1122 NONEL® Non-electric Delay Detonators 1.1 0029 pages 2-23

1122 NONEL® Non-electric Delay Detonators 1.1 0360 pages 24-45

1122 NONEL® Non-electric Delay Detonators 1.4B pages 46-66
## SECTION 1: Identification of the substance/mixture and of the company/undertaking

- **1.1 Product identifier**
  - Trade name: NONEL® Non-electric Delay Detonators
  - Article number: 1122
  - Other product identifiers:
    - NONEL® MS
    - NONEL® EZ DET®
    - NONEL® MS ARCTIC
    - NONEL® EZTL™
    - NONEL® LP NONEL®
    - EZ DRIFTER ®
    - NONEL® SL
    - NONEL® SUPER
    - NONEL® TD
    - NONEL® MS CONNECTOR
    - NONEL® TWINPLEX™
    - NONEL® STARTER

- **1.2 Relevant identified uses of the substance or mixture and uses advised against**
  No further relevant information available.

- **1.3 Details of the supplier of the Safety Data Sheet**
  - **Manufacturer/Supplier:**
    Dyno Nobel Inc.
    2795 East Cottonwood Parkway, Suite 500
    Salt Lake City, Utah 84121
    Phone: 801-364-4800
    Fax: 801-321-6703
    E-Mail: dnna.hse@am.dynonobel.com

- **1.4 Emergency telephone number:**
  CHEMTREC
  1-800-424-9300 (US/Canada)
  +01 703-527-3887 (International)

## SECTION 2: Hazards identification

- **2.1 Classification of the substance or mixture**
  - **Classification according to Regulation (EC) No 1272/2008**
    Classifications listed also are applicable to the OSHA GHS Hazard Communication Standard (29CFR1910.1200).
  - Exploding bomb

  Expl. 1.1 H201 Explosive; mass explosion hazard.
Classification according to Directive 67/548/EEC or Directive 1999/45/EC

E; Explosive

Risk of explosion by shock, friction, fire or other sources of ignition.

Information concerning particular hazards for human and environment:
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

Additional information:
There are no other hazards not otherwise classified that have been identified.
0 percent of the mixture consists of component(s) of unknown toxicity.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008
The product is additionally classified and labelled according to the Globally Harmonized System within the United States (GHS).
The product is classified and labelled according to the CLP regulation.

Hazard pictograms

GHS01

Signal word Danger

Hazard-determining components of labelling:
potassium perchlorate
pentaerythritol tetranitrate (PETN)

Hazard statements
H201 Explosive; mass explosion hazard.

Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P250 Do not subject to grinding/shock/friction.
P264 Wash thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P240 Ground/bond container and receiving equipment.
P270 Do not eat, drink or smoke when using this product.
P373 DO NOT fight fire when fire reaches explosives.
P370+P380 In case of fire: Evacuate area.
P372 Explosion risk in case of fire.
P401 Store in accordance with local/regional/national/international regulations.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Additional information:
EUH208 Contains diazodinitro phenol (DDNP). May produce an allergic reaction.
### Hazard description:

#### WHMIS-symbols:
Explosive products are not classified under WHMIS.
Not hazardous under WHMIS.

#### NFPA ratings (scale 0 - 4)

<table>
<thead>
<tr>
<th>Health</th>
<th>Fire</th>
<th>Reactivity</th>
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<td>0</td>
<td>1</td>
<td>4</td>
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Health = 1
Fire = 0
Reactivity = 4

Not available.

#### HMIS-ratings (scale 0 - 4)

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>*0</td>
<td>0</td>
<td>4</td>
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</table>

Health = *0
Fire = 0
Reactivity = 4

Not available.

### HMIS Long Term Health Hazard Substances

<table>
<thead>
<tr>
<th>Substance ID</th>
<th>Substance Name</th>
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<tbody>
<tr>
<td>13424-46-9</td>
<td>lead diazide</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>lead</td>
</tr>
<tr>
<td>13463-67-7</td>
<td>titanium dioxide</td>
</tr>
<tr>
<td>7758-97-8</td>
<td>lead chromate</td>
</tr>
<tr>
<td>7778-74-7</td>
<td>potassium perchlorate</td>
</tr>
</tbody>
</table>

### 2.3 Other hazards

#### Results of PBT and vPvB assessment

- **PBT:** Not applicable.
- **vPvB:** Not applicable.

#### Explosive Product Notice

**PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES** - The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

**WARNING** - All explosives are dangerous and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, DO NOT USE IT before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

(Contd. on page 4)
### SECTION 3: Composition/information on ingredients

#### 3.2 Mixtures

**Description:**
Mixture of substances listed below with nonhazardous additions. Some delay periods may contain potassium perchlorate. Those that do contain between from about 4 to a maximum of approximately 60 mg perchlorate per detonator.

#### Dangerous components:

| CAS     | EINECS       | Index number | Substance                     | R3          | R60-61-48/23/25 | N R50/53 | Repr. Cat. 1 | H360Df | STOT RE 2 | H372 | Aquatic Acute 1 | H400 | Aquatic Chronic 1 | H410 | Acute Tox. 4 | H302 | Acute Tox. 4 | H332 | Aquatic Acute 1 | H400 | Aquatic Chronic 1 | H410 | Acute Tox. 4 | H302 | Acute Tox. 4 | H332 |
|---------|--------------|--------------|-------------------------------|-------------|-----------------|------------|---------------|--------|------------|-----|----------------|------|----------------|------|--------------|------|----------------|------|----------------|------|--------------|------|----------------|------|--------------|------|----------------|------|
| 78-11-5 | 201-084-3    | 603-035-00-5 | Pentaerythritol tetranitrate (PETN) | E R3        |                 |            |               |        |            |     |                 |      |                 |      |               |      |               |      |                 |      |               |      |               |      |               |      |
| 13424-46-9 | 236-542-1   | 082-003-00-7 | Lead diazide                  | T Repr. Cat. 1, 3 R61; Xn R62-20/22; E R3; N R50/53 |                 |            |               |        |            |     |                 |      |                 |      |               |      |               |      |                 |      |               |      |               |      |               |      |               |      |
| 7439-92-1 | 231-100-4    |              | Lead                          | T Repr. Cat. 1 R60-61-48/23/25; N R50/53 |                 |            |               |        |            |     |                 |      |                 |      |               |      |               |      |                 |      |               |      |               |      |               |      |               |      |               |      |
| 7440-21-3 | 231-130-8    |              | Silicon                       | F R11       |                 |            |               |        |            |     |                 |      |                 |      |               |      |               |      |                 |      |               |      |               |      |               |      |               |      |               |      |
| 7782-49-2 | 231-957-4    | 034-001-00-2 | Selenium                      | T R23/25    |                 |            |               |        |            |     |                 |      |                 |      |               |      | Acute Toxic 3 | H301 | Acute Toxic 3 | H331 | STOT RE 2 | H373 | Aquatic Chronic 4 | H413 |               |      |               |      |               |      |
| 1314-41-6 | 215-235-6    | 082-001-00-6 | Orange lead                   | T Repr. Cat. 1, 3 R61; Xn R62-20/22; N R50/53 |                 |            |               |        |            |     |                 |      |                 |      |               |      | Carc. 1B, H350; Repr. 1A, H360Df | STOT RE 2 | H373 | Aquatic Acute 1 | H400 | Aquatic Chronic 1 | H410 | Acute Toxic 4 | H302 | Acute Toxic 4 | H332 |
| 13463-67-7 | 236-675-5    |              | Titanium dioxide              | Substance with a Community workplace exposure limit |                 |            |               |        |            |     |                 |      |                 |      |               |      |               |      |               |      |               |      |               |      |               |      |               |      |               |      |

(Contd. on page 5)
<table>
<thead>
<tr>
<th>CAS: 10294-40-3</th>
<th>barium chromate</th>
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<td>EINECS: 233-660-5</td>
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<td>CAS: 7778-74-7</td>
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<td>EINECS: 231-912-9</td>
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<td>Index number: 017-008-00-5</td>
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<td>CAS: 61790-53-2</td>
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<tr>
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<td>EINECS: 231-143-9</td>
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<td>EINECS: 231-072-3</td>
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<td>Index number: 013-001-00-6</td>
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<td>EINECS: 231-146-5</td>
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<td>CAS: 2691-41-0</td>
<td>octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)</td>
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<td>Index number: 013-001-00-6</td>
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<td>CAS: 4682-03-5</td>
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<td>EINECS: 231-917-2</td>
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<td>SVHC</td>
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<tr>
<td>1314-41-6</td>
<td>orange lead</td>
</tr>
<tr>
<td>7758-97-6</td>
<td>lead chromate</td>
</tr>
</tbody>
</table>

Additional information:
For the listed ingredients, the identity and exact percentages are being withheld as a trade secret.
For the wording of the listed risk phrases refer to section 16.
SECTION 4: First aid measures

4.1 Description of first aid measures

General information:
Immediately remove any clothing soiled by the product. Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

After inhalation:
Unlikely route of exposure. Supply fresh air; consult doctor in case of complaints.

After skin contact:
Generally the product does not irritate the skin. Wash with soap and water. If skin irritation is experienced, consult a doctor.

After eye contact:
Remove contact lenses if worn. Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

After swallowing:
Rinse out mouth and then drink plenty of water. Do not induce vomiting; call for medical help immediately.

4.2 Most important symptoms and effects, both acute and delayed
Blast injury if mishandled.

Hazards
Danger of blast or crush-type injuries.
Harmful if swallowed.
Danger of disturbed cardiac rhythm.

4.3 Indication of any immediate medical attention and special treatment needed
Medical supervision for at least 48 hours. Product may produce physical injury if mishandled. Treatment of these injuries should be based on the blast and compression effects.

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing agents: DO NOT fight fire when fire reaches explosives.
For safety reasons unsuitable extinguishing agents: None.

5.2 Special hazards arising from the substance or mixture
DO NOT ATTEMPT TO FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions. Can explode or detonate under fire conditions. Burning material may produce toxic vapors. It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications. Explosive; mass explosion hazard.

5.3 Advice for firefighters
Protective equipment:
Wear self-contained respiratory protective device.
Wear fully protective suit.
SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
- Remove persons from danger area.
- Ensure adequate ventilation.
- Wear protective clothing.
- Protect from heat.
- Evacuate area.
- Isolate area and prevent access.

6.2 Environmental precautions: No special measures required.

6.3 Methods and material for containment and cleaning up:
- Pick up mechanically.
- Send for recovery or disposal in suitable receptacles.
- Dispose unusable material as waste according to item 13.

6.4 Reference to other sections
- See Section 7 for information on safe handling.
- See Section 8 for information on personal protection equipment.
- See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
- Open and handle receptacle with care.
- Handle with care. Avoid jolting, friction and impact.
- Use only in well ventilated areas.
- Do not subject to grinding/shock/friction.

Information about fire - and explosion protection:
- Protect from heat.
- Prevent impact and friction.
- Emergency cooling must be available in case of nearby fire.

7.2 Conditions for safe storage, including any incompatibilities
- Storage:
  Requirements to be met by storerooms and receptacles:
  - Store in a cool location.
  - Avoid storage near extreme heat, ignition sources or open flame.
  Information about storage in one common storage facility: Store away from foodstuffs.
  Further information about storage conditions:
  - Store under lock and key and with access restricted to technical experts or their assistants only.
### SECTION 8: Exposure controls/personal protection

- **Additional information about design of technical facilities:** No further data; see item 7.
- **8.1 Control parameters**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>PEL (USA)</th>
<th>REL (USA)</th>
<th>TLV (USA)</th>
<th>EL (Canada)</th>
<th>EV (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9 lead diazide</td>
<td>Long-term value: 0.05 mg/m³ as Pb; See 29 CFR 1910.1025</td>
<td>Long-term value: 0.05* mg/m³ as Pb;*8-hr TWA; See Pocket Guide App. C</td>
<td>Long-term value: 0.05 mg/m³ as Pb; BEI</td>
<td>Long-term value: 0.05 mg/m³ as Pb; IARC 2A, R</td>
<td></td>
</tr>
<tr>
<td>7439-92-1 lead</td>
<td>Long-term value: 0.05* mg/m³ *see 29 CFR 1910,1025</td>
<td>Long-term value: 0.05* mg/m³ *8-hr TWA, excl. lead arsenate; See Pocket Guide App. C</td>
<td>Long-term value: 0.05* mg/m³ *and inorganic compounds, as Pb; BEI</td>
<td>Long-term value: 0.05 mg/m³ R; IARC 2B</td>
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<tr>
<td>7440-21-3 silicon</td>
<td>Long-term value: 15* 5** mg/m³ *total dust **respirable fraction</td>
<td>Long-term value: 10* 5** mg/m³ *total dust **respirable fraction</td>
<td>TLV withdrawn</td>
<td>Long-term value: 10* 3** mg/m³ *total dust;**respirable fraction</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Long-term value: 10 mg/m³ total dust</td>
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</table>
# Trade name: NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>Chemical</th>
<th>PEL (USA)</th>
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<th>TLV (USA)</th>
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<th>EV (Canada)</th>
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<tr>
<td><strong>7782-49-2 selenium</strong></td>
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<td>Long-term value: 0,2 mg/m³ as Se</td>
<td>Long-term value: 0,2 mg/m³ as Se</td>
<td>Long-term value: 0,1 mg/m³</td>
<td>Long-term value: 0,2 mg/m³</td>
</tr>
<tr>
<td><strong>1314-41-6 orange lead</strong></td>
<td>Long-term value: 0,05 mg/m³ as Pb; See 29 CFR 1910,1025</td>
<td>Long-term value: 0,05* mg/m³ as Pb;*8-hr TWA; See Pocket Guide App. C</td>
<td>Long-term value: 0,05 mg/m³ as Pb; BEI</td>
<td>Long-term value: 0,05 mg/m³ as Pb; IARC 2A, R</td>
<td>Long-term value: 0,05 mg/m³ as Pb, Skin (organic compounds)</td>
</tr>
<tr>
<td><strong>13463-67-7 titanium dioxide</strong></td>
<td>Long-term value: 15* mg/m³ *total dust</td>
<td>See Pocket Guide App. A</td>
<td>Long-term value: 10 mg/m³ withdrawn from NIC</td>
<td>Long-term value: 10* 3** mg/m³ *total dust;**respirable fraction; IARC 2B</td>
<td>Long-term value: 10 mg/m³ total dust</td>
</tr>
<tr>
<td><strong>10294-40-3 barium chromate</strong></td>
<td>Long-term value: 0,005* mg/m³ Ceiling limit: 0,1** mg/m³ *as Cr(VI) **as CrO3; see 29 CFR 1910,1026</td>
<td>Long-term value: 0,0002 mg/m³ as Cr; See Pocket Guide Apps. A and C</td>
<td>Long-term value: 0,01 mg/m³ as Cr</td>
<td>Long-term value: 0,01 mg/m³ as Cr; ACGIH A1 IARC 1</td>
<td>(Contd. on page 10)</td>
</tr>
</tbody>
</table>
### Trade name: NONEL® Non-electric Delay Detonators

