



**ALTECRETE™**

**ALTESPRAY  
PROCEDUR  
STANDAR**

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## 1. Purpose

The purpose of this procedure is to provide a safe system for the manufacturing, batching and the quality of the application of Altespray.

## 2. Scope

This procedure is applicable to Kamoā Copper operations for the purpose of preventing fall of ground related incidents. The implementation and induction of all our staff members regarding safe work methods and procedures discussed will be the responsibility of the line management and assisted by senior site staff in conjunction with the training department.

Additional training needs will be addressed and attended to when identified to ensure that the required level of competence is maintained.

The Altespray product has been extensively tested to establish the product's mechanical properties such as: tensile strength, flexural strength, bond strength and material shear strength. It was developed with a high bonding characteristic and has a strong flexible component; when applied to blasted or geological disturbed rock mass it enhances the integrity of the fractured rock binding blasting fractures within the strata and seals the rock face to minimise moisture and oxidation that causes weathering in weak rock types or geological disturbed zones underground.

### 3. Definitions

#### 3.1 Terms

Term	Defination
Risk	A probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities and that may be avoided through pre-emptive action.
Hazard	Any object, situation, or behaviour that has the potential to cause injury, ill health, or damage to property.
Approved	Approved by the Engineer in writing
Batch	A collection of units of product made from the same consignment of materials from which a sample is to be drawn and inspected and tested to determine conformance with this specification.
Engineer	The Consulting Engineer, Consulting Mechanical and Electrical Engineer or the appointed representative.
ph Value	The logarithmic index giving a measure of the alkalinity or acidity of a solution
Altespray	Hybrid TSL shotcrete mix with high tensile strength, flexural strength and bond strength

#### 3.2 Abbreviations

Abbreviation	Definition
P.T.O	Planned task observation
OEM	Original Equipment Manufacturer
P.P.E	Personal protective equipment

## 4. Roles and Responsibilities

Task	Responsible Person					
	Designation	Designation	Designation	Designation	Designation	Designation
Revision						
Training						
Implementation						
Supervision						
Assessment						
Edit here...						

## 5. Requirements

### 5.1 Safety Requirements

The work must be performed under the general supervision of a person who is trained to understand the hazards associated with the work/activity and who has the authority to ensure that the precautionary measures laid down by the responsible Manager are implemented.

Hazard	Risk	Control
Application of Altespray in an unsupported area, which has not been declared safe.	Unsupported rock mass falling onto employees	Entry examination and safe declaration. Support installed to standard.
Pump assembly not done correctly.	Loss of equipment and production. Injury to person.	Assembly as per specification
Incorrect loading of material / failure of lifting equipment.	Loss of equipment and production.	Mine standards
Inadequate air and water pressure to operate the pump	Inadequate application / thickness. Loss of production Inadequate support that could cause fall of ground. Injury to person.	Engineering check controls / valves. Daily pre-use checklist
Improper cleaning of equipment	Loss of equipment and production.	Operating specifications
Incompetent operator / team members	Loss of equipment and production. Inadequate support that could cause fall of ground. Injury to person.	Operating specifications Daily pre-use checklist. Onsite training PTO by competent person.

## 5.2 Health Requirements

The crew must wear prescribed P.P.E, long-sleeved overalls, underground boots, hard hat, gloves, safety goggles and ear plugs. Kuwa Salama Rules from 1 to 10 must be adhered to.

## 5.3 Environmental Requirements

The site must be prepared in the means of hydroblasting to ensure that loose rock, and materials will be removed before spraying commences.

The site must be well ventilated according to the mine standard.

## 5.4 Emergency Response Requirements

If at any time a working place becomes unsafe during the shift, which all employees affected, other than those examining and making safe, are removed from such unsafe area and are not permitted to return until declared safe.

## 6. Standard

### 6.1 Standard Details

It is the responsibility of each crew to ensure their equipment is correctly cleaned and stored in a safe place.

The Operator must complete the machine checklist before and after the application in accordance with the OEM operation manual. The Miner of the specific section is responsible for entry examination and declaring safe for the crew.

The daily operational checklist will be filled in and submitted to the supervisor at the end of each shift.

### 6.2 Equipment and Materials required:

1. Altespray (ready mix bulk bags)
2. Altecrete Activator
3. Altetard (12 litres per Agi mixer car to be kept incase of unforeseen delays)
4. Waterflow meter
5. Agi truck
6. Spray mech equipment
7. PPE (gloves, goggles, masks)
8. Measuring tools (for accurate mixing ratios (flow meters & probe units)
9. Cleaning supplies (for equipment and spills)



**1. 1000Kg Altespray**



**2. 1000l flow bin of Altecrete Activator**



**3. Waterflow meter**



**4. Agi mixer car to mix Altespray**





#### 5. Normet Spraymec to apply Altespray



#### 6. 1000l Alte-tard flow bin (if extended open time beyond 5 hours is required)



### 6.3 Storage and transportation

Altespray bulk bags: Store in cool, dry place. Covered with a tarpaulin out of direct sunlight for maximum outdoor exposure .

Altecrete Activator: Keep container tightly closed in a dry and well-ventilated place. Containers which are open must be carefully re-sealed and kept upright to prevent leakage. Store in accordance with local regulations. Refer to MSDS provided .

Altetard: Keep in dry and well-ventilated areas . Refer to MSDS for more information .

