

USE OF NON – EXPLOSIVE MATERIAL FOR CRASHING AND CUTTING

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Abstract

This paper describe the material - expansive mortar (FRACT.AG.C) in cartridges pack for demolish and cutting rocks and all type of concretes. Also are given some results of use in the queries in Macedonia for white marble and impact to environmental with accent of environmental protection and policy.

Keywords: Mortar, Non Explosion, Cutting, Demolish, Marble

INTRODUCTION

FRACT.AG is a highly expansive mortar to demolish and cut rocks and concretes. FRACT.AG swells when poured into a hole and develops a pressure higher than 8000 t/m² on the hole walls, thereby breaking them open. FRACT.AG is **environmentally friendly** because it releases no toxic fumes or harmful substances of any kind. It is non-explosive, therefore supervision of trained personnel is not essential. FRACT.AG storage requires no special precautions, provided the containers are not tampered with and are kept in a dry place.

The product is not sensitive to electrical discharges or currents.

On the market are any types of this material or agent. There are six types of fract.ag like powder and plus type with cartridge for horizontal holes.

In this paper we give some characteristics and way of use for the expansive mortar pack in cartridges.

1.0 SOME CHARACTERISTICS OF MATERIAL

This material, FRACT.AG can be used in an unlimited range of applications and particularly to break, cut, or demolish rocks, concrete and reinforced concrete when explosives cannot be used for safety reasons. This is clean CaCO₃ dehydrated and baked in high temperature over 1600C⁰ and milled in fine granulation in the form of powder.

We can used on any type of rocks formation, concrete or tiled structure in: excavating foundations, leveling rocks for road works removing boulders, different demolitions for buildings, poles, towers, walls etc. Also this is very important: can be use for cutting blocks of marble, granite and travertine more economically than with the traditional helicoidally wire

cutting method and excavation and demolition of rocks formation or cement/concrete structures where the use of explosives would be expensive due to long operating times, special transport, more secure and safety ways, storage and handling precautions and the need to comply with public safety regulations. This material are produce with different commercial names. Most popular is this tip FRACT.AG, from the firm CHIMICA EDILE, srl, Italy. Six tipos of Fract,AG are available on the market. This all types are in use depends of temperature in the air when we use.



Figure 1. Pack of cartridges types of frack.Ag C

On the market are any types of this material or agent. There are six types of fract.ag like powder and plus type with cartridge for horizontal holes.

Depends of temperature in the air, this types can be used.

For format with cartridges are this types:

RED – for near 5⁰C, GREEN – for temperatures from 5 to 25⁰ C, YELLOW – from 20 to 35⁰C, GOLD – for 35 to 50⁰. BLUE – 50 to 60⁰C or universal and SILVER types for high temperatures..

The product in cartridges is conveniently supplied ready – mixed in plastic wrapped cartridges and as such there are no limitation to its use in any working environment. Mixing is not necessary thereby eliminating the possibility of using the wrong amount of water, since it will only absorb the required amount. It can be used anywhere without taking special measures (roofs or wall holes). reaction time is quicker, therefore it demolishes or cuts faster. Cartridges are available in 100 cartridge – boxes. each cartridge is f 28mm, 22cm long and contains 200g of agent. They **must be used** in 32-34mm diameter holes. 100 cartridges are enough for a length of 14 to 16 meters of holes.

Goggles and rubber gloves should be worm as a safety precaution. This is an alkaline product with a PH = 13 and could cause severe irritation to mucous membranes, especially eyes.

2.0 TIPS ON HOW TO USE THE CARTRIDGES

When we use FRACT.AG must to know tips for best useful. The distance between the centers of the holes in the rock (marble or granite) or non-reinforced concrete should be 30 to 60cm, depending on the diameter of the holes. (for example: f32mm dist.= 30cm, 35=40cm, 40mm=50cm). For the best possible use and to obtain best results it is advisable to carry out preliminary tests with FRACT.AG before starting work.

