ALLIANCE for
LOW-CARBON CEMENT
& CONCRETE

Feedback ALCCC on milestone 3

As Alliance for Low-Carbon Cement and Concrete (ALCCC), we are committed to bring European cements within planetary boundaries, targeting a net zero value chain by 2040. The swift adoption of performance-based cement and concrete standards in Europe is a key priority for the ALCCC. This is much needed to overcome current market entrance barriers, accelerate decarbonisation of cement and concrete and in doing so strengthen the competitiveness of our industry.

Recommendations

We welcome the opportunity to provide feedback on the draft proposal Milestone 3 made by the European Commission to the CPR acquis Expert Group. As ALCCC, we wish to provide the following comments:

Essential characteristics (milestone 3) are intrinsically linked with scope (milestone 1)

As reflects from the proposed milestone 3, the essential characteristics cannot be seen separately from the scope of the standard (cf. draft milestone 1). **Given that there are still many outstanding issues regarding the scope of the standard, we strongly recommend prioritising these before entering more technical discussion on milestone 3.**

Reiterating our input on draft milestone 1[1], we would like to stress that the proposed scope of future harmonised cement standard(s) falls short, both in terms of complying with the spirit and the legal requirements of the new CPR as well as in reflecting the state-of-the-art of cement technologies and products. This stems from the fact that **the scope of the future cement standard (i.e. harmonised zone) remains solely defined based on a recipe-based logic.**

As a direct result, **a wide and fast-growing range of cements will continue to fall outside of the scope of the future standard.** This will create significant market distortions, with traditional cements being offered a clear competitive advantage. Furthermore, the proposed approach will **lock in the status-quo for at least another 7 years[2] in Europe.** At a time when other regions are doubling down their efforts on the development of clean cement technologies[3], this **jeopardises the future resilience and competitiveness of our industry.** Furthermore, the proposed recipe-based approach puts the objectives of the CPR and the European climate law at risk as it falls short on promoting the main and most (cost) effective lever for cement and concrete decarbonisation.

Improvements to be made on milestone 3

Awaiting a clear perspective on the scope of the final standard (cf. supra), we like to recommend the following elements:

- The definition of product requirements in terms of definition of minimum quantities of clinker and other constituents will be obstructive to innovation. The main concern is that there is continuous progress in clinker level reductions in novel composite cements, as for instance demonstrated by the

[1] Joint position – Feedback on Draft Milestone I | Alliance for low-carbon cement & concrete (alliancelccc.com)
[2] Referring to a timeline whereby at the soonest a next revision of the standard is planned within 5 years, which in itself will require at least another 2 years of technical discussions.
[3] A case in point is the US who recently announced 1,55 billion USD of investments in cement and concrete https://www.energy.gov/oced/industrial-demonstrations-program-selections-award-negotiations

EN 197-5 standard for CEM II/C-M cements. Present standards, scientific literature and ETAs show that clinker levels can be as low as 5% for cementitious products meeting all performance requirements. As such, from a scientific and intellectual point of view the paradigm of the "existence of a minimal clinker content required to ascertain minimal performance" should be refuted and abandoned.

- Similarly, specification of cement constituents in terms of origin and chemical composition under a product requirement approach, is seen to obstruct the development and adoption of new constituents. This is seen as particularly concerning as conventional constituents such as GGBFS and coal combustion fly ash are already in short supply in many European markets. In the near future, further downscaling and electrification of production processes could lead to the absurd situation where by-product constituents are imported from other regions having less ambitious decarbonisation roadmaps, hence leading to unintended support to these third country suppliers, counterproductive to global decarbonisation efforts and policies.

Technical comments on Annex A

The following comments challenges the specification of certain "essential characteristics" and highlights each characteristic that has no direct scientifically proven relationship with the performance of constituents of cement, lime and other hydraulic binders. We would like to remind that only those characteristic essential to the performance of the products should be withheld. All others should be delisted to avoid overspecification and technology lock-in.

