

ARC INNOVATIONS



**ECOSHOTCRETE
MINING SYSTEM**

Ec0shotcrete Mining



Description

Ec0Shot is a factory blended material designed to be a primary activator for the Ec0Shotcrete mining system.

The Ec0Shotcrete mining system is used as secondary support on rock faces and primary support on embankments that resists up to from 200J to 1100J of energy and gains strength when placed. Ec0Shot has an inherent energy absorption capability and is used mainly for the secondary support of underground shafts and rock faces.

Ecofill is pumped underground from silo.



30kg Ec0Shot bags are transported underground in 1 ton bags via the cage



Material handled underground can decrease by approximately 75% resulting in substantial savings on :
-electricity
-labour
-underground transport
-underground storage
-cage time

Reduced product being transported underground via cage



Mixing area



UNDERGROUND MINING AREA



Ec0shotcrete is sprayed to reinforce temporary and permanent excavations.

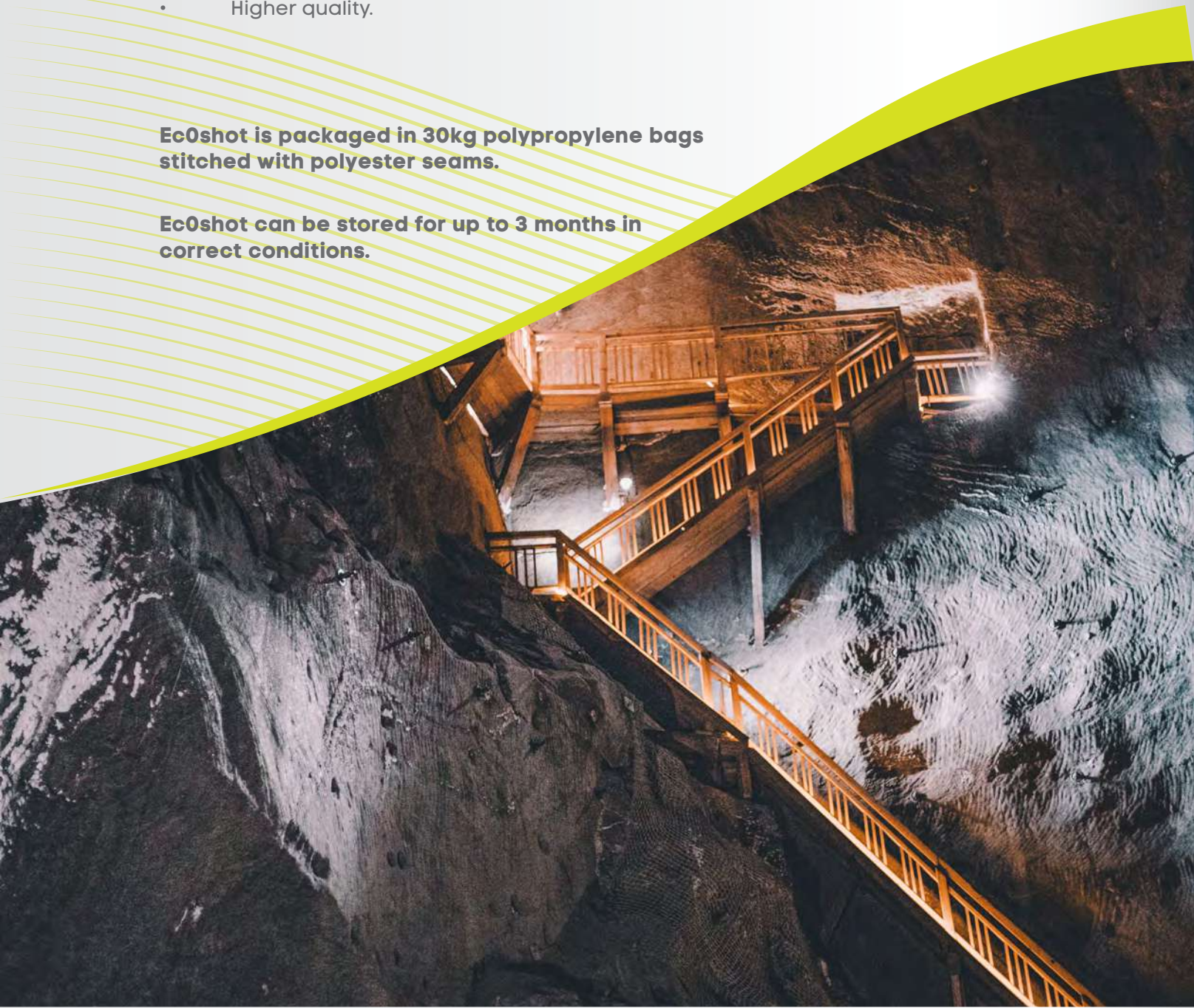


Further benefits are:

- Ability to set and strengthen in low waterflow.
- Good early strengths when combined with conventional shotcrete accelerators based on Aluminium Sulphate.
- No shrinkage when used in its designed application.
- Low rebound when applied with an air pressure exceeding 2.5 bar.
- Zero rebound when used in conjunction with the Ec0shotcrete system.
- Increased durability.
- Improved sustainability.
- Higher quality.

Ec0shot is packaged in 30kg polypropylene bags stitched with polyester seams.

Ec0shot can be stored for up to 3 months in correct conditions.





Ec0fill

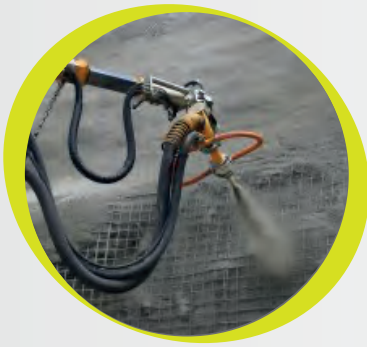
(Refer to MSDS and TDS)

Ec0fill is used as a concrete within the construction and mining

The key benefits of Ec0fill are:

- It develops higher compressive and flexural strengths than ordinary concrete.
- It makes denser and more durable concrete.
- It has superior chemical resistance, e.g. to sulphates and chloride attack and thus is vital in applications like chemical plants and marine structures.
