

IDENTIFICATION/CONTACT INFORMATION:

Owner of the EPD: EMC Development AB | Luleå, Sweden | NATO-NCAGE identifier: ayx0n ([here](#)) | SAM identifier D3M1SZMJFMJ7.

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Description of the organisation: Building materials manufacturer.

Product group classification: UN CPC 3744 (CPC, v.2.1, [here](#)).

INTRODUCTION:

■ **Energetically modified cements** (EMCs) are a class of cements made from pozzolans (e.g. fly ash, volcanic ash, pozzolana), silica sand, blast furnace slag, or Portland cement (or blends of these ingredients). The term "energetically modified" arises by virtue of the mechano-chemistry process applied to the raw material, more accurately classified as "high energy ball milling" (HEBM) that deliver high-impact kinetics to cause the required low-energy transformation in the material being processed. This causes, amongst others, a thermodynamic transformation in the material to increase its chemical reactivity. For EMCs, the HEBM process used is a unique form of specialised vibratory milling discovered in Sweden and applied only to cementitious materials. Despite its "high energy" label, HEBM is extremely effective in delivering its aims. It is tremendously energy efficient, so that processes can liberate significant energy savings.

By improving the reactivity of pozzolans, their strength-development rate is increased when cast into concrete mixes. This allows for compliance with modern product-performance requirements ("technical standards") for concretes and mortars. In turn, this allows for the replacement of Portland cement in the various mixes. This has a number of benefits to their long-term qualities. Finally, the enhanced reactivity delivered by EMC Volcanics means that for the first time, volcanic materials can be compared with GGBFS (a by-product of blast furnace steel production). All told, by way of example, 95% of the U.K.'s ready mix concrete market can now be fully served with concretes of such low embodied CO₂ that they will likely deliver 'Net Zero' across their full lifecycles (please see the section on "Carbonation" below).

PHYSICAL AND CHEMICAL:

In common across all candidate source material, the raw material here is loose and of minor agglomeration, of size 0-60mm (75% >1mm). Typical chemical composition is as follows (all values in %), to account for 100% across the permutations of stated tolerances:

◆ SiO ₂	74±1.0
◆ Al ₂ O ₃	13±0.5
◆ Fe ₂ O ₃	1±0.2
◆ MgO	0.3±0.1
◆ CaO	1±0.2
◆ Na ₂ O	3.5±0.3
◆ K ₂ O	4±0.3
◆ SO ₃	<0.05
◆ Loss of Ignition	3±0.5



■ **Detail:** Loose Aegean raw material.

Fully-processed EMC Volcanics.

The EMC process does not cause any chemical reaction. Hence, raw material's nascent chemical-composition remains unchanged.

All materials are tested according to specifications to meet the needs of the user base. This will engage an ongoing testing process carried out to E.U. and U.S. Standards – both internally in our own labs and also externally in qualified third-party material-testing labs.

TOXICITY:

All products will comply with REACH Regulation (EC) No 1907/2006, i.e., the Registration, Evaluation, Authorization and Restriction of Chemicals. Products will not contain any Substances of Very High Concern (SVHC) listed on the current candidate list. More information about safety handling is set out in our illustrative Safety Data Sheet (SDS), available separately. Typical values comprise:

- ◆ Respirable crystalline quartz content: 0.70% max (average <0.1%);
- ◆ Feldspars: 1.30% max;
- ◆ Mica: 0.00%

**DETAIL:****MATERIAL SAFETY DATA SHEET: EMC VOLCANICS**

1 Product Information			
Generic Name:	Natural pozzolan of volcanic source.		
Formula:	Blend of silicates, iron oxides and aluminium oxides bound into silicates		
Chemical Name:	Predominantly aluminosilicate with other oxides (U.S. ASTM C618 compliant)		
Primary Material Use:	Supplementary cementitious material		
2 Composition			
INGREDIENT NAME	CAS NUMBER	%	Exposure Limit (WEL)
Aluminosilicate	1327-36-2	99	* 1 mg/m ³
Quartz	14808-60-7	< 1.0%	* 1 mg/m ³
Crystalline Quartz	14808-60-7	< 0.1%	US: 0.025 mg/m ³ EU: 0.1 mg/m ³
3 Hazards and Identification			
Appearance:	Gray granules, odourless.		
Potential Health Effects:	See section 11 Toxicological information.		
Primary Entry Routes:	See below.		
Eyes:	Temporary irritation or inflammation.		
Skin:	May cause dryness with continued exposure.		
Ingestion:	Not considered harmful in small amounts, but mouth, throat etc. irritation may occur.		
Chronic Health Effects:	This product contains crystalline silica (CS) <0.1% in respirable dust, which is classified as a hazard by inhalation. Long term inhalation of respirable CS dusts in excess of the respective workplace exposure limit (WEL) over a prolonged period may cause a non-cancerous lung disease (Silicosis). In addition, the inhalation of respirable CS has been classified by U.S. National Toxicology Program as a carcinogen and as a Group 1 carcinogen by IARC (sufficient evidence of carcinogenicity in humans), meaning sufficient exposure over prolonged periods may have a carcinogenic effect.		
Conditions aggravated by pre-existing conditions:	Upper respiratory/lung conditions such as bronchitis, emphysema and exposure asthma.		
4 First Aid Measures			
Eyes:	Do not rub eyes. Flush eyes with copious amounts of water to remove any dust particles. Consult a medical doctor if irritation persists.		
Inhalation:	Remove from dusty area; drink water to clear throat; blow nose to evacuate dust.		
Skin Contact:	Use moisturizing lotions if dryness occurs.		
Skin Absorption:	—		
Ingestion:	Drink copious amounts of water to reduce bulk and dryness effects.		