Estimated consumption of FRACT.AG powder in cartridges for 1meter of hole is:

Diameter	30	32	34	38	40	45	50
Consumption (kg/m')	0,9-1,0	1,0-1,2	1,5	1,8	2,0	2,6	3,0

When we use this agent must keep our face from the hole during the first 2-4 hours as the product might (thigh highly unlikely) eject from the hole violently (blow-out) if instruction have not been followed correctly.

When used in highly absorbent materials like **concrete**, the holes should be dampened before the mortar is poured, making sure however, that there is no presence of water.

Mixing is not necessary thereby eliminating the possibility of using the wrong amount of water, since it will only absorb the required amount. It can be used anywhere without taking special measures (e.g. roofs or wall holes. Reaction time is quicker therefore it demolishes or cuts faster.

3.0 WHO CAN USE AND WHERE FRACK.AG C?

This is material – highly expansive mortar to demolish and cut rocks and concretes. When is purred into a hole after some time (3 to 8 hours depends of temperature) develops a pressure higher then 8000t/m² on the hole walls.

It is non explosive material, and for storage requires no special conditions, provided the containers are not tampered with and are kept in a dry place.

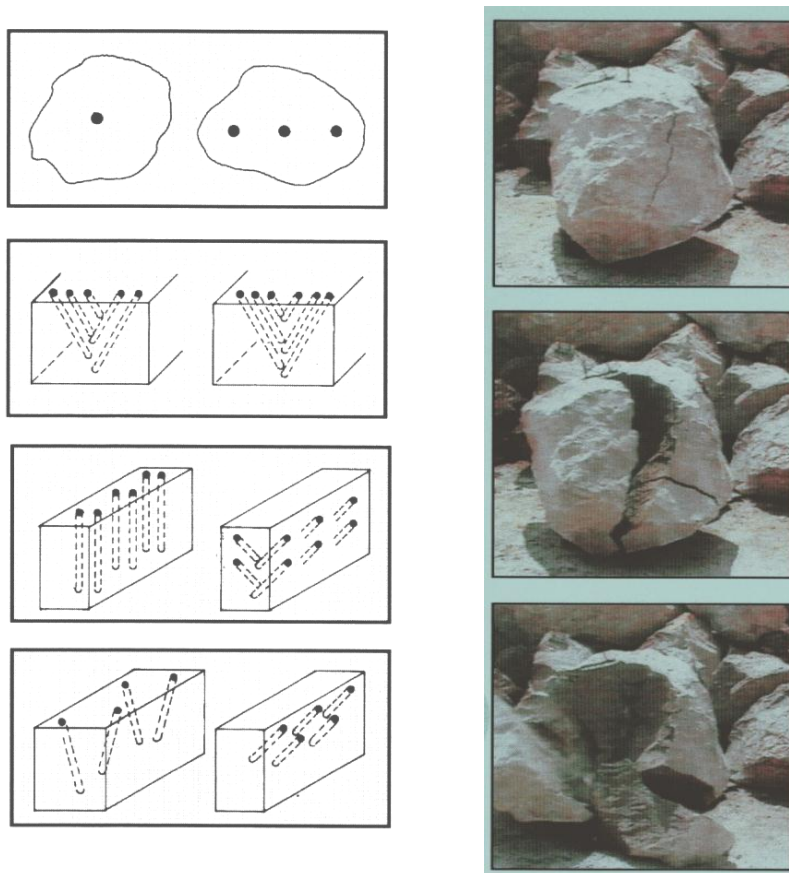
FRACKT.AG C can be used in an unlimited range of applications and particularly to break, cut, or demolish rocks, concrete and reinforced concrete when explosives cannot be used for safety reasons.