#### 7758-97-6 lead chromate

| IOELV (EU) | Long-term value: 2 mg/m³ as Cr |
| PEL (USA)  | Long-term value: 0,005* mg/m³ as Cr(VI), 0,002 mg/m³ as CrO₃; see 29 CFR 1910,1026 |
| REL (USA)  | Long-term value: 0,0002 mg/m³ as Cr; See Pocket Guide Apps. A and C |
| TLV (USA)  | Long-term value: 0,05* 0,012** mg/m³ as Pb, BEI; **as Cr |
| EL (Canada)| Long-term value: 0,05* 0,012** mg/m³ ACIGH A2, IARC 2A; R; as Pb; **as Cr |
| EV (Canada)| Long-term value: 0,012* 0,05** mg/m³ as Cr, **as Pb |

#### 7727-43-7 barium sulphate, natural

| PEL (USA)  | Long-term value: 15* 5** mg/m³ total dust, **respirable fraction |
| REL (USA)  | Long-term value: 10* 5** mg/m³ total dust, **respirable fraction |
| TLV (USA)  | Long-term value: 5* mg/m³ inhalable fraction; E |
| EL (Canada)| Long-term value: 10* 3** mg/m³ total dust, **respirable fraction |
| EV (Canada)| Long-term value: 10 mg/m³ total dust |

#### 61790-53-2 Diatomaceous earth (Silica-Amorphous)

| PEL (USA)  | 20mppcf or 80mg/m³/%SiO₂ |
| REL (USA)  | Long-term value: 6 mg/m³ See Pocket Guide App. C |
| TLV (USA)  | TLV withdrawn |
| EL (Canada)| Long-term value: 4* 1,5** mg/m³ total, **respirable |
| EV (Canada)| Long-term value: 10* 3** mg/m³ uncalcined; *inhalable; **respirable |

#### 7439-98-7 molybdenum

| PEL (USA)  | Long-term value: 15* mg/m³ total dust |
| TLV (USA)  | Long-term value: 10* 3** mg/m³ as Mo; *inhalable fraction **respirable fraction |
| EL (Canada)| Long-term value: 3* 10** mg/m³ as Mo; *respirable **inhalable |
### Trade name: NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Long-term value: 10* 3** mg/m³</th>
<th>Metal, insol. compd.: inh; resp; sol. compd.: resp</th>
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<tbody>
<tr>
<td>7440-33-7 tungsten</td>
<td>PEL (USA)</td>
<td>Short-term value: 10 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Long-term value: 5 mg/m³</td>
<td>as W</td>
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<tr>
<td></td>
<td>REL (USA)</td>
<td>Short-term value: 10 mg/m³</td>
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<td></td>
<td>Long-term value: 5 mg/m³</td>
<td>as W</td>
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<tr>
<td></td>
<td>TLV (USA)</td>
<td>Short-term value: 10 mg/m³</td>
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<tr>
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<td>Long-term value: 5 mg/m³</td>
<td>as W</td>
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<tr>
<td></td>
<td>EL (Canada)</td>
<td>Short-term value: 10 mg/m³</td>
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<td></td>
<td>Long-term value: 5 mg/m³</td>
<td>as W</td>
</tr>
<tr>
<td></td>
<td>EV (Canada)</td>
<td>Short-term value: 10* 3** mg/m³</td>
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<tr>
<td></td>
<td>Long-term value: 5* 1** mg/m³</td>
<td>(as tungsten; compds.: water-insol.; water-sol.</td>
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<tr>
<td>7429-90-5 aluminium powder (pyrophoric)</td>
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<td>Long-term value: 15*; 15** mg/m³</td>
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<td>*Total dust; ** Respirable fraction</td>
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<td>REL (USA)</td>
<td>Long-term value: 10* 5** mg/m³</td>
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<tr>
<td></td>
<td>as Al*Total dust**Respirable/pyro powd./welding f.</td>
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<tr>
<td></td>
<td>TLV (USA)</td>
<td>Long-term value: 1* mg/m³</td>
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<td></td>
<td>as Al; *as respirable fraction</td>
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<td></td>
<td>EL (Canada)</td>
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<td>7440-36-0 antimony</td>
<td>PEL (USA)</td>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td></td>
<td>as Sb</td>
<td></td>
</tr>
<tr>
<td></td>
<td>REL (USA)</td>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td></td>
<td>as Sb</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TLV (USA)</td>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td></td>
<td>as Sb</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EL (Canada)</td>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
<tr>
<td></td>
<td>EV (Canada)</td>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
</tbody>
</table>

- **DNELs** No further relevant information available.
- **PNECs** No further relevant information available.

**Ingredients with biological limit values:**

1. **13424-46-9 lead diazide**
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Concentration</th>
<th>Medium</th>
<th>Time</th>
<th>Parameter</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>7439-92-1 lead</td>
<td>30 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>7439-92-1 lead</td>
<td>10 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>7439-92-1 lead</td>
<td>10 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead (women of child bearing potential)</td>
<td></td>
</tr>
<tr>
<td>1314-41-6 orange lead</td>
<td>30 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>1314-41-6 orange lead</td>
<td>10 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>1314-41-6 orange lead</td>
<td>10 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead (women of child bearing potential)</td>
<td></td>
</tr>
<tr>
<td>10294-40-3 barium chromate</td>
<td>25 µg/L</td>
<td>urine</td>
<td>end of shift at end of workweek</td>
<td>Total chromium (fume)</td>
<td></td>
</tr>
<tr>
<td>10294-40-3 barium chromate</td>
<td>10 µg/L</td>
<td>urine</td>
<td>increase during shift</td>
<td>Total chromium (fume)</td>
<td></td>
</tr>
<tr>
<td>7758-97-6 lead chromate</td>
<td>30 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>7758-97-6 lead chromate</td>
<td>10 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>7758-97-6 lead chromate</td>
<td>10 µg/100 ml</td>
<td>blood</td>
<td>not critical</td>
<td>Lead (women of child bearing potential)</td>
<td></td>
</tr>
</tbody>
</table>

- **Additional information:** The lists valid during the making were used as basis.
- **8.2 Exposure controls**
- **Personal protective equipment:**
  - **General protective and hygienic measures:**
    - The usual precautionary measures are to be adhered to when handling chemicals.
    - Keep away from foodstuffs, beverages and feed.
    - Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin.

- **Respiratory protection:**
  Not required under normal conditions of use. Respiratory protection may be required after product use.

- **Protection of hands:**
  Wear gloves for the protection against mechanical hazards according to NIOSH or EN 388.

- **Material of gloves**
  The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

- **Penetration time of glove material**
  The exact breakthrough time has to be found out by the manufacturer of the protective gloves and has to be observed.

- **Eye protection:**
  Safety glasses

- **Face protection**
  Impervious protective clothing

- **Body protection**
  Impervious protective clothing

- **Limitation and supervision of exposure into the environment**
  No further relevant information available.

- **Risk management measures**
  Organizational measures should be in place for all activities involving this product.

---

**SECTION 9: Physical and chemical properties**

- **9.1 Information on basic physical and chemical properties**
- **General Information**
  - **Appearance:**
    - **Form:** Solid material
    - **Colour:** According to product specification
  - **Odour:** Characteristic
  - **Odour threshold:** Not determined.
  - **pH-value:** Not applicable.

- **Change in condition**
  - **Melting point/Melting range:** Not Determined.
  - **Boiling point/Boiling range:** Undetermined.
  - **Flash point:** Not applicable.

- **Flammability (solid, gaseous):** Explosive; mass explosion hazard.

- **Auto/Self-ignition temperature:** Not determined.

- **Decomposition temperature:** Not determined.
Trade name: NONEL® Non-electric Delay Detonators

- Self-igniting: Product is not self-igniting.
- Danger of explosion: Risk of explosion by shock, friction, fire or other sources of ignition.
- Explosion limits:
  - Lower: Not determined.
  - Upper: Not determined.
- Vapour pressure: Not applicable.
- Density: Not determined.
- Relative density: Not determined.
- Vapour density: Not applicable.
- Evaporation rate: Not applicable.
- Solubility in / Miscibility with water: Variable, dependent upon product composition and packaging.
- Partition coefficient (n-octanol/water): Not determined.
- Viscosity:
  - Dynamic: Not applicable.
  - Kinematic: Not applicable.
- 9.2 Other information: No further relevant information available.

SECTION 10: Stability and reactivity

- 10.1 Reactivity
- 10.2 Chemical stability
- Thermal decomposition / conditions to be avoided:
  Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- 10.3 Possibility of hazardous reactions
  Danger of explosion.
  Toxic fumes may be released if heated above the decomposition point.
- 10.4 Conditions to avoid: No further relevant information available.
- 10.5 Incompatible materials: No further relevant information available.
- 10.6 Hazardous decomposition products:
  Carbon monoxide and carbon dioxide
  Hydrocarbons
  Nitrogen oxides
  Chlorine compounds
  Leadoxide vapour
  Bariumoxide vapour
  Toxic metal oxide smoke
  Danger of forming toxic pyrolysis products.
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity:

- LD/LC50 values relevant for classification:
  
<table>
<thead>
<tr>
<th>Compound</th>
<th>Oral LD50/LC50 (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7439-92-1 lead</td>
<td>&gt;2000 mg/kg (rat)</td>
</tr>
<tr>
<td>7782-49-2 selenium</td>
<td>6700 mg/kg (rat)</td>
</tr>
<tr>
<td>7758-97-6 lead chromate</td>
<td>12000 mg/kg (mouse)</td>
</tr>
</tbody>
</table>

Primary irritant effect:
- on the skin: Not a skin irritant in unused form. Vapors/particles from used product are possibly irritating to skin.
- on the eye: Not an eye irritant in unused form. Vapors/particles from used product are possibly irritating to eyes.
- Sensitisation: No sensitising effects known.
- Subacute to chronic toxicity: No further relevant information available.
- Additional toxicological information:
  The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
  - Harmful
    - Acute effects (acute toxicity, irritation and corrosivity):
      - Danger of blast or crush-type injuries.
      - Harmful if swallowed.
    - Repeated dose toxicity: No further relevant information available.

SECTION 12: Ecological information

12.1 Toxicity
- Aquatic toxicity: No further relevant information available.
- 12.2 Persistence and degradability: No further relevant information available.
- 12.3 Bioaccumulative potential: No further relevant information available.
- 12.4 Mobility in soil: No further relevant information available.
- Additional ecological information:
  - General notes:
    - Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
    - Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
  - 12.5 Results of PBT and vPvB assessment
    - PBT: Not applicable.
    - vPvB: Not applicable.
Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and
OSHA GHS

Trade name: NONEL® Non-electric Delay Detonators

12.6 Other adverse effects
No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Recommendation
Must not be disposed together with household garbage. Do not allow product to reach sewage system.
Damaged materials pose a danger to anyone in the immediate area; consult experts for disposal of damaged products.
The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes. Residual materials should be treated as hazardous.
Uncleaned packaging:
Recommendation: Disposal must be made according to official regulations.

