Singapore Standard SS EN 12620 : 2008

Specification for aggregates for concrete

AMENDMENT NO. 1

May 2009

1. Page 6, Contents

Re-number Table 20 as Table 21 in the entire SS and insert new Tables:

20 Categories for constituents of coarse recycled aggregates

22 Categories for maximum values of water-soluble sulfate content of recycled aggregates

23 Categories for influence of water-soluble materials from recycled aggregates on the initial setting time of cement paste

2. Page 7, National Foreword

Insert the following sentence at the end of the 2nd para:

It incorporates Amendment No. 1, May 2009. The start and finish of text introduced or altered by CEN Amendment 1 dated 2008-02-16 is indicated in the text by tags A1> <A1. The amendment introduces clauses for recycled aggregates. The clauses call up new test methods, prEN 933-11, EN 1744-5 and EN 1367-4.

3. Page 8, Scope

Insert the following sentence at the end of the 1st para:

It also covers recycled aggregate with densities between 1.50 Mg/m^3 (1500 kg/m^3) and 2.00 Mg/m^3 (2000 kg/m^3) with appropriate caveats and recycled fine aggregate (4 mm) with appropriate caveats.

4. Page 8, Normative references

Replace 'EN 196-21' with 'EN 196-2, *Methods of testing cement – Part 2: Chemical analysis of cement' and* 'EN 1367-1:1999' with 'EN 1367-1:2007' wherever they appear in the standard.

Insert the following new references:

prEN 933-11, *Tests for geometrical properties of aggregates – Part 11: Classification test for the constituents of coarse recycled aggregates*

EN 1744-5, *Tests for chemical properties of aggregates – Part 5: Determination of acid soluble chloride salts*

EN 1744-6*, Tests for chemical properties of aggregates – Part 6: Determination of the influence of recycled aggregate extract on the initial setting time of cement'*

5. Page 21, 5.7.2 Volume stability – drying shrinkage

Replace the text with the following:

Where disruptive shrinkage cracking of concrete occurs due to the properties of the aggregate, the drying shrinkage associated with aggregates to be used in structural concrete shall, when required, not exceed 0.075 % when tested in accordance with EN 1367-4 (*in the case of recycled aggregate, see also Annex A)* and the results declared.

NOTE 1 – This requirement does not apply to positions where drying out never occurs, mass concrete surfaced with air entrained concrete, or to structural elements symmetrically and heavily reinforced and not exposed to the weather

NOTE 2 – Volume stability – expansion. In very rare circumstances, it is possible that recycled aggregate can contain expansive material such as un-slaked lime. Currently it is not possible to give requirements as no test methods are available.

6. Page 21, New Clause 5.8 and new Table 20

Add the following new clause and table*:*

5.8 Classification of the constituents of coarse recycled aggregates

The proportions of constituent materials in coarse recycled aggregate shall be determined in accordance with prEN 933-11 and shall be declared in accordance with the relevant categories specified in Table 20.

Table 20 – Categories for constituents of coarse recycled aggregates

Constituent	Content Percentage by mass	Category
Rc	≥ 90	Rc_{90}
	≥ 80	Rc_{80}
	≥ 70	Rc_{70}
	≥ 50	Rc_{50}
	< 50	$Rc_{Declared}$
	No requirement	Rc_{NR}
Rc + Ru	≥ 95	Rcu_{95}
	≥ 90	Rcu_{90}
	≥ 70	Rcu_{70}
	≥ 50	Rcu_{50}
	< 50	$Rc_{Declared}$
	No requirement	Rcu_{NR}
Rb	≤ 10	Rb_{10-}
	≤ 30	Rb_{30-}
	≤ 50	Rb_{50-}
	> 50	$Rb_{Declared}$
	No requirement	Rb_{NR}
Ra	≤ 1	Ra_{1-}
	≤ 5	Ra_{5-}
	≤ 10	Ra_{10-}
X + Rg	≤ 0.5	$XRg_{0.5-}$
	≤ 1	XRg_{1-}
	≤ 2	XRg_{2-}
	Content cm^3 / kg	
FL	≤ 0.2 [a]	$FL_{0.2-}$
	≤ 2	FL_{2-}
	≤ 5	FL_{5-}

[a] The ≤ 0.2 category is intended only for special applications requiring high quality surface finish.

where, according to prEN 933-11:

Constituent	Description
Rc	Concrete, concrete products, mortar Concrete masonry units
Ru	Unbound aggregate, natural stone Hydraulically bound aggregate
Rb	Clay masonry units (i.e. bricks and tiles) Calcium silicate masonry units Aerated non-floating concrete
Ra	Bituminous materials
FL	Floating materials in volume
X	Other: Cohesive (i.e. clay and soil) Miscellaneous: metals (ferrous and non-ferrous), Non-floating wood, plastic and rubber Gypsum plaster
Rg	Glass

7. Page 21, 6.2 Chlorides

Insert the following para after the 'NOTE':

The acid-soluble chloride ion content of recycled aggregates for concrete shall be determined in accordance with EN 1744-5, and shall, on request, be declared by the producer.

