



# KEMIITTI 610

Product information July 31<sup>st</sup>, 2018

## 1. Product description and use

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Kemiitti 610 is an emulsion explosive with added prilled ammonium nitrate (10-30%) and produced on charging site. Its physical state is grease-like and it is white-yellowish in colour. The product is sensitized in situ on the charging vehicle from intermediate products and charged by pumping. The mediums used as raw-materials are not classified as explosives. In the charging vehicle, the oxidizer (nitrate solution) and fuel (oil mixture) are a ready mixture i.e. matrix (in Kemiitti 510 vehicles these are separate). Ammonium nitrate prills are added to the matrix on blasting site and it is sensitized into a ready product using a gassing solution. The mixed product is pumped into the boreholes through a 40-100 m long charging pipe. A chemical reaction sensitises the product in the borehole to ready explosive within 10-20 minutes after pumping. The product surface rises slightly in the borehole after the pumping is completed.

Kemiitti 610 is suitable for all sorts of strip mining where fast charging and/or good water resistance is required. A progressive charging (in which the density lessens toward surface) can be attained by using Kemiitti 610. Using Kemiitti 610, national regulations concerning bulk explosive material must be observed concerning inhabited areas.

## 2. Packaging and transportation categories

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Kemiitti 610 is delivered to the blasting site in Oy Forcit Ab's charging truck. The details of the delivery are agreed case by case when making the order in cooperation with Kemiitti station manager.

During transportation, the truck does not and may not transport explosive material. The raw material contained in the truck has the capacity to produce 12-20 tons of ready explosive. The charging speed of the mixed product is 80-150 kg/min.

TRANSPORTATION CATEGORY, MATRIX	
RID/ADR	5.1 Ammonium nitrate emulsion
IMDG	5.1
UN NUMBER	3375
HAZARD CLASS	5.1

TRANSPORTATION CATEGORY, AMMONIUM NITRATE PRILL	
RID/ADR	5.1 Ammonium nitrate
IMDG	5.1
UN NUMBER	1942
HAZARD CLASS	5.1
TRANSPORTATION CATEGORY, AMMONIUM NITRATE PRILL	
RID/ADR	5.1 Ammonium nitrate
IMDG	5.1
UN NUMBER	1942
HAZARD CLASS	5.1

### 3. Explosion technical features

Specification	Unit	
Density of explosive*	kg/dm <sup>3</sup>	0.85-1.25
Velocity of detonation	m/s	4200-5500
<b>Typical and calculational values (Prill content 30%)</b>		
Transmission	cm	0
Initiation sensitivity		Plain detonator and additionally a detonator with detonation velocity of at least 4800 m/s
Power/weight unit **	S	0.80
Explosion heat***	MJ/kg	3.0
Gas volume (NTP)***	l/kg	1000
Diameter of borehole min.	mm	64
Operation depth in water	m	30
Environment temperature	°C	min. -25

\*Density increases according to borehole depth

\*\* Compared to ANFO

\*\*\*Cheetah 2.0 (NTP), theoretical

## 4. Main raw materials and their hazard clauses

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Raw material	Risk clause
Kemiitti 610 Matrix	O; R5-8
Ammonium nitrate prill	O; R5-8
Gassing solution	O; R8, T; R25, R32, R20-22
Diesel/fuel oil	X <sub>n</sub> ;R40, R65-66, N; R51, R53

As the basic oil of oil mixture, highly refined denotation-free mineral oil is always used with a high flash point and low evaporability. Emulsifiers are substances commonly used in the food and/or cosmetics industry.

## 5. Storage and weather resistance

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Manufacturing the product for storage is prohibited. Kemiitti 610 is pumped directly into the borehole, where it will keep for at least 3 months from the day of pumping. The product is nearly insoluble in water.

## 6. Handling safety

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No explosive materials shall be transported or stored in the charging truck. In connection with production, a small amount of explosive material is formed in the product funnel of the charging truck. The funnel is always emptied at the end of charging.

The test values of Kemiitti 610 describing handling safety are nearly the same as those of Anfo. Its shock sensitivity is measured in shooting tests, in which a 15-gram brass cylinder is shot into the explosive material and the lowest velocity of the cylinder, with which a reaction is detected in the explosive material (explosion, flame, smoke) is measured. In Kemiitti 610, no reaction is detected with the cylinder speed of less than 450 m/s. With Anfo, the said value is about 400 m/s.

