



the Sign of Quality

CEMENT ADMIXTURES ASSOCIATION

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ADMIXTURE ENVIRONMENTAL SHEET AES 12 ADMIXTURES, Ecopoints and the Green Guide

The UK admixture industry:

Admixtures are the smallest component of concrete but provide significant beneficial effects to the properties in terms of performance, durability and environmental optimisation.

The 7 major UK manufacturers are represented by the Cement Admixture Association (CAA) whose members supply admixture to dose about 70 million tonnes of concrete annually.

The CAA members are committed to working with Concrete Industry suppliers and producers to minimise the environmental impact of concrete as supplied and to demonstrate the whole life sustainability and socio-economic benefits that concrete provides to society. The CAA's own environmental policy includes the provision of environmental information, use of responsibly sourced materials, optimised production, minimised waste and effective transportation of its products to customers.

Demonstrating Sustainability

Sustainable construction should take into account the environmental, social and economic impacts of the structure through its whole life cycle from raw materials for production through the in-life phase, including maintenance to end of life and disposal / recycling.

Demonstrating sustainability is subjective as many of the impacts are difficult to quantify and compare in a meaningful way. Much of the current methodology tends to concentrate on the construction phase, the end of life recyclability and the 'in-use energy' consumption / carbon footprint but less on the socio-economic aspects of the in-use phase, an area where concrete scores highly.

In the UK, the Building Research Establishment (BRE) has taken a lead in developing methodology for measuring and comparing different construction materials. This started with Life Cycle Assessment methodology (LCA) leading to the BREEAM range of specifications aimed mainly at commercial and industrial structures including schools and hospitals. More recently BRE have turned their attention to domestic structures and this has led to BRE **Ecopoints**, **The Green Guide** for specification and ultimately to the **Code for Sustainable Homes**.

BRE Ecopoints

Ecopoint are a method of expressing and comparing the embodied environmental performance of construction materials and products. The lower the Ecopoints score, the lower the environmental impact. 100 Ecopoints are equivalent to the annual impact of the average European citizen and this can be used as a level against which to access products and services.

The process initially involves carrying out an input and output inventory on individual products or materials. This information can be used to produce an Environmental Product Declaration (EPD), see CAA Admixture Environmental Sheets AES 1 to 6. EPDs can be used in the next step of the Ecopoints methodology or combined with other EPDs to carry out an LCA on a multi component product or functional unit.

The Ecopoints methodology uses the inventory information or EPD to look at and measure 13 environmental impacts such as 'Global Warming Potential', or 'Resource Depletion' and then have an importance weighting applied to give the Ecopoints. This is similar to the process described on CAA Admixture Environmental Sheet AES 7.

One cubic metre of ready-mix concrete typically scores around 1.9 Ecopoints, which is largely determined by the production energy and embodied Carbon Dioxide of the Portland cement clinker and the mineral resource depletion of the cement and aggregate production and the water use. Admixtures and especially water reducing admixtures used in the concrete can significantly reduce the Ecopoints score compared to a concrete made without admixture.

The BRE Green Guide

Buildings components are generally made up of several different products or materials. For example a concrete wall will be made up of cement, aggregate, admixtures, steel etc each material having their own Ecopoints score. BRE aggregates the Ecopoint scores for these generic products to give a score for the Buildings component and this aggregated score forms the basis of the **BRE Green Guide** which provides environmental ratings of A+ to E for a broad range of Buildings components or functional units. These are grouped under various headings such as external walls, roofs, windows etc. The A+ to E ratings are in bands that may mask small differences in Ecopoints. The user cannot easily determine if the difference between components in say, a B rating and a D rating is 0.1 or 10 Ecopoints so use a degree of judgement when choosing systems.

Admixtures and especially water reducing admixtures can be used to help reduce both the water requirement and cementitious components thereby reducing the Ecopoints score and Green Guide rating for a concrete element. This is done without any detrimental effect on the performance or durability of the concrete, indeed these properties are usually enhanced by admixture use.

The dosage of the admixture is so low that, even at maximum dose their inclusion in the concrete contributes less than 2% and normally less than 1% to the environmental impact of the mix, however the resultant benefit can significantly reduce the overall environmental profile.

BRE recognise this benefit in the following statement included in their reports:

“According to data provided on the typical dosage level of admixtures, the resultant environmental profile of admixtures was deemed by BRE to be sufficiently low that it would have no significant contribution to the impact assessment of the concrete in which it is used. However the reduction in water demand and the consequential potential for reducing cement content resulting from admixture use may produce a significant reduction in the overall environmental profile of the concrete.”

Whilst the Green Guide ratings largely focus on the embodied environmental impacts of materials, it is the operational impacts of a building that are most significant. The BRE attempts to cover these in their building assessment methodologies (BRE Environmental Assessment Methodologies (BREEAM) which has been almost completely adopted in the Code for Sustainable Homes.

BRE Code for Sustainable Homes:

The Code measures the sustainability of a new home against nine categories of sustainable design, rating the 'whole home' as a complete package. The Code uses a 1 to 6 rating system to communicate the overall sustainability performance of a new home. The Code sets minimum standards for energy and water use at each level and, within England, superceeds the BRE EcoHomes scheme and is now mandatory..

The main sustainability categories include:

- Energy efficiency in the fabric of the building and appliances in the building. This covers for example, the standard of insulation, the use of solar heating, fitting of low energy light bulbs, the use of 'A' rated kitchen appliances.
- Water efficiency, for example, fitting dual or low flush toilets, reduced flow taps.
- Surface water management, for example sustainable drainage or storage and use of gray water.

This is where the Green Guide, BREEAM and Code for Sustainable Homes ratings are limited as a design tool since they do not provide an effective measure of the overall impact of the construction materials during their life e.g. key operational issues are not included such as long term durability, acoustic performance, flood resilience, fire resistance and energy in use and the benefits of passive measures such as thermal mass effects etc. These are all areas where concrete would score highly in relation to the economic investment being made.

Admixtures:

Although sustainability considerations are a current focus for admixture use, the historic benefits should not be ignored as they contribute to the durability of concrete which in itself is a key sustainability benefit for concrete over other construction materials. Admixtures can give economic benefits in both production and placing, optimising mix design, reducing the need for heat curing in precast and allowing modern placing methods to be employed which reduce noise and vibration as well as faster construction.

The CAA website contains further information on admixtures including technical and environmental sheets that are available for free download. **Visit www.admixtures.org.uk.**

Information on Admixtures:

For general information on admixtures contact:
John Dransfield, CAA Secretary (see above).