- It lowers hydration temperatures, reducing inner stresses and cracking in massive concrete structures.
- It improves the workability/placeability of a mix, making it flow better and ensuring a greater impermeability and density.
- Concrete and backfill produced with Ec0fill is more economical.
- Reduction of pump-line pressures.
- Quicker mixing per batch.
- Reduced production times.
- Removal of toxic pollutants.
- Removal of chemical burns within cementitious systems.
- Ec0fill is delivered inw bulk tankers and pumped directly into silos.
- Ec0fill in silos can be stored for up to 3 months in correct conditions.

Ec0shot



Description

Ec0Shot is a factory blended material designed to be a primary activator for the Ec0Shotcrete system. The Ec0Shotcrete system is used as secondary support on rock faces and primary support on embankments that resists up to from 200J to 1100J of energy and gains strength when placed.



Typical Uses :

Ec0Shot has an inherent energy absorption capability and is used mainly for the secondary support of underground shafts and rock faces.

Further benefits are:

- Ability to set and strengthen in low waterflow.
- Good early strengths when combined with conventional shotcrete accelerators based on Aluminium Sulphate.
- No shrinkage when used in its designed application.
- Low rebound when applied with an air pressure exceeding 2.5 bar.
- Zero rebound when used in conjunction with the Ec0shotcrete system.



Special Features :

Ec0Shot has a zero to low rebound within when compared to conventional shotcrete materials.



Limitations :

Ec0Shot should be applied at an air pressure of 3 – 5 bar.



Physical Properties :

pH	12.0	>10
Specific Gravity	2930kg/ ³	>2050
Colour	Grey	
Strength (MPa)	35 @ 7 days	>30
Strength (MPa)	60 @ 28 days	>55
Energy Absorption (J)	200 - 1100	

*Please read MSDS in conjunction with the TDS.



Packaging :

30kg bags.



Storage :

Keep in cool containers off the ground.



