1. **Product Identification**

Product Identification: Clayton Certainty Fog Signal - Single – Lead Clip  
Common Name: Railway Fog Signal Detonator  
Proper Shipping Name: SIGNALS, RAILWAY TRACK, EXPLOSIVE  
Use of product: Audible Railway Track Warning Device  
Document Date: 25/09/2013

2. **Composition & Information on Ingredients**

Hazardous Component – Potassium Nitrate  
5.6 grammes

**Risk Phrases**  
R2 Risk of explosion by shock, friction, fire or other source of ignition  
R5 Heating may cause explosion

**Safety Phrases**  
S1/2 Keep locked up and out of reach of children.  
S3 Keep in a cool place.  
S4 Keep away from living quarters.  
S7/8 Keep container tightly closed and dry.  
S13 Keep away from food, drink and animal feeding stuffs.  
S15 Keep away from heat.  
S16 Keep away from sources of ignition – NO SMOKING.  
S18 Handle and open container with care.  
S20 When using do not eat, drink or smoke.  
S22 Do not breathe dust.  
S25 Avoid contact with eyes.  
S33 Take precautionary measures against static discharges.  
S35 This product and its container must be disposed of in a safe way.
**Composition/ Information on Device**

A railway fog signal is a small metal device containing a limited quantity of explosive. In use, the device is placed on the running surface of a rail such that any rail-mounted vehicle passing over it would cause it to explode, and in so doing, alert the driver of the vehicle to a hazard on the line ahead. A common use for railway fog signals is to protect possessions.

**Size**

51mm diameter by 9mm deep

**Case**

The outer case of each signal is comprised of two parts, a base plate and an upper flat-topped dome, both are made from cold reduced tinplate of thickness 0.43mm and joined at the rim.

**Construction**

The rim joint is comprised of a single fold, made by bending the edge of the upper part of the case underneath the base plate and sealed to prevent entry of moisture.

**Percussion**

Each signal contains five percussion caps fitted on an anvil made of tinned malleable iron, sufficiently soft not to indent the rail. The anvil assembly is held securely in a central position on the base plate by a perforated tinplate disc.

**Explosive**

Each signal contains 8 grammes weigh of gunpowder.

**Binding Strip**

Signals shall have a lead strip, average length 178mm by 6.4mm wide and 0.8m thick firmly soldered to the base plate.

**Marking**

The word SINGLE and figures to show the month and year of manufacture shall be stamped on the dome plate of each signal and painted with a protective coating of paint. The Signals have a maximum service life of 5 years (60 months) from the date of manufacture after which they should be disposed of in line with section 13.
3. **Hazard Identification**
No signal under any condition of explosion, properly placed, shall eject fragments of metal in quantity or size likely to cause injury to personnel.

The signal is designed to be used as a stand alone device and should not be modified or used with any adaptor or alternative Binding Strip.

UN NUMBER UN 0493

**CLASSIFICATION**
The detonators are classified as 1.4G.

The explanation for this classification is as follows:

- 1.4 Substances and articles which present no significant hazard.
- G A substance which is an explosive substance because it is designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as a result of not-detonative self-sustaining exothermic chemical reactions or an article containing such a substance or an article containing both a substance which is explosive because it is capable by chemical reaction in itself of producing gas at such a temperature and pressure and at such a speed as could cause damage to surroundings and an illuminating, incendiary, lachrymatory or smoke-producing substance (other than a water-activated article or one containing white phosphorus, phosphide or a flammable liquid or gel)

4. **First Aid Measures**
In the event of close proximity to the activation of a device, check the integrity of ear drums and hearing (Audiogram by an ENT Specialist)

If combustion products are inhaled, remove victim to fresh air. If Symptoms (nausea) persist consult doctor.

5. **Fire Fighting Measures**
Extinquishing Media : If product is on fire, all personnel should retire to a safe location some distance away (100m) from the fire.

Individual signals will trigger if involved in a fire however do not present a mass explosion risk.

Large quantities of water may be used for cooling purposes if product is at risk of fire / heat.

1 x 2kg dry powder extinguisher must be on vehicle regardless of load quantity. Additional will be required if load exceeds 333kg.

**Exposure Hazards**
**Resulting Gases**
Oxides of Nitrogen (NOX), Carbon Monoxide (CO), Sulphur Dioxide (SO2), Hydrogen Sulphide (H2S)

**Combustion Products**
As above plus Nitrogen (N2), Water Vapour (H2o), Carbon Dioxide (CO2)

6. **Accidental Release Measures**
All objects and material must be collected to be evacuated and destroyed. Avoid Shocks , rough handling, friction, sparks & fire
Keep away from any source of heat, do not approach with a naked flame.
In the event of damage or rupture to the packaging of the signals, they should be transferred into suitable approved packaging.
7. Handling & Storage
Precautions for :-
Safe Handling

Avoid flame, spark, shock & Impact
Protect from fire
Open and Handle containers with care
The Lead binding strip has a finite number operations and care should be taken when bending
or repacking not to create a stress fracture

Storage
A number of common principles should be applied to the safe storage of explosives no matter the quantity:

a) protect explosives from sources of ignition
b) prevent fire and explosion spreading
c) avoid unsuitable storage conditions
d) ensure both accurate control and record keeping arrangements.