## Discharging of Altespray Bulk Bag

Transport the sufficient amount of Altespray bulk bags to the Agi mixer car, where it needs to be discharged. Hang the bag over the discharge point, loosen or cut the spout strings from a safe position, located under the bag to discharge the material. **NB- refrain from standing or operating directly under the bulk bag to avoid unforeseen injuries that may occur in that space .**

## 6.4 Mixing and application

- The crew preparing to apply Altespray must have the following PPE: long sleeved overall, safety steel cap boots, hard hat, ear plugs, goggles, gloves and dust mask.
- The crew must conduct a visual pre-use checklist on the spraymec and agi car in accordance to the OEMs operational manual.
- Ensure the pumping system is in accordance to the OEMs operational manual
- Add between 86 to 87 litres of water per 1000Kg bulk bag of Altespray, our recommended pH level is between 7,2 and 7,8
- Mix until a consistent mix is achieved.
- Mixing times can range from a minimum of 1 hour with intermitted mixing of 15 minutes per hour thereafter.
- Add 1L of Alte-tard liquid per 1000KG Altespray ( with water) bulk bag if an extended open time of beyond 5 hours is needed ,1L per Altespray bulk bag batched will extend the open time a further 5 hours .

### 6.4.1 Mix design for 5.52m<sup>3</sup> (dry) batched directly into Agi mixer Car

- Fill the Agi Car with 1035 to 1044 litres of water prior to introducing Altespray bulk bags into Agi car .
- Discharge 12 x 1000Kg pre mixed Altespray bulk bags into the Agi mixer car
- Allow the Agi mixer car to mix for a minimum of 60-90 minutes prior to discharging into spraymec

**Note: As an example to the above mix design:** If you require a further 5 hours open time add 12 liters pf Alte-tard into Agi mixer car.

## 6.6 Spraying

- Clean the surface to be sprayed by barring down ,hydroblasting to clean any loose rock or dust on the surface of the applied area , test the mix prior to application to ensure pumpable consistency.
- The Altespray should be sprayed to the required thickness by the Rock Engineering Department.
- The probe indicators or probe holes should be placed on a pattern and marked for quality control inspection.
- The required flowrate for spraying Altespray with the Spray mech ranges from 0,5m<sup>3</sup>– 6m<sup>3</sup> per hour, as this will ensure that the operator has more control over the thickness of Altespray being applied. The recommended thickness of 25mm , although it might vary depending on the rock conditions. To effectively seal the rock to prevent oxidation and ensure loose rocks are properly locked in place, 100% rock coverage needs to be achieved in all areas while spraying.

### 6.6.1 The trained nozzle operator needs to ensure that:

- The area intending to spray has been declared safe, barred and watered down.
- The nozzle is kept perpendicular(90 degrees) to the substrate to minimize rebound,be sure to spray fractures and the over break of the substrate .
- Always start from the lowest point and spray towards the hanging wall.
- Nozzle is always kept in a constant Oscillating motion while spraying.
- The Nozzle operator must re-spray areas where the required thickness is not achieved.
- The Nozzle operator must always, try and keep the nozzle at 1 to 1,5 metres from the substrate while spraying.
- The Nozzle operator must maintain a consistent pace and movement pattern while spraying, to ensure evenness and maximize area coverage.
- Ensure you have maximum air pressure when spraying to ensure proper atomization of the product and to achieve an even finish with the correct compaction achieved to ensure best strengths

## 6.7 Cleaning

- The cleaning of the pump must commence immediately after the Altespray has been sprayed.
- Use water to clean equipment and flush machinery after every batch or moving the Spray mech to another working area.
- Ensure no Altespray is stuck anywhere on the pump and moving parts.
- Repeat the water flushing process until the mixing bin and the discharge bin is clean of any product
- Use a sponge ball to ensure the material hoses are flushed properly ,
- Ensure the nozzle tip and body are cleared of any obstructions to ensure the altespray is effectively atomized out of the nozzle

## 6.8 Probing

- Probing shall be conducted on the sidewalls during application to verify that the specified Altespray thickness is being achieved.
- Probing must follow a 1.5-meter spacing on the grade line and will be limited to sidewall areas only
- Where possible use thickness indicators supplied by Alcrete to ensure correct thickness is achieved .

## 6.9 Precautions:

- Only open and remove the plastic bulk bag shroud before use, as the shroud protects the material from weathering and rain conditions .
- Do not use bulk bags of which the shrouds have been opened, removed or damaged .
- Should the batch "age" exceed 5 hours in the Agi Car, Ensure you have 12 litres of Altetard in your agi car to extend the open time by 5 hours incase of any unforeseen emergencies that may occur.
- Make sure to check the expiry date of all materials supplied by Alcrete before use.

Batch Plant – Altespray Mix Design												
Material (1000KG)	1x Bulk Bag	2x Bulk Bag	3x Bulk Bag	4x Bulk Bag	5x Bulk Bag	6x Bulk Bag	7x Bulk Bag	8x Bulk Bag	9x Bulk Bag	10x Bulk Bag	11x Bulk Bag	12x Bulk Bag
M3=	0.46	0,92	1,38	1,84	2,3	2,76	3,22	3,68	4,14	4,6	5,06	5,52
Alte-tard  NB: if needed to extend further than 5 to 10 hours	1L	2L	3L	4L	5L	6L	7L	8L	9L	10L	11L	12L
Water (L)	86L	172L	258L	344L	431L	517L	603L	689L	776L	862L	948L	1034L

