



HOW TO USE COLBY EXPANSIVE MORTAR

Technical Information

Colby Mortar is a **non-explosive, non-toxic chemical demolition agent** that safely and silently cracks rocks and concrete in four easy steps: **Drill, Mix, Pour and Expand!**

Preparation before using Colby expansive mortar

First measure the temperature of the jobsite, demolition agent, water, stone/concrete and container to ensure temperatures are in accordance with compliance requirements. The following objects need to be prepared:

- Demolition agent
- Clean and cold water
- Plastic or metal bucket
- Beater or wooden rod for mixing
- Safety goggles
- Rubber gloves
- Dust proof mask (recommended)
- Helmet (recommended)
- Thermometer (recommended)

Step 1. Drill

Drill holes in the rock or concrete where the material is to be cracked.

The distance between holes will vary depending on type of material. Generally, the closer the holes, the quicker it is to crack the material.

The diameter of the holes will dictate cracking results – holes that are too small may result in sub-optimal performance, while holes that are too big may cause blowout shots.

Please note: do not exceed 40mm diameter drill size

The following figures are for reference purposes only. For best results, it is advisable to carry out experiments or tests with Colby agent before starting work.

Holes should be cleaned out using compressed air or vacuum.

Step 2. Mix

Colby expansive mortar must be thoroughly mixed with clean cold water before use. Gradually add one bag of mortar to 1.5 – 1.7 litres of water. Stir until you obtain a smooth lump-free slurry.

Use only open pails or containers for mixing. Narrow necked containers must not be used.

Avoid adding extra water, as this may reduce concentration and effectiveness of the mix.

Avoid mixing more than 10kg of mortar at any one time

Step 3. Pour

Pour the freshly mixed slurry into predrilled holes within ten minutes of mixing. Do not look directly into filled holes for the next 2 – 6 hours.

Tamp the mortar filled into the holes by using a slightly smaller stamp stem. For long holes, tamp the mortar section by section to remove trapped air pockets.

For horizontal and slant holes, insert a slightly smaller plastic pipe into the hole and fill the mortar into the pipe slowly, withdrawing the pipe from the hole simultaneously. Tamp the mortar section by section to remove trapped air pockets.

Another method for horizontal holes is filling sausage shaped plastic bags. Tie the bags off and insert them into the horizontal holes.

The benefit of this method is that it will retain the fluid in the horizontal hole.

Step 4. Expand

The reaction time of Colby Agent to crack stones varies from 24 to 76 hours.

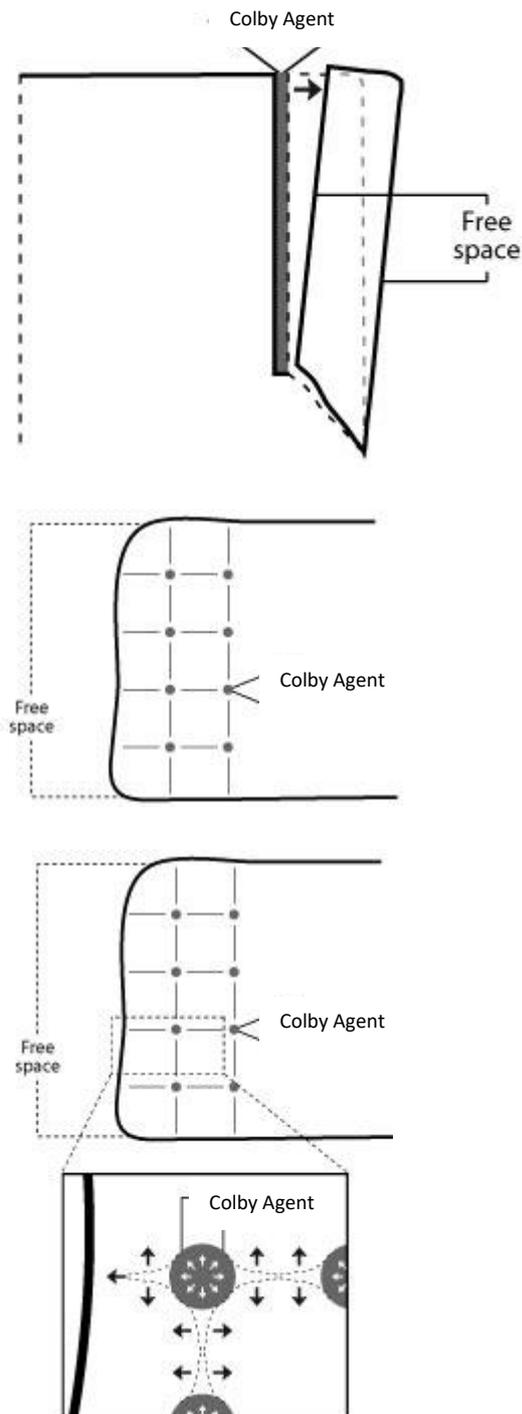
This varies depending on material being cracked, the hole design and the ambient temperature at the job site. The mortar continues to increase in pressure for up to 5 days.