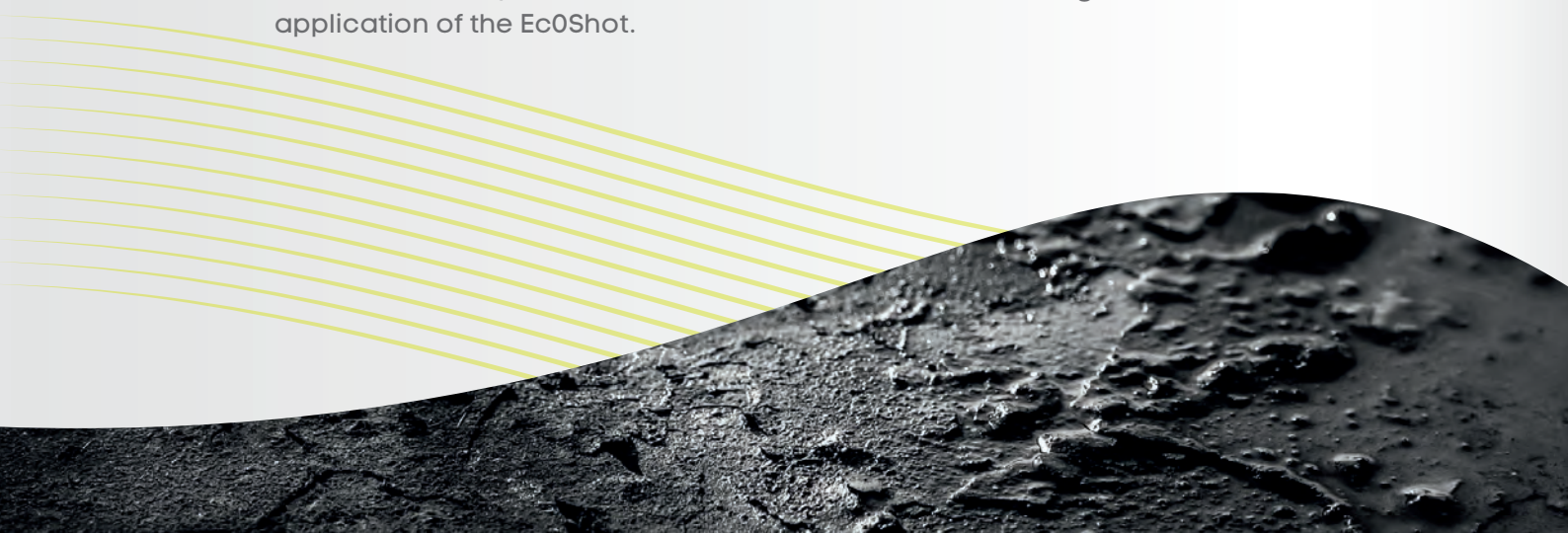
Shelf Life :

6 months correctly stored.



Technical Advice :

The technical department is available to assist with mix designs and advice on the correct application of the Ec0Shot.



Material Data Safety Sheet

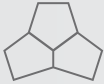


1. Company Details

Name: ARC Innovations (PTY)LTD

Address: 82 Bonnyvale road, Norton Home Estates Benoni, 1501

In case of an emergency contact either Cyril Attwell (0784563833) or Hassim Osman (0827864003)



2. Composition

Product name : Ec0shot

CAS no : 65997-16-2

E.C no : 266-045-5

E.C label : 1272/2008

EU no. : 67/548/EEC



3. Hazardous Identification

Ec0shot poses little immediate risk.

However, prolonged exposure to wet Ec0shot can cause caustic burns or allergic reactions.

Inhalation : Ec0shot contains small amounts of free crystalline silica. Prolonged exposure to respirable free crystalline silica can aggravate other lung conditions and cause silicosis, a disabling and potentially fatal lung disease and/or other diseases. Risk of injury or disease depends on duration and degree of exposure.

Skin : Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly contact with wet Ec0shot. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Exposure to dry Ec0shot may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Dry Ec0shot contacting wet skin or exposure to moist or wet Ec0shot may cause more severe skin effects including thickening, cracking or fissuring of the skin.