SECTION 14: Transport information

14.1 UN-Number
DOT, ADR, IMDG UN0029
IATA FORBIDDEN

14.2 UN proper shipping name
DOT, IMDG DETONATORS, NON-ELECTRIC
ADR 0029 DETONATORS, NON-ELECTRIC
IATA FORBIDDEN

14.3 Transport hazard class(es)

DOT

- Class 1.1
- Label 1.1

ADR, IMDG

- Class 1.1
- Label 1.1B

IATA

- Class FORBIDDEN
- 14.4 Packing group
- DOT, ADR, IMDG II

(Contd. on page 17)
### SECTION 15: Regulatory information

| 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture |
| United States (USA) |
| Section 355 (extremely hazardous substances): |
| None of the ingredients are listed. |
| Section 313 (Specific toxic chemical listings): |
| 13424-46-9 | lead diazide |
| 7439-92-1 | lead |
| 7782-49-2 | selenium |
| 1314-41-6 | orange lead |
| 10294-40-3 | barium chromate |
| 7758-97-6 | lead chromate |
| 7727-43-7 | barium sulphate, natural |
| 7429-90-5 | aluminium powder (pyrophoric) |
| 7440-36-0 | antimony |
| TSCA (Toxic Substances Control Act): |
| All ingredients are listed. |

(Contd. on page 18)
### Proposition 65 (California):

- **Chemicals known to cause cancer:**
  - 13424-46-9 lead diazide
  - 7439-92-1 lead
  - 1314-41-6 orange lead
  - 13463-67-7 titanium dioxide
  - 10294-40-3 barium chromate
  - 7758-97-6 lead chromate

- **Chemicals known to cause reproductive toxicity for females:**
  - 7439-92-1 lead
  - 10294-40-3 barium chromate
  - 7758-97-6 lead chromate

- **Chemicals known to cause reproductive toxicity for males:**
  - 7439-92-1 lead
  - 10294-40-3 barium chromate
  - 7758-97-6 lead chromate

- **Chemicals known to cause developmental toxicity:**
  - 13424-46-9 lead diazide
  - 7439-92-1 lead
  - 10294-40-3 barium chromate
  - 7758-97-6 lead chromate

### Carcinogenic Categories

- **EPA (Environmental Protection Agency)**
  - 13424-46-9 lead diazide B2
  - 7439-92-1 lead B2
  - 7782-49-2 selenium D
  - 1314-41-6 orange lead B2
  - 10294-40-3 barium chromate A(inh), D(oral), K/L(inh), CBD(oral)
  - 7758-97-6 lead chromate K
  - 7727-43-7 barium sulphate, natural D, CBD(oral), NL(oral)
  - 7778-74-7 potassium perchlorate NL
  - 2691-41-0 octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) D

- **IARC (International Agency for Research on Cancer)**
  - 13424-46-9 lead diazide 2A
  - 7439-92-1 lead 2B
  - 7782-49-2 selenium 3
  - 1314-41-6 orange lead 2A
  - 13463-67-7 titanium dioxide 2B

---

*(Contd. on page 19)*
Table 1: Ingredients

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Chemical Name</th>
<th>Safety Class/Precaution</th>
</tr>
</thead>
<tbody>
<tr>
<td>10294-40-3</td>
<td>Barium chromate</td>
<td>1 (A1)</td>
</tr>
<tr>
<td>7758-97-6</td>
<td>Lead chromate</td>
<td>1 (A2)</td>
</tr>
<tr>
<td>61790-53-2</td>
<td>Diatomaceous earth (Silica-Amorphous)</td>
<td>3 (A3)</td>
</tr>
</tbody>
</table>

**TLV (Threshold Limit Value established by ACGIH)**

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Chemical Name</th>
<th>Safety Class/Precaution</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9</td>
<td>Lead diazide</td>
<td>A3</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>Lead</td>
<td>A3</td>
</tr>
<tr>
<td>1314-41-6</td>
<td>Orange lead</td>
<td>A3</td>
</tr>
<tr>
<td>13463-67-7</td>
<td>Titanium dioxide</td>
<td>A4</td>
</tr>
<tr>
<td>10294-40-3</td>
<td>Barium chromate</td>
<td>A1</td>
</tr>
<tr>
<td>7758-97-6</td>
<td>Lead chromate</td>
<td>A2</td>
</tr>
<tr>
<td>7439-98-7</td>
<td>Molybdenum</td>
<td>A3</td>
</tr>
<tr>
<td>7429-90-5</td>
<td>Aluminium powder (pyrophoric)</td>
<td>A4</td>
</tr>
</tbody>
</table>

**NIOSH-Ca (National Institute for Occupational Safety and Health)**

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Chemical Name</th>
<th>Safety Class/Precaution</th>
</tr>
</thead>
<tbody>
<tr>
<td>13463-67-7</td>
<td>Titanium dioxide</td>
<td></td>
</tr>
<tr>
<td>10294-40-3</td>
<td>Barium chromate</td>
<td></td>
</tr>
<tr>
<td>7758-97-6</td>
<td>Lead chromate</td>
<td></td>
</tr>
</tbody>
</table>

**Canada**

- **Canadian Domestic Substances List (DSL)**
  - Some components are listed on the NDSL.
  - All ingredients are listed.

- **Canadian Ingredient Disclosure list (limit 0.1%)**
  - 7439-92-1 Lead
  - 7782-49-2 Selenium
  - 10294-40-3 Barium chromate
  - 7758-97-6 Lead chromate

- **Canadian Ingredient Disclosure list (limit 1%)**
  - 7439-98-7 Molybdenum
  - 7440-33-7 Tungsten
  - 7429-90-5 Aluminium powder (pyrophoric)
  - 7440-36-0 Antimony

**Other regulations, limitations and prohibitive regulations**

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

- **Substances of very high concern (SVHC) according to REACH, Article 57**
  - 13424-46-9 Lead diazide
  - 1314-41-6 Orange lead
  - 7758-97-6 Lead chromate
### SECTION 16: Other information

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**Relevant phrases**

- H200 Unstable explosives.
- H201 Explosive; mass explosion hazard.
- H228 Flammable solid.
- H250 Catches fire spontaneously if exposed to air.
- H261 In contact with water releases flammable gases.
- H271 May cause fire or explosion; strong oxidiser.
- H301 Toxic if swallowed.
- H302 Harmful if swallowed.
- H311 Toxic in contact with skin.
- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H319 Causes serious eye irritation.
- H331 Toxic if inhaled.
- H332 Harmful if inhaled.
- H350 May cause cancer.
- H360Df May damage the unborn child. Suspected of damaging fertility.
- H360FD May damage fertility. May damage the unborn child.
- H372 Causes damage to organs through prolonged or repeated exposure.
- H373 May cause damage to organs through prolonged or repeated exposure.
- H400 Very toxic to aquatic life.
- H410 Very toxic to aquatic life with long lasting effects.
- H413 May cause long lasting harmful effects to aquatic life.
- R11 Highly flammable.
- R15 Contact with water liberates extremely flammable gases.
- R17 Spontaneously flammable in air.
- R2 Risk of explosion by shock, friction, fire or other sources of ignition.
- R20/22 Harmful by inhalation and if swallowed.
- R22 Harmful if swallowed.
- R23/25 Toxic by inhalation and if swallowed.
- R24 Toxic in contact with skin.
### Abbreviations and acronyms:

- **ADR**: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
- **IMDG**: International Maritime Code for Dangerous Goods
- **DOT**: US Department of Transportation
- **IATA**: International Air Transport Association
- **GHS**: Globally Harmonised System of Classification and Labelling of Chemicals
- **ACGIH**: American Conference of Governmental Industrial Hygienists
- **EINECS**: European Inventory of Existing Commercial Chemical Substances
- **ELINCS**: European List of Notified Chemical Substances
- **CAS**: Chemical Abstracts Service (division of the American Chemical Society)
- **NFPA**: National Fire Protection Association (USA)
- **HMIS**: Hazardous Materials Identification System (USA)
- **WHMIS**: Workplace Hazardous Materials Information System (Canada)
- **DNEL**: Derived No-Effect Level (REACH)
- **PNEC**: Predicted No-Effect Concentration (REACH)
- **LC50**: Lethal concentration, 50 percent
- **LD50**: Lethal dose, 50 percent
- **Explosives, Division 1.1**
- **Explosives, Unstable explosives**
- **Flammable solids, Hazard Category 2**
- **Pyrophoric Solids, Hazard Category 1**
- **Substances and Mixtures which, in contact with water, emit flammable gases, Hazard Category 2**
- **Oxidising Solids, Hazard Category 1**
- **Acute toxicity, Hazard Category 3**
- **Acute toxicity, Hazard Category 4**
- **Skin corrosion/irritation, Hazard Category 2**
- **Serious eye damage/eye irritation, Hazard Category 2**
- **Carcinogenicity, Hazard Category 1A**
- **Carcinogenicity, Hazard Category 1B**
- **Reproductive toxicity, Hazard Category 1A**
- **Reproductive toxicity, Hazard Category 1A**
- **Specific target organ toxicity - Repeated exposure, Hazard Category 1**
- **Specific target organ toxicity - Repeated exposure, Hazard Category 2**
- **Hazardous to the aquatic environment - Acute Hazard, Category 1**
- **Hazardous to the aquatic environment - Chronic Hazard, Category 1**
- **Hazardous to the aquatic environment - Chronic Hazard, Category 4**

### Sources

- SDS Prepared by: ChemTel Inc.
- 1305 North Florida Avenue

---

**Safety Data Sheet**

**according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS**

**Trade name: NONEL® Non-electric Delay Detonators**

<p>| R3 | Extreme risk of explosion by shock, friction, fire or other sources of ignition. |
| R33 | Danger of cumulative effects. |
| R36/38 | Irritating to eyes and skin. |
| R43 | May cause sensitisation by skin contact. |
| R45 | May cause cancer. |
| R48/23/25 | Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed. |
| R50/53 | Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. |
| R53 | May cause long-term adverse effects in the aquatic environment. |
| R60 | May impair fertility. |
| R61 | May cause harm to the unborn child. |
| R62 | Possible risk of impaired fertility. |
| R9 | Explosive when mixed with combustible material. |</p>
<table>
<thead>
<tr>
<th>Trade name: NONEL® Non-electric Delay Detonators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tampa, Florida USA 33602-2902</td>
</tr>
<tr>
<td>Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573</td>
</tr>
<tr>
<td>Website: <a href="http://www.chemtelinc.com">www.chemtelinc.com</a></td>
</tr>
</tbody>
</table>

(Contd. of page 21)
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
- Trade name: NONEL® Non-electric Delay Detonators
- Article number: 1122
- Other product identifiers:
  - NONEL® MS
  - NONEL® EZ DET®
  - NONEL® MS ARCTIC
  - NONEL® EZTL™
  - NONEL® LP NONEL®
  - EZ DRIFTER ®
  - NONEL® SL
  - NONEL® SUPER
  - NONEL® TD
  - NONEL® MS CONNECTOR
  - NONEL® TWINPLEX™
  - NONEL® STARTER

1.2 Relevant identified uses of the substance or mixture and uses advised against
- No further relevant information available.

Application of the substance / the mixture
- Explosive product.
- Commercial blasting applications

1.3 Details of the supplier of the Safety Data Sheet
- Manufacturer/Supplier:
  Dyno Nobel Inc.
  2795 East Cottonwood Parkway, Suite 500
  Salt Lake City, Utah 84121
  Phone: 801-364-4800
  Fax: 801-321-6703
  E-Mail: dnna.hse@am.dynonobel.com

1.4 Emergency telephone number:
- CHEMTREC
  1-800-424-9300 (US/Canada)
  +01 703-527-3887 (International)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
- Classification according to Regulation (EC) No 1272/2008
  Classifications listed also are applicable to the OSHA GHS Hazard Communication Standard (29CFR1910.1200).

exploding bomb

Expl. 1.1 H201 Explosive; mass explosion hazard.

(Contd. on page 2)
### Classification according to Directive 67/548/EEC or Directive 1999/45/EC

- **Xn; Harmful**
- **E; Explosive**

#### Information concerning particular hazards for human and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

#### Classification system:

The classification is according to the latest editions of the EU-lists, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

#### Additional information:

There are no other hazards not otherwise classified that have been identified. 0 percent of the mixture consists of component(s) of unknown toxicity.

### 2.2 Label elements

#### Labelling according to Regulation (EC) No 1272/2008

The product is additionally classified and labelled according to the Globally Harmonized System within the United States (GHS). The product is classified and labelled according to the CLP regulation.

#### Hazard pictograms

- GHS01

#### Signal word

Danger

#### Hazard-determining components of labelling:

- potassium perchlorate
- pentaerythritol tetranitrate (PETN)

#### Hazard statements

- **H201 Explosive; mass explosion hazard.**

#### Precautionary statements

- **P210** Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- **P250** Do not subject to grinding/shock/friction.
- **P264** Wash thoroughly after handling.
- **P280** Wear protective gloves/protective clothing/eye protection/face protection.
- **P240** Ground/bond container and receiving equipment.
- **P270** Do not eat, drink or smoke when using this product.
- **P373** DO NOT fight fire when fire reaches explosives.
- **P370+P380** In case of fire: Evacuate area.
- **P372** Explosion risk in case of fire.
- **P401** Store in accordance with local/regional/national/international regulations.
Trade name: NONEL® Non-electric Delay Detonators

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- **Additional information:**
  - EUH208 Contains diazodinitro phenol (DDNP). May produce an allergic reaction.

- **Hazard description:**
  - WHMIS-symbols: Explosive products are not classified under WHMIS.
  - NFPA ratings (scale 0 - 4) Not available.

- **HMIS-ratings (scale 0 - 4) Not available

**HMIS Long Term Health Hazard Substances**

| 13424-46-9 | lead diazide |
| 7439-92-1 | lead |
| 13463-67-7 | titanium dioxide |
| 7758-97-6 | lead chromate |
| 7778-74-7 | potassium perchlorate |

**2.3 Other hazards**

- **Results of PBT and vPvB assessment**
  - PBT: Not applicable.
  - vPvB: Not applicable.

