Certified Environmental Product Declaration (EPD)

MEHEC

Description of the product and the company

The product
MEHEC* (Methyl Ethyl HydroxyEthyl Cellulose) provides water retention and suitable consistency to hydraulic binders. Except these properties the multifunctional product improves adhesion, open time and workability of mortars. It is manufactured from cellulose and modified with methyl, ethyl and hydroxyethyl substituents to make the product water-soluble. The end product is a free-flowing, whitish powder.

MEHEC is used in mortars

The reaction steps in the manufacturing process of MEHEC are performed in batch reactors. Cellulose is ground and treated with sodium hydroxide. The cellulose is then reacted with ethylene oxide, methyl chloride and ethyl chloride. The product is washed, dried, ground, sieved and packed. The manufacturing of MEHEC takes place in Örnsköldsvik, Sweden.

This Environmental Product Declaration (EPD) for MEHEC is also valid for similar products, e.g. MEHEC with minor amounts of different additives, provided that the range of variations within each environmental impact category does not exceed +/- 10%.

The functional unit is 1000 kg of MEHEC. This means that the environmental load presented, is valid for 1000 kg of MEHEC.

MEHEC is not classified as either a health or an environmental risk and therefore no labelling is required. The actual chemical content of MEHEC is methyl ethyl hydroxyethyl cellulose.

The company
Akzo Nobel serves customers throughout the world with healthcare products, coatings, and chemicals. Akzo Nobel run operations in 80 countries and has about 70,000 employees.

Cellulosic Specialties, who manufactures MEHEC, is part of the business unit Akzo Nobel Surface Chemistry, which has a global presence and a solid technological base in cellulose derivatives and fatty acids, with a particular emphasis on cationic surfactants.

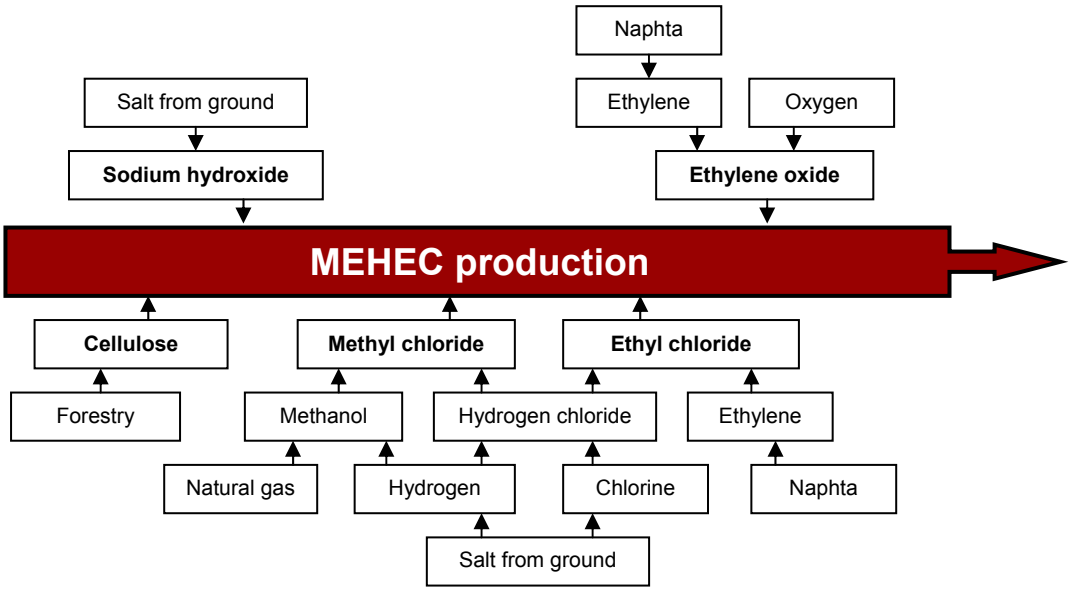
Cellulosic Specialties has more than 50 years of experience in manufacturing and developing BERMOCOLL products. Marketing, research and development for these products are based in Stenungsund while production facilities are located in Örnsköldsvik, Sweden.

