



KEMIITTI 810

Product information 13.3.2012

1. Product description and use

Kemiitti 810 is suitable for underground rock quarrying where there is a need for quick and adjustable charging and good water resistance. Kemiitti 810 is charged by pumping it into upward, downward or horizontal boreholes with custom-built charging equipment. The official regulations on loose explosives have to be followed concerning the use of Kemiitti 810 in built areas.

Kemiitti 810 is an in situ matrix sensitized, water-in-oil emulsion explosive that is charged by pumping. Its physical state is grease-like and it is white-yellowish in color. The raw materials of Kemiitti 810 are not classified as explosives. The product is sensitized into explosive not until in the borehole.

2. Packages

The raw materials of Kemiitti 810 (matrix and the additive) are delivered to the customer in transport containers or IBC-containers. The matrix can be stored at site in silos, containers or in 1000 l IBC plastic containers. The additive is stored in a 1000 l IBC-container, for example. The on-site storages must always be approved by the authorities. Forcit technical service will give more information about on-site storing.

Empty unwashed containers are regarded as full containers from the legislation point of view. Transport containers have to have the necessary labels in place also when empty unwashed containers are returned.

Transport classification, matrix	
RID/ADR	5.1 Ammonium nitrate emulsion
IMDG	5.1
UN number	3375
Hazard class	5.1

Transport classification, additive	
RID/ADR	5.1 Nitrates, inorganic, aqueous solution, n.o.s.
IMDG	5.1
UN number	3219
Hazard class	5.1

3. Explosion technical features

Specifications	Unit	
Explosive density	kg/dm ³	1.0
Detonation velocity	m/s	3000 - 5000
Typical and calculated values		
Ignitability		Requires a booster, see point 8.
Explosion heat*	MJ/kg	2.9
Gas volume (NTP)*	l/kg	990
Force / weight unit**	S	0.78
Critical density	kg/dm ³	When the density exceeds 1.25, the ignitability deteriorates quickly
Min. borehole diameter	mm	30
Operating temperature	°C	Min +10
Operation depth in water		Tested 40 m

* Cheetah 2.0 (NTP), theoretical

** Compared to Anfo

4. Main raw materials and their hazard clauses

Raw material	Hazard clause
Ammonium nitrate solution	O; R5-9
Oil	-
Emulsifiers	-

5. Storage life and weather resistance

Kemiitti 810 can remain in a borehole for several months since the oil film surrounding the nitrate solution makes the product insoluble to water.

The product rigidity (viscosity) increases somewhat as the temperature drops. When the product temperature drops below +10 °C, there may be problems with matrix flowability/pumping. According to the manufacturer's tests, the product is at its best until 3 months after the

manufacturing date. It is recommended to store the matrix in a closed container at a temperature of $-10...+25$ °C. Extreme cold and high heat may spoil the matrix.

As the matrix ages its pumpability gradually deteriorates. This cannot be perceived visually. As the product ages further, it will form local concretions and crystallizations or the entire product will harden. At this point the product should not be used (usually there is a thin hardened layer inside the container that does not pose a problem for use).

6. Handling safety

The test values describing the handling safety of Kemiitti 810 are in the same range as those of ANFO. The impact sensitivity of the product is measured in a shooting test, where a 15 g brass cylinder is shot against the explosive and the slowest cylinder speed causing a reaction (explosion, flame, smoke) to the explosive is measured. Kemiitti 810 showed no reaction when the cylinder speed was below 450 m/s. The same value for ANFO is about 400 m/s.

Kemiitti 810 does not ignite easily since it contains water. The most common reason for involuntary ignition (explosion) of similar products has been substance decomposition due to pump misuse. The substance has decomposed due to strong heating. (See the instructions in section 8.)

The used oils are always highly refined marking-free mineral oils (Concawc report 95/59) which have a high flashpoint and low volatility. The emulsifiers are substances used in the food processing and/or cosmetics industry. The ammonium nitrate included in the matrix reacts to caustic substances (e.g. cement and water-glass). This reaction releases strong-smelling ammonia. A very caustic environment decomposes the emulsion.

