



Strata Injection & Cavity Fill Chemicals

Product Data





Strata Injection & Cavity Fill Chemicals

Minova are the Global leader in the development, manufacture and supply of chemical strata injection and cavity filling products and systems. Strata injection chemicals have been successfully used throughout the global mining and tunneling industries for many decades to consolidate fractured strata and prevent the ingress of water. Chemical foams have been used for almost 10 years to rapidly fill cavities in underground mining and tunneling applications.

Minova has over 40 years experience in the development, manufacture and application of these style of products, including more than 20 years in the provision of specialist contract application services in Australia. Minova employs a qualified team of experienced technical personnel who work exclusively on product development of strata injection and cavity filling chemicals. All Minova's Strata Injection and Cavity Filling chemicals used in coal mines hold the German Authority permit

(LOBA compliant), an Internationally accepted standard for the safe and correct manufacture and application of these systems. In addition to products, Minova Australia's contract services division maintains a large fleet of application equipment including pumps, hoses, equipment/material PODS and injection consumables.

Strata injection applications are routinely conducted to stabilise longwall faces in underground coal mines and prevent falls of ground during production. These applications can be undertaken as a preventative measure prior to mining or subsequent to mining when poor strata conditions are encountered. Polyurethane products can be injected under high pressures and consequently have a long and successful history in the prevention of water ingress of varying magnitudes into mine or tunnel excavations.

Cavity filling resin systems are used to rapidly fill underground voids where timing is critical. Applications are

regularly carried out to fill cavities resulting from roof collapse above longwall mining supports and in development roadways. Cavity filling is also carried out behind steel sets and arches to stabilise the ground and prevent movement, and many other general underground applications. Minova's foaming resin systems require minimal if any containment formwork and can be placed at a rate of up to 50m³ per hour.

Minova Australia maintains product stock, equipment, and several teams of designated trained and highly experienced full time personnel, available at short notice to complete emergency strata injection, water stopping and cavity filling applications. All equipment and processes are fully risk assessed and industry standard safe operating procedures (SOP's) exist for all materials, equipment and applications techniques.

Strata Injection & Cavity Fill Chemicals

Strata Injection Chemicals

Minova's comprehensive range of Strata Injection Chemicals includes Polyurethane (PUR), Silicate and Phenolic based systems. All systems are LOBA and NSW DII licensed and are consequently approved for injection in underground coal mines.

Bevedol®/Bevedan®

- two component foaming PUR injection system for consolidation, stabilisation and sealing of highly convergent wet or dry strata

Carbomine

- extremely fast reacting two component alkaline phenolic resin injection system with high bond strength for solidification of dry or slightly moist strata

Geoflex™

- non foaming two component silicate injection system with extremely high bond strength for strata injection, sealing of injection anchors, and stabilisation of debris

Advantages

Bevedol/Bevedan

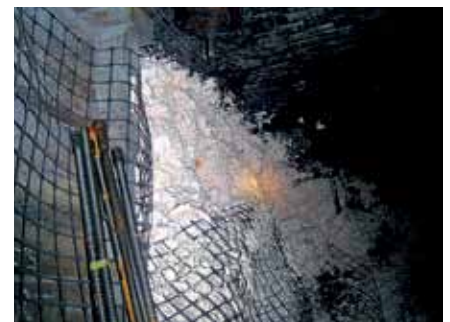
- A variety of grades to suit numerous application situations
- Low viscosity allowing good penetration into small fissures
- Excellent adhesive strength forming strong bond with strata
- Quick reaction time to reduce migration and loss of material
- Yields to ground pressure, accommodating subsequent movement
- High mechanical resistance gives improved support of strata
- Consolidates brittle and fractures wet and water bearing strata
- Seals against water with hydrostatic pressure

Carbomine

- Very low exothermic reaction
- Low viscosity allowing good penetration into small fissures
- Excellent adhesive strength forming strong bond with strata
- No exothermic reaction when in contact with water
- Common application equipment (Carbofill)

Geoflex

- Rapid reaction and strength development
- High adhesive strength after 1 hour
- Low exothermic reaction
- Fire resistant
- High elasticity