Prolonged exposure can cause severe skin damage in the form of (caustic) chemical burns. Some individuals may exhibit an allergic response (e.g., allergic contact dermatitis) upon exposure to Ec0shot.

The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with the product. Other persons may experience this effect after years of contact with Ec0shot products.

Eyes : Exposure to airborne dust may cause immediate or delayed irritation or inflammation.

Eye contact with larger amounts of dry powder or splashes of these wet materials may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposures require immediate first aid (See section 4.) and medical attention to prevent significant damage to the eye.

Ingestion : Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. Ec0shot should not be eaten.

Carcinogenic potential : NTP, OSHA, or IARC has not listed Ec0shot as a carcinogen. It may, however, contain trace amounts of substances listed as carcinogens by these organizations. Crystalline silica, which is present in Ec0shot in small amounts, has been listed by IARC and NTP as a known human carcinogen (Group I) through inhalation.



4. First Aid Measures

First Aid Inhaled : Move to fresh air in discomfort

First Aid Skin : Wash off with water and pH-neutral soap or mild detergent.

Remove clothing.
Shower thoroughly.

First Aid Eyes : Flush eyes with water for at least 20 minutes
Seek medical advice if symptoms persist
Speed is essential

First Aid Ingested : Wash mouth with plenty of water.
Do not induce vomiting
Contact a medical practitioner



5. Fire Fighting Measures

Flash point : None

Lower explosive limit : None

Upper explosive limit : None

Extinguishing media : Not combustible

Auto ignition : Not combustible

No special fire-fighting procedures are required as Ec0shot poses no fire-related hazard.



6. Accidental Release Measures

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment as described in Section 8. Scrape up wet material and place in an appropriate container. Allow the material to “dry” before disposal. Do not attempt to wash Ec0shot down drains.

Dispose of waste material according to local, state, and federal regulations.



7. Handling and storage

Keep Ec0shot dry until used. Normal temperatures and pressures do not affect the material. Promptly remove dusty clothing or clothing that is wet with Ec0shot fluids, and launder before reuse. Wash thoroughly after exposure to dust, wet Ec0shot mixtures or fluids.



8. Exposure Controls/Personal Protection

Inhalation : Wear dust mask (never inhale any dust or fumes from any chemical)

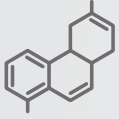
Skin : Prevention is essential to avoid potentially severe skin injury. Avoid contact with unhardened wet Ec0shot products. If contact occurs, promptly wash affected area with soap and water.

Where prolonged exposure to unhardened Ec0shot products might occur, wear impervious clothing and gloves to prevent skin contact. Where required, wear sturdy boots that are impervious to water to eliminate foot and ankle exposure. Do not rely on barrier creams; barrier creams should not be used in place of impervious gloves and clothing.

Periodically wash areas contacted by dry or wet Ec0shot or concrete containing Ec0shot with a pH-neutral soap. Wash again at the end of the work. If irritation occurs, immediately wash the affected area and seek treatment. If clothing becomes saturated with wet concrete containing Ec0shot, it should be removed and replaced with clean, dry clothing.

Eyes : In conditions where user may be exposed to splashes or puffs of Ec0shot wear safety glasses with side shields or goggles. In extremely or unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with Ec0shot.

Ingestion : Observe the rules of hygiene, wash hands before eating, drinking or smoking.



9. Physical & Chemical Properties

Chemical class : Commercial

Description : White-gray sand-like powder

Odor : No distinct odor

pH (in water) : 10 to 12

Solubility in water : Marginal (0.1 to 1.0%)

Flashpoint : Not Applicable

Melting Point : 1300 to 1350 °C

Specific Gravity : 2.8 to 3.0



10. Stability and Reactivity

Stability : Stable.

Incompatibility : Wet Ec0shot is alkaline when wet, as such it is incompatible with acids and aluminium metal.

Conditions to avoid : Unintentional contact with water or acids.

Hazardous Decomposition : Will not occur spontaneously.

Hazardous polymerization : Will not occur.



11. Toxicological Information

The substance is not classified as dangerous in the sense of European Directive 67/548/EEC on Dangerous Substances and Regulation 1272/2008/EC on CLP.