8. Page 22, New Subclause 6.3.3 and Table 22

Insert the following new subclause and table:

6.3.3 Water soluble sulfate content of recycled aggregates

When required, the water soluble sulfate content of recycled aggregates determined in accordance with EN 1744-1, shall be declared in accordance with the relevant category specified in Table 22.

Table 22 — Categories for maximum values of water-soluble sulfate content of recycled aggregates

Water-soluble sulphate content Percentage by mass	**Category** SS
≤ 0.2	$SS_{0.2}$
No requirement	SS_{NR}

9. Page 22, 6.4.1 Constituents which alter the rate of setting and hardening of concrete

Replace the last para (after 'NOTE 2') with the following:

When required, the presence of lightweight contaminators that alter the rate of setting and hardening of concrete shall be tested in accordance with EN 1744-1.

When required, recycled aggregates shall be assessed for the influence of water-soluble materials from the aggregates on the initial setting time of cement paste in accordance with EN 1744-6. The change in initial setting time, t_e, shall conform to the requirements of Table 23.

Table 23 – Categories for influence of water-soluble materials from recycled aggregates on the initial setting time of cement paste

Change in initial setting time, t_e (min)	Category (A)
≤ 10	A_{10}
≤ 40	A_{40}
> 40	$A_{Declared}$
No requirement	A_{NR}

Two screening tests for the presence of organic matter are in common use, the sodium hydroxide test and the fulvo acid test (see EN 1744-1:1998, 15.1 and 15.2). Both tests may be applied to recycled aggregates. If the supernatant liquid in these tests is lighter than the standard colours the aggregates may be considered to be free from organic matter.

NOTE 3 – Sugars do not affect the colour of the supernatant liquid in the sodium hydroxide or the fulvo acid test. If it is suspected that sugars or sugar type materials are present, the aggregate should be tested using the water extract test (see EN 1744-6). The requirements for the influence on setting time shown above should apply.

NOTE 4 – Constituents of recycled aggregates that may adversely affect the rate of setting and hardening of concrete may be inorganic, and therefore not detected by the procedures given in 15.3 of EN 1744-1:1998. The procedures given in EN 1744-6 should be used for recycled aggregates.'

10. Page 23, 8.1 Designation

Replace the entire text with the following:

Aggregates shall be identified in the following terms:

a) source and producer – if the material has been rehandled in a depot both source and depot shall be given;

b) type of aggregates (see EN 932-3 and for recycled aggregate: 'recycled aggregate');

c) for recycled aggregate, the constituent categorisation according to Table 20;

d) aggregate size.

11. Page 32, F.2.4 Other indicative tests

Insert the following sentence at the end of the clause:

The magnesium sulfate test is unsuitable for recycled aggregates with cement-bound fractions.

12. Page 33, Annex G

Replace Annex G as follows:

‘Annex G
(informative)

Guidance on the effects of some chemical constituents of aggregates on the durability of concrete in which they are incorporated

G.1 Chlorides

G.1.1 [A1>] Chlorides in natural aggregates [<A1]

Chlorides can be present in aggregates usually as sodium and potassium salts, the quantity present being largely dependent on the source of the aggregate. Such salts contribute to the total chloride and alkali content of the concrete. To minimise the risk of corrosion of embedded metal it is usual to limit the total quantity of chloride ion contributed by all the constituent materials in the concrete.

The water-soluble chloride ion content of aggregates extracted from most inland deposits is likely to be very low. Where it can be shown that the chloride content of such materials is not greater than 0.01 % this value can be used in the calculation procedure based on the maximum chloride contents of the constituent materials in the concrete.

G.1.2 [A1>] Chlorides in recycled aggregates

For recycled aggregates, particularly those containing hardened concrete or mortar, chlorides may be combined in the calcium aluminate and other phases. The combined chlorides are unlikely to be extracted using water in the procedures described in Clause 7 of EN 1744-1:1998 even if the sample is ground to a fine powder before extraction.