Strata Injection & Cavity Fill Chemicals

Typical Properties – Strata Injection Chemicals

| | Bevedol (PUR S component A) | Bevedan (PUR S component B) | Bevedol (PUR WF component A) | Bevedan (PUR WF component B) | Carbomine component A | Carbomine component B | Geoflex component A | Geoflex component B |
|---------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|------------------------|------------------------|------------------------|------------------------|
| Density @ 25°C | 1.03 g/cm ³ | 1.23 g/cm ³ | 1.03 g/cm ³ | 1.23 g/cm ³ | 1.29 g/cm ³ | 1.05 g/cm ³ | 1.48 g/cm ³ | 1.14 g/cm ³ |
| Colour | honey | dark brown | honey | dark brown | dark brown/red | light brown | colourless | brown |
| Viscosity @ 25°C | 280 ±40 mPas | 210 ±70 mPas | 280 ±40 mPas | 210 ±70 mPas | 170 ±30 mPas | 10 ± 2 mPas | 260 ±40 mPas | 150 ±30 mPas |
| Flash Point | 200°C | 200°C | 200°C | 200°C | N/A | 100°C | N/A | >100°C |
| Mix Ratio | 1 : 1 | | 1 : 1 | | 4 : 1 | | 1:1 | |
| Foam Factor | 1.7 – 5.0 | | 1.0 | | Non-foaming | | Non-foaming | |
| Maximum Temperature of Reaction | 100 – 150°C | | 100 – 150°C | | 40 – 50°C | | 80 – 90°C | |
| Adhesive Strength | > 3 MPa (unfoamed) | | > 3 MPa | | 7.3 MPa | | 5.8 MPa | |
| Flexural Strength | 90 MPa (unfoamed) | | 90 MPa | | N/A | | N/A | |
| Compressive Strength | 20 MPa | | 80 MPa (unfoamed) | | N/A | | N/A | |
| Tensile Strength | 45 MPa (unfoamed) | | 45 MPa (unfoamed) | | N/A | | N/A | |
| Modulus of Elasticity @ 7 days | N/A | | N/A | | N/A | | 250 MPa | |
| Reaction Time @ 25°C | 80 seconds | | 30 seconds | | 120 seconds | | 225 seconds | |



Strata Injection & Cavity Fill Chemicals

Cavity Fill Chemicals

Minova's range of foaming cavity filling chemicals includes Silicate and Phenolic based systems. All systems hold the German Authority Permit (LOBA compliant).

Carbofill

- instant foaming two component phenolic resin system for the filling of cavities in underground roadways and longwalls for stabilisation and the prevention of gas accumulation. NSW Injection Licence granted

Geofoam

- rapidly reacting and strongly expanding two component urea silicate resin system for immediate stabilisation via strata injection or cavity filling applications

Advantages

Carbofill

- Rapid reaction time minimises formwork requirements
- High foam factor (low product consumption for transport and handling)
- Low reaction temperature
- Fire resistant
- Can be used to form temporary ventilation seals
- Long shelf life under correct storage conditions
- Low formaldehyde emissions during product reaction
- Rapid placement speed
- Common application equipment (Carbomine)

Geofoam

- Extremely fast reaction time minimises formwork requirements
- Dual purpose system (strata injection and cavity filling)
- High foam factor (low product consumption for transport and handling)
- Injection against water flow possible
- Low reaction temperature

