

EFCA ENVIRONMENTAL DECLARATION SUPERPLASTICIZING ADMIXTURES – June 2002

SUPERPLASTICIZING ADMIXTURES

Admixtures are chemicals added to concrete, mortar or grout to improve the properties in the fresh wet state or after hardening. They are an important component of good quality concrete, together with the cement, water, aggregates and, where applicable, reinforcing steel.

Superplasticizers currently make up about 38% of all admixtures sold in Europe. Normal plasticizers account for a further 40% and are the subject of a separate EFCA Declaration Sheet.

Superplasticizers, also known as High Range Water Reducing admixtures, are synthetic, water-soluble organic chemicals that significantly reduce the amount of water needed to achieve a given consistence in fresh concrete. This effect can be utilised in two ways:

- To reduce water content for increased strength and reduced permeability / improved durability
- As a cement dispersant at the same water content to increase consistence and workability retention

With a slightly higher admixture dosage, both these effects can be achieved in the same mix.

When compared with a plain concrete of equal strength and consistence, superplasticizers will usually give an improved overall LCA profile.

This Eco-profile is only valid for superplasticisers and is representative for all four main groups of superplasticizers used in concrete:

- Sulphonated naphthalene formaldehyde
- Sulphonated melamine formaldehyde
- Vinyl copolymers
- Poly carboxylic ethers.

These chemicals may be factory blended with each other or with 'normal plasticizers' to give superplasticizers with carefully targeted properties.

ACCOUNTABLES

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

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

The data collection has been carried out according to ISO 14040 series on Life Cycle Assessment.

The process was critically reviewed by IKP/University of Stuttgart and accepted for use in LCA's of concrete.

ECO-PROFILE SUPERPLASTICIZERS

Eco-profile for 1 kg superplasticizers, 30-45% active content

<i>Raw materials - input</i>	<i>Unit</i>	<i>Value</i>
coal	g	62
crude oil (feedstock)	g	91
crude oil (fuel)	g	74
natural gas (feedstock)	dm ³	0.13
natural gas (fuel)	m ³	0.21
water	kg	7.4
<i>Emissions to air</i>		
CO ₂	kg	0.69
CO	g	2.1
C _x H _y (VOC)	g	2.2
methane	g	1.2
methanol	g	1.1
NO _x	g	3.5
SO _x	g	6.6
benzene	mg	2.6
heavy metals	mg	0.26
nickel (Ni)	mg	0.28
mercury (Hg)	µg	10
cadmium (Cd)	µg	9.1
Halon-1301	µg	8.0
<i>Emissions to water</i>		
barium (Ba)	mg	8.8
copper (Cu)	mg	0.28
formaldehyde	mg	90
nickel (Ni)	mg	0.28
PAH's	µg	23
<i>Solid waste</i>		
Non-hazardous waste	g	28
Hazardous waste	g	1.8
<i>Total energy</i>		
Total energy	MJ	16

SCOPE OF THE ECO-PROFILE

This Eco-profile covers cradle-to-gate production of Superplasticizing Admixtures in Europe. Transport of Superplasticizers from fabricator to customer is not included.

Members of EFCA, the European Federation of Concrete Admixtures Associations collected manufacturing data for the synthesis and blending of Superplasticizers in 2000-2001. This environmental declaration is based on the figures from 8 of Europe's largest admixture producers and is an average of the Superplasticizers types detailed above.

The variation in effect between Superplasticizer types and between manufacturers is insignificant in relation to the LCA of concrete. Superplasticizers typically account for less than 4% of most LCA impact value for concrete. However, the figures should not be taken as absolute values for that manufacturer or Superplasticizer type.

REFERENCES

Background information on this Eco-profile is described in:

- 1) Rouwette, R. and Schuurmans, A. (INTRON): "LCI and LCA of Concrete. Goal and scope definition", Joint Project Group document IN 00/25, Brussels, 2001.
- 2) Rouwette, R. and Schuurmans, A. (INTRON): "LCI of admixtures in Europe. Data collection process for LCAs of concrete", Joint Project Group document IN 01/09, Brussels, 2001.

QUESTIONS?

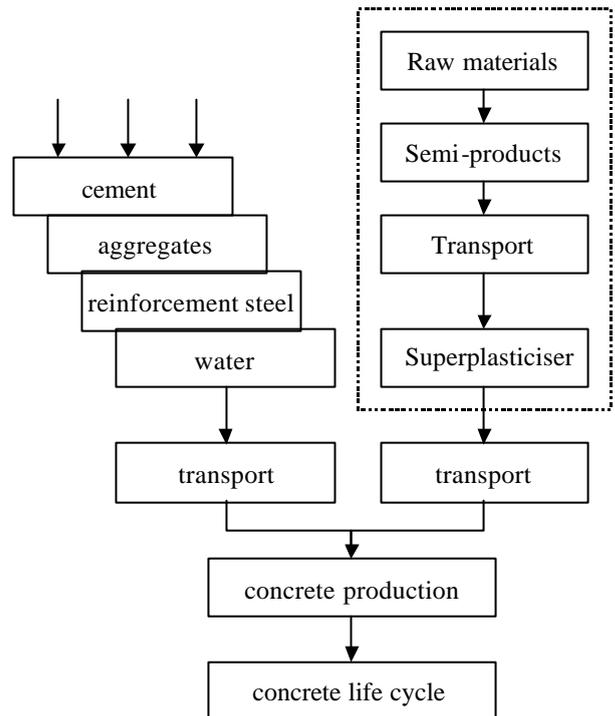
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ENVIRONMENTAL IMPACT

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



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

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

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