

Concrete EN-day is fast approaching

Introduction

December 2003 is the month when the British Standard for concrete BS 5328 is withdrawn to be replaced by the European Standard BS EN 206-1: **Concrete-Part 1: Specifications, performance, production and conformity**, which was published in December 2000. This Standard has not included provisions for a number of items (eg procedures to minimise alkali-aggregate reaction and minimum cement contents or maximum water-cement ratios for different exposure conditions). This type of information is contained within BS 8500: **Concrete - Complementary British standard to BS EN 206-1**, which was published in March 2002 and is in two parts:

- BS 8500-1: **Methods of specifying and guidance for the specifier**
- BS 8500-2: **Specification for constituent materials and concrete**

A further publication, a derived document, titled **Standards for Fresh Concrete** is due to be published in spring 2003. This is a compilation of BS EN 206-1 and BS 8500 and will incorporate an explanatory commentary.

Implications of the withdrawal of BS 5328

The producers of ready-mixed concrete are preparing their systems to cope with the introduction of these new standards. The certification bodies, such as the BSI Kitemark Scheme and the Quality Scheme for Ready Mixed Concrete, have redrafted their Regulations to take account of BS EN 206-1 and BS 8500 and they are likely to require producers to adopt the new standards as these standards represent the current view of BSI. It may not be practical for producers to run

dual-systems and consequently from December 2003 ready-mixed concrete producers are likely to be supplying in accordance with the new standards. Concrete specifiers need to become familiar with the contents of these standards and specifications for contracts to be commenced after December 2003 should be written in terms of the new standards. Where contracts are expected to extend across the date of withdrawal of BS 5328, specifiers/purchasers of concrete should discuss the situation with their ready-mixed concrete supplier.

Methods of specifying

The four methods of specifying concrete given in BS 5328 are retained in BS 8500-1, namely:

- Designed concrete
 - Designated concrete
 - Standardised prescribed concrete (called 'Standard mixes' in BS 5328)
 - Prescribed concrete
- and an additional method has been included in BS 8500-1 for special applications, namely
- Proprietary concrete.

In BS 8500-1 the word 'mix' has been dropped and the word 'concrete' used in its place. In future one should refer to a 'designed concrete' rather than a 'designed mix'.

In the UK, specifiers wish to trade-off cover to reinforcement against concrete quality and use different intended working lives. Consequently, BS 8500-1 uses the same approach to specification as BS 5328.

Strength classes

A dual classification has been adopted for compressive strength. This is due to the European design codes being drafted in terms of cylinder strength and most concrete producers using the cube for conformity testing. The lower number is the characteristic cylinder strength and the higher number is the characteristic cube strength. As the relationships between cylinder strength and cube strength are not the same for normal and lightweight concrete, different strength classes are provided, see Tables 1 & 2 below & overleaf. Examination of the two tables for compressive strength shows that this has resulted in some unfamiliar strength designations.

Table 1 Compressive strength classes for normal-weight and heavyweight concrete (based upon BS EN 206-1: 2000, Table 7 and BS 8500-1: 2002, Table A.20)

Required minimum characteristic cylinder strength, N/mm ²	Required minimum characteristic cube strength, N/mm ²	Specify compressive strength class
8	10	C8/10
12	15	C12/15
16	20	C16/20
20	25	C20/25
25	30	C25/30
28	35	C28/35
30	37	C30/37
32	40	C32/40
35	45	C35/45
40	50	C40/50
45	55	C45/55
50	60	C50/60
55	67	C55/67
60	75	C60/75
70	85	C70/85
80	95	C80/95
90	105	C90/105
100	115	C100/115

Table 2 Compressive strength classes for lightweight concrete (based upon BS EN 206-1: 2000, Table 8 and BS 8500-1: 2002, Table A.20)

Required minimum characteristic cylinder strength, N/mm ²	Required minimum characteristic cube strength, N/mm ²	Specify compressive strength class
8	9	LC8/9
12	13	LC12/13
16	18	LC16/18
20	22	LC20/22
25	28	LC25/28
30	33	LC30/33
35	38	LC35/38
40	44	LC40/44
45	50	LC45/50
50	55	LC50/55
55	60	LC55/60
60	66	LC60/66
70	77	LC70/77
80	88	LC80/88

Consistence

The term 'workability' is replaced by the term 'consistence'. At the same time BS 5328 is withdrawn, many parts of BS 1881 will also be withdrawn, including all the consistence tests. The equivalent European tests are given in Table 3.

Table 3 Test method standards

Test method	Test to be withdrawn in December 2003	Equivalent European test method
Slump	BS 1881: Part 102	BS EN 12350 - 2
Flow table	BS 1881: Part 105	BS EN 12350 - 5
Vebe	BS 1881: Part 104	BS EN 12350 - 3
Degree of compactability	See text below	BS EN 12350 - 4

Differences between the BS 1881 and BS EN 12350 tests for slump, flow and Vebe are minor. It should be noted that the degree of compactability test is used for the same application as the BS 1881: Part 103: Compaction factor test, but the tests are not identical. To avoid the confusion of having two similar tests, BS 1881: Part 103 will be withdrawn in December 2003.

Generally consistence should be specified by a class rather than by a target value. Classes have been provided for slump, flow, Vebe and degree of compactability. BS 8500 only makes reference to slump and flow classes. Tables 4 & 5 give guidance on the likely target slump and flow when a class is specified. A consistence appropriate to the intended method of placing and compacting should be specified, see BS 8500-1: 2002, Table A.19.

Table 4 - Slump classes

Slump class	Likely target slump ^a , mm
S1	25
S2	70
S3	125
S4	185
S5 ^b	250

Table 5 - Flow classes

Flow class	Likely target flow ^a , mm
F1 ^b	310
F2	380
F3	450
F4	520
F5	590
F6 ^b	660

^a Where there are lower and upper limits, this is the mid-range value.

^b The test method may lack sensitivity with these classes.

Further information bulletins

Further information bulletins will discuss the essential information that needs to be provided for the five methods of specifying concrete and the differences between the BS 5328 and BS 8500/ BS EN 206-1. Additional information may also be found in a series of documents located on the BCA web site (<http://www.bca.org.uk/activities/matstand>).



Providing Essential Materials for Britain

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