We can used on any type of rocks formation, concrete or tiled structure in: excavating foundations, leveling rocks for road works removing boulders, different demolitions for buildings, poles, towers, walls etc. Also this is very important: can be use for cutting blocks of marble , granite and travertine more economically and easily way than with the traditional helicoidal wire-cutting method and excavation and demolition of rocks formation or cement/concrete structures where the use of explosives would be expensive due to long operating times, special transport, more secure and safety ways, storage and handling precautions and the need to comply with public safety regulations.

In general, anyone can use it in any situations, because it is perfectly safe, soundless and nonhazardous. It does not debris or dust, not does it form gas or cause any shock waves. Unskilled labor can be very easily trained to use in a short time. FRACKT.AG in powder form in the bags of 5kg and 20 kg is a powder that must be thoroughly use with clean cool water. Powder (5kg bags) of this material mixed in a ratio of 30% of the overall weight. Put the required amount of water into a large container (1,5 liters for each 5 kg package), gradually add the powder to water stirring all the time to obtain a smooth, lump free mortar . Pour the mortar into the prepared holes within 5 to 10 minutes.

4.0 WAY OF USE

The necessary number of cartridges (depends of total length of holes) dip in a bucket of clean water at the correct temperature (check type of fract.ag.C selected) for approx. 3 – 5 minutes. Insert the wet cartridges in the holes one at the time, one by one, packing them in tightly with a rod to make them adhere to the wall of the hole.



ways of use in the blocks for demolition breaking big blocks

Figure 2. Ways of use fract.ag C (for demolition, cuts, splitting, breaking rocks)

In the last cartridge once inserted, should not fit, remove it, and using your hands, fold it in half and break it in two pieces which can then be used to complete the filling of two holes.

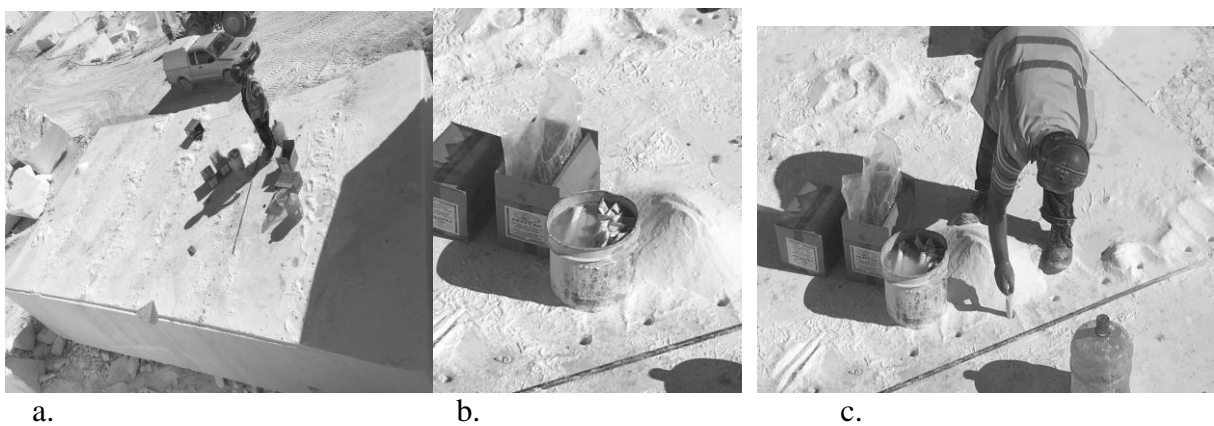
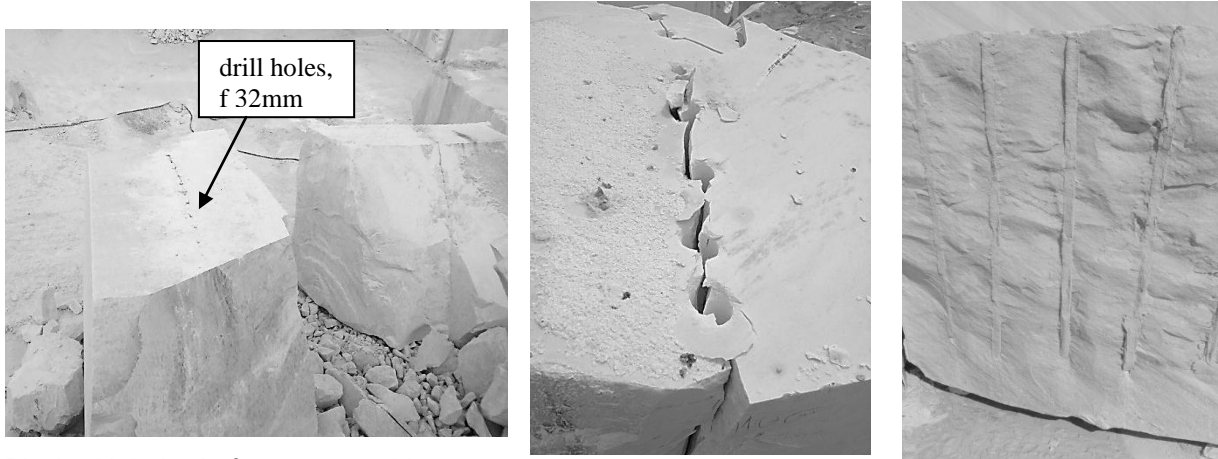


