

1. What are the new Eurocode equivalents of BS8110-1, BS8110-2, BS8007, BS5400, BS8102, CIRIA 139?

BS EN 1992-1-1 and BS EN 1992-1-2 replace BS8110-1, BS8110-2.

BS EN 1992-2 replaces BS 5400, but note that BS EN 1992-2 has to be used in conjunction with BS EN 1992-1-1.

BS EN 1992-3 replaces BS 8007, but note that BS EN 1992-3 has to be used in conjunction with BS EN 1992-1-1.

BS 8102 is not replaced by a Eurocode, but a new revision is currently being prepared.

CIRIA 139 is a guidance document to BS 8102 and will presumably be updated in line with BS 8102

2. When will I have to change from using BS8110/BS5400 to using Eurocode 2?

BSI plans to withdraw BS 8110 and other structural concrete design codes on or about 31 March 2010. 'Withdrawn' indicates that a standard is no longer current and has been superseded by another standard or is no longer relevant to industry. It will also no longer be supported by a committee, which means that it will not undergo a five-year review. The standard is not necessarily unsafe, but will increasingly become outdated and therefore not current best practice.

For bridges, the major clients are public bodies and under European law they should require designers to use Eurocodes from March 2010 for new contracts.

For buildings there is no obligation to use Eurocode 2 from this date as the building regulations only require that the designer shows that design is safe; there is no obligation to use a particular Code of Practice. Clients (particularly those which are Public Bodies) or a designer's insurers may require the latest Codes of Practice to be used this will be a driver to change over to Eurocodes.

3. What is the minimum number of bars in a circular column?

Eurocode 2 has a minimum number of 4 (BS 8110 recommends 6). If only using 4 bars use any column design charts with caution because they may have assumed a minimum of 6 bars.

4. In Eurocode 2, is the lap length based on the size of the smaller bar as is the case to BS8110.

Eurocode 2 is not specific, but logically the strength of the lap will be limited by the smaller bar and therefore this should be used to determine the minimum lap length.

5. What is the relationship between cylinder strength and cube strength? And is it the same for lightweight concrete?

There is no single expression linking cylinder strengths to cube strengths in Eurocode 2, but they are given in Table 3.1 of BS EN 1992-1-1 for normal weight concrete.. For lightweight concrete the information is given in Table 11.3.1 and roughly speaking the cylinder strength is 90% of the cube strength.

6. What angle of the concrete strut should I take in assessing the shear strength to Eurocode 2 as it is not set at 45 degrees?

The concrete strut can be varied between 21.8° and 45°. The shallower the angle the more efficient the design. Generally, it will be found that a strut angle of 21.8° provides adequate strength and it is therefore advised to assume this in the first instance. For short beams and transfer beams the strut angle may need to be increased and the angle required can be calculated. Further guidance is given in *How to design concrete structures using Eurocode 2*, chapter 4, beams.

7. Are there any worked examples for design to Eurocode 2?

Yes, these are available from www.eurocode2.info and will be published in hard copy in December 2009. (Order from the Concrete Bookshop 0700 460 7777/www.concretebookshop.com.)

A set of examples has also been published by British Precast for precast concrete elements, including prestressed elements. These are also available from the Concrete Bookshop.

8. Where do I find a list of the new symbols and abbreviations used in Eurocode 2?

Each Eurocode has a list of symbols in section 1. The symbols are also usually described in full at the point at which they are introduced. A comprehensive list of symbols can be found at the front of *Concise Eurocode 2* and *Concise Eurocode 2 for bridges*. (Note, they are slightly different lists to suit buildings and bridges respectively.)

9. What load case should I take when designing for cracking in prestressed concrete?

The *frequent* load combination should be used.

10. Can I design for the shear force at d away from the support in Eurocode 2?

Yes, see clause 6.2.1(8) of BS EN 1992-1-1.