**Explosive Product Notice**

PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES - The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

WARNING - All explosives are dangerous and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, DO NOT USE IT before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

**SECTION 3: Composition/information on ingredients**

- **3.2 Mixtures**
  - **Description:**
    Mixture of substances listed below with nonhazardous additions.
    Some delay periods may contain potassium perchlorate. Those that do contain between from about 4 to a maximum of approximately 60 mg perchlorate per detonator.
### Dangerous components:

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>EINECS</th>
<th>Index Number</th>
<th>Chemical Name</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>78-11-5</td>
<td>201-084-3</td>
<td>603-035-00-5</td>
<td>pentaerythritol tetranitrate (PETN)</td>
<td>E R3, Unst. Expl., H200</td>
</tr>
<tr>
<td>13424-46-9</td>
<td>236-542-1</td>
<td>082-003-00-7</td>
<td>lead diazide</td>
<td>T Repr. Cat. 1, 3 R61; Xn R62-20/22, E R3; N R50/53 R33</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>231-100-4</td>
<td></td>
<td>lead</td>
<td>T Repr. Cat. 1 R60-61-48/23/25; N R50/53</td>
</tr>
<tr>
<td>7440-21-3</td>
<td>231-130-8</td>
<td></td>
<td>silicon</td>
<td>F R11, Flam. Sól. 2, H228</td>
</tr>
<tr>
<td>7782-49-2</td>
<td>231-957-4</td>
<td>034-001-00-2</td>
<td>selenium</td>
<td>R33-53, Acute Tox. 3, H301; Acute Tox. 3, H331; STOT RE 1, H372</td>
</tr>
<tr>
<td>1314-41-6</td>
<td>215-235-6</td>
<td>082-001-00-6</td>
<td>orange lead</td>
<td>T Repr. Cat. 1, 3 R61; Xn R62-20/22; N R50/53 R33</td>
</tr>
<tr>
<td>13463-67-7</td>
<td>236-675-5</td>
<td></td>
<td>titanium dioxide</td>
<td>Substance with a Community workplace exposure limit</td>
</tr>
<tr>
<td>10294-40-3</td>
<td>233-660-5</td>
<td>056-002-00-7</td>
<td>barium chromate</td>
<td>Xn R20/22</td>
</tr>
<tr>
<td>7758-97-6</td>
<td>231-846-0</td>
<td>082-004-00-2</td>
<td>lead chromate</td>
<td>T Carc. Cat. 2, Repr. Cat. 1, 3 R45-61; Xn R62; N R50/53 R33</td>
</tr>
</tbody>
</table>

(Contd. of page 5)
### Trade name: NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>CAS: 7727-43-7</th>
<th>barium sulphate, natural substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-784-4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7778-74-7</th>
<th>potassium perchlorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-912-9</td>
<td></td>
</tr>
<tr>
<td>Index number: 017-008-00-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ox. Sol. 1, H271; Acute Tox. 4, H302</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 61790-53-2</th>
<th>Diatomaceous earth (Silica-Amorphous) substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-107-2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7439-98-7</th>
<th>molybdenum substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-107-2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7440-33-7</th>
<th>tungsten substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-143-9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7429-90-5</th>
<th>aluminium powder (pyrophoric)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-072-3</td>
<td></td>
</tr>
<tr>
<td>Index number: 013-001-00-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F R15-17</td>
</tr>
<tr>
<td></td>
<td>Pyr. Sol. 1, H250; Water-react. 2, H261</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7440-36-0</th>
<th>antimony substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-146-5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 2691-41-0</th>
<th>octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 220-260-0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T R24; Xn R22; E R2</td>
</tr>
<tr>
<td></td>
<td>Expl. 1.1, H201</td>
</tr>
<tr>
<td></td>
<td>Acute Tox. 3, H301; Acute Tox. 3, H311</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 4682-03-5</th>
<th>diazodinitro phenol (DDNP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Xi R36/38; Xi R43; E R3</td>
</tr>
<tr>
<td></td>
<td>Unst. Expl., H200</td>
</tr>
<tr>
<td></td>
<td>Skin Irrit. 2, H315; Eye Irrit. 2, H319; Skin Sens. 1, H317</td>
</tr>
</tbody>
</table>

**Additional information:**
For the listed ingredients, the identity and exact percentages are being withheld as a trade secret.
For the wording of the listed risk phrases refer to section 16.

### SECTION 4: First aid measures

**4.1 Description of first aid measures**

**General information:**
Immediately remove any clothing soiled by the product. Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

**After inhalation:**
Unlikely route of exposure. Supply fresh air; consult doctor in case of complaints.
Trade name: NONEL® Non-electric Delay Detonators

- **After skin contact:**
  Generally the product does not irritate the skin.
  Wash with soap and water.
  If skin irritation is experienced, consult a doctor.

- **After eye contact:**
  Remove contact lenses if worn.
  Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

- **After swallowing:**
  Rinse out mouth and then drink plenty of water.
  Do not induce vomiting; call for medical help immediately.

- **4.2 Most important symptoms and effects, both acute and delayed** Blast injury if mishandled.

- **Hazards**
  Danger of blast or crush-type injuries.
  Harmful if swallowed.
  Danger of disturbed cardiac rhythm.

- **4.3 Indication of any immediate medical attention and special treatment needed**
  Medical supervision for at least 48 hours.
  Product may produce physical injury if mishandled. Treatment of these injuries should be based on the blast and compression effects.

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**SECTION 5: Firefighting measures**

- **5.1 Extinguishing media**
  **Suitable extinguishing agents:** DO NOT fight fire when fire reaches explosives.
  **For safety reasons unsuitable extinguishing agents:** None.

- **5.2 Special hazards arising from the substance or mixture**
  DO NOT ATTEMPT TO FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions. Can explode or detonate under fire conditions. Burning material may produce toxic vapors. It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications.
  Explosive; mass explosion hazard.

- **5.3 Advice for firefighters**
  **Protective equipment:**
  Wear self-contained respiratory protective device.
  Wear fully protective suit.

- **Additional information**
  Eliminate all ignition sources if safe to do so.
SECTION 6: Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures
  Remove persons from danger area.
  Ensure adequate ventilation
  Wear protective clothing.
  Protect from heat.
  Evacuate area.
  Isolate area and prevent access.
- 6.2 Environmental precautions: No special measures required.
- 6.3 Methods and material for containment and cleaning up:
  Pick up mechanically.
  Send for recovery or disposal in suitable receptacles.
  Dispose unusable material as waste according to item 13.
- 6.4 Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.

SECTION 7: Handling and storage

- 7.1 Precautions for safe handling
  Open and handle receptacle with care.
  Handle with care. Avoid jolting, friction and impact.
  Use only in well ventilated areas.
  Do not subject to grinding/shock/friction.
- Information about fire - and explosion protection:
  Protect from heat.
  Prevent impact and friction.
  Emergency cooling must be available in case of nearby fire.
- 7.2 Conditions for safe storage, including any incompatibilities
  - Storage:
    - Requirements to be met by storerooms and receptacles:
      Store in a cool location.
      Avoid storage near extreme heat, ignition sources or open flame.
    - Information about storage in one common storage facility: Store away from foodstuffs.
    - Further information about storage conditions:
      Store under lock and key and with access restricted to technical experts or their assistants only.
      Keep away from heat.
- 7.3 Specific end use(s) No further relevant information available.

SECTION 8: Exposure controls/personal protection

- Additional information about design of technical facilities: No further data; see item 7.
## 8.1 Control parameters

### Ingredients with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>Trade name</th>
<th>NONEL® Non-electric Delay Detonators</th>
</tr>
</thead>
</table>

| PEL (USA) | Long-term value: 0,05 mg/m³ as Pb; See 29 CFR 1910,1025 |
| REL (USA) | Long-term value: 0,05* mg/m³ as Pb;*8-hr TWA; See Pocket Guide App. C |
| TLV (USA) | Long-term value: 0,05 mg/m³ as Pb; BEI |
| EL (Canada) | Long-term value: 0,05 mg/m³ as Pb; IARC 2A, R |

<table>
<thead>
<tr>
<th>7439-92-1 lead</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 0,05* mg/m³</td>
</tr>
<tr>
<td>REL (USA)</td>
<td>Long-term value: 0,05* mg/m³ *8-hr TWA, excl. lead arsenate; See Pocket Guide App. C</td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>Long-term value: 0,05* mg/m³ *and inorganic compounds, as Pb; BEI</td>
</tr>
<tr>
<td>EL (Canada)</td>
<td>Long-term value: 0,05 mg/m³ R; IARC 2B</td>
</tr>
<tr>
<td>EV (Canada)</td>
<td>Long-term value: 0,05 mg/m³ as Pb, Skin (organic compounds)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7440-21-3 silicon</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 15* 5** mg/m³ *total dust **respirable fraction</td>
</tr>
<tr>
<td>REL (USA)</td>
<td>Long-term value: 10* 5** mg/m³ *total dust **respirable fraction</td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>TLV withdrawn</td>
</tr>
<tr>
<td>EL (Canada)</td>
<td>Long-term value: 10* 3** mg/m³ *total dust;**respirable fraction</td>
</tr>
<tr>
<td>EV (Canada)</td>
<td>Long-term value: 10 mg/m³ total dust</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7782-49-2 selenium</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 0,2 mg/m³ as Se</td>
</tr>
<tr>
<td>REL (USA)</td>
<td>Long-term value: 0,2 mg/m³ as Se</td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>Long-term value: 0,2 mg/m³ as Se</td>
</tr>
<tr>
<td>EL (Canada)</td>
<td>Long-term value: 0,1 mg/m³</td>
</tr>
<tr>
<td>EV (Canada)</td>
<td>Long-term value: 0,2 mg/m³</td>
</tr>
</tbody>
</table>

(Contd. on page 9)
### 1314-41-6 orange lead

<table>
<thead>
<tr>
<th>Standard</th>
<th>Exposure Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 0,05 mg/m³ as Pb; See 29 CFR 1910,1025</td>
<td></td>
</tr>
<tr>
<td>REL (USA)</td>
<td>Long-term value: 0,05 mg/m³ as Pb; 8-hr TWA; See Pocket Guide App. C</td>
<td></td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>Long-term value: 0,05 mg/m³ as Pb; BEI</td>
<td></td>
</tr>
<tr>
<td>EL (Canada)</td>
<td>Long-term value: 0,05 mg/m³ as Pb; IARC 2A, R</td>
<td></td>
</tr>
<tr>
<td>EV (Canada)</td>
<td>Long-term value: 0,05 mg/m³ as Pb; Skin (organic compounds)</td>
<td></td>
</tr>
</tbody>
</table>

### 13463-67-7 titanium dioxide

<table>
<thead>
<tr>
<th>Standard</th>
<th>Exposure Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 15 mg/m³ as total dust</td>
<td></td>
</tr>
<tr>
<td>REL (USA)</td>
<td>See Pocket Guide App. A</td>
<td></td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>Long-term value: 10 mg/m³ withdrawn from NIC</td>
<td></td>
</tr>
<tr>
<td>EL (Canada)</td>
<td>Long-term value: 10 mg/m³ as total dust; **respirable fraction; IARC 2B</td>
<td></td>
</tr>
<tr>
<td>EV (Canada)</td>
<td>Long-term value: 10 mg/m³ total dust</td>
<td></td>
</tr>
</tbody>
</table>

### 10294-40-3 barium chromate

<table>
<thead>
<tr>
<th>Standard</th>
<th>Exposure Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 0,005 mg/m³ as Cr(VI) **as CrO3; see 29 CFR 1910,1026</td>
<td></td>
</tr>
<tr>
<td>REL (USA)</td>
<td>Long-term value: 0,0002 mg/m³ as Cr; See Pocket Guide Apps. A and C</td>
<td></td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>Long-term value: 0,01 mg/m³ as Cr</td>
<td></td>
</tr>
<tr>
<td>EL (Canada)</td>
<td>Long-term value: 0,01 mg/m³ as Cr; ACGIH A1 IARC 1</td>
<td></td>
</tr>
</tbody>
</table>

### 7758-97-6 lead chromate

<table>
<thead>
<tr>
<th>Standard</th>
<th>Exposure Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOELV (EU)</td>
<td>Long-term value: 2 mg/m³ as Cr</td>
<td></td>
</tr>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 0,005 mg/m³ as Cr(VI) **as CrO3; see 29 CFR 1910,1026</td>
<td></td>
</tr>
<tr>
<td>REL (USA)</td>
<td>Long-term value: 0,0002 mg/m³ as Cr; See Pocket Guide Apps. A and C</td>
<td></td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>Long-term value: 0,05 mg/m³ as Pb; BEI; **as Cr</td>
<td></td>
</tr>
</tbody>
</table>

(Contd. on page 10)
### 7727-43-7 Barium Sulphate, Natural

<table>
<thead>
<tr>
<th>Source</th>
<th>Long-term value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL (Canada)</td>
<td>0.05* 0.012** mg/m³</td>
<td>as Pb, Cr</td>
</tr>
<tr>
<td>EV (Canada)</td>
<td>0.012* 0.05** mg/m³</td>
<td>as Cr, Pb</td>
</tr>
</tbody>
</table>

### 61790-53-2 Diatomaceous Earth (Silica-Amorphous)

<table>
<thead>
<tr>
<th>Source</th>
<th>Long-term value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>20mppcf or 80mg/m³ 7%SiO₂</td>
<td></td>
</tr>
<tr>
<td>REL (USA)</td>
<td>6 mg/m³</td>
<td>See Pocket Guide App. C</td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>TLV withdrawn</td>
<td></td>
</tr>
</tbody>
</table>

### 7439-98-7 Molybdenum

<table>
<thead>
<tr>
<th>Source</th>
<th>Long-term value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>15* mg/m³</td>
<td>Total dust</td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>10* 3** mg/m³</td>
<td>as Mo; respiratory fraction</td>
</tr>
</tbody>
</table>

### 7440-33-7 Tungsten

<table>
<thead>
<tr>
<th>Source</th>
<th>Long-term value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
<td>10 mg/m³</td>
<td>and insoluble compounds, as We</td>
</tr>
<tr>
<td>REL (USA)</td>
<td>10 mg/m³</td>
<td>Short-term value</td>
</tr>
<tr>
<td></td>
<td>5 mg/m³</td>
<td>as W</td>
</tr>
</tbody>
</table>
### Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printed date: 01.11.2018  Revision: 01.11.2018

**Trade name: NONEL® Non-electric Delay Detonators**

<table>
<thead>
<tr>
<th>Substance</th>
<th>TLV (USA)</th>
<th>EL (Canada)</th>
<th>EV (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7429-90-5 aluminium powder (pyrophoric)</strong></td>
<td>Short-term value: 10 mg/m³ as W</td>
<td>Short-term value: 10 mg/m³ as W</td>
<td>Short-term value: 10* 3** mg/m³ (as tungsten; compds.:*water-insol.;**water-sol.)</td>
</tr>
<tr>
<td></td>
<td>Long-term value: 5 mg/m³ as W</td>
<td>Long-term value: 5 mg/m³ as W</td>
<td>Long-term value: 5* 1** mg/m³ as Al*Total dust; **Respirable/ pyro powd./welding f.</td>
</tr>
<tr>
<td></td>
<td>PEL (USA)</td>
<td>REL (USA)</td>
<td>TLV (USA)</td>
</tr>
<tr>
<td></td>
<td>Long-term value: 15*; 15** mg/m³ as Al</td>
<td>Long-term value: 10* 5** mg/m³ as Al*Total dust; **Respirable/ pyro powd./welding f.</td>
<td>Long-term value: 1* mg/m³ as Al; *as respirable fraction</td>
</tr>
<tr>
<td></td>
<td>EL (Canada)</td>
<td>EV (Canada)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long-term value: 1,0 mg/m³ respirable, as Al</td>
<td>Long-term value: 5 mg/m³ aluminium-containing (as aluminium)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Substance</th>
<th>PEL (USA)</th>
<th>REL (USA)</th>
<th>TLV (USA)</th>
<th>EL (Canada)</th>
<th>EV (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7440-36-0 antimony</strong></td>
<td>Long-term value: 0,5 mg/m³ as Sb</td>
<td>Long-term value: 0,5 mg/m³ as Sb</td>
<td>Long-term value: 0,5 mg/m³ as Sb</td>
<td>Long-term value: 0,5 mg/m³</td>
<td>Long-term value: 0,5 mg/m³</td>
</tr>
</tbody>
</table>

*DNELs No further relevant information available.*

*PNECs* No further relevant information available.

