ANFO

ANFO 800

ANFO WR

ANFO UP-HOLE

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1. Product description and use

Anfos are explosives mainly used in large open cast blasts outside of urban areas as well as in underground excavations. There are some special Anfo products developed for specific applications like Anfo WR, which is developed for wet conditions and resists water better than ordinary Anfo, Anfo up-hole is developed for up hole charging having additives for stickiness to better stay in upholes. Anfo 800 gives lower charge density compared to standard Anfo. Anfo is a mix of prilled ammonium nitrate and fuel oil. Special Anfos include harmless additives.

2. Package

Product name	Package	Weight/bag	Weight/stack	Colour code
Anfo	Plastic bag	25 kg	1000 kg	Transparent
Anfo	Large recycle bag	500 kg	750 kg	-
Anfo 800	Plastic bag	25 kg	1000 kg	Orange
Anfo 800	Large recycle bag	400 kg	750 kg	-
Anfo WR	Plastic bag	25 kg	1000 kg	Blue
Anfo up-hole	Plastic bag	20 kg	800 kg	Green

Transport classification	
RID/ADR	1.1D Blasting Explosive, type B
IMDG	1.1 D
UN nro	0082
Hazard class	1.1

3. Technical features: specifications and typical values

Specifications		Anfo	Anfo 800	Anfo WR	Anfo up-hole
Structure		Prills	Prills	Prills	Prills
Density *	kg/dm^3	0.87-0.95	0.75-0.85	0.85-0.95	0.65-0.80
VOD	m/s	> 3 000	> 3 000	> 3 000	> 3 000
Typical and calculated values					
VOD (Ø 55 mm)**	m/s	3 000 – 3 500	3 000 – 3 500	3 000 – 3 500	3 000 – 3 500
Transmission (Ø 40 mm)**	cm	-	-	-	-
Oxygen balance	%	± 0	± 0	- 2,2	- 5,2
Gas volyme***	dm^3/kg	965	965	925	1015
Energy***	MJ/kg	4.00	3.90	3.80	3.55
Relative mass strength ***	S	1.00	0.98	0.95	0.90
Ignition method		Primary charge	Primary charge	Primary charge	Primary charge
Reliability in cold temperatures		Down to -25 °C	Down to -25 °C	Down to -25 °C	Down to -25 °C
Functionality in water		-	-	Short period	-

* density measured in laboratory conditions, density in blast hole depends on charging method

** in steel pipe, free space *** Cheetah 2.0 (NTP), theoretic

4. Main raw materials and risk clauses

Raw material	Risk clause
Ammonium nitrate	O; R8 X_i;R36 Ox. Sol. 3; H272 Eye Irrit. 2; H319
Fuels, Diesel	Xn; R20, R38, R40, R65 N; R51/53 Flam. liq. 3; H226 Asp. tox. 1; H304 Skin Irrit. 2; H315 Acute tox. 4, H332 Carc. 2; H351 STOT RE2; H373 Aquatic Chronic 2; H411

5. Storage life and weather resistance

When Anfos are handled and stored according to instructions, functionality is guaranteed six months from manufacturing date. The product is stored in cool and dry place and according to valid legislation. The frost resistance of Anfos is good and reliability is down to -25°C. Anfos have poor water resistance except WR-Anfo which stands moisture for limited time because of additive.

6. Handling safety

Anfos are CE-marked products, which have been found to fill the EU:s safety requirements. The products have to fill, for instance, the following minimum requirements describing handling safety:

Test	Requirement
Impact sensitivity (BAM)	≥ 2 J
Abrasion sensitivity (Julius Peters)	≥ 80 N
Heat stability	75 ° C, 48 h (no reaction)

Overalls and other work clothes, which have been contaminated with explosives, can catch fire. The explosive is mechanically removed from work clothes and the clothes are then normally washed by wet cleaning.

7. Environmental effects

Non-exploded or spillage Anfo solutes relatively quickly to ground water releasing nitrates and fuel oil into nature. Nitrate has an eutrophicating effect on the water system and it soils ground water. Fuel oil can cause long-term ill-effects in the water environment and create a pollution risk for the ground and ground water.

With careful and tidy charging work and by following directions the environmental effects can be minimized. Also the amount of noxious gases (CO, NO_x) formed from the explosion can be minimized with the right use of the products.

In general the gases formed in explosion are dependent on the oxygen balance of the product and the explosion itself. In ideal case, when having an oxygen balance of zero and a perfect detonation, the remaining gases are basically carbon dioxide, water and nitrogen. In practice, however, the ideal is never reached and the oxygen balance is usually either slightly negative or positive.

Anfo blasting generates small amounts of NOx-gases and carbon monoxide. The more negative the oxygen balance the more CO-gases are generated compared to NOx and vice versa. In open air the gases are quickly diluted, but in underground excavation one must take care of sufficient ventilation.

8. Instructions for the use

According to Finnish regulations, Anfos and other bulk explosives, are allowed to use only outside of urban areas, which is defined as a distance of 200 m from the nearest house and public road.

Anfo blasting requires a booster. Suitable boosters are e.g. Fordyn, Redex, Kemix A and Forprime (in tunneling).

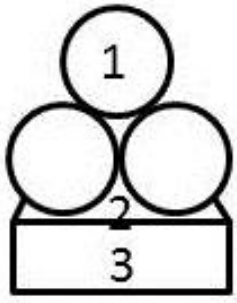
Anfo can be charged either pouring it directly from bag and using a suitable funnel to avoid splatter or by using a mechanised charging unit. Anfo up-hole and Anfo 600 require always a mechanised charging unit to keep Anfo homogenous. It is recommended to use mechanised charging unit also for Anfo WR. The charging density increases when using mechanised charging unit.

Anfo WR is also suitable for moist holes. The holes must, however, be blown empty of water before charging. The use of Anfo in wet conditions is not recommended.

If there is a risk that Anfo is out of date or other way not proper, it can be disposed by burning or blasting.

9. Disposal

Anfo products that are in doubt to not function must be disposed of. 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. Igniting the fire can be done using a one-meter-long stick with a wood cotton tip doused in fuel oil.

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

Explosives to be shipped to Forcit for disposal must have the appropriate denotations. Contact customer care or technical services before shipping the product.

10. Reclamation instructions

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, size and manufacturing date marked on the package
- Product or package appearance
- Description of the product's abnormality
- 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.