NON-ELECTRIC DETONATORS
All commercial detonators require an initiating spark which may be produced by one of the following:

a) Flame from core in burning safety fuse:
   Plain detonator.

b) Fusion of bridge wire by an electric current:
   Electric detonator.

c) Flame from initiation of reactive powder in a tube:
   Shock tube detonator.

NONEL NEPD
This is a shock tube detonator system manufactured by Dyno Nobel, Sweden which contains no primary explosive in its composition thus making it safer in use.

There are three Nonel detonator types:
1. Nonel MS
2. Nonel LP
3. Nonel Unidet

1. *Nonel MS
   This is a short delay detonator system of 25ms increments from period No. 3 (75ms) to period No. 20 (500ms). The detonator tubes are connected using either a Snapline connector or low energy detonating cord. (3.6-5.0g/m).

* Special order

2. Nonel LP
   This is a long period delay for use in underground applications. It is available in delay periods from No. 0 to No. 60 with time delay of 25 to 6000 ms nominal time with 6m the length. Tubes are connected using either Bunch connectors or low energy detonating cord (3.6-5.6 g/m)

3. Nonel Unidet
   This is a detonator system designed for surface applications. The principle is that the same delay period is used for every hole with the timing between holes being affected by surface delays incorporated into connector units. For double-decked holes a common delay period is used for the bottom deck with another common delay for the top deck. Unidets are available in the following delays:

   Nominal time* (ms)
   U 450 450
   U 475 475
   U 500 500

   * Nominal times with 6m length tubes.

SURFACE DELAY
SNAPLINE CONNECTOR UNITS

<table>
<thead>
<tr>
<th>Delay Time* (ms)</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Green</td>
</tr>
<tr>
<td>17</td>
<td>Yellow</td>
</tr>
<tr>
<td>25</td>
<td>Red</td>
</tr>
<tr>
<td>42</td>
<td>White</td>
</tr>
<tr>
<td>67</td>
<td>Blue</td>
</tr>
</tbody>
</table>

*Nominal time with 3.6m length tubes.
Snapline Connector units contain a detonator with a reduced base charge as well as a small primary explosive charge.

NONEL ACCESSORIES
1. Bunch Connectors
   The Bunch Connector is used in tunnel blasting and is designed to initiate a maximum of 20 Nonel tubes at the same time. It consists of a snapline 0 connector block coupled to a loop of low energy detonating cord.

2. Snapline Starter
   This is a Snapline 0 connector with a long tube for connecting the blast round to the firing apparatus.

   Tube lengths
   50.0m 2 per bag 10 per box
   100.0m 1 per bag 5 per box

See over for safety data ➤
SAFETY DATA

SHOCK TUBE DETONATORS
N O N - E L E C T R I C  D E T O N A T O R S

1. CHEMICAL COMPOSITION
The explosive elements of a detonator consist of lead azide and pentaaerythritol tetranitrate (PETN). The delay elements consist of various chemicals, mainly lead oxide, silicon, antimony, and potassium permanganate.

2. HAZARDS IDENTIFICATION
Detonators are classified Division 1.1 i.e. substances which have a mass explosion risk. Some detonators have been designed in such a way that they may be classified as U.N. Division 1.4 i.e. they will not set off adjacent detonators.

3. FIRST AID MEASURES
A single detonator exploding accidentally will cause serious injury as it will produce metal splinters. Treat as any traumatic injury. Get urgent medical assistance.

4. FIRE FIGHTING MEASURES
In the event of fire there is a risk of explosion. Any fire involving detonators must NOT be fought. An area of at least 300 metres around the fire should be evacuated, and the site of the fire must not be approached until it is absolutely certain that the fire is out.

5. ACCIDENTAL RELEASE MEASURES
Damaged detonators should be disposed of by being put into a drill hole and detonated.

6. HANDLING AND STORAGE
Detonators must be handled with care and not subjected to naked flame, high temperatures, friction or shock. Tubing should never be put under excessive tensile strain. Smoking while handling detonators is strictly forbidden. Storage of Nonel detonators is permitted only by the Government Inspector of Explosives who will lay down the conditions of storage.

7. EXPOSURE CONTROL AND PERSONAL PROTECTION
When handled properly detonators do not present any serious hazard to personnel.

8. PHYSICAL AND CHEMICAL PROPERTIES
Description: Detonator of aluminium with non-electric wire of the low energy type (plastic tubing covered with a reactive substance).

<table>
<thead>
<tr>
<th>Solidifying/melting point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic of the tube</td>
</tr>
<tr>
<td>PETN in the cap</td>
</tr>
<tr>
<td>Ignition temperature</td>
</tr>
</tbody>
</table>

Each detonator has approximately one gramme of explosive and varying amounts of delay compound. (For further details see over).

9. STABILITY AND REACTIVITY

Stability
It is recommended that Nonel detonators are stored at a maximum temperature not exceeding 50°C. Dangerous combustion products:
- Nitrous gasses (NOx)
- Carbon monoxide and
- 0.03g Pb.

On detonation metallic splinters are created.

10. TOXICOLOGICAL INFORMATION
There is no toxic hazard from intact detonators. However should the ingredients become exposed there will be a toxic hazard from lead azide and lead fumes.

11. ECOLOGICAL INFORMATION
When burned these explosives will detonate and give off some nitrous and lead fumes.

12. DISPOSAL CONSIDERATIONS
See Accidental release measures above.

13. TRANSPORT INFORMATION
Explosives may only be transported as laid down in the relevant legislation viz.
- S.I. No. 38 of 1995
- S.I. No. 151 of 1960
- S.I. No. 309 of 1973
- S.I. No. 317 of 1981
- S.I. No. 275 of 1986 and
- any legislation that may be enacted.

14. REGULATORY INFORMATION

15. OTHER INFORMATION
The following is an extract under the above heading from the Safety Data Sheet of the manufacturer of the product, Dyno Nobel:

“Nonel detonators are made without a primary explosive which make them safer to manufacture and handle. Sensitivity to impact and friction is significantly less than in caps made with the more sensitive primary explosives. Nonel blasting caps do not contain any carcinogenic components or raw materials and the amount of lead is very low. By using new substances which are not classified as hazardous to the environment we have greatly reduced the amount of dangerous residues produced when the blasting caps are detonated. It is our aim to develop products which are as environmentally friendly as possible. Lead, for example, has to a great extent been replaced by non-classified substances. The detonation of a single blasting cap produces one litre of gas which must be regarded as minimal in this context in comparison with the amount of gas produced by the blast”.

The information and recommendations are given without warranty, expressed or implied, statutory or otherwise, and no liability shall be accepted for the consequence of any reliance placed thereon. Recipients should make their own tests to determine the suitability of products for their particular purposes.

NOTE: If in any doubt concerning the correct use of the above products contact Irish Industrial Explosives Ltd.

IMPORTANT: If considering destruction of surplus products in the field please refer to Recommended methods for the destruction of explosives and accessories.