Constituents

Essential characteristic	Assessment method	Comments and recommendation
portland cement clinker - aluminium oxide content	EN 196-2	There is no direct relationship of this characteristic to Portland cement clinker performance, it is well-known that the aluminium oxide content should be seen in relationship to the other oxides in the clinker. It may be included for declaration purposes but should not be used as compositional requirement.
portland cement clinker - combined calcium silicates content	EN 196-2	There is no direct relationship of this characteristic to Portland cement clinker performance, the main calcium silicates in clinker, alite and belite, provide very different performance, hence their summation is not a predictor of performance. **This characteristic should be delisted.**
portland cement clinker - calcium oxide content	EN 196-2	There is no direct relationship of this characteristic to Portland cement clinker performance, it is well-known that the calcium oxide content should be seen in relationship to the other oxides in the clinker. It may be included for declaration purposes but should not be used as compositional requirement.
portland cement clinker - silicon dioxide content	EN 196-2	There is no direct relationship of this characteristic to Portland cement clinker

		performance, it is well-known that the silicon dioxide content should be seen in relationship to the other oxides in the clinker. It may be included for declaration purposes but should not be used as compositional requirement.
portland cement clinker - magnesium oxide content	EN 196-2	There is no direct relationship of this characteristic to Portland cement clinker performance, hard-burnt MgO (periclase) may result in unsoundness, however this property is directly assessed through EN 196-3. Hence a separate specification of MgO content is superfluous.
portland cement clinker - iron (iii) oxide content	EN 196-2	There is no direct relationship of this characteristic to Portland cement clinker performance, it is well-known that the ferric oxide content should be seen in relationship to the other oxides in the clinker. It may be included for declaration purposes but should not be used as compositional requirement.
clinker -ratio calcium oxide in respect to silicon dioxide	EN 196-2	There is no direct relationship of this characteristic to Portland cement clinker performance, this ratio should be seen in relationship to other oxides, yet it should not be considered as a predictor of clinker phase composition as many other parameters interfere (minor and trace elements, clinkering and cooling conditions…) It may be included for declaration purposes, but should not be used as compositional requirement.
granulated blast furnace slag - ratio calcium oxide plus magnesium oxide in respect to silicon dioxide content of the	EN 196-2	There is no well-defined correlation of this characteristic to granulated blast furnace slag performance and should not be used as an indicator of performance as such. For instance, it is well-known that aluminium contents have a strong effect on GGBFS performance. It may be included for declaration purposes but should not be used as compositional requirement. More performance related testing i.e. strength activity, reactivity or soundness testing (EN 196-1, EN 196-12 or EN 196-3) are more reliable performance indicators.
granulated blast furnace slag - combined calcium oxide, magnesium oxide and silicon dioxide content	EN 196-2	There is no well-defined correlation of this characteristic to granulated blast furnace slag performance and should not be used as an indicator of performance as such. For instance, it is well-known that aluminium contents have a strong effect on GGBFS performance.

		It may be included for declaration purposes but should not be used as compositional requirement. More performance related testing i.e. strength activity, reactivity or soundness testing (EN 196-1, EN 196-12 or EN 196-3) are more reliable performance indicators.
pozzolanic materials - reactive silicon dioxide content	EN 196-2	Recent research has shown that there is no clear and unambiguous correlation between performance and reactive silicon dioxide content. Moreover, the test method is experienced as tedious and outdated in view of recent methodological developments. In addition, reactivity of pozzolanic constituents resides not only in silicon dioxide but also in other oxides, in particular Al2O3 in calcined clays contributes to reactivity and performance. In conclusion, this characteristic should be delisted and substituted by hydration heat or bound water test results following EN 196-12.
siliceous fly ash - loss of ignition 1 h ignition time	EN 196-2	A measure of organic carbon content is preferable over loss on ignition, this is more directly related to constituent performance and compatibility. Loss on ignition may also include bound water, CO_2 and other volatiles.
siliceous fly ash - reactive silicon dioxide content	EN 196-2	Recent research has shown that there is no clear and unambiguous correlation between performance and reactive silicon dioxide content. Moreover, the test method is experienced as tedious and outdated in view of recent methodological developments. In addition, reactivity of siliceous fly ash constituents resides not only in silicon dioxide but also in other oxides, and in particular Al2O3 contributes to reactivity and performance. In conclusion, this characteristic should be delisted and substituted by hydration heat or bound water test results following EN 196-12.
calcareous fly ash - reactive silicon dioxide content	EN 196-2	Recent research has shown that there is no clear and unambiguous correlation between performance and reactive silicon dioxide content. Moreover, the test method is experienced as tedious and outdated in view of recent methodological developments. In addition, reactivity of siliceous fly ash constituents resides not only in silicon dioxide but also in other oxides, and in particular Al2O3 contributes to reactivity and performance.

