Prillex®

High Performance Ammonium Nitrates

Enaex

Ammonium nitrate Prillex® characteristics

Prillex® Low Density Ammonium Nitrate is the main raw material for manufacturing high-quality explosives and blasting agents, especially ANFO (Ammonium Nitrate/ Fuel Oil). It is manufactured by Enaex in the largest and most modern plant in the world, resulting in a product noted for its low density and oil absorption, which give it a low critical diameter, optimum sensitivity and velocity of detonation. Enaex has developed three porous grades to offer a wider range for different applications: Prillex®, Prillex® ULD and Prillex® LR.

Its microporous and microcrystalline structure is obtained through the most advanced technology which gives it a specific density, absorption and strength properties to ensure maximum performance of explosive blends. All Prillex® products can be used in any kind of weather, polar or tropical, without caking or prill deformation (under recommended storage conditions).

The primary benefits of using Prillex as a Blasting Agent, are its higher velocity of detonation and the increase in effecti-ve energy released during detonation. This effective energy released can be measured by using underwater tests.

Electron Microscopy of Prillex® LR crystallization and whole Prill grain.

Planta Prillex América ubicada en Mejillones, Chile
Enaex Prillex America Plant located in Mejillones, Chile

Ammonium nitrate Prillex® uses

The main use of Prillex® ammonium nitrates is the manufacture of ANFO and heavy ANFO, as a low-cost blasting agent compared to other products available in the market.

ANFO
The high porosity of the Prillex® prills allows great oil retention capacity,which reaches over 10%.

Experience has shown that to obtain the Oxygen Balance (5.7% Oil and 94.3% Ammonium Nitrate), the ANFO blend requires a high oil retention capacity prill. Prillex® ensures excellent oil retention, allowing a stoichiometric blend along with an excess of free porosity that allows an effective action of the “Hot Spots” in the explosive blend.

The small dimensions of the pores increase surface tension, thus obtaining better contact between liquid and solid due to the effect of capillarity on the oil that is drawn to the center of the Ammonium Nitrate prills.

Heavy ANFO blends
For instance, in the heavy ANFO’s, Prillex® porosity can sensitize the emulsion phase, thus eliminating the use of glass microspheres or gasifying agents, which is quite interesting from the economical point of view. Prillex® can be used with good results in pumpable AN/emulsion blends that have more than 50% of the desensitized emulsion, which is not possible with other ammonium nitrates. Prillex® delivers the same advantages when used in watergels, doped slurries, and emulsions.

Prillex® in other explosives
In other explosive blends such as Dynamites, Prillex® can also provide better sensitivity and performance due to its high microporosity. Likewise, absorption of Nitroglycerin and Nitroglycol by Prillex® guarantees a product of great stability over time. These same advantages are also obtained in watergels, doped slurries and emulsions.

In Dynamites, absorption of Nitroglycerin/Nitroglycol by Prillex® guarantees a product of great stability in time.

Benefits

Compared to higher density ammonium nitrates, benefits include:

- Fast and homogeneous absorption of oil.
- Its free flowing properties allow a fast loading at the boreholds.
- Any kind of blender can be used improving blending efficiency (stationary, mobile, auger, drums, spray type, auger trucks, etc.).
- The blend is stable and does not lose oil even after several months.
- Higher sensitivity to the shock wave allows reduction of the initiation methods. For this same reason, the detonation stability is quickly reached and closer to the initiation point.
- An increase in the detonation efficiency (a velocity of detonation closer to the theoretical one is reached) is more important for smaller diameters, but keeps its importance for larger diameters.
- Reduction in the explosives consumption.
- Additional energy per foot of drilling.
- Smaller cast booster could be used. Higher safety and blasting reliability.
- Savings in blasting direct costs (drilling, initiators and explosives) and indirect costs such as interruptions during operations.
- Savings in removal and fragmented material costs: reduction in secondary blasting, transportation, loading and milling costs.

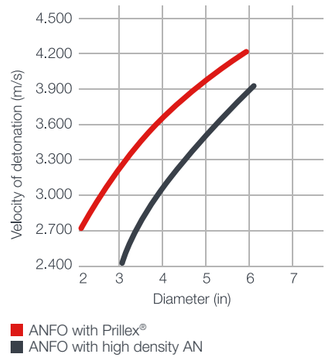
Main Products

Prillex®
This is the main specialized ammonium nitrate Low Density grade for Anfo production and show Enaex state of the art production level.

Prillex® ULD
This newly developed grade, with lower density than standard Prillex®, is specially suitable for smaller diameter applications. The higher interna! porosity marks this product as the most sensitive product in the Prillex® family.