* I.e., the level of dust per a standard good workplace practice.



MATERIAL SAFETY DATA SHEET: EMC VOLCANICS

5 Fire Hazard and Fire Fighting Measures

Flash Point (Method):	Non-flammable mineral
Flammable or Combustible:	–
Liquid Classification:	–
Extinguishing Media:	–
Auto-Ignition Temperature:	–
Fire or Explosion Hazards:	None
Special Fire Fighting Methods:	None

6 Accidental Release Measures

Personal Precautions:	Use proper PPE (See section 8)
Environmental Precautions:	No significant environmental impact
Containment and Cleanup:	Clean up material with vacuum equipped with HEPA filter. Use water as dust suppressant if necessary.

7 Handling and Storage

Handling:	Minimize dust generation and accumulation. Avoid contact with eyes. Avoid breathing dust. Repair or dispose of broken bags immediately.
Storage:	Keep away from hydrofluoric acid. Keep dry, and generally away from odours.

8 Exposure Control and PPE

Goggles:	The use safety eyewear to protect from dusts is recommended.
Gloves:	May use gloves to protect sensitive skin.
Respirator:	<ul style="list-style-type: none"> ◆ Aim to keep exposure to respirable dust < 1 mg/m³ as the workplace exposure limit (WEL). ◆ This product contains crystalline silica (CS) <0.1% in respirable dust and therefore keeping dust limit generally to the WEL should keep exposure to CS which is significantly below all current global standards. ◆ Use CE or NIOSH approved respirators to protect against CS.

For dust concentrations:

<10x WEL	Use an N95 (ASTM 2100) / FFP2 (EN 149:2001+A1:2009) quarter or half mask respirator.
<50x WEL	Use a full face respirator equipped with N95/FFP2 filters.
<200x WEL	Use a powered air purifying respirator (positive pressure) with N95/FFP2 filters.
>200x WEL	Use a Type C supplied air respirator (continuous flow, positive pressure source of respirable breathing air, a hose, a detachable coupling, a control valve, orifice, a demand valve or pressure demand valve, and arrangement for attaching the hose to the wearer), with a full face piece (in EU, see EN 529:2005).

Ventilation:	Exhaust ventilation and/or dust collection to keep dust levels below WEL 1 mg/m ³
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**MATERIAL SAFETY DATA SHEET: EMC VOLCANICS****9 Physical and Chemical Properties**

Appearance and Odour:	Gray granules, odourless		
Boiling Point:	–	Evaporation Rate:	–
Vapour Pressure:	–	Specific Gravity (water = 1):	1.8 – 2.0
Water Solubility (%):	Negligible	Melting Point °F/°C:	1800/980
Vapor Density (Air=1):	–	% Volatile by Volume:	NONE
pH (10% Solution):	6.5 – 7.5		

10 Stability and Reactivity

Stability and Polymerisation:	An inorganic stable mineral. Hazardous polymerization cannot occur.
Physical Hazards:	Material is not reactive
Conditions to Avoid:	None in prescribed use.
Incompatibilities:	Hydrofluoric Acid (HF).
Hazardous Decomposition Products:	None

11 Toxicological Information (Summary form — See also Section 3.)

- ◆ This product contains crystalline silica (CS) <0.1% in respirable dust, which is classified as a hazard by inhalation.
- ◆ Long term inhalation of respirable crystalline silica dusts in excess of the WEL, over a prolonged period may cause a non-cancerous lung disease (silicosis).
- ◆ Inhalation of respirable crystalline silica has been classified as carcinogenic (Group1) by IARC, a unit of the WHO (World Health Organization).

12 Ecological

Considered inert in the environment as manufactured. Will not biodegrade, bioaccumulation unlikely.

13 Waste Disposal

Material is non-hazardous. Dispose of in accordance with applicable, Federal, State and Local laws and regulations.

14 Transportation

- ◆ The material is not classified as a dangerous substance and no restrictions apply for land/sea/air (for example, ADR/RID, IMDG, IATA).
- ◆ No special precautions are needed apart from those mentioned under Section 8.

UN number:	Not relevant
UN proper shipping name:	Not relevant
Transport hazard class(es):	No transport warning sign required
Packing group:	No information required.
Environmental hazards:	Not relevant
Special precautions for user:	No information required.
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:	No information required

**MATERIAL SAFETY DATA SHEET: EMC VOLCANICS****15 Regulatory Information** (According to various example legal systems)

The following is an indicative guide only. Please check local law health, safety and environmental regulations and legislation specifically.

Statutory Instruments (UK):	See for example, The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (S.I 2009 No. 716).
Approved Code Of Practice:	Classification and Labelling of Substances and Preparations Dangerous for Supply. Safety Data Sheets for Substances and Preparations per CLP Regulation (CE) 1272/2008.
Guidance Notes:	See for example, Workplace Exposure Limits EH40 per Control of Substances Hazardous to Health Regulations 2002 (UK).
EU Legislation:	Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures (the CLP Regulation) Regulation EU No 453/2010.

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