Caution: The chemical reaction of the Colby agent and water generates heat. If the reaction goes too quickly the temperature can be above the boiling point of water before all the water has chemically combined with the agent. This can result in a steam driven explosion which blows the mortar from the holes with sudden force.

Once mixed and poured into holes, expands as it slowly sets gradually applying **expansive stress up to 14,000 PSI.**

Initially propagation occurs then the crack widens. When multiple holes are filled adjacent to each other, the cracks propagate to join with the neighbouring holes. This allows you to determine the exact direction of the cracks with your hole pattern designs.

The hole pattern design must allow the material to move to free space when the mortar expands as shown below. Failure to provide free space will result in unpredictable material movement. It is recommended that you plan your work, so you are always working away from a free space (this gives the broken piece of material somewhere to move to).



Safety instructions:

- Assess and secure the site to ensure that no damage or harm is caused to persons or surrounding property during and after the process.
- Wear long sleeved shirt and trousers. Use personal protective equipment if there is risk of exposure to powder, slurry or dust.
- Avoid contact with eyes and skin. If accidental contact occurs, wash off powder immediately.
- Avoid inhaling dust and wear a dust mask
- Use approved safety goggles and gloves when mixing and filling.
- If working in a confined area ensure adequate ventilation, wear dust mask and use appropriate safety equipment as required by relevant regulation.
- Do not use hot water for mixing.
- Do not put prepared slurry into bottles or cans, this could lead to a blow-out of glass or metal fragments.
- Do not look into the filled holes. Cover holes with a cloth sheet until reaction is completed.

How to prevent expansive mortar blowout shoots

Although it's highly unlikely, the mortar might blow out from the filled holes if the following instructions have not been followed correctly:

- Not using Colby Mortar in the correct temperatures.
- It is unsafe to drill more than a 40mm diameter hole size, in doing so you may incur a blowout.
- 28mm is the minimum hole size you should drill in any material.
- Too shallow holes may result in blowout. (Depth must be four times longer than its diameter or more).
- Lots of dry dust in holes will absorb water from EXPANDO and result in blowout.
- Use enough water and mix thoroughly to avoid lump formation.
- Do not manually mix more than 10kg (2 bags) for each lot.
- Pour the mixture into holes within 10 minutes after mixing.
- Do not overfill the holes.
- Do not plug filled holes with bars or similar tools.