**Ingredients with biological limit values:**

<table>
<thead>
<tr>
<th>Substance</th>
<th>BEI (USA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>13424-46-9 lead diazide</strong></td>
<td>30 µg/100 ml</td>
</tr>
<tr>
<td>Medium: blood</td>
<td></td>
</tr>
<tr>
<td>Time: not critical</td>
<td></td>
</tr>
<tr>
<td>Parameter: Lead</td>
<td></td>
</tr>
</tbody>
</table>

(Contd. on page 12)
### 40.1.5

**Trade name:** NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th><strong>7439-92-1 lead</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BEI (USA)</strong></td>
<td>30 µg/100 ml</td>
</tr>
<tr>
<td>Medium: blood</td>
<td></td>
</tr>
<tr>
<td>Time: not critical</td>
<td></td>
</tr>
<tr>
<td>Parameter: Lead</td>
<td></td>
</tr>
<tr>
<td>10 µg/100 ml</td>
<td></td>
</tr>
<tr>
<td>Medium: blood</td>
<td></td>
</tr>
<tr>
<td>Time: not critical</td>
<td></td>
</tr>
<tr>
<td>Parameter: Lead (women of child bearing potential)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>1314-41-6 orange lead</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BEI (USA)</strong></td>
<td>30 µg/100 ml</td>
</tr>
<tr>
<td>Medium: blood</td>
<td></td>
</tr>
<tr>
<td>Time: not critical</td>
<td></td>
</tr>
<tr>
<td>Parameter: Lead</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>10294-40-3 barium chromate</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BEI (USA)</strong></td>
<td>25 µg/L</td>
</tr>
<tr>
<td>Medium: urine</td>
<td></td>
</tr>
<tr>
<td>Time: end of shift at end of workweek</td>
<td></td>
</tr>
<tr>
<td>Parameter: Total chromium (fume)</td>
<td></td>
</tr>
<tr>
<td>10 µg/L</td>
<td></td>
</tr>
<tr>
<td>Medium: urine</td>
<td></td>
</tr>
<tr>
<td>Time: increase during shift</td>
<td></td>
</tr>
<tr>
<td>Parameter: Total chromium (fume)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>7758-97-6 lead chromate</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BEI (USA)</strong></td>
<td>30 µg/100 ml</td>
</tr>
<tr>
<td>Medium: blood</td>
<td></td>
</tr>
<tr>
<td>Time: not critical</td>
<td></td>
</tr>
<tr>
<td>Parameter: Lead</td>
<td></td>
</tr>
<tr>
<td>10 µg/100 ml</td>
<td></td>
</tr>
<tr>
<td>Medium: blood</td>
<td></td>
</tr>
<tr>
<td>Time: not critical</td>
<td></td>
</tr>
<tr>
<td>Parameter: Lead (women of child bearing potential)</td>
<td></td>
</tr>
</tbody>
</table>

**Additional information:** The lists valid during the making were used as basis.

**8.2 Exposure controls**

**Personal protective equipment:**

**General protective and hygienic measures:**
The usual precautionary measures are to be adhered to when handling chemicals. Keep away from foodstuffs, beverages and feed. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin.

**Respiratory protection:**
Not required under normal conditions of use.
Respiratory protection may be required after product use.

- **Protection of hands:**
  Wear gloves for the protection against mechanical hazards according to NIOSH or EN 388.

- **Material of gloves**
  The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

- **Penetration time of glove material**
  The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

- **Eye protection:**
  - **Safety glasses**
  - **Face protection**
  - **Body protection:** Impervious protective clothing

- **Limitation and supervision of exposure into the environment**
  No further relevant information available.

- **Risk management measures**
  Organizational measures should be in place for all activities involving this product.

---

**SECTION 9: Physical and chemical properties**

- **9.1 Information on basic physical and chemical properties**
  - **General Information**
  - **Appearance:**
    - **Form:** Solid material
    - **Colour:** According to product specification
    - **Odour:** Characteristic
    - **Odour threshold:** Not determined.
    - **pH-value:** Not applicable.
  - **Change in condition**
    - **Melting point/Melting range:** Not Determined.
    - **Boiling point/Boiling range:** Undetermined.
  - **Flash point:** Not applicable.
  - **Flammability (solid, gaseous):** Explosive; mass explosion hazard.
  - **Auto/Self-ignition temperature:** Not determined.
  - **Decomposition temperature:** Not determined.
  - **Self-igniting:** Product is not self-igniting.
  - **Danger of explosion:** Risk of explosion by shock, friction, fire or other sources of ignition.

(Contd. on page 14)
Trade name: NONEL® Non-electric Delay Detonators

- Explosion limits:
  - Lower: Not determined.
  - Upper: Not determined.

- Vapour pressure: Not applicable.
- Density: Not determined.
- Relative density: Not determined.
- Vapour density: Not applicable.
- Evaporation rate: Not applicable.
- Solubility in / Miscibility with water: Variable, dependent upon product composition and packaging.
- Partition coefficient (n-octanol/water): Not determined.
- Viscosity:
  - Dynamic: Not applicable.
  - Kinematic: Not applicable.

9.2 Other information
No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity
10.2 Chemical stability
  - Thermal decomposition / conditions to be avoided:
    Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
10.3 Possibility of hazardous reactions
  Danger of explosion.
  Toxic fumes may be released if heated above the decomposition point.
10.4 Conditions to avoid
  No further relevant information available.
10.5 Incompatible materials: No further relevant information available.
10.6 Hazardous decomposition products:
  Carbon monoxide and carbon dioxide
  Hydrocarbons
  Nitrogen oxides
  Chlorine compounds
  Leadoxide vapour
  Bariumoxide vapour
  Toxic metal oxide smoke
  Danger of forming toxic pyrolysis products.
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity:

- LD/LC50 values relevant for classification:
  - 7439-92-1 lead
    - Oral LD50 >2000 mg/kg (rat)
  - 7782-49-2 selenium
    - Oral LD50 6700 mg/kg (rat)
  - 7758-97-6 lead chromate
    - Oral LD50 12000 mg/kg (mouse)

Primary irritant effect:
- on the skin: Not a skin irritant in unused form. Vapors/particles from used product are possibly irritating to skin.
- on the eye: Not an eye irritant in unused form. Vapors/particles from used product are possibly irritating to eyes.
- Sensitisation: No sensitising effects known.
- Subacute to chronic toxicity: No further relevant information available.

Additional toxicological information:
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
- Harmful
- Acute effects (acute toxicity, irritation and corrosivity): Danger of blast or crush-type injuries. Harmful if swallowed.
- Repeated dose toxicity: No further relevant information available.

SECTION 12: Ecological information

12.1 Toxicity
- Aquatic toxicity: No further relevant information available.
- 12.2 Persistence and degradability: No further relevant information available.
- 12.3 Bioaccumulative potential: No further relevant information available.
- 12.4 Mobility in soil: No further relevant information available.
- Additional ecological information:
  - General notes: Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
    Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
  - 12.5 Results of PBT and vPvB assessment
    - PBT: Not applicable.
    - vPvB: Not applicable.
SECTION 13: Disposal considerations

- **13.1 Waste treatment methods**
  - **Recommendation**
    Must not be disposed together with household garbage. Do not allow product to reach sewage system. Damaged materials pose a danger to anyone in the immediate area; consult experts for disposal of damaged products. The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes. Residual materials should be treated as hazardous.
  - **Uncleaned packaging:**
    - **Recommendation:** Disposal must be made according to official regulations.

SECTION 14: Transport information

- **14.1 UN-Number**
  - DOT, ADR, IMDG: UN0360
  - IATA: FORBIDDEN

- **14.2 UN proper shipping name**
  - DOT, IMDG: DETONATOR ASSEMBLIES, NON-ELECTRIC
  - ADR: 0360 DETONATOR ASSEMBLIES, NON-ELECTRIC
  - IATA: FORBIDDEN

- **14.3 Transport hazard class(es)**
  - DOT
    - **Class:** 1.1
    - **Label:** 1.1
  - ADR, IMDG
    - **Class:** 1.1
    - **Label:** 1.1B
  - IATA
    - **Class:** FORBIDDEN
    - **14.4 Packing group**
      - DOT, ADR, IMDG: II
Trade name: NONEL® Non-electric Delay Detonators

14.5 Environmental hazards:
- Marine pollutant: No
- Special marking (IATA): FORBIDDEN BY AIR.
- 14.6 Special precautions for user: Not applicable.
- EMS Number: F-B,S-X
- Segregation groups: Perchlorates

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.

Transport/Additional information:
- ADR
- Limited quantities (LQ): 0
- Excepted quantities (EQ): Code: E0 Not permitted as Excepted Quantity
- Tunnel restriction code: 1

IMDG
- Limited quantities (LQ): 0
- Excepted quantities (EQ): Code: E0 Not permitted as Excepted Quantity

IATA
- UN "Model Regulation": FORBIDDEN.

UN0360, DETONATOR ASSEMBLIES, NON-ELECTRIC, 1.1B, II

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
- United States (USA)
- SARA

Section 355 (extremely hazardous substances):
None of the ingredients are listed.

Section 313 (Specific toxic chemical listings):

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9</td>
<td>lead diazide</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>lead</td>
</tr>
<tr>
<td>7782-49-2</td>
<td>selenium</td>
</tr>
<tr>
<td>1314-41-6</td>
<td>orange lead</td>
</tr>
<tr>
<td>10294-40-3</td>
<td>barium chromate</td>
</tr>
<tr>
<td>7758-97-6</td>
<td>lead chromate</td>
</tr>
<tr>
<td>7727-43-7</td>
<td>barium sulphate, natural</td>
</tr>
<tr>
<td>7429-90-5</td>
<td>aluminium powder (pyrophoric)</td>
</tr>
<tr>
<td>7440-36-0</td>
<td>antimony</td>
</tr>
</tbody>
</table>

(Contd. on page 18)
Trade name: NONEL® Non-electric Delay Detonators

- **TSCA (Toxic Substances Control Act):**
  - All ingredients are listed.

- **Proposition 65 (California):**
  - **Chemicals known to cause cancer:**
    - 13424-46-9 lead diazide
    - 7439-92-1 lead
    - 1314-41-6 orange lead
    - 13463-67-7 titanium dioxide
    - 10294-40-3 barium chromate
    - 7758-97-6 lead chromate
  - **Chemicals known to cause reproductive toxicity for females:**
    - 7439-92-1 lead
    - 10294-40-3 barium chromate
    - 7758-97-6 lead chromate
  - **Chemicals known to cause reproductive toxicity for males:**
    - 7439-92-1 lead
    - 10294-40-3 barium chromate
    - 7758-97-6 lead chromate
  - **Chemicals known to cause developmental toxicity:**
    - 13424-46-9 lead diazide
    - 7439-92-1 lead
    - 10294-40-3 barium chromate
    - 7758-97-6 lead chromate

- **Carcinogenic Categories**
  - **EPA (Environmental Protection Agency)**
    - 13424-46-9 lead diazide B2
    - 7439-92-1 lead B2
    - 7782-49-2 selenium D
    - 1314-41-6 orange lead B2
    - 10294-40-3 barium chromate A(inh), D(oral), K/L(inh), CBD(oral)
    - 7758-97-6 lead chromate K
    - 7727-43-7 barium sulphate, natural D, CBD(inh), NL(oral)
    - 7778-74-7 potassium perchlorate NL
    - 2691-41-0 octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) D
  - **IARC (International Agency for Research on Cancer)**
    - 13424-46-9 lead diazide 2A
    - 7439-92-1 lead 2B
    - 7782-49-2 selenium 3

(Contd. on page 19)
### Trade name: NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Substance Description</th>
<th>TLV/NIOSH/Canada</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1314-41-6</td>
<td>orange lead</td>
<td>2A</td>
<td></td>
</tr>
<tr>
<td>13463-67-7</td>
<td>titanium dioxide</td>
<td>2B</td>
<td></td>
</tr>
<tr>
<td>10294-40-3</td>
<td>barium chromate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7758-97-6</td>
<td>lead chromate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>61790-53-2</td>
<td>Diatomaceous earth (Silica-Amorphous)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>13424-46-9</td>
<td>lead diazide</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>7439-92-1</td>
<td>lead</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>1314-41-6</td>
<td>orange lead</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>13463-67-7</td>
<td>titanium dioxide</td>
<td>A4</td>
<td></td>
</tr>
<tr>
<td>10294-40-3</td>
<td>barium chromate</td>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>7758-97-6</td>
<td>lead chromate</td>
<td>A2</td>
<td></td>
</tr>
<tr>
<td>7439-98-7</td>
<td>molybdenum</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>7429-90-5</td>
<td>aluminium powder (pyrophoric)</td>
<td>A4</td>
<td></td>
</tr>
</tbody>
</table>

- TLV (Threshold Limit Value established by ACGIH)
- NIOSH-Ca (National Institute for Occupational Safety and Health)
- Canada
  - Domestic Substances List (DSL)
    - Some components are listed on the NDSL.
    - All ingredients are listed.
  - Ingredient Disclosure list (limit 0.1%)
    - Lead
    - Selenium
    - Barium chromate
    - Lead chromate
  - Ingredient Disclosure list (limit 1%)
    - Molybdenum
    - Tungsten
    - Aluminium powder (pyrophoric)
    - Antimony

- Other regulations, limitations and prohibitive regulations
  - This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

