European Federation of Concrete Admixture Associations

EFCA ENVIRONMENTAL DECLARATION

RETARDING ADMIXTURES – DECEMBER 2005.

RETARDING ADMIXTURES

Admixtures are an important component of concrete, together with the cement, water, aggregates and, where applicable, reinforcing steel. Retarding admixtures currently make up about 1.5% of all admixtures sold in Europe.

Retarders are typically based on solutions of phosphates, phosphonates, sucrose, gluconate, polysaccharides.

Retarding admixtures are used to slow down the speed of the reaction between cement and water by affecting the growth of the hydration products and/or reducing the rate of water penetration to the cement particles. The use of a retarder will increase the setting time and may delay strength development of the concrete.

Retarders can be used:

- in hot weather to prevent early stiffening;
- to increase working life, especially when used in conjunction with superplasticisers;
- to allow the placing of a large pour of concrete over several hours;
- to place concrete in layers without cold joints;
- to extend the time between mixing and placing (e.g., for long transport time);
- prevent setting of the concrete in the truck in case of delay.

This Eco-profile is valid for retarders based on phosphates, phosphonates, sucrose, gluconate, polysaccharides solutions, which may be factory blended with other chemicals to give carefully targeted properties.

Retarders are dissolved in water and typically contain 17-46% active matter.

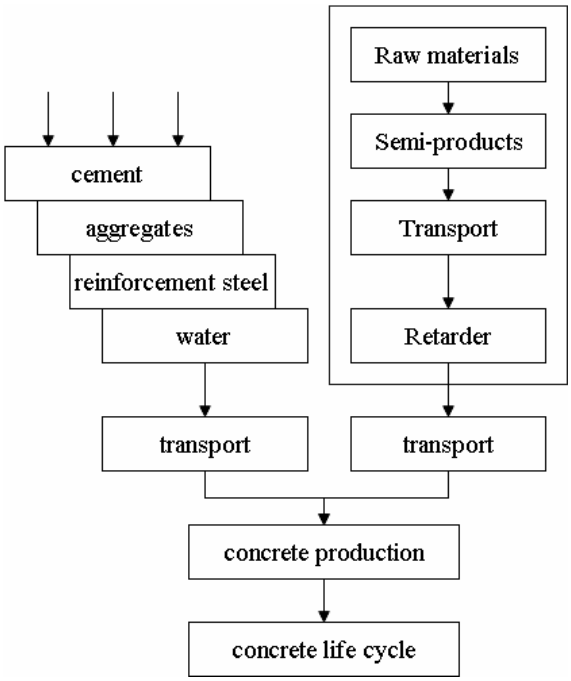
SCOPE OF THE ECO-PROFILE

The Eco-profile covers cradle-to-gate production of retarders in Europe. Transport of retarders 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 retarders in 2005. This environmental declaration is based on the figures from three of Europe's largest admixture producers and is an average of the retarder 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 retarder type.

ENVIRONMENTAL IMPACT

The figure below reveals how the Eco-profile for retarders 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.



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ECO-PROFILE RETARDERS

Eco-profile for 1 kg retarders, 17-46% solids

Raw materials - input	*Unit*	*Value*
coal, brown	g	18
coal, hard	g	21
crude oil	kg	0.13
natural gas	m3	0.21
Emissions to air		
CO_2	g	76
CO	g	0.81
N_2O	mg	35
NO_x	g	1.7
SO_x	g	1.4
Butane	mg	2.4
Ethene	mg	16
Methane	g	58
Methanol	mg	63
Propene	mg	9.9
Benzene	mg	36
Cumene	mg	27
PAH	µg	25
Hydrocarbons, unspecified	g	0.19
Acetic acid	mg	99
Ammonia	g	0.2
Dioxins	µg	0.012
Arsenic (As)	µg	16
Chromium VI (Cr)	µg	5.6
Mercury (Hg)	µg	29
Nickel (Ni)	mg	0.15
Vanadium (V)	mg	0.43
CFC-10	µg	18
HCFC-140	mg	0.12
CFC-113	µg	5.1
Halon-1211	µg	1.9
Halon-1301	µg	1.0
Emissions to water		
Chemical Oxygen Demand	g	4.1
Nitrate	g	0.5
Phosphate	mg	97
Phosphorus pentoxide	g	0.62
Barite	mg	14
Nickel (Ni)	mg	1.6
Hydrocarbons, unspecified	mg	21
Oils, unspecified	g	0.12
Benzene	mg	65

Indicators for 1 kg retarders, 17-46% solids

Emissions to soil	*Unit*	*Value*
Chromium VI (Cr)	µg	25
Oils, unspecified	g	0.11
Parathion	mg	0.11
Solid waste		
Non-hazardous waste	g	91
Hazardous waste	g	0.74
Total energy		
Total energy	MJ	15.7

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:

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

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