



FUSES

F-CORD 10

DETONEX 5

DETONEX 10

SAFETY FUSE

Cordtex Premium

Product information December 12, 2018

1. Product description and use

The explosive of a DETONATING CORD is pentrite (PETN). Two layers of polypropylene thread have been twined around the explosive and the cord resulting from this process has been coated with plastic. The plastic may be PVC or more environmentally friendly thermoplastic. Cordtex Premium is coated with waxed textile yarn.

Detonating cord is used for example in quarries and in precision stoping as well as smooth wall blasting when several boreholes are to be detonated simultaneously. Often in the aforementioned work, the charging used is so light that the detonation is not transmitted securely without a detonating cord. A detonating cord is used also in open pit mining to ensure continuation of the detonation.

Cordtex Premium and Detonex 5 detonating cord is recommended for igniting shock tube (for example Daveytube – shock tube) and detonating cap (for example Daveynel). Detonex 10 can be used same way as F-cord 10.

SAFETY FUSE is a ductile cord twined of cotton threads and coated with black polyethylene plastic. The core of the fuse contains black powder. Safety fuse is primarily used in quarrying and in small blasts with detonating cord caps.

Forcitra produces F-Cord 10. Detonex-, Cordtex cords and safety fuse are imported by Forcitra.

2. Packages

Product	φ/mm	Quantity m/spool	Quantity m/case	Net weight** /case	Thread colour
F-cord 10	*	200	1000	10,0 kg	Yellow
Detonex 10	5	250	500	5,0 kg	Red
Detonex 5	3,7	500	1000	5,0 kg	Red
Cordtex Premium	4.1	300	1200	6.4 kg	Black and red
Safety fuse	5.1±0.1	250	1000	6.1 kg	Black

*F-cord is mangled so that its cross-section is oval in shape. In round threads, the diameter of F-cord 10 is about 5 mm.

** Explosive.

Transportation classification – Detonating cord	
RID/ADR /IMDG Hazard Class	1.1D
UN number	0065
Proper Shipping Name	Fuses, detonating, flexible

Transportation classification – Safety fuse	
RID/ADR /IMDG Hazard Class	1.4 S
UN number	0105
Proper Shipping Name	Fuse, safety

3. Explosion technical features

Specifications	Unit	F-cord 10	Detonex 10	Detonex 5	Cordtex Premium
Coating		Yellow plastic	Red plastic	Red plastic	Black and red textile yarn
Oxygen balance	%	Negative	Negative	Negative	Negative
Quantity of explosive	g/m	10	10	5	5.3±0,5
Velocity of detonation	m/s	> 6 000	> 6 000	> 6 000	> 6 600
Initiation sensitivity with detonation cap		Detonator sensitive	Detonator sensitive	Detonator sensitive	Detonator sensitive
Functionality in cold temperature		Reliable down to -30°C	Reliable down to -30°C	Reliable down to -30°C	Reliable down to -30°C

Properties	Unit	Safety fuse
Coating		Black plastic
Quantity of black powder	g/m	6.1
Burning velocity	s/m	120 ± 12
Initiation sensitivity		Open flame or electrical igniter
Operation reliability		Operation reliable from -30 °C to +50 °C

4. Main raw materials and their hazard clauses

Raw material	Exploding detonating cord	Delayed detonating cord
Pentrite (PETN)	E; R3	-
Black powder (S, KNO ₃)	-	O; R8

5. Storage and weather resistance

The shelf life of detonating cords and safety fuse are excellent, when the products are stored in a dry and cool location in accordance with valid legislation.

The detonating cords and the safety fuse have good frost resistance. The products ignite reliably down to -30 degrees C.

The water resistance of detonating cords is good. Note, however, that if an open end of the cord is under the water surface, water will absorb into the pentrite core of the cord, especially when under hydrostatic pressure.

The water resistance of the safety fuse is good. Note, however, that humidity absorbed into the cord through its open end results in the cord not igniting in the wet spot.

6. Handling safety

Avoid skin contact with the explosive contained by the cord.

All the detonating and safety fuses that have been produced and sold by Forcitr are CE approved products fulfilling the essential safety requirements of the EU directive. The products must fulfil for example the following minimum requirements describing handling safety:

Test	Requirement
Shock sensitivity (BAM)	≥ 10 J
Thermal stability	75°C, 48 h (no reaction)

7. Environmental impact

Unexploded or otherwise residual pentrite does not dissolve into water but remains as such in nature. Dry pentrite causes danger of explosion. Residual pentrite in the ground is wetted and collected for disposal, see chapter 9.