#### Substances of very high concern (SVHC) according to REACH, Article 57

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Substance Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9</td>
<td>lead diazide</td>
</tr>
<tr>
<td>1314-41-6</td>
<td>orange lead</td>
</tr>
</tbody>
</table>
15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

Disclaimer
Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

Relevant phrases
- H200 Unstable explosives.
- H201 Explosive; mass explosion hazard.
- H228 Flammable solid.
- H250 Catches fire spontaneously if exposed to air.
- H261 In contact with water releases flammable gases.
- H271 May cause fire or explosion; strong oxidiser.
- H301 Toxic if swallowed.
- H302 Harmful if swallowed.
- H311 Toxic in contact with skin.
- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H319 Causes serious eye irritation.
- H331 Toxic if inhaled.
- H332 Harmful if inhaled.
- H350 May cause cancer.
- H360Df May damage the unborn child. Suspected of damaging fertility.
- H360FD May damage fertility. May damage the unborn child.
- H372 Causes damage to organs through prolonged or repeated exposure.
- H373 May cause damage to organs through prolonged or repeated exposure.
- H400 Very toxic to aquatic life.
- H410 Very toxic to aquatic life with long lasting effects.
- H413 May cause long lasting harmful effects to aquatic life.
- R11 Highly flammable.
- R15 Contact with water liberates extremely flammable gases.
- R17 Spontaneously flammable in air.
- R2 Risk of explosion by shock, friction, fire or other sources of ignition.
- R20/22 Harmful by inhalation and if swallowed.
- R22 Harmful if swallowed.
**Safety Data Sheet**
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

**Trade name:** NONEL® Non-electric Delay Detonators

| R23/25 | Toxic by inhalation and if swallowed. |
| R24   | Toxic in contact with skin. |
| R3    | Extreme risk of explosion by shock, friction, fire or other sources of ignition. |
| R33   | Danger of cumulative effects. |
| R36/38| Irritating to eyes and skin. |
| R43   | May cause sensitisation by skin contact. |
| R45   | May cause cancer. |
| R48/23/25 | Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed. |
| R50/53| Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. |
| R53   | May cause long-term adverse effects in the aquatic environment. |
| R60   | May impair fertility. |
| R61   | May cause harm to the unborn child. |
| R62   | Possible risk of impaired fertility. |
| R9    | Explosive when mixed with combustible material. |

**Abbreviations and acronyms:**
- ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
- IMDG: International Maritime Code for Dangerous Goods
- DOT: US Department of Transportation
- IATA: International Air Transport Association
- GHS: Globally Harmonised System of Classification and Labelling of Chemicals
- ACGIH: American Conference of Governmental Industrial Hygienists
- EINECS: European Inventory of Existing Commercial Chemical Substances
- ELINCS: European List of Notified Chemical Substances
- CAS: Chemical Abstracts Service (division of the American Chemical Society)
- NFPA: National Fire Protection Association (USA)
- HMIS: Hazardous Materials Identification System (USA)
- WHMIS: Workplace Hazardous Materials Information System (Canada)
- DNEL: Derived No-Effect Level (REACH)
- PNEC: Predicted No-Effect Concentration (REACH)
- LC50: Lethal concentration, 50 percent
- LD50: Lethal dose, 50 percent
- Expl. 1.1: Explosives, Division 1.1
- Unst. Expl.: Explosives, Unstable explosives
- Flam. Sol. 2: Flammable solids, Hazard Category 2
- Pyr. Sol. 1: Pyrophoric Solids, Hazard Category 1
- Water-react. 2: Substances and Mixtures which, in contact with water, emit flammable gases, Hazard Category 2
- Ox. Sol. 1: Oxidising Solids, Hazard Category 1
- Acute Tox. 3: Acute toxicity, Hazard Category 3
- Acute Tox. 4: Acute toxicity, Hazard Category 4
- Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
- Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
- Skin Sens. 1: Sensitisation - Skin, Hazard Category 1
- Carc. 1A: Carcinogenicity, Hazard Category 1A
- Carc. 1B: Carcinogenicity, Hazard Category 1B
- Rep. 1A: Reproductive toxicity, Hazard Category 1A
- Rep. 1A: Reproductive toxicity, Hazard Category 1A
- STOT RE 1: Specific target organ toxicity - Repeated exposure, Hazard Category 1
- STOT RE 2: Specific target organ toxicity - Repeated exposure, Hazard Category 2
- Aquatic Acute 1: Hazardous to the aquatic environment - AcuteHazard, Category 1
- Aquatic Chronic 1: Hazardous to the aquatic environment - Chronic Hazard, Category 1
- Aquatic Chronic 4: Hazardous to the aquatic environment - Chronic Hazard, Category 4

(Contd. on page 22)
Trade name: NONEL® Non-electric Delay Detonators

· Sources
SDS Prepared by:
ChemTel Inc.
1305 North Florida Avenue
Tampa, Florida USA 33602-2902
Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573
Website: www.chemtelinc.com
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: NONEL® Non-electric Delay Detonators

Article number: 1122

Other product identifiers:
- NONEL® MS
- NONEL® EZ DET®
- NONEL® MS ARCTIC
- NONEL® EZTL™
- NONEL® LP NONEL®
- EZ DRIFTER ®
- NONEL® SL
- NONEL® SUPER
- NONEL® TD
- NONEL® MS CONNECTOR
- NONEL® TWINPLEX™
- NONEL® STARTER

1.2 Relevant identified uses of the substance or mixture and uses advised against

No further relevant information available.

Application of the substance / the mixture

Explosive product.
Commercial blasting applications

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer/Supplier:
Dyno Nobel Inc.
2795 East Cottonwood Parkway, Suite 500
Salt Lake City, Utah 84121
Phone: 801-364-4800
Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com

1.4 Emergency telephone number:
CHEMTREC
1-800-424-9300 (US/Canada)
+01 703-527-3887 (International)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Classifications listed also are applicable to the OSHA GHS Hazard Communication Standard (29CFR1910.1200).

Exploding bomb

Exp. 1.4 H204 Fire or projection hazard.

(Contd. on page 2)
Trade name: NONEL® Non-electric Delay Detonators

- Classification according to Directive 67/548/EEC or Directive 1999/45/EC
  R5: Heating may cause an explosion.

- Information concerning particular hazards for human and environment:
  The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

- Classification system:
  The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
  The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

- Additional information:
  There are no other hazards not otherwise classified that have been identified.
  0 percent of the mixture consists of component(s) of unknown toxicity.

- 2.2 Label elements

- Labelling according to Regulation (EC) No 1272/2008
  The product is additionally classified and labelled according to the Globally Harmonized System within the United States (GHS).
  The product is classified and labelled according to the CLP regulation.

- Hazard pictograms
  GHS01

- Signal word Warning

- Hazard-determining components of labelling:
  diazodinitro phenol (DDNP)
  pentaerythritol tetranitrate (PETN)
  octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
  lead diazide
  orange lead

- Hazard statements
  H204 Fire or projection hazard.

- Precautionary statements
  P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
  P250 Do not subject to grinding/shock/friction.
  P280 Wear protective gloves/protective clothing/eye protection/face protection.
  P240 Ground/bond container and receiving equipment.
  P373 DO NOT fight fire when fire reaches explosives.
  P370+P380 In case of fire: Evacuate area.
  P372 Explosion risk in case of fire.
  P401 Store in accordance with local/regional/national/international regulations.
  P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- Additional information:
  EUH201 Contains lead. Should not be used on surfaces liable to be chewed or sucked by children.
Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Trade name: NONEL® Non-electric Delay Detonators

- Hazard description:
- WHMIS-symbols: Explosive products are not classified under WHMIS.
- NFPA ratings (scale 0 - 4) Not available.
- HMIS-ratings (scale 0 - 4) Not available

HMIS Long Term Health Hazard Substances

<table>
<thead>
<tr>
<th>CAS</th>
<th>Index number</th>
<th>Substance</th>
<th>NFPA</th>
<th>HMIS Long Term Health Hazard</th>
<th>UN Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9</td>
<td>603-035-00-5</td>
<td>lead diazide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7439-92-1</td>
<td></td>
<td>lead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13463-67-7</td>
<td></td>
<td>titanium dioxide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7758-97-6</td>
<td></td>
<td>lead chromate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7778-74-7</td>
<td></td>
<td>potassium perchlorate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.3 Other hazards

Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

Explosive Product Notice

PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES - The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

WARNING - All explosives are dangerous and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, DO NOT USE IT before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Description: Mixture of substances listed below with nonhazardous additions.

Dangerous components:

<table>
<thead>
<tr>
<th>CAS</th>
<th>EINECS:</th>
<th>Index number</th>
<th>Substance</th>
<th>NFPA</th>
<th>HMIS Long Term Health Hazard</th>
<th>UN Class</th>
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</thead>
<tbody>
<tr>
<td>78-71-5</td>
<td>201-084-3</td>
<td>603-035-00-5</td>
<td>pentaerythritol tetranitrate (PETN)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Contd. of page 2)
**Safety Data Sheet**
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and
OSHA GHS

**Trade name:** NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>CAS: 13424-46-9</th>
<th>EINECS: 236-542-1</th>
<th>Index number: 082-003-00-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>lead diazide</td>
<td>T Repr. Cat. 1, 3 R61; Xn R62-20/22; E R3; N R50/53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unst. Expl., H200</td>
<td>Carc. 1B, H350; Repr. 1A, H360df; STOT RE 2, H373</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aquatic Acute 1, H400; Aquatic Chronic 1, H410</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute Tox. 4, H302; Acute Tox. 4, H332</td>
</tr>
<tr>
<td>CAS: 7439-92-1</td>
<td>EINECS: 231-100-4</td>
<td></td>
</tr>
<tr>
<td>lead</td>
<td>T Repr. Cat. 1 R60-61-48/23/25; N R50/53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Repr. 1A, H360FD; STOT RE 1, H372</td>
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</tr>
<tr>
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<td>Aquatic Acute 1, H400; Aquatic Chronic 1, H410</td>
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<tr>
<td>CAS: 7440-21-3</td>
<td>EINECS: 231-130-8</td>
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<tr>
<td>silicon</td>
<td>F R11</td>
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<tr>
<td></td>
<td>Flam. Sol. 2, H228</td>
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<tr>
<td>CAS: 2691-41-0</td>
<td>EINECS: 220-260-0</td>
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<tr>
<td>octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)</td>
<td>T R24; Xn R22; E R2</td>
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<tr>
<td></td>
<td>Expl. 1.1, H201</td>
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<td></td>
<td>Acute Tox. 3, H301; Acute Tox. 3, H311</td>
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<tr>
<td>CAS: 7782-69-2</td>
<td>EINECS: 231-957-4</td>
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<td>selenium</td>
<td>T R23/25</td>
<td>R33-53</td>
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<td></td>
<td></td>
<td>Acute Tox. 3, H301; Acute Tox. 3, H331</td>
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<td>STOT RE 2, H373</td>
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<td></td>
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<td>Aquatic Chronic 4, H413</td>
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<tr>
<td>CAS: 1314-41-6</td>
<td>EINECS: 215-235-6</td>
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<tr>
<td>orange lead</td>
<td>T Repr. Cat. 1, 3 R61; Xn R62-20/22; N R50/53</td>
<td>R33</td>
</tr>
<tr>
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<td>Carc. 1B, H350; Repr. 1A, H360df; STOT RE 2, H373</td>
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<td></td>
<td>Aquatic Acute 1, H400; Aquatic Chronic 1, H410</td>
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<td>Acute Tox. 4, H302; Acute Tox. 4, H332</td>
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<tr>
<td>barium chromate</td>
<td>Xn R20/22</td>
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</tr>
<tr>
<td></td>
<td>Carc. 1A, H350</td>
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<td>Acute Tox. 4, H302; Acute Tox. 4, H332</td>
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<tr>
<td>lead chromate</td>
<td>T Carc. Cat. 2, Rep. Cat. 1, 3 R45-61; Xn R62; N R50/53</td>
<td>R33</td>
</tr>
<tr>
<td></td>
<td>Carc. 1B, H350; Repr. 1A, H360df; STOT RE 2, H373</td>
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</tr>
<tr>
<td></td>
<td>Aquatic Acute 1, H400; Aquatic Chronic 1, H410</td>
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<td>CAS: 4682-03-5</td>
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<tr>
<td>diazodinitro phenol (DDNP)</td>
<td>Xi R36/38; Xi R43; E R3</td>
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<td>Unst. Expl., H200</td>
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</tr>
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<td></td>
<td>Skin Irrit. 2, H315; Eye Irrit. 2, H319; Skin Sens. 1, H317</td>
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<tr>
<td>CAS: 7440-36-0</td>
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<tr>
<td>antimony</td>
<td>substance with a Community workplace exposure limit</td>
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(Contd. on page 5)
Trade name: NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>CAS: 7440-33-7</th>
<th>tungsten substance with a Community workplace exposure limit</th>
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<tr>
<th>CAS: 7429-90-5</th>
<th>aluminium powder (pyrophoric)</th>
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</thead>
<tbody>
<tr>
<td>EINECS: 231-072-3</td>
<td>F R15-17</td>
</tr>
<tr>
<td>Index number: 013-001-00-6</td>
<td>Pyr. Sol. 1, H250; Water-react. 2, H261</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7439-98-7</th>
<th>molybdenum substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-107-2</td>
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<table>
<thead>
<tr>
<th>CAS: 61790-53-2</th>
<th>Diatomaceous earth (Silica-Amorphous) substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-912-9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7778-74-7</th>
<th>potassium perchlorate</th>
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</thead>
<tbody>
<tr>
<td>EINECS: 231-912-9</td>
<td>Xn R22: O R9</td>
</tr>
<tr>
<td>Index number: 017-008-00-5</td>
<td>Ox. Sol. 1, H271</td>
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<tr>
<td></td>
<td>Acute Tox. 4, H302</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7727-43-7</th>
<th>barium sulphate, natural substance with a Community workplace exposure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-784-4</td>
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</tr>
</tbody>
</table>

· SVHC
13424-46-9 lead diazide
1314-41-6 orange lead
7758-97-6 lead chromate

· Additional information:
For the wording of the listed risk phrases refer to section 16.
For the listed ingredients, the identity and exact percentages are being withheld as a trade secret.