Effects on human health: Slightly alkaline substance. Risk of irritant dust formation.

Skin contact: Acute effects: Risk of irritation in case of prolonged contact with the skin. Must wear clothes suitable for dealing with alkaline products. Must wear gloves suitable for dealing with alkaline products.

Eye contact: Acute effects: Risk of irritation and/or burns. Must wear safety goggles.

Swallowed: Risk of irritation, burning sensation, abdominal pain.

Inhalation: Acute effects - in case of dust inhalation, risk of irritation of respiratory tract, burning sensation, cough, sore throat, breathlessness.

Aggravation of pre-existing illnesses due to exposure : Exposure to slag dust may aggravate the symptoms of pre-existing illnesses, such as respiratory pathologies, emphysema, asthma, eye pathologies and skin pathologies.



12. Ecological Information

The substance is not classified as dangerous in the sense of European Directive 67/548/EEC on Dangerous Substances and Regulation 1272/2008/EC on CLP.

No negative ecological effects are expected based on current knowledge. Naturally and environmentally harmlessly, granulated blast furnace slag produces an inhibitory effect on germination in the areas where it is applied. This must be taken into account in areas where natural flora and fauna are protected.

Risk of environmental pH modification (pH>7). When used in stagnant or slow flow water, it is recommended that water be oxygenated, and speed of work execution be adapted so that water pH does not adversely affect fauna and flora.



13. Disposal Considerations

Ec0shot must always be reused except in case of mixing or contamination from other substances or mixtures preventing reuse.

If disposal is required when reuse is not possible, the substance must be disposed of according to the current laws. From a safety perspective, long periods of storage do not alter the product characteristics.

Do not discharge into sewers or surface waters.

Hardened Ec0shot is a non-hazardous waste according to Decision 118/2001/EC modifying Decision 253/2000/EC relating to the list of wastes.



14. Transport Information

Ec0shot is not considered as hazardous according to the following transport regulations:

- ADR/RID/CDG Road / CDG Rail.
- Inland waterway transport (ADN/ADNR)
- Sea transport (IMO/ IMDG)
- Air transport (ICAO/IATA)

No special precautions are required except for those mentioned in section 8.



15. Regulatory Information

E.C. no. : 266-045-5

R36/38 : Irritating to skin and eyes.

S24/25 : Avoid contact with the skin and eyes

S29 : Do not empty into drains

S57 : Use appropriate containment to avoid environmental contamination



16. Other Information:

Reason for Alteration:

New Issue -

Ec0shot should only be used by knowledgeable persons. While the information provided in the material safety data sheet is believed to provide a useful summary of the hazards of Ec0shot as it is commonly used, the sheet cannot anticipate and provide all the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product. A key to using the product safely requires the user to recognize that Ec0shot chemically reacts with water, and that some of the intermediate products of this reaction (that is, those present while a Ec0shot product is "setting") pose a more severe hazard than does Ec0shot itself. These hazards include potential injuries to eyes and skin.

The data furnished in this sheet do not address hazards that may be posed by other materials mixed with Ec0shot to produce Ec0shot products. Users should review other relevant material safety data sheets before working with this Ec0shot or with Ec0shot products, including, for example, concrete containing Ec0shot.

ACTIVATED GROUND GRANULATED BLAST FURNACES LAG



Description

Activated ground granulated blastfurnace slag (AGGBS) is a chemical enriched cementitious material that is a low carbon alternative with a 90% reduction in carbon footprint compared to standard Portland cement.

AGGBS is a factory blend of ground granulated blast-furnaces lag with chemical add mixtures to promote flow and finishability.



Typical Uses :

AGGBS is used for 60 to 95% replacement of portland cement with significant benefits:

- Long term strength development.
- Excellent chloride and sulphate resistance.
- Lower pH than portland cement.
- Lower heat of hydration.



Special Features :

AAGBS used inconstituted mix designs exhibit:

- Exceptional resistance to chemical attack from sulphate in ground water.
- Exceptional low carbon footprint.
- Resistance to oil and grease absorption.