The quantity of harmful combustion gases (CO, NO_x) generated by the explosion can be reduced by correct use of the products. (See Operating instructions, chapter 8.)

As a general rule, the generation of gases in the explosion depends on the oxygen balance and on how complete the explosion is. In ideal conditions, in which the oxygen balance is zero and the explosion is complete, the main explosion products are carbon dioxide, water vapour and nitrogen gas. However, in practice this ideal situation is not reached and the oxygen balance is usually either slightly negative or positive.

In open space, the oxygen balance of a detonating cord is negative, which means that small amounts of NO_x gases and carbon monoxide are generated in the explosion. The more negative the oxygen balance, the more CO gases are generated in proportion to nitrogen oxides. In an open space, these gases dissipate quickly. When blasting in a confined space, underground, in an excavation or other location in which toxic or harmful explosion gases

may accumulate, one should not enter the blast site until the explosion gases have dissipated (for example by ventilation) enough to no longer pose a health hazard.

The spools of detonating cord can be returned to the factory for reuse.

8. Operating instructions

8.1 F-cord 10

F-cord 10 (coated with PVC plastic) and F-cord 10T (coated with thermoplastic) detonating cords are used for example in quarrying as well as precision stoping and smooth wall blasting, when several boreholes are to be detonated simultaneously. Often in the aforementioned work, the charging used is so light that the detonation is not transmitted or does not continue securely without a detonating cord. Detonating cord is used also in open pit mining to ensure continuation of the detonation for example when using pipecharges. F-cord 10T, coated with thermoplastic, generates less soot and is somewhat more rigid than the F-cord 10 coated with PVC.

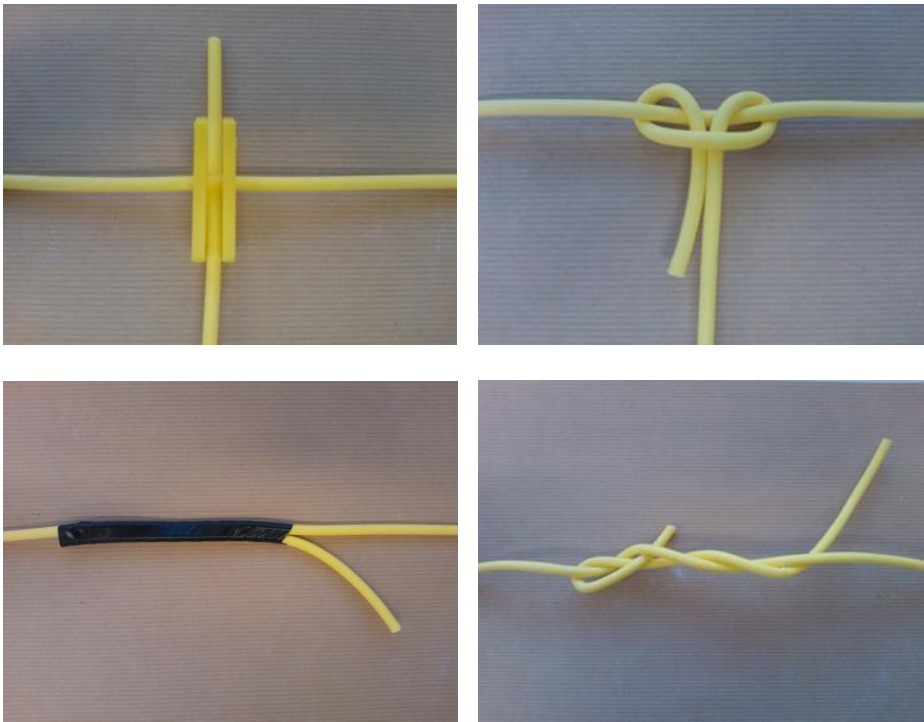
A detonating cord is insensitive to electric hazard factors such as thunder, except straight strike of lightning.

When igniting several boreholes simultaneously using a detonating cord, the detonating cord is attached to the lowest (preferably) cartridge of each borehole for example with rubbered tape. The detonating cords coming up from the boreholes are connected to each other with the so-called trunkline that is also a detonating cord.