Details of these principles can be found in the Approved Code of Practice and Guidance to MSER (HSE L139).

The safety principles that should be followed when storing explosives:

a) keep explosives within their transport packaging wherever possible
b) separate ‘normal’ product explosives from those which have suffered deterioration or are waste explosives
c) explosives should be stored well away from other dangerous goods
   (eg flammable materials, gas cylinders and pesticides).

A suitable place of storage whether in a container, store or cupboard should where appropriate:

a) be suitably weatherproof
b) prevent explosives from coming into contact with any incompatible substances
c) be protected by a lightning conductor
d) be used only to store explosives or connected implements
e) be kept clean with steps taken to prevent grit entering unpackaged explosives.

Quantity Limits
The MSER govern the storage of railway fog signals. These regulations set thresholds relating to the storage conditions
and the need to license or register the storage premises, according to the ‘net mass’ of explosives stored

‘Net mass’ refers to the actual weight of explosive substances in the article rather than the whole weight of the article
(explosives and casing). Each railway fog signal contains on average 8g of gunpowder.

If no more than 5kg net mass of HT4 explosive is stored, there is no need to register the premises under the MSER. 5kg
is equal to approximately 600 railway fog signals.

An unlimited amount of HT4 explosive can also be stored for up to 24 hours without the need to license or register the
premises. This allows a large consignment of railway fog signals to be delivered to one location and then split up and
distributed to other locations.

If 5kg to 250kg ‘net mass’ of HT4 explosive (over 600 to 30,000 railway fog signals) is stored then the premises have to
be registered by the local licensing authority (this is usually the local council, county council, London Borough or City of
London). If more than 250kg ‘net mass’ of railway fog signals is stored then the premises must be licensed.

MSER refer to ‘each place of keeping’ and not each individual company. Therefore an individual company may keep up
to 5kg net mass of railway fog signals at ‘each place of keeping’ (these must have different addresses) without the need
to license the premises. Where more than one individual company occupies a premise, they should co-operate with
each other to ensure that no more than 5kg net mass of railway fog signals are kept on the premises.

8. Exposure Controls & Personal Protection
When used in line with Rail Safety & Standard Board , Guidance on railway fog signals no special Personal Protective
Equipment is required.

The detonators are secured to the rail track by a lead strip, lead in sheet or extruded form does not in itself present a
health hazard however normal washing precautions should be performed after handling.
9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer Shell</td>
<td>Tin Plated Steel</td>
<td>30 grammes</td>
</tr>
<tr>
<td>Anvil</td>
<td>Malleable Iron</td>
<td>6 grammes</td>
</tr>
<tr>
<td>Binding Strip</td>
<td>Lead</td>
<td>10 grammes</td>
</tr>
<tr>
<td>Blackpowder</td>
<td>Potassium Nitrate 75%</td>
<td>5.6 grammes</td>
</tr>
<tr>
<td></td>
<td>Sulphur 15%</td>
<td>1.4 grammes</td>
</tr>
<tr>
<td></td>
<td>Charcoal 10%</td>
<td>0.8 grammes</td>
</tr>
<tr>
<td>Percussion Caps</td>
<td></td>
<td>0.8 grammes</td>
</tr>
</tbody>
</table>

10. Stability & Reactivity Data

Conditions to Avoid
- Temperature: High
- Pressure: Not Applicable
- Light: Store out of Direct Sunlight when not in use
- Impact: Yes
- Friction: Yes
- Ignition: Yes

Materials to avoid:
- Water: No
- Air: No
- Acids: Yes
- Bases / Alkalis: Yes
- Oxidisers: Yes

Decomposition
- Stabilisers Required: No
- Exotherm Possible: Yes
- Physical Appearance Change: Yes, Separates into component assemblies
- Contact with Water: Cooling affect
- Degradation to unsatable: No

11. Toxicological Data

Dangerous to Health
Sulphur and charcoal present in these formulations are not considered to be toxic by ingestion, the toxicity of potassium nitrate is 3750 mg/kg, Acute oral toxicity of sulphur LD50 oral rat is more than 500mg/kg. The fumes developed as a result of operation can cause strong irritation of the eyes and respiratory system resulting in possible pulmonary oedema.

A Lead strip is used for the binding strip, in normal use this does not present a significant exposure to lead or significant risk to health providing basic cleanliness good practice is followed.

The main exposure risk from the lead strip is ingestion which can be avoided by after contact always washing hands prior to eating or drinking.

Please refer to the HSE guidance note INDG305 Working Safely with Lead.

12. Ecological Data

Sulphur and charcoal are regarded in an eco-toxicological sense to be chemically inert. Only potassium nitrate is classified as being environmentally relevant. Information on the biodegradability or the bioaccumulation of potassium nitrate is unavailable at present.