For most recycled aggregates, chloride ion contents are likely to be low. The acid-soluble chloride content, determined in accordance with EN 1744-5, will probably overestimate the availability of chlorides and this value should be used in the calculation of the chloride ion content of the concrete. This may provide an additional margin of safety. [<A1]

G.2 Sulfates

Sulfates in aggregates can give rise to expansive disruption of the concrete. A substantial proportion of the sulphate in crystalline blast-furnace slag is encapsulated in the slag grains and therefore plays no part in the hydration reactions of cement. For this reason a higher proportion of sulfate is tolerable in slag. Under certain circumstances other sulfur compounds present in the aggregates can oxidise in the concrete to produce sulfates. These can also give rise to expansive disruption of concrete.

[A1>] Water-soluble sulfates in recycled aggregates determined in accordance with EN 1744-1 are essentially potentially reactive sulfates (e.g. gypsum plaster) and may also give rise to expansive disruption of concrete. [<A1]

G.3 Alkali-silica reaction

G.3.1 [A1>] Alkali-silica reaction with natural aggregates [<A1]

Certain aggregates can react with alkaline hydroxides present in the pore fluids of concrete. Under adverse conditions and in the presence of moisture this can lead to expansion and subsequent cracking or disruption of the concrete. The most common form of reaction occurs between alkalis and certain forms of silica (alkali-silica reaction). Another less common form of reaction is alkali-carbonate reaction.

In the absence of previous long-term experience of a lack of disruptive reactivity of a particular combination of cement and aggregate, it can be necessary to take one of the following precautions:

– limit the total alkali content of the concrete mix;

– use a cement with a low effective alkali content;

– use a non-reactive aggregate combination;

– limit the degree of saturation of the concrete with water.

The combination of aggregates and cement can be assessed using Regulations applying at the place of use when compliance with one of the above procedures is not possible.

Where aggregates are imported across national boundaries, the purchaser should take account of experience in the country of origin.

NOTE – For further information see CEN Report CR1901 “Regional specifications and recommendations for the avoidance of alkali-silica reactions in concrete”.

G.3.2 [A1>] Alkali-silica reaction with recycled aggregates

The use of recycled aggregates can influence the suitability of the above precautions. In the case of recycled concrete aggregates, it will be necessary to ascertain that the original concrete does not contain reactive (or reacting) aggregate and, where the alkali content of the new concrete (or the cement therein) is being limited, the alkali content of the recycled concrete aggregates will need to be determined and taken into account. In the case of general recycled aggregates, it will be appropriate to regard the material as being a potentially reactive aggregate, unless it has been specifically established to be non-reactive. In both cases, the possibility of unpredictable compositional variability should be considered. [<A1]

G.4 Constituents affecting the surface finish of concrete

Where appearance is an essential feature of concrete, aggregates should not contain materials in proportions that adversely affect surface quality or durability.

NOTE – Since very small percentages by mass of contaminators in aggregates can have a considerable effect on concrete finishes, attention should be given to the suitability of a source for a particular end use.

The proportion of lightweight organic contaminators, determined in accordance with EN 1744-1:1998, 14.2, should not normally exceed:

a) 0.5 % by mass of fine aggregate; or

b) 0.1 % by mass of coarse aggregate.

Where the surface of concrete is of importance, the proportion of lightweight organic contaminators, determined in accordance with EN 1744-1:1998, 14.2, should not normally exceed:

a) 0.25 % by mass of fine aggregate; or

b) 0.05 % by mass of coarse aggregate.

In some situations, for example critical fair faced concrete, it can be necessary to make additional agreements on levels of lightweight organic contaminators.

Some constituents of aggregates can adversely affect the surface finish of concrete causing staining, discoloration, swelling or pop-outs if present close to the surface of the concrete. Reactive iron sulfide and lignite are two examples of materials that can affect concrete in this way.

G.5 Constituents affecting the setting and hardening of concrete

Other constituents of aggregates can adversely affect the rate of hydration of cement altering the rate of setting and hardening of concrete. Humus and sugar-type materials are two examples of substances that have such an effect. Some clay minerals also adversely affect the rate of development of strength, the strength and the durability of concrete in which they are incorporated.