SECTION 4: First aid measures

· 4.1 Description of first aid measures
· General information: No special measures required.
· After inhalation:
  Unlikely route of exposure.
  Supply fresh air; consult doctor in case of complaints.
· After skin contact:
  Generally the product does not irritate the skin.
  Wash with soap and water.
  If skin irritation is experienced, consult a doctor.
· After eye contact:
  Remove contact lenses if worn.
  Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· After swallowing:
  Unlikely route of exposure.
  Do not induce vomiting; call for medical help immediately.
· 4.2 Most important symptoms and effects, both acute and delayed Blast injury if mishandled.
· Hazards Danger of blast or crush-type injuries.
Trade name: NONEL® Non-electric Delay Detonators

• 4.3 Indication of any immediate medical attention and special treatment needed
  Product may produce physical injury if mishandled. Treatment of these injuries should be based on the blast and compression effects.

SECTION 5: Firefighting measures

• 5.1 Extinguishing media
  Suitable extinguishing agents: DO NOT fight fire when fire reaches explosives.
  For safety reasons unsuitable extinguishing agents: None.

• 5.2 Special hazards arising from the substance or mixture
  DO NOT ATTEMPT TO FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions. Can explode or detonate under fire conditions. Burning material may produce toxic vapors. It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications.
  Fire or projection hazard.
  Product may explode if burned in confined space. Individual cartridges may explode. Mass explosion of many cartridges at once is unlikely.

• 5.3 Advice for firefighters
  Protective equipment:
  Wear self-contained respiratory protective device.
  Wear fully protective suit.
  Additional information
  Eliminate all ignition sources if safe to do so.
  Flammability Classification: (defined by 29 CFR 1910.1200) Explosive. Can explode under fire conditions. Individual devices will randomly explode. Will not mass explode if multiple devices are involved. Burning material may produce toxic and irritating vapors. In unusual cases, shrapnel may be thrown from exploding devices under containment. See 2008 Emergency response Guidebook for further information.

SECTION 6: Accidental release measures

• 6.1 Personal precautions, protective equipment and emergency procedures
  Wear protective clothing.
  Ensure adequate ventilation
  Protect from heat.

• 6.2 Environmental precautions:
  Do not allow to enter sewers/ surface or ground water.
  Inform respective authorities in case of seepage into water course or sewage system.

• 6.3 Methods and material for containment and cleaning up:
  Pick up mechanically.
  Send for recovery or disposal in suitable receptacles.
  Dispose unusable material as waste according to item 13.

• 6.4 Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.

(Contd. on page 7)
SECTION 7: Handling and storage

7.1 Precautions for safe handling
Handle with care. Avoid jolting, friction and impact.
Use only in well ventilated areas.
Do not subject to grinding/shock/friction.

Information about fire - and explosion protection:
Protect from heat.
Emergency cooling must be available in case of nearby fire.

7.2 Conditions for safe storage, including any incompatibilities

Storage:
Requirements to be met by storerooms and receptacles:
Store in a cool location.
Avoid storage near extreme heat, ignition sources or open flame.

Information about storage in one common storage facility:
Store away from foodstuffs.

Further information about storage conditions:
Store in cool, dry conditions in well sealed receptacles.
Keep away from heat.

7.3 Specific end use(s) No further relevant information available.

SECTION 8: Exposure controls/personal protection

Additional information about design of technical facilities: No further data; see item 7.

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>13424-46-9 lead diazide</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
</tr>
<tr>
<td>REL (USA)</td>
</tr>
<tr>
<td>TLV (USA)</td>
</tr>
<tr>
<td>EL (Canada)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7439-92-1 lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
</tr>
<tr>
<td>REL (USA)</td>
</tr>
</tbody>
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(Contd. on page 8)
Trade name: NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>Substance</th>
<th>TLV (USA)</th>
<th>EL (Canada)</th>
<th>EV (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-21-3 silicon</td>
<td>Long-term value: 15* 5** mg/m³ total dust **respirable fraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REL (USA)</td>
<td>Long-term value: 10* 5** mg/m³ total dust **respirable fraction</td>
<td></td>
</tr>
<tr>
<td>7782-49-2 selenium</td>
<td>Long-term value: 0,2 mg/m³ as Se</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1314-41-6 orange lead</td>
<td>Long-term value: 0,05 mg/m³ as Pb; See 29 CFR 1910,1025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13463-67-7 titanium dioxide</td>
<td>Long-term value: 15* mg/m³ total dust</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* as Pb; BEI
** 8-hr TWA; See Pocket Guide App. A
---

Printing date 01.11.2018  Revision: 01.11.2018
<table>
<thead>
<tr>
<th>Component</th>
<th>USA (TLV)</th>
<th>Canada (EL)</th>
<th>Canada (EV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term value:</td>
<td>10 mg/m³</td>
<td>10 mg/m³</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>withdrew from NIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term value:</td>
<td>10 mg/m³</td>
<td>10* 3** mg/m³</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>total dust;**respirable fraction; IARC 2B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**barium chromate**

<table>
<thead>
<tr>
<th>Component</th>
<th>USA (PEL)</th>
<th>USA (REL)</th>
<th>USA (TLV)</th>
<th>Canada (EL)</th>
<th>Canada (EV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term value:</td>
<td>0.005* mg/m³</td>
<td>0.0002 mg/m³</td>
<td>0.01 mg/m³</td>
<td>0.01 mg/m³</td>
<td>0.0002 mg/m³</td>
</tr>
<tr>
<td>Ceiling limit:</td>
<td>0.1** mg/m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as Cr(VI);**as CrO₃; see 29 CFR 1910,1026</td>
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</tr>
</tbody>
</table>

**lead chromate**

<table>
<thead>
<tr>
<th>Component</th>
<th>USA (PEL)</th>
<th>USA (REL)</th>
<th>USA (TLV)</th>
<th>Canada (EL)</th>
<th>Canada (EV)</th>
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</thead>
<tbody>
<tr>
<td>Long-term value:</td>
<td>2 mg/m³</td>
<td>0.005* mg/m³</td>
<td>0.01 mg/m³</td>
<td>0.01 mg/m³</td>
<td>0.005* mg/m³</td>
</tr>
<tr>
<td>Ceiling limit:</td>
<td>0.1** mg/m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as Cr</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**barium sulphate, natural**

<table>
<thead>
<tr>
<th>Component</th>
<th>USA (PEL)</th>
<th>USA (REL)</th>
<th>USA (TLV)</th>
<th>Canada (EL)</th>
<th>Canada (EV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term value:</td>
<td>15* 5** mg/m³</td>
<td>10* 5** mg/m³</td>
<td>5* mg/m³</td>
<td>10* 3** mg/m³</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>total dust;**respirable fraction</td>
<td>total dust;**respirable fraction</td>
<td>inhalable fraction; E</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Contd. on page 10)
### 61790-53-2 Diatomaceous earth (Silica-Amorphous)

<table>
<thead>
<tr>
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<th>PEL (USA)</th>
<th>REL (USA)</th>
<th>TLV (USA)</th>
<th>EL (Canada)</th>
<th>EV (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term</td>
<td>10 mg/m³</td>
<td>Long-term</td>
<td>20mppcf</td>
<td>Long-term</td>
<td>Long-term</td>
</tr>
<tr>
<td>value</td>
<td>6 mg/m³</td>
<td>value</td>
<td>or 80mg/m³</td>
<td>value</td>
<td>value</td>
</tr>
<tr>
<td></td>
<td>*total, *<em>respirable</em></td>
<td>See Pocket Guide App. C</td>
<td>TLV withdrawn</td>
<td>*uncalcined; *inhaleable;*<em>respirable</em></td>
<td></td>
</tr>
</tbody>
</table>

PEL (USA) 20mppcf or 80mg/m³ %SiO2
REL (USA) Long-term value: 6 mg/m³
See Pocket Guide App. C
TLV (USA) TLV withdrawn
EL (Canada) Long-term value: 4* 1,5** mg/m³
*total, **respirable
EV (Canada) Long-term value: 10* 3** mg/m³
uncalcined; *inhaleable;**respirable

### 7439-98-7 Molybdenum

<table>
<thead>
<tr>
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<th>PEL (USA)</th>
<th>REL (USA)</th>
<th>TLV (USA)</th>
<th>EL (Canada)</th>
<th>EV (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term</td>
<td>15* mg/m³</td>
<td>Long-term</td>
<td>10* 3** mg/m³</td>
<td>Long-term</td>
<td>Long-term</td>
</tr>
<tr>
<td>value</td>
<td>*Total dust</td>
<td>value</td>
<td>or 80mg/m³</td>
<td>value</td>
<td>value</td>
</tr>
<tr>
<td></td>
<td>*Total dust</td>
<td>*total, **respirable fraction as Mo; *inhaleable fraction ** respirable fraction</td>
<td>as Mo; *respirable **inhaleable</td>
<td>*total, **respirable fraction as Mo; *respirable **inhaleable</td>
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</table>

### 7440-33-7 Tungsten

<table>
<thead>
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<th>REL (USA)</th>
<th>TLV (USA)</th>
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</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>10 mg/m³</td>
<td>Short-term</td>
<td>10 mg/m³</td>
<td>Short-term</td>
<td>Short-term</td>
</tr>
<tr>
<td>value</td>
<td>5 mg/m³</td>
<td>value</td>
<td>5 mg/m³</td>
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<tr>
<td></td>
<td>as W</td>
<td>as W</td>
<td>as W</td>
<td>as W</td>
<td>as W</td>
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</table>

### 7429-90-5 Aluminium powder (pyrophoric)

<table>
<thead>
<tr>
<th></th>
<th>PEL (USA)</th>
<th>REL (USA)</th>
<th>TLV (USA)</th>
<th>EL (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term</td>
<td>15*; 15** mg/m³</td>
<td>Long-term</td>
<td>10* 5** mg/m³</td>
<td>Long-term</td>
</tr>
<tr>
<td>value</td>
<td>*Total dust; ** Respirable fraction</td>
<td>value</td>
<td>as Al*Total dust**Respirable/pyro powd./welding f.</td>
<td>value</td>
</tr>
</tbody>
</table>

PEL (USA) Long-term value: 15*; 15** mg/m³
REL (USA) Long-term value: 10* 5** mg/m³
as Al*Total dust**Respirable/pyro powd./welding f.
TLV (USA) Long-term value: 1* mg/m³
as Al; *as respirable fraction
EL (Canada) Long-term value: 1,0 mg/m³
respirable, as Al

(Contd. on page 11)
Trade name: **NONEL® Non-electric Delay Detonators**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>EV (Canada)</td>
<td>Long-term value: 5 mg/m³</td>
<td>7440-36-0 antimony</td>
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</tr>
<tr>
<td></td>
<td>aluminium-containing (as aluminium)</td>
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</tr>
<tr>
<td>PEL (USA)</td>
<td>Long-term value: 0,5 mg/m³ as Sb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REL (USA)</td>
<td>Long-term value: 0,5 mg/m³ as Sb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TLV (USA)</td>
<td>Long-term value: 0,5 mg/m³ as Sb</td>
<td></td>
<td></td>
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<tr>
<td>EL (Canada)</td>
<td>Long-term value: 0,5 mg/m³</td>
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<tr>
<td>EV (Canada)</td>
<td>Long-term value: 0,5 mg/m³</td>
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<td></td>
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</tr>
<tr>
<td><strong>DNELs</strong></td>
<td>No further relevant information available.</td>
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<tr>
<td><strong>PNECs</strong></td>
<td>No further relevant information available.</td>
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### Ingredients with biological limit values:

#### 13424-46-9 lead diazide

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<tr>
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</thead>
<tbody>
<tr>
<td>BEI (USA)</td>
<td>30 µg/100 ml</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Medium: blood</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time: not critical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parameter: Lead</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 7439-92-1 lead

<p>| | | | |</p>
<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BEI (USA)</td>
<td>30 µg/100 ml</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Medium: blood</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time: not critical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parameter: Lead</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 µg/100 ml</td>
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<td></td>
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<tr>
<td></td>
<td>Medium: blood</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Time: not critical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parameter: Lead (women of child bearing potential)</td>
<td></td>
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</tbody>
</table>

#### 1314-41-6 orange lead

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BEI (USA)</td>
<td>30 µg/100 ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium: blood</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time: not critical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parameter: Lead</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 10294-40-3 barium chromate

<p>| | | | |</p>
<table>
<thead>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BEI (USA)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Medium: urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time: end of shift at end of workweek</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parameter: Total chromium (fume)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 µg/L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium: urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time: increase during shift</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parameter: Total chromium (fume)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Trade name: NONEL® Non-electric Delay Detonators

<table>
<thead>
<tr>
<th>7758-97-6 lead chromate</th>
</tr>
</thead>
<tbody>
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<td>BEI (USA)</td>
</tr>
<tr>
<td>30 µg/100 ml</td>
</tr>
<tr>
<td>Medium: blood</td>
</tr>
<tr>
<td>Time: not critical</td>
</tr>
<tr>
<td>Parameter: Lead</td>
</tr>
<tr>
<td>10 µg/100 ml</td>
</tr>
<tr>
<td>Medium: blood</td>
</tr>
<tr>
<td>Time: not critical</td>
</tr>
<tr>
<td>Parameter: Lead (women of child bearing potential)</td>
</tr>
</tbody>
</table>

- **Additional information:** The lists valid during the making were used as basis.

8.2 Exposure controls

- **Personal protective equipment:**
  - **General protective and hygienic measures:**
    The usual precautionary measures are to be adhered to when handling chemicals. Keep ignition sources away - Do not smoke. Keep away from foodstuffs, beverages and feed. Wash hands before breaks and at the end of work.
  - **Respiratory protection:**
    Not required under normal conditions of use. Respiratory protection may be required after product use.
  - **Protection of hands:**
    Wear gloves for the protection against mechanical hazards according to NIOSH or EN 388.
  - **Material of gloves**
    The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
  - **Penetration time of glove material**
    The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
  - **Eye protection:**
    Face protection

- **Safety glasses**

- **Body protection:** Impervious protective clothing

Limitation and supervision of exposure into the environment

- No further relevant information available.