Tips on how to use Coby expansive mortar

- For effective use and to obtain optimum results, a controlled trial of our agent is recommended.
- Secure the site to ensure that the material, once cracked, does not damage or harm surrounding property or persons. When using the mortar with highly absorbent materials like concrete, dampen the holes before pouring; however, make sure that there is no standing water.
- To accelerate breaking time position large diameter holes together
- Make sure the holes are clean without water and residue.
- Pour fresh mortar into holes within 10 minutes after mixing.
- Do not mix more than two bags (10 kg) for each lot at a time.
- The feeding depth should be 100% of the pre-drilled holes.
- Do not plug the holes after filling
- The mortar can only be used in holes and will not work in existing cracks of stones or concrete
- Never fill glass or metal containers with the mixture, or any container which widens towards the bottom. The pressure will shatter the container.
- In the unlikely event that the mortar begins to steam in the mixing container, add some water to dilute the mixture and throw it away to an open surface.
- For best results it's important to consider air ambient and internal material temperature of the materials to be broken.
 - SCA II Object temp 10 - 25 degrees Celsius
- In summer fill holes at the end of the day to allow cracking overnight
- In summer cover filled holes from direct sunlight using a tarp or damp hay to provide shade.
- If rain is forecast you will also need to cover the holes with tarp so the mortar will not be diluted from the rain.

Colby Mortar FAQs

What size holes do I need to drill?

Drill holes 28-40mm in diameter

How deep do I drill?

Drill to 80-90% of the depth of the materials – do not go through. Hole depth must be a minimum of four times the diameter of the hole.

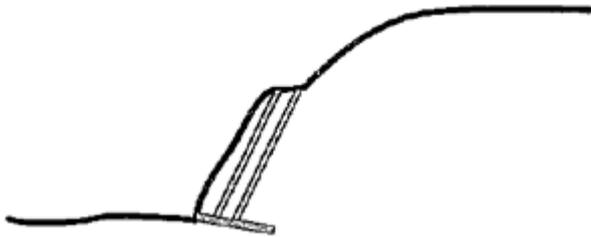
How far apart should I drill the holes?

See diagram below

The spacing, length (or depth) angle and diameter of the drill holes will be determined by the properties of the material to be removed and may require adjustment when areas of different hardness are encountered in the same rock body.

Following are examples of hole patterns for different situations and are to be used as a guide only. It is recommended that a test pattern be trialled to ascertain the quality of the material to be demolished.

Removal of a toe rock



Bench Cut

Note: High faces may need to be cut in several layers.

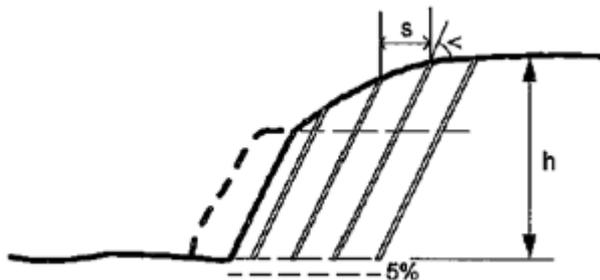
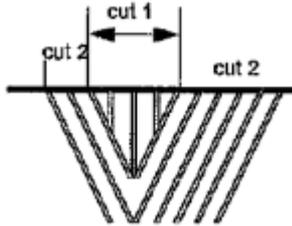


Table 1: **Bench and Toe Cut**

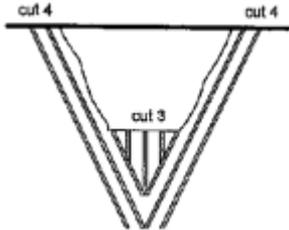
(Remove toe before starting bench cut).

Diameter (d)	28mm – 40mm
Spacing (s)	250 - 350 mm
Height (h)	100% (+ 5% if flatter base required)
Angle (α)	Parallel to free face

Shallow Trenching



Deep Trenching



In thin materials holes should be angled between 45 and 60 degrees for greater breaking effect.



How much Mortar will I use?

32mm Drill x 1 meter deep hole = 1.3kg Agent

34mm Drill x 1 meter deep hole = 1.5kg Agent

38mm Drill x 1meter deep hole = 1.8 kg Agent

Before drilling consider the maximum broken rock or concrete size you can safely manoeuvre.

How should I design my hole patterns?

Consider the maximum broken rock or concrete you can safely manipulate. Then plan out your hole pattern.

The reaction time of the mortar to crack stone varies from 24 hours to 72 hours, depending on the cracking object, material, hole design and temperature. Generally speaking, within the temperature scope of each type, the higher the temperature of the object and the closer together the holes, the quicker the object will crack (otherwise, the opposite will occur).