		In conclusion, this characteristic should be delisted and substituted by hydration heat or bound water test results following EN 196-12.
calcareous fly ash - loss of ignition 1 h ignition time	EN 196-2	A measure of organic carbon content is preferable over loss on ignition, this is more directly related to constituent performance and compatibility. Loss on ignition may also include bound water, CO_2 and other volatiles.
silica fume - loss of ignition 1 h ignition time	EN 196-2	A measure of organic carbon content is preferable over loss on ignition, this is more directly related to constituent performance and compatibility. Loss on ignition may also include bound water, CO_2 and other volatiles
siliceous fly ash of circulating fluidised bed - aggregated silicon dioxide, aluminium oxide, and iron (iii) oxide content	EN 196-2	There is no well-defined correlation of this characteristic to siliceous fly ash performance and should not be used as an indicator of performance as such. It may be included for declaration purposes but should not be used as compositional requirement. More performance related testing i.e. strength activity, reactivity or soundness testing (EN 196-1, EN 196-12 or EN 196-3) are more reliable performance indicators.
siliceous fly ash of circulating fluidised bed - reactive silicon dioxide content	EN 196-2	Recent research has shown that there is no clear and unambiguous correlation between performance and reactive silicon dioxide content. Moreover, the test method is experienced as tedious and outdated in view of recent methodological developments. In addition, reactivity of siliceous fly ash constituents resides not only in silicon dioxide but also in other oxides, and in particular Al2O3 contributes to reactivity and performance. In conclusion, this characteristic should be delisted and substituted by hydration heat or bound water test results following EN 196-12.
paper sludge ash - aggregated silicon dioxide, aluminium oxide, and iron (iii) oxide content	EN 196-2	There is no well-defined correlation of this characteristic to paper sludge ash performance and should not be used as an indicator of performance as such. It may be included for declaration purposes but should not be used as compositional requirement. More performance related testing i.e. strength activity, reactivity or soundness testing (EN 196-1, EN 196-12 or EN 196-3) are more reliable performance indicators.
paper sludge ash - magnesium oxide content	EN 196-2	There is no direct relationship of this characteristic to paper sludge ash performance, as hard-burnt MgO (periclase) is usually not present in paper sludge ashes. To exclude soundness issues, direct measurement through EN 196-3 is already

		foreseen. Hence a separate specification of MgO content is superfluous.
crystallised basic oxygen furnace - calcium oxide content	EN 196-2	There is no direct relationship of this characteristic to crystallised BOF slag performance, it well-known that the calcium oxide content should be seen in relationship to the other oxides in the slag. It may be included for declaration purposes but should not be used as compositional requirement.
crystallised basic oxygen furnace - aggregated silicon dioxide, aluminium oxide, and iron (iii) oxide content	EN 196-2	There is no well-defined correlation of this characteristic to BOF slag performance and should not be used as an indicator of performance as such. It may be included for declaration purposes but should not be used as compositional requirement. More performance related testing i.e. strength activity, reactivity or soundness testing (EN 196-1, EN 196-12 or EN 196-3) are more reliable performance indicators.
crystallised basic oxygen furnace - magnesium oxide content	EN 196-2	There is no direct relationship of this characteristic to BOF slag performance. To exclude soundness issues, direct measurement through EN 196-3 is already foreseen. Hence a separate specification of MgO content is superfluous.

Cement, lime and other hydraulic binders

Essential characteristic	Declaration	Assessment method	Comments and recommendation
pozzolanicity - hydroxyl ion concentration	amount of substance per litre	EN 196-5	Recent research has shown that there is no clear and unambiguous correlation between performance and the pozzolanicity test. The interpretation of the test results is ambiguous. This characteristic may be delisted and substituted by hydration heat or bound water test results following EN 196-12.
pozzolanicity - calcium oxide concentration	amount of substance per litre	EN 196-5	Recent research has shown that there is no clear and unambiguous correlation between performance and the pozzolanicity test. The interpretation of the test results is ambiguous. This characteristic may be delisted and substituted by hydration heat or bound water test results following EN 196-12.
insoluble residue content	mass ratio	EN 196-2	It is not apparent to what extent insoluble residue content relates to product performance. It may be declared but should not be specified.
alumina content	mass ratio	EN 196-2	There is no direct relationship of this characteristic to product performance.

			It may be included for declaration purposes but should not be used as compositional requirement.

Technical comments on Annex E

Concerning the essential characteristics for common cement and masonry cement, the majority of the present EU thresholds have not been included in the presented Milestone 3 draft. It is unclear whether this implies that the essential characteristics without threshold will need declaration only, or whether the present draft is incomplete in this respect. While ALCCC is in support of declaration, rather than imposition of thresholds for characteristics that are not directly correlated to product performance, the present position of the draft as regards the specification of common cements is unclear, the proposed specifications for the other products appear more developed in terms of threshold definition.