Figure 3. Block – lamellae of white marble ready for cutting with 5 row of holes, b. cartriges in water, c. put in the holes

3.1 Results from tests with *frack.ag C* in some quarries for marble and granite

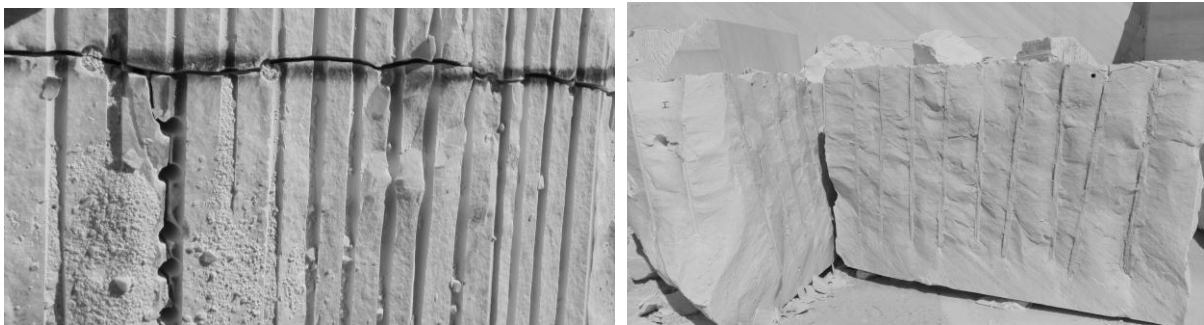
This material is in use in some queries in Macedonia. They use this type for cutting big blocks to commercial dimension. After cut the place of cartridges (empty holes) is only with white color and hard calcium carbonate.



Block with holes before use cartridges

Crack between new blocks

New fresh site of the block



NEW FACE IN THE COMERCIAL BLOCK AFTER ACTIVITY OF FRACT.AG.C



Figure 4. Results from action with *FRACT.AG.C* in some queries in MK

CONCLUSION

This material (base is CaCO_3) can use in any situation for more methods for cutting and splitting blocks in the quarry mine. Also this agent we can use for demolition concrete/cement structures. This method is more economically than standard methods of cutting blocks of marble or granite. The time for action effects depend of weather and temperature on the blocks. This time was between 3 and 12 hours for our tests which we make in this quarries.

REFERENCES

- [1] Dambov R. Drilling and blasting, book, University "Goce Delcev", Stip, 2013, R. Macedonia
- [2] Dambov R. (2015) Special blasting, book, University "Goce Delcev", Stip, 2016, R. Macedonia
- [3] Catalogues and instruction manual from the firm Chimica Edile, Grosseto, Italy