The most common reason for accidental ignition with relative explosives around the world has been misuse of the loading pump, which leads to fast temperature rise and decomposition of the emulsion, which in opportune circumstances may lead to detonation.

Make sure that the detonator and the booster are already in the borehole before positioning the charging pipe.

Although the raw materials used are as harmless as possible, it is recommended to avoid continuous skin contact by using protective gloves. Any explosive getting on the skin is first removed mechanically with a rag or towel. Then wash the skin with water and soap.

In case the substance gets into the eyes, rinse with lots of water. Contact the doctor if irritation persists.

Overalls and other work clothes with dried explosive material on them may ignite and burn. Protective clothing is washed normally in water.

## **7. Environmental impact**

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In an emulsion explosive, the oxygen-giving (nitrate) and burning (oils) substances share a very large contacting surface and the manufacturing technique is very precise, which is why the explosion gases are relatively clean. However, small amounts of carbon monoxide and nitrogen oxides are always released.

Kemiitti 610 has excellent water resistance, so usually very little nitrates are dissolved from it. All unexploded explosives or explosives otherwise remaining on the ground dissolve gradually so that nitrates and oil end up in nature. Nitrate causes eutrophication of water systems and pollutes the groundwater. Oil may have long-term harmful effects on water environments and risks polluting the soil and groundwater. With careful and tidy charging work and by following instructions, the environmental impact can be minimized. Also the amount of hazardous explosion gases can be minimized by correct use of the explosive.

## **8. Operating instructions**

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Kemiitti 610 is ordered from Forciti station managers. When the order is placed, the delivery schedule and manner, quantity, borehole diameter and meters to be charged are agreed. When planning to use Kemiitti for the first time, discuss the details with Forciti customer care or technical services.

The price of Kemiitti consists of the kilos pumped and hours spent on pumping as well as the driving distance to the blasting site. The driving distance is determined from the Kemiitti station nearest to the customer. If the orderer wants to have the product delivered from a specific station, the driving distance is determined from the said station. However, if for reasons due to Oy Forciti Ab, the delivery is made from a station other than the nearest one, the driving distance charged will be from the nearest station.

Igniting Kemiitti 610 requires a powerful booster ( $\geq 4800$  m/s). We recommend Redex, Fordyn or Kemix charges. The smallest recommended diameter for the booster is 40 mm. The use of a detonating cord to ignite the booster is not recommended.

Please remember in all handling of the product that it is an explosive material which can, if used wrongly, lead to devastating consequences. When charging, make sure that the charging pipe does not damage the detonator or the booster. The detonator is best protected within a booster of the correct size. Also the detonator cables may be damaged if the charging pipe is handled carelessly.

Measures to be taken in advance:

- Plan the driving route of the Kemiitti truck and repair it if necessary.
- Plan the charging order of the field.
- Place the detonators and the base charges into the boreholes.
- Guide the Kemiitti truck as close to the charging site as possible (the truck has a charging pipe of 40-100m).
- The detonator cables must be straight in the hole and adequately tight before the charging pipe is introduced into the hole.
- Use always both bottom and top boosters for best blast result.
- Blockages in the boreholes must be opened before charging. Opening the blockages using the charging pipe is prohibited.
- Field and charging data (hole size, uncharged areas, etc.) must be told the Kemiitti operator before charging.
- Advance measures minimize the charging time and ensure the safe delivery of the product.

Emulsion pumping

- When introducing the charging pipe into the hole, make sure that the detonator cables are not damaged or dropped into the borehole or that contact between the detonator and the booster is not broken.
- The detonator cables are made tense and placed on one side of the borehole to prevent the charging pipe from getting caught in the cables.
- The charging pipe must not be pushed into the possible sludge on the bottom of the borehole.
- Inform the Kemiitti 610 manufacturer of the depth and required empty space (if it differs from the data given in field information).
- The required amount of explosive material is pumped into the borehole while pulling the charging pipe upward. The charging pipe must not be pulled out of the hole too fast or making big quick movements.