Risk management measures

- Organizational measures should be in place for all activities involving this product.

(Contd. on page 13)
## SECTION 9: Physical and chemical properties

- **9.1 Information on basic physical and chemical properties**
- **General Information**
  - **Appearance:**
    - **Form:** Solid material
    - **Colour:** According to product specification
  - **Odour:** Odourless
  - **Odour threshold:** Not determined.
  - **pH-value:** Not applicable.
  - **Change in condition**
    - **Melting point/Melting range:** Not Determined.
    - **Boiling point/Boiling range:** Undetermined.
  - **Flash point:** Not applicable.
  - **Flammability (solid, gaseous):** Fire or projection hazard.
  - **Auto/Self-ignition temperature:** Not determined.
  - **Decomposition temperature:** Not determined.
  - **Self-igniting:** Product is not self-igniting.
  - **Danger of explosion:** Heating may cause an explosion.
  - **Explosion limits:**
    - **Lower:** Not determined.
    - **Upper:** Not determined.
  - **Vapour pressure:**
    - **Dynamic:** Not applicable.
    - **Kinematic:** Not applicable.
  - **Density:**
    - **Not determined.**
  - **Relative density:**
    - **Not determined.**
  - **Vapour density:**
    - **Not applicable.**
  - **Evaporation rate:**
    - **Not applicable.**
  - **Solubility in / Miscibility with water:** Variable, dependent upon product composition and packaging.
  - **Partition coefficient (n-octanol/water):** Not determined.
  - **Viscosity:**
    - **Dynamic:** Not applicable.
    - **Kinematic:** Not applicable.
  - **9.2 Other information**
    - No further relevant information available.
SECTION 10: Stability and reactivity

· 10.1 Reactivity
· 10.2 Chemical stability
· Thermal decomposition / conditions to be avoided:
  No decomposition if used and stored according to specifications. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
· 10.3 Possibility of hazardous reactions
  Danger of explosion. Toxic fumes may be released if heated above the decomposition point. Reacts violently with oxidising agents.
· 10.4 Conditions to avoid
  Keep ignition sources away - Do not smoke.
· 10.5 Incompatible materials:
  No further relevant information available.
· 10.6 Hazardous decomposition products:
  Carbon monoxide and carbon dioxide
  Hydrocarbons
  Lead oxide vapour
  Barium oxide vapour
  Toxic metal oxide smoke
  Chlorine compounds
  Danger of forming toxic pyrolysis products.
  Nitrogen oxides

SECTION 11: Toxicological information

· 11.1 Information on toxicological effects
· Acute toxicity:
· LD/LC50 values relevant for classification:
  7439-92-1 lead
  Oral |LD50| >2000 mg/kg (rat)
  7782-49-2 selenium
  Oral |LD50| 6700 mg/kg (rat)
  7758-97-6 lead chromate
  Oral |LD50| 12000 mg/kg (mouse)
· Primary irritant effect:
  · on the skin:
    Not a skin irritant in unused form. Vapors/particles from used product are possibly irritating to skin.
  · on the eye:
    Not an eye irritant in unused form. Vapors/particles from used product are possibly irritating to eyes.
  · Sensitisation: No sensitising effects known.
  · Subacute to chronic toxicity: No further relevant information available.
  · Acute effects (acute toxicity, irritation and corrosivity): Danger of blast or crush-type injuries.
  · Repeated dose toxicity:
    Contains known or suspect carcinogens when inhaled. Product is in non-inhalable form and is nonclassifiable as a carcinogen.
CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):
Contains known or suspect carcinogens when inhaled. Product is in non-inhalable form and is non-classifiable as a carcinogen.

SECTION 12: Ecological information

- **Toxicity**
- **Aquatic toxicity:** Toxic for aquatic organisms
- **Persistence and degradability** No further relevant information available.
- **Bioaccumulative potential** May be accumulated in organism
- **Mobility in soil** No further relevant information available.
- **Ecotoxicological effects:**
  - **Remark:** Toxic for fish
- **Additional ecological information:**
  - **General notes:**
    Water hazard class 3 (German Regulation) (Self-assessment): extremely hazardous for water
    Do not allow product to reach ground water, water course or sewage system, even in small quantities.
    Danger to drinking water if even extremely small quantities leak into the ground.
    Also poisonous for fish and plankton in water bodies.
    The product contains heavy metals. Avoid transfer into the environment. Specific preliminary treatments are necessary
    Toxic for aquatic organisms
    Due to available data on eliminability/decomposition and bioaccumulation potential prolonged term damage of the environment can not be excluded.
- **Results of PBT and vPvB assessment**
  - **PBT:** Not applicable.
  - **vPvB:** Not applicable.
- **Other adverse effects** No further relevant information available.

SECTION 13: Disposal considerations

- **Waste treatment methods**
  - **Recommendation:**
    Must not be disposed together with household garbage. Do not allow product to reach sewage system.
    Damaged materials pose a danger to anyone in the immediate area; consult experts for disposal of damaged products.
    The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes. Residual materials should be treated as hazardous.
- **Uncleaned packaging:**
  - **Recommendation:** Disposal must be made according to official regulations.
SECTION 14: Transport information

14.1 UN-Number
   DOT, ADR, IMDG, IATA
   UN0361

14.2 UN proper shipping name
   DOT
   Detonator assemblies, non-electric
   ADR
   0361 DETONATOR ASSEMBLIES, NONELECTRIC,
   IMDG
   DETONATOR ASSEMBLIES, NONELECTRIC,
   IATA
   DETONATOR ASSEMBLIES, NON-ELECTRIC

14.3 Transport hazard class(es)
   DOT, ADR, IMDG, IATA
   Class 1.4
   Label 1.4B

14.4 Packing group
   DOT, ADR, IMDG, IATA
   II

14.5 Environmental hazards:
   Marine pollutant: No
   Special marking (IATA):
   Prohibited from Transport in Passenger Aircraft.

14.6 Special precautions for user
   Not applicable.
   EMS Number: F-B,S-X
   Segregation groups
   Lead and its compounds

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
   Not applicable.

Transport/Additional information:

14.8 ADR
   Limited quantities (LQ)
   0
   Excepted quantities (EQ)
   Code: EO
   Tunnel restriction code
   2 (E)

14.9 IMDG
   Limited quantities (LQ)
   0
   Excepted quantities (EQ)
   Code: EO
   UN "Model Regulation":
   UN0361, DETONATOR ASSEMBLIES, NONELECTRIC,, 1.4B, II
SECTION 15: Regulatory information

- **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
  - United States (USA)
  - SARA
  - **Section 355 (extremely hazardous substances):**
    None of the ingredients are listed.
  - **Section 313 (Specific toxic chemical listings):**
    13424-46-9 lead diazide
    7439-92-1 lead
    7782-49-2 selenium
    1314-41-6 orange lead
    10294-40-3 barium chromate
    7758-97-6 lead chromate
    7727-43-7 barium sulphate, natural
    7429-90-5 aluminium powder (pyrophoric)
    7440-36-0 antimony
  - **TSCA (Toxic Substances Control Act):**
    All ingredients are listed.
  - **Proposition 65 (California):**
    - **Chemicals known to cause cancer:**
      13424-46-9 lead diazide
      7439-92-1 lead
      1314-41-6 orange lead
      13463-67-7 titanium dioxide
      10294-40-3 barium chromate
      7758-97-6 lead chromate
    - **Chemicals known to cause reproductive toxicity for females:**
      7439-92-1 lead
      10294-40-3 barium chromate
      7758-97-6 lead chromate
    - **Chemicals known to cause reproductive toxicity for males:**
      7439-92-1 lead
      10294-40-3 barium chromate
      7758-97-6 lead chromate
    - **Chemicals known to cause developmental toxicity:**
      13424-46-9 lead diazide
      7439-92-1 lead
      10294-40-3 barium chromate
## Carcinogenic Categories

### EPA (Environmental Protection Agency)

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Name</th>
<th>TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9</td>
<td>lead diazide</td>
<td>B2</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>lead</td>
<td>B2</td>
</tr>
<tr>
<td>7782-49-2</td>
<td>selenium</td>
<td>D</td>
</tr>
<tr>
<td>1314-41-6</td>
<td>orange lead</td>
<td>B2</td>
</tr>
<tr>
<td>10294-40-3</td>
<td>barium chromate</td>
<td>A(inh), D(oral), K/L(inh), CBD(oral)</td>
</tr>
<tr>
<td>7758-97-6</td>
<td>lead chromate</td>
<td>K</td>
</tr>
<tr>
<td>7727-43-7</td>
<td>barium sulphate, natural</td>
<td>D, CBD(inh), NL(oral)</td>
</tr>
<tr>
<td>7778-74-7</td>
<td>potassium perchlorate</td>
<td>NL</td>
</tr>
<tr>
<td>2691-41-0</td>
<td>octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)</td>
<td>D</td>
</tr>
</tbody>
</table>

### IARC (International Agency for Research on Cancer)

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Name</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9</td>
<td>lead diazide</td>
<td>2A</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>lead</td>
<td>2B</td>
</tr>
<tr>
<td>7782-49-2</td>
<td>selenium</td>
<td>3</td>
</tr>
<tr>
<td>1314-41-6</td>
<td>orange lead</td>
<td>2A</td>
</tr>
<tr>
<td>13463-67-7</td>
<td>titanium dioxide</td>
<td>2B</td>
</tr>
<tr>
<td>10294-40-3</td>
<td>barium chromate</td>
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<tr>
<td>7758-97-6</td>
<td>lead chromate</td>
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</tr>
<tr>
<td>61790-53-2</td>
<td>Diatomaceous earth (Silica-Amorphous)</td>
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</table>

### TLV (Threshold Limit Value established by ACGIH)

<table>
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<tr>
<th>CAS Number</th>
<th>Name</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>13424-46-9</td>
<td>lead diazide</td>
<td>A3</td>
</tr>
<tr>
<td>7439-92-1</td>
<td>lead</td>
<td>A3</td>
</tr>
<tr>
<td>1314-41-6</td>
<td>orange lead</td>
<td>A3</td>
</tr>
<tr>
<td>13463-67-7</td>
<td>titanium dioxide</td>
<td>A4</td>
</tr>
<tr>
<td>10294-40-3</td>
<td>barium chromate</td>
<td>A1</td>
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<td>7758-97-6</td>
<td>lead chromate</td>
<td>A2</td>
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<tr>
<td>7439-98-7</td>
<td>molybdenum</td>
<td>A3</td>
</tr>
<tr>
<td>7429-90-5</td>
<td>aluminium powder (pyrophoric)</td>
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</tr>
</tbody>
</table>

### NIOSH-Ca (National Institute for Occupational Safety and Health)

<table>
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<tr>
<th>CAS Number</th>
<th>Name</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>13463-67-7</td>
<td>titanium dioxide</td>
<td></td>
</tr>
<tr>
<td>10294-40-3</td>
<td>barium chromate</td>
<td></td>
</tr>
<tr>
<td>7758-97-6</td>
<td>lead chromate</td>
<td></td>
</tr>
</tbody>
</table>

### Canada
- **Canadian Domestic Substances List (DSL)**
  - Some components are listed on the NDSL.
  - All ingredients are listed.
Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 01.11.2018
Revision: 01.11.2018

Trade name: NONEL® Non-electric Delay Detonators

- Canadian Ingredient Disclosure list (limit 0.1%)
  7439-92-1 lead
  7782-49-2 selenium
  10294-40-3 barium chromate
  7758-97-6 lead chromate

- Canadian Ingredient Disclosure list (limit 1%)
  7439-98-7 molybdenum
  7440-33-7 tungsten
  7429-90-5 aluminium powder (pyrophoric)
  7440-36-0 antimony

- Other regulations, limitations and prohibitive regulations
  This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

- Substances of very high concern (SVHC) according to REACH, Article 57
  13424-46-9 lead diazide
  1314-41-6 orange lead
  7758-97-6 lead chromate

- 15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

Disclaimer
Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

- Relevant phrases
  H200 Unstable explosives.
  H201 Explosive; mass explosion hazard.
  H228 Flammable solid.
  H250 Catches fire spontaneously if exposed to air.
  H261 In contact with water releases flammable gases.
  H271 May cause fire or explosion; strong oxidiser.
  H301 Toxic if swallowed.
  H302 Harmful if swallowed.
Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and
OSHA GHS

Trade name: NONEL® Non-electric Delay Detonators

H311 Toxic in contact with skin.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H332 Harmful if inhaled.
H350 May cause cancer.
H360Df May damage the unborn child. Suspected of damaging fertility.
H360FD May damage fertility. May damage the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.
H373 May cause damage to organs through prolonged or repeated exposure.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.
H413 May cause long lasting harmful effects to aquatic life.
R11 Highly flammable.
R15 Contact with water liberates extremely flammable gases.
R17 Spontaneously flammable in air.
R2 Risk of explosion by shock, friction, fire or other sources of ignition.
R20/22 Harmful by inhalation and if swallowed.
R22 Harmful if swallowed.
R23/25 Toxic by inhalation and if swallowed.
R24 Toxic in contact with skin.
R3 Extreme risk of explosion by shock, friction, fire or other sources of ignition.
R33 Danger of cumulative effects.
R36/38 Irritating to eyes and skin.
R43 May cause sensitisation by skin contact.
R45 May cause cancer.
R48/23/25 Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R53 May cause long-term adverse effects in the aquatic environment.
R60 May impair fertility.
R61 May cause harm to the unborn child.
R62 Possible risk of impaired fertility.
R9 Explosive when mixed with combustible material.

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
## Trade name: NONEL® Non-electric Delay Detonators

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<td>LD50</td>
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</table>

### Sources

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