Although the raw materials used in the manufacture are as harmless as possible, it is recommended to avoid continuous contact of Kemiitti 810 with the skin by using protective gloves. Kemiitti 810 has to be removed from the skin first mechanically (hand towel) and then washed off with water and soap. If explosives come into contact with the eyes, the eyes have to be rinsed with plenty of water. If any irritation persists, seek medical help. Overalls and other working clothes stained with dried explosive can inflame and burn. The explosive has to be removed mechanically from the working clothes and then the clothes can be washed normally with water.

7. Environmental effects

Kemiitti 810 burns very cleanly, because the oxygen providing (nitrates) and burning (oils) substances in the emulsion have a large common contact area. In addition, the manufacturing

technique of Kemiitti 810 is very precise. However, some small amounts of carbon monoxide and nitrogen oxides are always released in an explosion.

All unexploded or otherwise abandoned material on the ground gradually dissolves, so nitrates and oils do end up in the ecosystem. Nitrates have a eutrophic effect on water system and it soils ground waters. Oil may have long-term harmful effects on water environments and risks polluting the soil and groundwater. The environmental impact of nitrates and oils can be minimized by means of careful and precise charging.

8. Instructions for the use

The product is sensitized by adjusting its density to the desired value and charging it to boreholes by pumping it with charging equipment approved by the authorities for this purpose. According to international experience, pumping has been the leading cause of involuntary ignition for emulsion explosives. This has to be considered when charging or transferring Kemiitti from the transport container or storage bin to the charging equipment. It is recommended to carefully review all working instructions and safety equipment for pumping with the explosive manufacturer before commencing work.

The most important safety instructions:

- When the pump is running, the explosive has to flow through the charging equipment.
- The pump has to be stopped immediately if the product does not move in the system. The use of an automatic device (manometer, flow detector) is recommended to ensure stopping.
- The pump has to be equipped with a bursting disc or equivalent device to prevent a strong rise in pressure.
- Foreign objects must be prevented from entering the pump.
- The pump materials have to be chosen to withstand explosives (do not swell, for example).
- The pump has to be dimensioned so that there is no need for a high rotation speed.
- The pump has to have a preventive maintenance program, and it is especially important to check the joints, bearings and lead-throughs.
- The compatibility of substances used for greasing etc. with explosives has to be ensured.

If the equipment has no device for measuring the amount of pumped explosive, the amount has to be estimated from the pumping time, for example, in order to prevent over charging (cleavages).

The density of Kemiitti 810 may rise above the critical density due to several successive pumping, in which case the product will no longer be reliable. Normally the product is not pumped at all when sensitized.

A powerful booster (e.g. ForPrime) and a 1 g detonator are always required to ignite Kemiitti 810. It is not recommended to use a detonating cord for igniting the booster. Kemiitti 810 can be pumped directly into a borehole with water in it. When charging into upward boreholes, it is possible to use special arrangements to improve the immobility of the product in the borehole. In wet conditions it is recommended to use products with cartridges. Blocking an upward water hole may transfer the water leakage into the nearby holes and drop the charged explosives out of them.

Whenever handling the product it is important to understand that, regardless of its insensitivity, it is an explosive that can explode when misused, resulting in serious consequences. During charging it is important to avoid damaging the detonator cap. The detonator cap is best kept inside an appropriate booster. The detonator cap cables may also be damaged by overly brisk hose handling.

An appropriate pumping speed has to be chosen for each and every charging location. A speed that is too high causes unnecessary hassle, overfilled boreholes and explosive wastage, thus placing an unnecessary burden on the environment. The charging has to be performed so that there is a solid explosive column in the borehole. If necessary, the hole charge can be lightened by retracting the charging hose in the hole using a special retracting device. The chosen speed leads to a certain explosive amount per charged meter.

9. Disposal

If you have any doubts regarding the usability of Kemiitti 810, it must be disposed of according to given instructions.