- While pumping, the uniformity of the explosive material column is ensured by holding the charging pipe inside the emulsion charge throughout the pumping process. Thus, the charge functions in the planned manner.
- When the required amount has been pumped into a hole, Kemiitti manufacturer gives the charging pipe handler a voice signal. The charging pipe is then swiftly moved to the next borehole.
- When charging wet holes and boreholes with a diameter of 89 mm or less, the charging pipe must be on the bottom of the hole when pumping starts. NOTE! Although the borehole has been found to be dry when placing the bottom booster, some water may have been introduced when charging the adjacent waterhole.
- If charging should be stopped while not completed, notify the Kemiitti manufacturer immediately.
- In the charged holes, the bottom booster is tightened carefully into the explosive material once the charging pipe has been pulled out of the hole. The cable should not be tightened while the charging pipe is still in the borehole.
- The top booster is charged by pressing it into the Kemiitti explosive material using a charging stick after Kemiitti 610 has been sensitized. At this point one can check that the explosive material surface is at the desired level. If necessary, you can adjust the material level by adding more Kemiitti 610 material or explosive cartridges into the borehole or possibly removing some Kemiitti material.
- If the surface of the explosive has not reached the required level, more Kemiitti 610 can be added (max 1 addition/borehole). If the borehole is so cracked that Kemiitti wont stay in it, charging should be done using cartridge explosives.
- Kemiitti 610 manufacturer must be notified well in advance before the charging is completed about how many boreholes are left.
- When charging of the boreholes is completed, the charging pipe is lifted above the explosive column in the last borehole for cleaning. After the charging pipe has been cleaned, it is lifted from the borehole onto the field and pointed away from people and machinery. The Kemiitti manufacturer empties the charging pipe from water using compressed air. During emptying the pipe, it should be held firmly in place for example by standing on it.
- The pre-filling is placed in the boreholes a minimum of 10 minutes after pumping.

## General

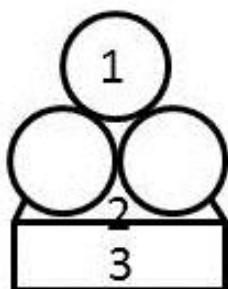
- Notify the Kemiitti 610 manufacturer immediately about any unusual occurrences.
- Kemiitti samples will be taken during charging and process is adjusted if needed. If the field is not detonated within one month from the charging a Forcit representative should be informed without delay.
- There is pressure in the charging pipe so a blocked charging pipe must not be pointed at people. Also, avoid the vicinity of joints in such circumstances.
- When working, use normal work clothes (overalls) and oil resistant and nitrate resistant rubber gloves. Always use protective goggles when manufacturing, handling or pumping Kemiitti 610 emulsion explosive.
- Observe protective clothing and work practice requirements specific to the construction site.
- For initial cleaning of mittens, charging pipe, hands etc. use chipping.
- The Kemiitti truck always has water for rinsing.
- Kemiitti manufacturer gives advice in the field concerning charging with Kemiitti.
- **Responsibilities: Supervision and control of the charging are the responsibility of the manager and charger of the orderer's blast site as provided in Government Decree on Safety in Blasting and Quarrying.**

## 9. Disposal

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Since the explosive is pumped into the borehole, usually no contaminated loose explosive material occurs. Kemiitti that may not be fit for use must be disposed of by burning with accessory fuels. The charger or senior charger is allowed to dispose of small quantities of explosive material. Disposal is done by burning with accessory fuels. The maximum quantity to be burnt is 5 kg in one batch and as a layer of maximum 5 cm. The burning shall be done a minimum of 100 metres from a public road or inhabited building.





1. Maximum 5 kg and as a maximum 5 cm thick *layer*.
2. Wood cotton or other equivalent burnable product
3. Wooden base (for example 50 x 100 plank)

Fuel oil is applied to the explosives and burnable accessory fuels and they are lit on the side from which the wind is blowing. For igniting the fire, use a one-meter-long stick with a wood cotton tip doused in fuel oil.

Forcit accepts expired explosives for disposal. No compensation is paid for returned explosives and the cost of disposal is agreed separately case by case.

## 10. Reclamation instructions

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If the product has detectable defects or it does not function in the expected manner, the following data shall immediately be given to Forcit customer care or technical services:

- Product name, manufacturing date and possible time of detonation.
- Product appearance and description of the product's manageability / feel to the touch.
- Operating circumstances in the blast site.

Defective products are delivered to the nearest Forcit service station from which they are delivered to the manufacturing plant for further examination. Returned products must be accompanied with a filled out Forcit product return form which you can print out on our website (<http://www.forcit.fi/forcit-explosives>, menu products). Contact customer care or technical services before returning the product.