that the next generation Eurocode 2 could be available, with its National Annex, in the UK is around April 2024 and the latest is by 2027 – the deadline under the CEN rules.

CONCLUDING REMARKS

The next generation Eurocode 2 is a significant revision to the current Code. Not only does it update many areas, but also it has a much wider scope than the current Code. While the technical work on the revision is

drawing to a close, the publication date in the UK is less clear. With the formal vote on the document at the beginning of next year and key decisions on the wider publication strategy from the British Standards Institution likely this year, the publication date should become much clearer in the next 12 months and the expectation is it will be closer to 2024 than 2027. **C**

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