Prillex® LR
It is a special porous product for use in the manufacture of ANFO, especially Heavy ANFO types. Its low density and controlled porosity produces a good oil absorption and good detonation velocity. The particles has a high degradation resistance ensuring good quality even after long storage or transport times. Can be used in both mining and civil applications.

VOD comparison in Confined Steel Pipe
(PRILLEX® x High Density Ammonium Nitrate)



Emulsion Grade Applications

Prillex® FR
Coated Ammonium Nitrate
This ammonium nitrate has high fluidity and it is easy to handle. It is recommended for the manufacture of pumpable emulsions and compatible with most emulsifiers used by the explosive industry.

Prillex® H-Pure
High Purity Ammonium Nitrate without additives.
For particular purposes such as the preparation of Ammonium Nitrate solutions used in the manufacture of pumpable and cartridge emulsions, Enaex has developed Prillex® H-Pure which allows compatibility with all kinds of emulsifiers.

Nasol 84
Enaex can supply, if the distances to the customer facilities allow it, a high purity (84%) ammonium nitrate solution. This solution is transported in inland road tankers or isotanks where loading is done at over 120ºC, in order to reach destination at proper temperatures for use.

This kind of product greatly facilitates the preparation of emulsions at the customer facilities, where no additional heating is required to dissolve the AN, and the product must be maintained at its storage temperature.

Storage and Handling

As a general recommendation, Prillex® bags must be stored protected from rain and sunrays, preferably in a dry environment and respecting the safety distances established by the authorities in each country.

It is highly recommended to rotate the ammonium nitrate while stored, under FIFO rule (First In,First Out).

UV-protected polypropylene outer packing with inner polyethylene bag.

International Classification
Class 5.1
Number UN 1942
Group III
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Transport Type	Packing Type *	Prillex® ULD	Prillex®	Prillex® LR	Prillex® H-PURE	Prillex® FR
Breakbulk	Bigbag	1150	1250	1250	1250	1250
Containers	Bigbag	1.000	1.100	1.100	1.100	1.100
		1.150	1.250	1.250	1.250	1.250
	Smallbag	-	25	25	25	25

* Expressed in Kg.

Technical Features

	Prillex® ULD	Prillex®	Prillex® LR
Description	Ultra Low Density Ammonium Nitrate	Low Density Ammonium Nitrate	Low Density Ammonium Nitrate
Purity (NH_4NO_3)	99,6% Min	99,4% Min	99,5% Min
Moisture	0,07% Max	0,16% Max	0,15% Max
pH 25°C (sol 10% w/w)	4,5 - 6,0	4,5 - 6,0	4,5 - 6,0
Fragility Test (DuPontTL-53)	35 Max	35 Max	30 Max
Bulk Density	0,68 ± 0,02 g/ml	0,72 ± 0,02 g/ml	0,75 ± 0,02 g/ml
Oil Absorption (F.O. N°2)	10% Min	10% Min	10% Min
Particle Size	> 2 mm - 15% Max	> 2 mm - 15% Max	> 2 mm - 15% Max
	Below 1 mm - 5% Max	Below 1 mm - 5% Max	Below 1 mm - 5% Max
External Additive	1050 ppm	1000 ppm	950 ppm
Internal Additive	Yes	Yes	Yes
Velocity of Detonation[1] m/s	4.412	4.216	4.167

(1) Measured as normal ANFO, confined in 6" Ø, steel pipe, initiated with a 450g cast booster-typical values.

	Prillex® H-PURE	Prillex® FR	Nasol 84[1]
Description	High Purity A.N. for Cartridge Emulsion	Free Flowing A.N. for Bulk Emulsion	High Purity A.N. Solution for Emulsions
Purity (NH_4NO_3)	99,8% Min	99,6% Min	84% ± 2
Moisture	1% Max	0,5% Max	-
pH 25°C (sol 10% w/w)	4,5 - 6,0	4,5 - 6,0	4,5 - 6,0 [2]
Density (g/ml)	-	-	1,30 - 1,40
External Additive	-	700 - 1000 ppm	-
Internal Additive	-	0 ppm	-
Temperature Loading Range (ºC)	-	-	90 - 120

(1) Nitrogen content: Total 34,50% minimum dry basis.
Nitric 17,25% minimum dry basis.
Ammonia 17,25% minimum dry basis.
(2) pH at 25°C (40% w/w solution).

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+562 2837 7600
El Trovador 4253
Las Condes - Santiago - Chile
enaex@enaex.com

www.enaex.com