Limitations :

AGGBS is not suitable for 100% replacement of portland cement without further adaption with chemical additives.

Request ARC Innovations personnel for assistance if replacement of Portland cement requirement is 75–100%.



Physical Properties :

Fineness (Blaine)	3875	>2750
Soundness	0.0	<10.0
Glass Content	>90	
Specific Gravity	2880kg/m ³	
Bulk Density	1350kg/m ³	>1100kg/m ³
Colour	Off-white	



Packaging :

30t bulk.



Storage :

As for cementitious binder keep dry in closed containers.



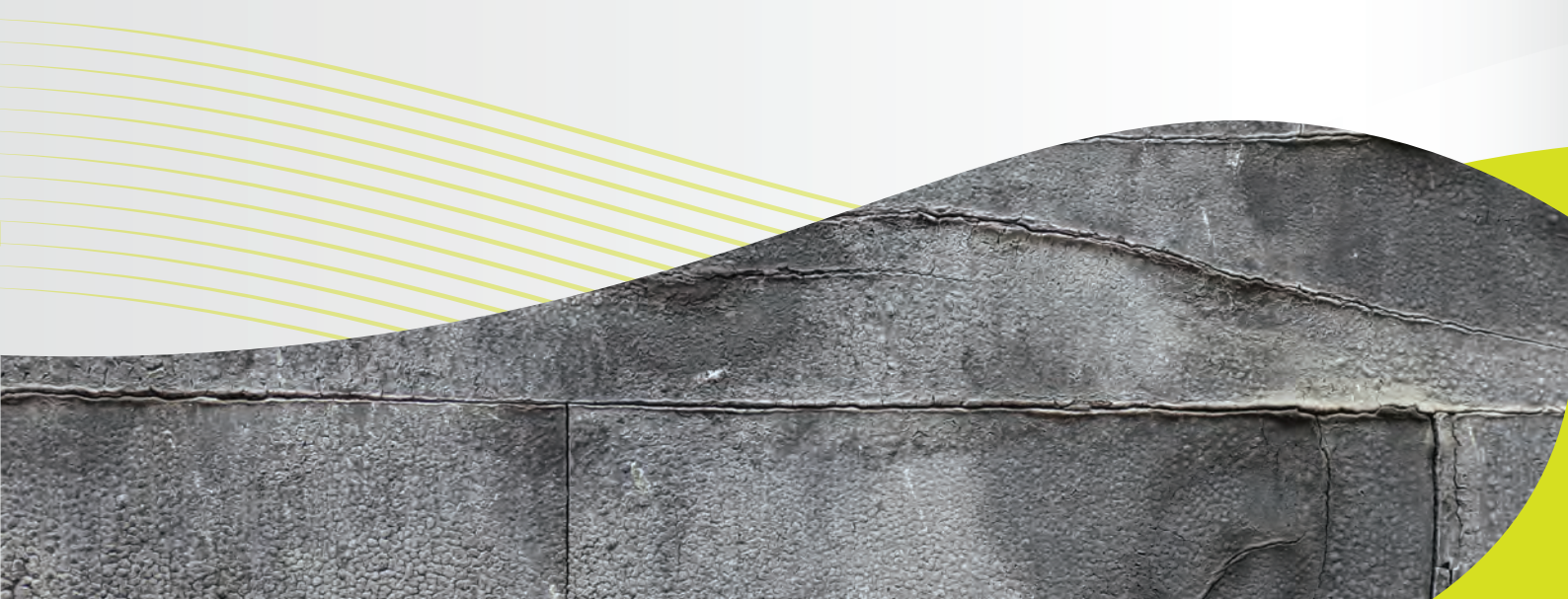
Shelf Life :

6 months correctly stored.



Technical Advice :

The technical department is available to assist with mix designs and advice on the correct application of the AGGBS.