The detonating cord is cut on a piece of wood or other non-metallic surface with a sharp knife or normally in the air with a knife.

Making branches:

The downlines are connected to the trunkline using MULTICLIPS (securest way), by a knot or rubbered tape. Distance in branching should be at least 20 cm. Explosion direction is from left to right in pictures.



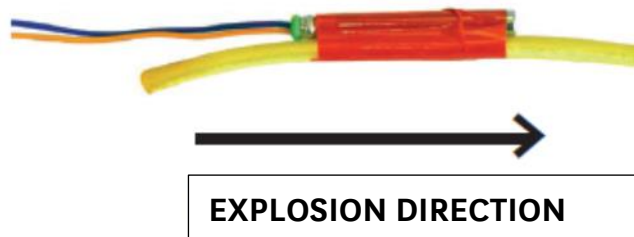
The trunkline must not be pulled too tense because the pull caused by the explosion may disconnect even a secure connection. Wrapping the cords together at least 10cm with the bottom pointing in the cord's direction.

Making joints:

The cord can be extended by knotting, taping or "twisting".



The detonating cord is ignited with a detonator cap that is taped to the cord so that the bottom of the cap is toward the direction of propagation of the explosion.



Using detonating cords in wet conditions:

During rain or other wet conditions the charger must make sure that the ends of detonating cords do not come into contact with water. If the end of the cord has come into contact with water, the charger must cut off the wet end of the cord and dispose of it for example in the charged space to be blasted.

In wet conditions, the charger must provide enough extra cord to the connections so that the possible absorption of water does not reach the point of connection. Based on the tests we have done, water proceeds in the cord at the rate: 10cm -30min, 15cm-one hour, 35cm – six hours.

When using detonating cords, pay attention especially to the following:

- the cords must not be pulled carelessly in rough terrain because the plastic coating must be intact for the cords to function reliably
- The trunkline and downlines must not be too tense so that the pull caused by the detonation front does not damage the cords.
- when unspooling the cord, the spool must be turning freely so that the cord is not twisted
- when unspooling the last part of a spool in frosty weather, make sure the plastic coating does not crack
- cords detonating at different times must not be closer than 20cm to each other
- the charged cords must not have sharp turns.

8.2 Detonex 5 and Cordtex Premium

Detonex 5 and Cordtex Premium detonating cords are used together with shocktube initiation system in many different ways. The said ways to use are described in detail in operation manuals. The handling of these products do not deviate from the handling of the F-cord 10 detonating cord presented above.

8.3 Safety fuse

The charger must always check the appropriate condition of the safety fuse before blasting. A detonating cap (number 8) is connected to the safety fuse by pressing it tightly into the cord using appropriate pliers or special pressing device. The detonating cap must be emptied of possible impurities by tapping it into the palm of the hand before connecting to the safety fuse. Right before connecting, the end of the safety fuse must be cut perpendicularly with a sharp knife (cut off 1-3cm) to ensure that the gunpowder core functions reliably on the contact surface of the cap. Pressing the cap to the cord must be done to the side of the person pressing it so that the cap is pointed away from dangerous targets.

When charging with gunpowder, the cord and possible detonator cap must be put into the hole so that they reach the middle third of the gunpowder charge. After charging, the fuse must reach at least 0.5 metres away from the mouth of the borehole.

According to the Order Instructions on Blasting and Quarrying Work, the legal minimum length of the safety fuse used in blasting is 60cm. In addition to this, in borehole charging, the cord must reach at least 20cm from the mouth of borehole. In trenching, the length of the safety fuse must be at least 1m and in rocky terrain at least 1,5 m.

If water accumulates in the charge hole, the connection between the cap and the fuse must be protected from humidity using a rubbered tape or some other appropriate means.

If there is a doubt that safety fuse will not burn securely and evenly, test burning can be done. For example 10 cm of safety fuse can be used to evaluate burning time and its relation to product specification.

The shelf life of Safety fuse and detonating cap is guaranteed for two years. In special circumstances and separately agreed the latest use date can be lengthened for 1 year, when testing is done by Forcitr.

9. Disposal

All fuses that are in doubt to not function must be disposed of in borehole within normal blasting. Safety fuse disposal is done by burning with accessory fuels. A qualified person can dispose small amount of explosives according to legislation. More information is found from manufacturer or distributor.

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.