Typical Properties – Cavity Fill Chemicals

| | Carbofill component A | Carbofill component B | Geofoam component A | Geofoam component B |
|---------------------------------|------------------------|----------------------------|------------------------|-------------------------|
| Density @ 25°C | 1.29 g/cm ³ | 1.54 g/cm ³ | 1.45 g/cm ³ | 1.22 g/cm ³ |
| Colour | beige-pink | blue-black | dark brown | brown |
| Viscosity @ 25°C | 200 – 400 mPas | >100 mPas | 270 ±70 mPas | 140 ± 15mPas |
| Flash Point | N/A | N/A | N/A | 200°C |
| PH Value | 8 – 9 | 0 – 1 | N/A | N/A |
| Mix Ratio | | 4:1 (pbv) | | 1:1 |
| Foam Factor | | 32 – 38 | | 15 – 30 |
| Maximum Temperature of Reaction | | <90°C | | N/A |
| Start of Foaming @ 25°C | | < 10 seconds | | 20 seconds ± 10 seconds |
| End of Foaming @ 25°C | | 190 seconds ± 50 seconds | | 45 seconds ± 15 seconds |
| Consumption (yield) | | 36 – 42kg's/m ³ | | N/A |
| Compressive Strength | | N/A | | N/A |
| Modulus of Elasticity @ 7 days | | N/A | | N/A |

Application Limitations – Strata Injection Chemicals

The application of all Minova Strata Injection Chemicals must be performed by or under the guidance of Minova operators who have been trained in accordance with Minova's strata injection training manual to ensure the safe and efficient application of all systems.

Strata Injection & Cavity Fill Chemicals

Storage, Packaging, Shelf Life – Strata Injection Chemicals

| | Packaging | Storage | Shelf Life |
|-----------------------------|--|--|--|
| Bevedol (PUR Part A) | 20 litre or 205 litre White Steel Drum | | |
| 1,000 litre IBC | Cool, dry and ventilated area, away from direct sunlight, between 5°C and 40°C | 12 months when stored as per instructions | |
| Bevedan (PUR Part B) | 20 litre or 205 litre Blue Steel Drum | | |
| 1,000 litre IBC | As above | As above | |
| Cabomine (Part A) | 20 litre or 205 litre Steel Drum | Cool, dry and ventilated area, away from direct sunlight, between 5°C and 20°C | 6 months when stored as per instructions |
| Cabomine (Part B) | 20 litre or 205 litre Steel Drum | As above | As above |
| Geoflex (Part A) | 20 litre or 205 litre Steel Drum | Recommended between 10°C and 30°C, Note that frost may damage Component A (flocculation) | 6 months when stored as per instructions |
| Geoflex (Part B) | 20 litre or 205 litre Steel Drum | As above | As above |

Application Limitations – Cavity Fill Chemicals

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Storage, Packaging, Shelf Life – Cavity Fill Chemicals

| | Packaging | Storage | Shelf Life |
|--------------------------|------------------------------------|--|---|
| Cabofill (Part A) | 20 litre or 205 litre Steel Drum | Should be stored at 5°C – 8°C | 12 months when stored as per instructions. Shelf life will be reduced to 3 months when stored at 20°C |
| Cabofill (Part B) | 20 litre or 205 litre Plastic Drum | Should be stored between 20°C – 30°C and away from materials stated in MSDS. | 6 months when stored as per instructions |
| Geofoam (Part A) | | | |
| Geofoam (Part B) | | | |

Note: It is recommended that Carbofill Part A be stored at a minimum 15°C for 12 hours before processing.

In addition to the above packaging information, Minova's full range of Cavity Fill Chemicals can be supplied in 200 litre drums or 1,000 litre IBC's.

Health and Safety

Minova Strata Injection and Cavity Fill Chemicals contain various substances that can be harmful to individuals. Minova strongly recommends that the individual product MSDS be thoroughly reviewed prior to the handling or use of any Minova products.

Disposal

Follow local regulations. We recommend disposing of liquid residues and empty drums in an authorized incineration plant. Cured product can be disposed of in a domestic waste landfill area.

Bevedol/Bevedan : MS2420/2008/C

Carbomine:

Geoflex: MS2417/2008/E

Carbofill: MS2398/2007/A

Geofoam:

Minova Australia

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Group Headquarters

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Minova BWZ GmbH

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Poland

Minova Ekochem S.A.
Minova Arnall Sp. z o.o.
Minova-Ksante Sp. z o.o.

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OOO Minova TPS
Branch OOO Minova (Ural)

South Africa

Minova RSA

Kazakhstan

TOO Minova Kasachstan

Ukraine

OOO Minova Ukraina
AOZT Carbo i Crep

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The Ground Support Company



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