Potassium Nitrate Aquatic Toxicity
- LC50: 1650 mg/24h (Daphnia)
- EC50: 200/1000 mg/l (Plankton)

Lead is toxic to birds and animals if ingested, ensure any lead debris disposed of or recycled in a responsible manner.

13. Disposal Considerations

Waste and/or contaminated signals must be disposed of only by authorised personnel by incineration on an approved burning or blasting ground in accordance with local and/or national regulations concerning hazardous waste.

Please contact either the distributor or manufacturer for further information.
14. Transport Information

Proper Shipping Name: SIGNALS, RAILWAY TRACK, EXPLOSIVE

<table>
<thead>
<tr>
<th>UN Number:</th>
<th>0493</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMDG Code/Class:</td>
<td>1.4G</td>
</tr>
<tr>
<td>ICAO/IATA (Air) Class:</td>
<td>1.4G</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>-</td>
</tr>
<tr>
<td>RID/ADR Class:</td>
<td>1.4G</td>
</tr>
</tbody>
</table>

In addition, attention should be paid to additional information as set out in the Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations 1994, or in international agreements on the transport and packaging of dangerous goods.

<table>
<thead>
<tr>
<th>Transport Category</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load threshold</td>
<td>333kg (explosive content) before ALL packaged goods transport rules apply</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Small Packages</th>
<th>LQ0</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td></td>
</tr>
<tr>
<td>Small package rules never apply</td>
<td></td>
</tr>
</tbody>
</table>

**Packaging**

**P135 applies (column 8 –ADR 2011)**

Approved combination packaging to be used at all times when being transported ‘commercially’ (ie: not for own use during normal work)

<table>
<thead>
<tr>
<th>Special provisions for road carriage when load above 333kg if EU journey.</th>
<th>Packages</th>
<th>V2</th>
<th>EXII/EXIII vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading/Unloading</td>
<td>CV1, CV2, CV3</td>
<td>No loading in public area, clean vehicles, no naked flames, and limits to be carried.</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>S1</td>
<td>Special driver training</td>
<td></td>
</tr>
</tbody>
</table>

**AIR (IATA)**

Additional rules applying to air transport

<table>
<thead>
<tr>
<th>Aircraft type</th>
<th>UN0493 cannot be transported in passenger planes, they must go in cargo planes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Limits</td>
<td>Cannot be transported as limited quantities (LQ) or excepted packages (E0) so must always be packaged in approved combination packaging as for road. The packaging must meet the requirements for a Packing Group (PG) 2 load (X or Y on code)</td>
</tr>
<tr>
<td>Packing Instruction</td>
<td>135</td>
</tr>
<tr>
<td>Maximum Load</td>
<td>75kg net</td>
</tr>
</tbody>
</table>

**SEA (IMDG)**

Additional rules applying to sea transport

<table>
<thead>
<tr>
<th>Stowage rules</th>
<th>Category 06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo ships (up to 12 passengers)</td>
<td>On deck in closed cargo transport units or under deck.</td>
</tr>
<tr>
<td>Passenger ship</td>
<td>On deck in closed cargo transport units, or under deck in closed cargo transport units. Maximum NET mass on passenger ships is 10kg (7.1.7.5.2)</td>
</tr>
<tr>
<td>Segregation</td>
<td>There are additional segregation rules if other classes of dangerous goods are to be carried. IMDG to be consulted.</td>
</tr>
</tbody>
</table>

These are intended as a guide only, dependent on the type of journey ADR, IATA, IMDG should be consulted to clarify exact rules.

**Packaging**

All Clayton Certainty Signals are shipped in certified packaging compliant with VCA packaging certificate 5985 & Packing Instructions P135, and contain a maximum of 100 Signals.

<table>
<thead>
<tr>
<th>Packaging Dimensions</th>
<th>274mm length x 116mm width x 160mm high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Solid Board Cartons</td>
</tr>
<tr>
<td>Gross Pack Weight</td>
<td>Maximum 6kg</td>
</tr>
<tr>
<td>Stacking Height</td>
<td>Max 8 box’s stacked upright</td>
</tr>
</tbody>
</table>
15. Regulatory Information
Because railway fog signals are explosives they are classified for transport under the Classification and Labelling of Explosives Regulations 1983 and for storage under the Manufacture and Storage of Explosives Regulations 2005. For transport railway fog signals are classified as UN Division 1.4 and for storage they are classified as Hazard Type (HT) 4.

The main legislation covering the transport, storage and use of railway fog signals is as follows:

a) Classification and Labelling of Explosives Regulations 1983 (CLER)

b) The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (CDG)

c) Manufacture and Storage of Explosives Regulations 2005 (MSER).

CDG is revised and reissued every two years (2007, 2009, 2011 etc.) to align with the RID Regulations that are also revised and re-issued to the same timescale. Where references are made to CDG they refer to the version in force. Stakeholders should ensure that they are referring to the most up to date version of those Regulations.

16. Other Information