[A1>] Constituents of recycled aggregates that can adversely affect the rate of setting and hardening of concrete can be inorganic, and therefore not detected by the procedures given in 15.3 of EN 1744-1:1998. The procedures given in EN 1744-6 should be used for recycled aggregates. [<A1]

G.6 Constituents of air-cooled blastfurnace slag

Some constituents of air-cooled blastfurnace slag can adversely affect its volume stability when used as aggregates for concrete. However, air-cooled blastfurnace slag from modern production units is less likely to be unsound in this way.'

13. Page 36, H.3.3 Knowledge of the raw material

Replace all the notes with the following:

NOTE 1 – Most of the dangerous substances defined in Council Directive 76/769/EEC are not usually present in most sources of aggregates of mineral origin. However Note in ZA. 1 of Annex ZA is drawn to the attention of the aggregates producer.

Additionally for recycled aggregates there shall be a documented input control of raw material to be recycled.

NOTE 2 – The input control procedures for recycling should identify:

– nature of the raw material,

– source and place of origin,

– supplier and transporting agent.

NOTE 3 – For recycled aggregates, the processing depot will suffice for the source.

14. Page 41, Table H.3 Minimum test frequencies for properties appropriate to aggregates from particular sources

Replace Table H.3 as follows:

<A1> **Table H.3 – Minimum test frequencies for properties appropriate to aggregates from particular sources** [a]

Property		Clause	Notes/ references	Test method	Minimum test frequency
1	Shell content	4.5	Coarse aggregates of marine origin	EN 933-7	1 per year
2	Volume stability – Drying shrinkage	5.7.2		EN 1367-4	1 per 5 years
3	Chloride content	6.2	Aggregates of marine origin	EN 1744-1:1998, Clause 7	1 per week
			Recycled aggregates	EN 1744-5	2 per year
4	Sulfur containing compounds	6.3	Blastfurnace slag and recycled aggregates	EN 1744-1:1998, Clause 12	2 per year
			Aggregates other than air-cooled blastfurnace slag and recycled aggregates	EN 1744-1:1998, Clause 12	1 per year
5	Organic substances:	6.4.1			
	- humus content			EN 1744-1:1998, 15.1	1 per year
	- fulvo acid (when indicated humus content is high)			EN 1744-1:1998, 15.2	1 per year
	- comparative strength test – stiffening time			EN 1744-1:1998, 15.3	1 per year
	- lightweight organic contaminators			EN 1744-1:1998, 14.2	2 per year
6	Dicalcium silicate disintegration	6.4.2.1	Blastfurnace slag only	EN 1744-1:1998, 19.1	2 per year
7	Iron disintegration	6.4.2.2	Blastfurnace slag only	EN 1744-1:1998, 19.2	2 per year
8	Influence on initial setting time of cement	6.4.1	Recycled aggregates only	EN 1744-6	2 per year
9	Constituents of coarse recycled aggregates	5.8	Coarse recycled aggregates only	prEN 933-11	1 per month
10	Particle density and water absorption	5.5	Coarse recycled aggregates only	EN 1097-6	1 per month
11	Water-soluble sulfate	6.3	Recycled aggregates only	EN 1744-1	1 per month

[a] For recycled aggregates, the source can be considered as the processing depot.

<A1

15. Page 43, Table ZA.1a Scope and relevant requirement clauses

Replace row 4 as follows:

[A1>] Composition/content	5.8 Constituents of coarse recycled aggregates	None	Categories
	6.2 Chlorides	None	Declared value
	6.3.1 Acid soluble sulfates	None	Category
	6.3.2 Total sulphur	None	Pass/fail threshold value
	6.3.3 Water-soluble sulphate content of recycled aggregates	None	Category
	6.4.1 Constituents of natural aggregates which alter the rate of setting and hardening of concrete	None	Pass/fail threshold value
	6.4.1 Influence on initial setting time of cement (recycled aggregates)	None	Category
	6.5 Carbonate content of fine aggregate for concrete pavement surface courses	None	Declared value [<A1]

16. Pages 49 to 52,

Replace Figures ZA.1, ZA.2, ZA.3 and ZA.4 with the following figures:

A1

CE			*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC.*
01234			*Identification number of the inspection body*
Any Co Ltd, PO Box 21, B-1050			*Name or identifying mark and registered address of the producer*
08			*Last two digits of the year in which the marking was affixed*
0123-CPD-0456			*Number of the EC certificate*
EN 12620			*No. of European Standard*
Aggregates for concrete			*Description of product and*
Particle shape	Declared value	(*FI*)	*information on product and on regulated characteristics*
Particle size	Designation	(*d*/*D*)	
Particle density	Declared value	(Mg/m^3)	
Cleanliness			
Fines quality	Pass/fail threshold value and Category	(*%*) (*MB*, *SE*)	
Shell content	Category	(e.g. SC_{10})	
Resistance to fragmentation/crushing	Category	(LA_{15})	
Resistance to polishing	Category	(PSV_{56})	
Resistance to abrasion	Category	(AAV_{10}, A_N30)	
Resistance to wear	Category	($M_{DE}20$)	
Composition/content			
Composition of coarse recycled aggregate	Categories	(Rc_{90}, $XG_{0,2}$)	
Chlorides	Declared value	(% *C*)	
Acid soluble sulfates	Category	(e.g. $AS_{0,2}$)	
Total sulfur	Category	(e.g. S_{NR})	
Water soluble sulfate content of recycled aggregate	Category	($SS_{0,2}$)	
Constituents which alter the rate of setting and hardening of concrete	Pass/fail threshold value	(*Stiffening time in minutes and compressive strength S%*)	
Influence of recycled aggregates on initial setting time of cement	Category	(A_{25})	
Carbonate content	Declared value	(% CO_2)	

Volume stability		
Drying shrinkage	Pass/fail threshold value	(% *WS*)
Constituents which affect the the volume stability of air-cooled blastfurnace slag	Declared value	(Appearance)
Carbonate content	Declared value	(% CO_2)
Water absorption	Declared value	(% *WA*)
Emission of radioactivity	Declared values as requested	
Release of heavy metals **Release of polyaromatic carbons**	Threshold values valid in the place of use	
Release of other dangerous substances	e.g. substance X: 0,2 µm^3	
Durability against freeze-thaw	Declared value	(*F* or *MS*)
Durability against alkali-silica reactivity	Declared value as requested	

〈A1〉

Figure ZA.1 – Example of CE marking information for aggregates for concrete under system 2+

CE			*CE conformity marking, consisting of the "CE"-symbol given in directive 93/68/EEC.*
01234			*Identification number of the inspection body*
Any Co Ltd, PO Box 21, B-1050			*Name or identifying mark and registered address of the producer*
〈A1〉 **08** 〈A1〉			*Last two digits of the year in which the marking was affixed*
0123-CPD-0456			*Number of the EC certificate*
EN 12620			*No. of European Standard*
Aggregates for concrete			*Description of product and information on regulated characteristics*
Fineness/Particle size	Declared value	(% passing by mass)	
Particle density	Declared value	(Mg/m^3)	
Composition/content			
Chlorides	Declared value	(% *C*)	
Acid soluble sulfates	Categories	(e.g. *AS* $_{0,2}$)	
Total sulfur	Pass/fail threshold value	(% *S*)	
Cleanliness	Pass/fail threshold values	(% passing, % by mass, *MB*, *SE*)	
Volume stability			
Drying shrinkage	Pass/fail threshold value	(% *drying shrinkage*)	
Constituents which affect the volume stability of air-cooled blastfurnace slag	Declared value	(visual appearance, visual cracking or disintegration)	
Release of other dangerous substances	X decree YY/nn (yy-mm-dd)		

Figure ZA.2 – Example of CE marking information for fillers under system 2+

			*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC*
Any Co Ltd, PO Box 21, B-1050 **08**			*Name or identifying mark and registered address of the producer* *Last two digits of the year in which the marking was affixed*
EN 12620 **Aggregates for concrete**			*No. of European Standard* *Description of product and*
Particle shape	Declared value	(*FI*)	*information on product and on regulated characteristics*
Particle size	Designation	(*d*/*D*)	
Particle density	Declared value	(Mg/m^3)	
Cleanliness			
Fines quality	Pass/fail threshold value and Category	(*%*) (*MB*, *SE*)	
Shell content	Category	(e.g. SC_{10})	
Resistance to fragmentation/crushing	Category	(LA_{15})	
Resistance to polishing	Category	(PSV_{56})	
Resistance to abrasion	Category	(AAV_{10}, A_N30)	
Resistance to wear	Category	($M_{DE}20$)	
Composition/content			
Constituents of coarse recycled aggregate	Categories	(Rc_{90}, $XG_{0,2}$)	
Chlorides	Declared value	(% *C*)	
Acid soluble sulfates	Category	(e.g. $AS_{0,2}$)	
Total sulfur	Category	(e.g. S_{NR})	
Water soluble sulfate content of recycled aggregate	Category	($SS_{0,2}$)	
Constituents which alter the rate of setting and hardening of concrete	Pass/fail threshold value	(*Stiffening time in minutes and compressive strength S%*)	
Influence of recycled aggregates on initial setting time of cement	Category	(A_{25})	
Carbonate content	Declared value	(% CO_2)	