Management systems are certified according to ISO 9002 and according to ISO 14001.

* *MEHEC is a BERMOCOLL® product*

Presentation of environmental performance

All major steps, from the extraction of natural resources until the product leaves the gates in Örnsköldsvik, are included in the environmental performance of the manufacturing phase. A few of these steps are displayed in the simplified flowchart below.



The data used were collected for year 2000 and others are said to be valid for that time according to suppliers. Site-specific data have been retrieved for all major raw materials or have been guaranteed to correspond with site-specific data according to suppliers. In this EPD economical allocation has been the base for calculations, meaning the environmental load from a production has been divided according to economical value of the products produced. From the MEHEC production no commercial by-products are produced and there is no need for any allocations in that specific process.

The manufacturing phase

The figures displayed below cover not only the environmental load derived from the production site of MEHEC. All other steps during the life cycle up until the product leaves the gates in Örnsköldsvik are included like natural resource extraction, raw material production, energy production and transportation. All figures are given for 1000 kg of MEHEC.

Non-renewable resources			
Without energy content	**kg**	**With energy content**	**MJ**
Sodium chloride	1300	Natural gas	43000
Limestone	44	Crude oil	23000
Copper in ore	3	Nuclear energy	19000
		Coal	6400

This table displays the total use of non-renewable resources, including feedstock, needed for 1000 kg MEHEC.

Renewable resources			
Without energy content	**kg**	**With energy content**	**MJ**
–	–	Biomass	11000
		Hydro energy	10000
		Wood	9500
		Wind energy	4

The Wood resource represents the feedstock used for MEHEC while Biomass represents the total energy use derived from bio fuels.

The net electricity consumption is not a resource use since the resources used for, and emissions and waste derived from, electricity production are included in the other displayed figures. It simply displays how much electricity that has been consumed within the system studied.

Electricity net consumption	
Electricity production source	**kWh**
Unspecified	2900
Hydro power	2200
Nuclear power	1500
Natural gas	98
Coal	26
Bio fuel	16

Unspecified means that the electricity grid is not known and is represented by a mix of electricity production sources.

Note that energy is not the same as electricity. For example nuclear energy is a measure of the total energy content in the uranium fuel in the same way as crude oil is a measure of energy content. Hence nuclear energy is not the same as nuclear electricity (here named Nuclear power), like crude oil is not the same as electricity produced from oil.

Some of the environmental flows presented below have indexes in the different environmental impact categories and are therefore influencing them. The environmental flows displayed are in some cases demanded by the Product-Specific Requirements (PSR) for chemical products. In other cases they are displayed because they are considered to be significant for the production of MEHEC.

Emissions to air	g
CO_2	2800000
CH_4	15000
NO_X	14000
SO_2	13000
Particles	4000
HC	3000
Ethene	1600
CO	1200
Ethyl chloride	1100
Dimetyl ether	500
Ethanol	400
Methyl chloride	300
Glycolether	100
Major and most significant air emissions.	

Emissions to water	g
NaCl	1000000
COD	140000
N total	760
P total	110
Major and most significant water emissions.	

Waste generation	kg
Non hazardous waste	360
Hazardous waste	14
Different types of waste are divided into the two groups displayed above.	

In accordance with the guidelines for EPDs, the most important air and water emissions are expressed as influence on different environmental impact categories. The result is displayed below.

Emissions, expressed in terms of environmental impact		
Category of impact	**Equivalent unit**	**Impact**
Global warming potential (GWP)	g CO_2	3 200 000
Ozone depletion potential (ODP)	g CFC-11	9
Acidification potential (AP)	mole H^+	720
Photochemical ozone creation potential (POCP)	g ethene	2700
Eutrophication potential (EP)	g O_2	260 000
An explanation to these impact categories is found at the end of this EPD.		

