

## **EFCA ENVIRONMENTAL DECLARATION ACCELERATING ADMIXTURES – December 2005.**

### **ACCELERATING ADMIXTURES**

Admixtures are an important component of concrete, together with the cement, water, aggregates and, where applicable, reinforcing steel.

Accelerators are used to increase the initial rate and speed of the chemical reaction between cement and the mixing water. This results in a faster stiffening of the concrete (set accelerating admixture) or faster hardening and strength development (hardening accelerating admixture) or both. This Environmental Product Declaration covers accelerators for normal concrete use, it does not include nozzle added accelerators for sprayed concrete. Accelerators covered by this EPD make up about 4% of all admixtures sold in Europe.

Accelerators are based mainly on selected inorganic Calcium or Sodium salts but may also contain small amounts of organic modifiers or plasticisers. Only chloride free accelerators should be used in concrete containing embedded metal.

The accelerating effect can be utilised in two ways:

- As 'set accelerators' to decrease the time to commencement of transition of the mix from the plastic to the rigid state.
- As hardening accelerators to increase the rate of development of early compressive strength in the concrete with or without effecting the setting time.

Depending on the accelerator type and dose, the admixture may perform one or both of these functions.

This Eco-profile is valid for Accelerators based on blends of Calcium or Sodium salts of Chloride and Nitrate.

These salts may also be factory blended with other chemicals to give carefully targeted properties.

The accelerators are normally dissolved in water and typically contain 35-50% active matter.

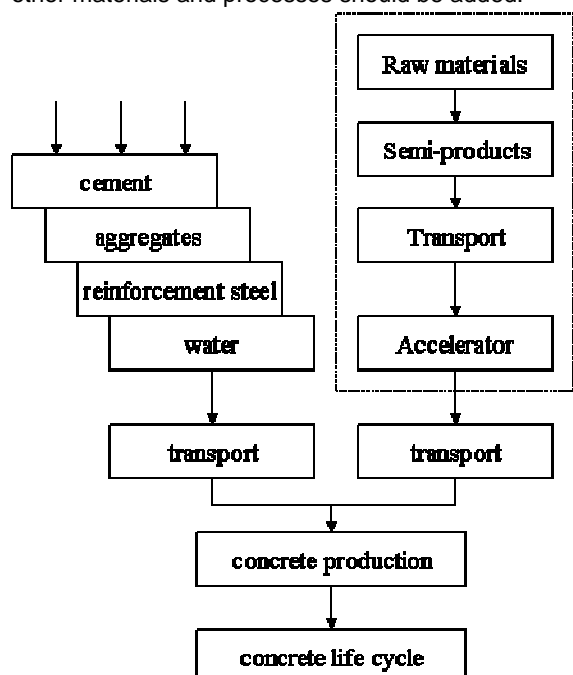
### **SCOPE OF THE ECO-PROFILE**

The Eco-profile covers cradle-to-gate production of accelerators in Europe. Transport of accelerators from manufacturer to customer is not included.

Members of EFCA, the European Federation of Concrete Admixtures Associations collected manufacturing data for synthesis and blending of accelerators in 2005. This environmental declaration is based on the figures from four of Europe's largest admixture producers and is an average of the accelerator types described. The variation between these types and between manufacturers leads to relatively small differences in LCA's of concrete, however the figures should not be taken as absolute values for any one manufacturer or accelerator type.

### **ENVIRONMENTAL IMPACT**

The figure below reveals how the Eco-profile for accelerators fits in a concrete life cycle. This Eco-profile includes processes shown within the dotted line. To complete the life cycle, environmental data from other materials and processes should be added.



## ECO-PROFILE ACCELERATORS

### Eco-profile for 1 kg accelerators, 35-50% solids

<i>Raw materials - input</i>	<i>Unit</i>	<i>Value</i>
coal, brown	g	49
coal, hard	g	100
crude oil	g	96
natural gas	m3	0.35
<i>Emissions to air</i>		
CO <sub>2</sub>	kg	1.2
CO	g	1.0
NO <sub>x</sub>	g	2.3
SO <sub>x</sub>	g	2.8
Butane	mg	15
Ethane	mg	60
Ethene	mg	5.8
Methane	g	2.5
Pentane	mg	21
Propane	mg	25
Benzene	mg	9.7
PAH	mg	0.14
Ammonia	g	0.18
Dioxins	µg	0.13
Arsenic (As)	mg	0.18
Chromium VI (Cr)	µg	67
Mercury (Hg)	µg	34
Nickel (Ni)	mg	1.7
Vanadium (V)	mg	5.5
CFC-10	µg	3.3
Halon-1211	µg	17
Halon-1301	µg	3.1
<i>Emissions to water</i>		
Chemical Oxygen Demand	g	1.9
Oils, unspecified	g	0.40
Nitrate	g	2.5
Phosphate	mg	29
Barite	mg	70
Copper (Cu)	mg	12
Nickel (Ni)	mg	14
Vanadium (V)	mg	1.8
PAH's	µg	88
<i>Emissions to soil</i>		
Chromium VI (Cr)	µg	74
Oils, unspecified	g	0.40

### Indicators for 1 kg accelerators, 35-50% solids

<i>Solid waste</i>	<i>Unit</i>	<i>Value</i>
Non-hazardous waste	g	3.2
Hazardous waste	g	0.12
<i>Total energy</i>		
Total energy	MJ	22.8

## ACCOUNTABLES

The Eco-profile is derived from primary data supplied by EFCA and its member organisations.

An independent consultancy from The Netherlands, INTRON, verified primary data and computed the Eco-profile.

Additional information for LCA practitioners:

- The Eco-profile on this sheet is valid for admixtures in a range of solids percentages. Even though this percentage may vary substantially it is not a major contributor to the total Eco-profiles and individual admixtures will all be within an acceptable range. The average profile should therefore not be related to the solids percentage of an individual admixture.
- INTRON used literature data on raw material production primarily based upon the Eco-Invent (v1.2) database. Close proximity substitution has been applied.
- Eco-Invent data contain capital goods.
- LCI data for electricity production are based on the European fuel mix.
- Substances that contribute more than 1% to the environmental impact on any of the following environmental categories have been included in the Eco-profile: ADP, GWP, ODP, HTP, TETP, FAETP, POCP, AP and EP.
- The substances in the Eco-profile typically amount to at least 90-95% of the environmental impact in any category.

The membership of EFCA, the European Federation of Concrete Admixture Associations, currently consists of the following national associations:

<b>Belgium</b>	<b>FIPAH</b>	<b>Norway</b>	<b>NCCA</b>
<b>France</b>	<b>SYNAD</b>	<b>Spain</b>	<b>ANFAH</b>
<b>Germany</b>	<b>DB</b>	<b>Sweden</b>	<b>SACA</b>
<b>Italy</b>	<b>ASSIAD</b>	<b>Switzerland</b>	<b>FSHBZ</b>
<b>Netherlands</b>	<b>VHB</b>		
<b>United Kingdom</b>	<b>CAA</b>		

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