Volume stability		
Drying shrinkage	Pass/fail threshold value	(% *WS*)
Constituents which affect the the volume stability of air-cooled blastfurnace slag	Declared value	(Appearance)
Water absorption	Declared value	(% *WA*)
Emission of radioactivity	Declared values as requested	
Release of heavy metals **Release of polyaromatic carbons**	Threshold values valid in the place of use	
Release of other dangerous substances	e.g. substance X: 0,2 µm^3	
Durability against freeze-thaw	Declared value	(*F* or *MS*)
Durability against alkali-silica reactivity	Declared value as requested	

〈A1〉

Figure ZA.3 – Example of CE marking information for aggregates for concrete under system 4

CE			*CE conformity marking, consisting of the "CE"-symbol given in directive 93/68/EEC.*
Any Co Ltd, PO Box 21, B-1050			*Name or identifying mark and registered address of the producer*
〈A1〉 **08** 〈A1〉			*Last two digits of the year in which the marking was affixed*
EN 12620			*No. of European Standard*
Aggregates for concrete			*Description of product and information on regulated characteristics*
Fineness/Particle size	Declared value	(% passing by mass)	
Particle density	Declared value	(Mg/m^3)	
Composition/content			
Chlorides	Declared value	(% *C*)	
Acid soluble sulfates	Categories	(e.g. *AS* $_{0,2}$)	
Total sulfur	Pass/fail threshold value	(% *S*)	
Cleanliness	Pass/fail threshold values	(% passing, % by mass, *MB*, *SE*)	
Volume stability			
Drying shrinkage	Pass/fail threshold value	(% *drying shrinkage*)	
Constituents which affect the volume stability of air-cooled blastfurnace slag	Declared value	(visual appearance, visual cracking or disintegration)	
Release of other dangerous substances	X decree YY/nn (yy-mm-dd)		

Figure ZA.4 – Example of CE marking information for fillers under system 4

17. Page 56, Table ZZA.3 Minimum test frequencies for properties appropriate to aggregates from particular sources

A1> *Replace* Table ZZA.3 as follows:

Table ZZA.3 – Minimum test frequencies for properties appropriate to aggregates from particular sources / quarries

	Property	Clause	Notes/ references	Test method	Minimum test frequency
1	Shell content	4.5	Coarse aggregates of marine origin	EN 933-7	1 per year
2	Volume stability – Drying shrinkage	5.7.2		EN 1367-4	1 per 5 years
3	Chloride content	6.2	Aggregates of marine origin Recycled aggregates	EN 1744-1:1998, Clause 7 EN 1744-5	1 per week 2 per year
4	Sulfur containing compounds	6.3	Blastfurnace slag and recycled aggregates Aggregates other than air-cooled blastfurnace slag and recycled aggregates	EN 1744-1:1998, Clause 12 EN 1744-1:1998, Clause 12	2 per year 1 per year
5	Organic substances: - humus content - fulvo acid (when indicated humus content is high) - comparative strength test – stiffening time - lightweight organic contaminators	6.4.1		 EN 1744-1:1998, 15.1 EN 1744-1:1998, 15.2 EN 1744-1:1998, 15.3 EN 1744-1:1998, 14.2	 1 per year 1 per year 1 per year 2 per year
6	Dicalcium silicate disintegration	6.4.2.1	All types of slag	EN 1744-1:1998, 19.1	2 per year
7	Iron disintegration	6.4.2.2	All types of slag	EN 1744-1:1998, 19.2	2 per year
8	Influence on initial setting time of cement	6.4.1	Recycled aggregates only	EN 1744-6	2 per year
9	Constituents of coarse recycled aggregates	5.8	Coarse recycled aggregates only	prEN 933-11	1 per month
10	Particle density and water absorption	5.5	Coarse recycled aggregates only	EN 1097-6	1 per month
11	Water-soluble sulfate	6.3	Recycled aggregates only	EN 1744-1	1 per month
[a] For recycled aggregates, the source can be considered as the processing depot.					

<A1