The use phase

MEHEC is used in cement or gypsum based applications as tile adhesive and plaster. The cellulose ether (MEHEC) is added to a hydraulic formulation in an amount of 0,02-2,0% calculated on the total dry mix of mortar.
MEHEC is sold to customers all over the world and ends up in different building applications. The product is not considered to contribute to an increased environmental load during the use phase and it will eventually end up together with other construction waste, which some times is used to make up ground.

The environmental impact from the transport to customer is given for the transport of 1000 kg of MEHEC, 100 km for the means of transport in question. This makes it possible for customers to assess the environmental load derived from transportation of MEHEC. The actual means used depend on where the customer is situated

Environmental impact from transport to customer				
Impact	**Unit**	**Train[1]**	**Truck[2]**	**Ship[3]**
Crude oil	MJ	–	73	22
Hydro energy	MJ	23	–	–
CO_2	g	0,4	5200	1500
CO	g	0,01	5	0,9
HC	g	0,001	4	2
NOx	g	0,001	50	43
SO_2	g	0,0006	2,8	26
Particles	g	0,0001	0,9	2
All above means of transportation are used for transportation of MEHEC to customers. Sometimes all three are used.				

The means of transport are approximated with a train transport, a truck transport and a ship transport.
1. The train is a Swedish electric train.
2. The truck has a maximum weight of 40 ton, a Euro II engine and is using EC3-diesel. The loading factor is 70%.
3. The ship has a maximum weight of more than 8000 ton and a loading factor of 50-60%.

Information from the company and the accredited certification body

Contact person: Christer Bengtsson
Akzo Nobel Surface Chemistry AB, S-444 85, Stenungsund, Sweden.
Phone: +46-(0)303-85000. Fax: +46-(0)303-83921
http://www.bermocoll.com/

Information from the accredited certification body

This Environmental Product Declaration has been reviewed and approved by an accredited certification body - the Swedish National Testing and Research Institute (SP) - according to the Product-Specific Requirement, PSR 2000:5 for Chemical Products and the Swedish Environmental Council requirements for environmental product declarations, MSR 1999:2.
Valid until: June 30, 2005
Registration number: S-P-00029

SP, Box 857, S-501 15, Borås, Sweden
Phone: +46-(0)33-165000. Fax: +46-(0)33-135502

Other information

More information about environmental product declarations, the EPD system, can be found on the internet: http://www.environdec.com/

References:

- LCA documentation for MEHEC, 2002
- Product-Specific Requirements Chemical Products, (PSR 2000:5)
- Requirements for Environmental Product Declarations, EPD (MSR 1999:2) – an application of ISO TR 14025.

Glossary

Acidification potential, AP. Chemical alternation of the environment, resulting in hydrogen ions being produced more rapidly than they are dispersed or neutralised. Occurs mainly through fallout of sulphur and nitrogen compounds from combustion processes. Acidification can be harmful to terrestrial and aquatic life.

Eutrophication potential, EP. Enrichment of bodies of water by nitrates and phosphates from organic material or the surface runoff. This increases the growth of aquatic plants and can produce alga blooms that deoxygenate water and smother other aquatic life.

Global warming potential, GWP. The index used to translate the level of emissions of various gases into a common measure to compare their contributions to the absorption by the atmosphere of infrared radiation. GWPs are calculated as the absorption that would result from the emission of 1 kg of a gas to that from emission of 1 kg of carbon dioxide over 100 years.

Life Cycle Assessment, LCA. A management tool for appraising and quantifying the total environment impact of products or activities over their entire life cycle of particular materials, processes, products, technologies, services or activities.

Ozone depletion potential, ODP. The index used to translate the level of emissions of various substances into a common measure to compare their contributes to the breakdown of the ozone layer. ODPs are calculated as the change that would result from the emission of 1 kg of a substance to that from emission of 1 kg of CFC-11 (a freon)

Photochemical ozone creation potential, POCP. The index used to translate the level of emissions of various gases into a common measure to compare their contributions to the change of ground-level ozone concentration. POCPs are calculated as the change that would result from the emission of 1 kg of a gas to that from emission of 1 kg of ethene.