11. How do I work out the appropriate concrete cover?

Concrete cover is required for three reasons:

1. For bond - use bar diameter for reinforced concrete. See clause 4.4.1.2(3) for prestressed concrete.
2. For durability - use BS 8500.
3. For fire resistance - use BS EN 1992-1-2, section 5.

A tolerance (usually 10 mm) should be added to the minimum cover to obtain the nominal cover.

Further guidance is given in *How to design concrete structures using Eurocode 2*, chapter 2, getting started.

12. How have you derived the formulae for K and K' ?

We have worked from first principles and our derivations are available from www.eurocode2.info.

13. How do I work out the slenderness limit for a column to Eurocode 2?

BS EN 1992-1-1 sets out how to determine slenderness for a particular section and then gives guidance on a limiting value. A procedure for working through the guidance can be found in *How to design concrete structures using Eurocode 2*, chapter 5, columns.

14. Is there a maximum limit for horizontal deflection to Eurocode 2?

There is no guidance given in Eurocode 2.

15. Can I enhance the shear capacity of a section close to the support in Eurocode 2?

Clause 6.2.2(6) of BS EN 1992-1-1 explains how the load close to the support can be reduced to take into account the enhancement. For bridges, the UK National Annex to BS EN 1992-2 amends this clause so that the shear resistance is enhanced.

16. Where can I find the National Annexes for other countries

Country	Organisation	Web address
Austria	Austrian Standards Institute	http://www.eurocode.at/
Belgium	Bureau de Normalisation - NBN	http://www.ibn.be/
Bulgaria	Bulgarian Institute for Standardization	http://www.bds-bg.org/
Cyprus	Cyprus Organisation for Standardisation	http://www.cys.org.cy/
Czech republic	Czech Standards Institute (CSNI)	
Denmark	Dansk Standard	http://www.ds.dk/
Estonia	Estonian Centre for Standardisation	http://www.evs.ee/
Finland	Finnish Standards Association SFS	http://www.eurocodes.fi/
France	Association Française de Normalisation	http://www.afnor.org/construction.asp
Germany	Deutsches Institut für Normung	http://www.eurocode-online.de/
Greece	Hellenic Organisation for Standardisation (ELOT)	http://www.elot.gr/
Hungary	Hungarian Standards Institution	http://www.mszt.hu/
Iceland	Icelandic Standards	http://www.stadlar.is/
Ireland	National Standards Authority of Ireland (NSAI)	http://www.nsai.ie
Italy	Italian Organization for Standardization	http://www.uni.com/
Latvia	Latvian standard LVS	http://www.lvs.lv/
Lithuania	Lithuanian standards board	http://www.lsd.lt/
Luxembourg	Institut Luxembourgeois de la Normalisation	http://www.ilnas.public.lu
Malta	Malta Standards authority	http://www.msa.org.mt/
Netherlands	Netherlands Normalisatie Instituut (NEN)	http://www.eurocodes.nl/
Norway	Norges Standardiseringsforbund	http://www.eurokoder.no/
Poland	Polish Committee for Standardization	http://www.pkn.pl/
Portugal	Instituto Português da Qualidade	http://www.ipq.pt/
Romania	Romanian Standards Association	http://www.asro.ro/
Slovakia	Slovenský Ústav Technickej Mormalizácie	http://www.sutn.gov.sk/
Slovenia	Slovenian Institute for standardization	http://www.sist.si/
Spain	Spanish Association for Standardisation and Certification	http://www.aenor.es/
Sweden	Swedish Standards Institute	http://www.eurokoder.se/
Switzerland	Swiss Association for standardisation	http://www.snv.ch/
Additional countries intending to participate in Eurocode programme		
Croatia	Croatian Standards institute	http://www.hzn.hr/
Macedonia	Standardization institute for the republic of Macedonia	http://www.isrm.gov.mk/
Turkey	Turkish Standards Institution	http://www.tse.org.tr/
Singapore	The Singapore Standardisation programme	http://www.standards.org.sg/
South Africa	South African Bureau of Standards	https://www.sabs.co.za/