Material Safety Data Sheet

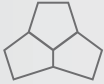


1. Company Details

Name: ARC Innovations (PTY)LTD

Address: 82 Bonnyvale road, Norton Home Estates Benoni, 1501

In case of an emergency contact either Cyril Attwell (0784563833) or Hassim Osman (0827864003)



2. Composition

Product name : Activated Ground Granulated Blast Furnace Slag, (AGGBS)

CAS no : 65996-69-2

E.C no : 266-002-0

E.C label : 1272/2008

EU no. : 67/548/EEC



3. Hazardous Identification

AGGBS poses little immediate risk. However, prolonged exposure to wet AGGBS can cause caustic burns or allergic reactions.

Inhalation : AGGBS contains small amounts of free crystalline silica. Prolonged exposure to respirable free crystalline silica can aggravate other lung conditions and cause silicosis, a disabling and potentially fatal lung disease and/or other diseases. Risk of injury or disease depends on duration and degree of exposure.

Skin : Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly contact with wet AGGBS. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Exposure to dry AGGBS may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Dry AGGBS contacting wet skin or exposure to moist or wet AGGBS may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (caustic) chemical burns.

Some individuals may exhibit an allergic response (e.g., allergic contact dermatitis) upon exposure to AGGBS. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with the product. Other persons may experience this effect after years of contact with AGGBS products.

Eyes : Exposure to airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with larger amounts of dry powder or splashes of these wet materials may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposure require immediate first aid (See section 4.) and medical attention to prevent significant damage to the eye.

Ingestion : Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. AGGBS should not be eaten.

Carcinogenic potential : NTP, OSHA, or IARC has not listed GGBS as a carcinogen. It may, however, contain trace amounts of substances listed as carcinogens by these organizations. Crystalline silica, which is present in AGGBS in small amounts, has been listed by IARC and NTP as a known human carcinogen (Group I) through inhalation.



4. First Aid Measures

First Aid Inhaled : Move to fresh air in discomfort

First Aid Skin : Wash off with water and pH-neutral soap or mild detergent.

Remove clothing.

Shower thoroughly.

First Aid Eyes : Flush eyes with water for at least 20 minutes

Seek medical advice if symptoms persist

Speed is essential

First Aid Ingested : Wash mouth with plenty of water.

Do not induce vomiting

Contact a medical practitioner



5. Fire Fighting Measures

Flash point : None

Lower explosive limit : None

Upper explosive limit : None

Extinguishing media : Not combustible

Auto ignition : Not combustible. No special fire-fighting procedures are required as Ec0fill poses no fire-related hazard.



6. Accidental Release Measures

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment as described in Section 8. Scrape up wet material and place in an appropriate container. Allow the material to “dry” before disposal. Do not attempt to wash Ec0fill down drains. Dispose of waste material according to local, state, and federal regulations.

7. Handling and storage



Keep AGGBS dry until used. Normal temperatures and pressures do not affect the material. Promptly remove dusty clothing or clothing that is wet with Ec0fill fluids, and launder before reuse. Wash thoroughly after exposure to dust, wet Ec0fill mixtures or fluids.



8. Exposure Controls/Personal Protection

Inhalation : Wear dust mask (never inhale any dust or fumes from any chemical)

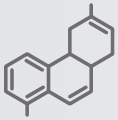
Skin : Prevention is essential to avoid potentially severe skin injury. Avoid contact with unhardened wet AGGBS products. If contact occurs, promptly wash affected area with soap and water.

Where prolonged exposure to unhardened AGGBS products might occur, wear impervious clothing and gloves to prevent skin contact. Where required, wear sturdy boots that are impervious to water to eliminate foot and ankle exposure. Do not rely on barrier creams; barrier creams should not be used in place of impervious gloves and clothing.

Periodically wash areas contacted by dry or wet Ec0fill or concrete containing Ec0fill with a pH-neutral soap. Wash again at the end of the work. If irritation occurs, immediately wash the affected area and seek treatment. If clothing becomes saturated with wet concrete containing AGGBS, it should be removed and replaced with clean, dry clothing.

Eyes : In conditions where user may be exposed to splashes or puffs of AGGBS wear safety glasses with side shields or goggles. In extremely or unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with AGGBS.

Ingestion : Observe the rules of hygiene, wash hands before eating, drinking or smoking.



9. Physical & Chemical Properties

Chemical class : Commercial

Description : White-gray sand-like powder

Odor : No distinct odor

pH (in water) : 10.5 to 11

Solubility in water : Marginal (0.1 to 1.0%)

Flashpoint : Not Applicable

Melting Point : 1300 to 1350°C

Specific Gravity : 2.8 to 3.0



10. Stability and Reactivity

Stability : Stable.

Incompatibility : Wet AGGBS is alkaline when wet, as such it is incompatible with acids and aluminium metal.

Conditions to avoid : Unintentional contact with water or acids.

Hazardous Decomposition : Will not occur spontaneously.

Hazardous polymerization : Will not occur.



11. Toxicological Information

The substance is not classified as dangerous in the sense of European Directive 67/548/EEC on Dangerous Substances and Regulation 1272/2008/EC on CLP.

Effects on human health: Slightly alkaline substance. Risk of irritant dust formation.

Skin contact: Acute effects: Risk of irritation in case of prolonged contact with the skin. Must wear clothes suitable for dealing with alkaline products. Must wear gloves suitable for dealing with alkaline products.

Eye contact: Acute effects: Risk of irritation and/or burns. Must wear safety goggles.

Swallowed: Risk of irritation, burning sensation, abdominal pain.

Inhalation: Acute effects - in case of dust inhalation, risk of irritation of respiratory tract, burning sensation, cough, sore throat, breathlessness.

Aggravation of pre-existing illnesses due to exposure : Exposure to slag dust may aggravate the symptoms of pre-existing illnesses, such as respiratory pathologies, emphysema, asthma, eye pathologies and skin pathologies.



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No negative ecological effects are expected based on current knowledge. Naturally and environmentally harmlessly, granulated blast furnace slag produces an inhibitory effect on germination in the areas where it is applied. This must be taken into account in areas where natural flora and fauna are protected.

Risk of environmental pH modification (pH>7). When used in stagnant or slow flow water, it is recommended that water be oxygenated, and speed of work execution be adapted so that water pH does not adversely affect fauna and flora.



13. Disposal Considerations

AGGBS must always be reused except in case of mixing or contamination from other substances or mixtures preventing reuse.

If disposal is required when reuse is not possible, the substance must be disposed of according to the current laws. From a safety perspective, long periods of storage do not alter the product characteristics.

Do not discharge into sewers or surface waters.

Hardened Ec0fill is a non-hazardous waste according to Decision 118/2001/EC modifying Decision 253/2000/EC relating to the list of wastes.



14. Transport Information

Ec0fill is not considered as hazardous according to the following transport regulations:

- ADR/RID/CDG Road / CDG Rail.
- Inland waterway transport (ADN/ADNR)
- Sea transport (IMO/ IMDG)
- Air transport (ICAO/IATA)

No special precautions are required except for those mentioned in section 8.



15. Regulatory Information:

E.C. no. : 266-022-0

R36/38 : Irritating to skin and eyes.

S24/25 : Avoid contact with the skin and eyes

S29 : Do not empty into drains

S57 : Use appropriate containment to avoid environmental contamination



16. Other Information

Reason for Alteration:

New Issue -

AGGBS should only be used by knowledgeable persons. While the information provided in the material safety data sheet is believed to provide a useful summary of the hazards of Ec0fill as it is commonly used, the sheet cannot anticipate and provide all the information that might be needed in every situation.

Inexperienced product users should obtain proper training before using this product.

A key to using the product safely requires the user to recognize that AGGBS chemically reacts with water, and that some of the intermediate products of this reaction (that is, those present while a AGGBS product is "setting") pose a more severe hazard than does Ec0fill itself. These hazards include potential injuries to eyes and skin.

The data furnished in this sheet do not address hazards that may be posed by other materials mixed with AGGBS to produce Ec0fill products. Users should review other relevant material safety data sheets before working with this AGGBS or with Ec0fill products, including, for example, concrete containing AGGBS.



CONTACT DETAILS

CONTACT NUMBER(S)

Cyril Attwell (0784563833) / Hassim Osman (0827864003)

ADDRESS

82 Bonnyvale road, Norton Home Estates Benoni, 1501

WEBSITE

<https://www.arcinnovations.co.za>