

AUTOSTEM CARTRIDGES GENERATION III

SUMMARISED SAFETY DATA SHEET (Revised 2023)

1. **IDENTIFICATION**

Product Identifier: AUTOSTEM Cartridge: The AUTOSTEM cartridge is a polymer-based cartridge with lengths varying from 90mm to 420mm. It contains a granular mix ranging from 9g to 1,700g. The external diameter of the cartridge varies from 9mm up to 87mm. The cartridge may be shipped with or without an electrical igniter, and the granular mix is designed to deflagrate upon initiation.

Recommended Use: The AUTOSTEM cartridge is designed for use in built-up areas, near foundations and gas pipes, and facilitates continuous mining in both underground and pit operations. Unlike traditional explosives, it is permitted in built-up areas, can be used near strategic infrastructure, and has shorter blasting cycle times. The cartridges are primarily used in the construction and demolition industries to create fractures in rock and concrete structures. The rapid pressure wave generated by the cartridge's granular mix results in mechanical stress that fragments the rock or concrete into smaller sections. The cartridges are designed for rock and/or concrete breaking in mining, quarrying, and in vibration-sensitive civil works.

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2. **COMPOSITION/INFORMATION ON INGREDIENTS**

Composition: The AUTOSTEM cartridges are composed of a blend of smokeless powder and ammonium nitrate (ppAN), designed to deflagrate upon initiation. The cartridges contain a mixture that ranges from 9g to 1,700g of smokeless powder and ammonium nitrate (ppAN). They can be shipped with or without an electric fuse attached to lead wires for initiation. The maximum current intensity permissible for testing the firing circuit resistance is 10mA.
3. **HAZARDS IDENTIFICATION**

The AUTOSTEM cartridges are classified as:
UN No. - 0323 (Cartridges, Power Device).
Class - 1 **Hazard Division - 1.4S** **Signal Word – WARNING** **HS Code - 3604.90.00 (1)**
Subsidiary Risk – None. **Poisons Schedule Number - None**

Any modification or tampering with the cartridge or its contents can lead to serious injuries. Do not attempt to disassemble or burn the cartridges as it can be dangerous and may result in injury. While the cartridges are not designed for ingestion due to their size, handling or accidental release of the propellant powder could pose a hazard.

Periodic inhalation of normal combustion products presents no hazard to the user. Repeated inhalation of significantly large quantities may become hazardous. Permanent damage to hearing may result from frequent exposure to impact noise without wearing suitable hearing protection.
4. **FIRST AID MEASURES**

Acute and delayed symptoms may include headaches due to inhalation of combustion products. In such cases, it is advised to move to an area with fresh air. Before resuming work, ensure the work area is well-ventilated. For added safety, it is recommended to wear a Self-Contained Breathing Apparatus (SCBA) to prevent inhalation of harmful gases. If symptoms persist, seek medical attention immediately. Always follow safety guidelines to prevent exposure to harmful substances or conditions.
5. **FIRE-FIGHTING MEASURES**

Extinguishing Methods - In case of fire, use water, dry powder, carbon dioxide, or foam as extinguishing agents. Avoid direct contact with flames as it may ignite the cartridges and cause damage to the packaging. The cartridges do not pose a mass explosion risk unless they are confined. Pressure build-up may cause the cartridges to explode and scatter. Combustion of cartridges produces gases such as carbon monoxide, carbon dioxide, nitrogen, and water vapor, which can be harmful. When dealing with fires involving large quantities of cartridges, it is recommended to wear a Self-Contained Breathing Apparatus (SCBA) to protect against potential chemical hazards.
6. **ACCIDENTAL RELEASE MEASURES**

The special design of each AUTOSTEM blasting cartridge is equipped with a patented safety switch that prevents any potential initiation prior to "unlocking" the product for use in the borehole. The cartridge makes spillage of propellant very unlikely. AUTOSTEM cartridges cannot be initiated outside of a borehole. However, should this occur, the recovered propellant would have to be sent to a suitably qualified and equipped authority for disposal. Cartridges should be similarly disposed of. These may also be returned to the Manufacturer in their original packaging for disposal.
7. **HANDLING AND STORAGE**

Handling - Ensure that cartridges are transported only in the packaging provided by the manufacturer. Any form of tampering or modification of a cartridge can lead to injuries. Cartridges that are damaged should not be used and must be disposed of as previously outlined. Cartridges are designed to withstand reasonable levels of impact, friction, heat, or electrostatic sources. Follow all safety practices applicable to handling explosives. The design of the cartridges ensures that the operator is not at risk of injury or breaking the electric wire during insertion into the drilled borehole. Stemming/tamping of the live cartridge is not required, thereby saving time, and reducing risk.

Storage - Cartridges should be stored in a dry place, ideally at a temperature between 5°C and 35°C (ideally 20°C), and relative humidity less than 50%. Prolonged exposure to water or high humidity can adversely affect cartridge functioning. Avoid exposure to direct sunlight or any other source of radiant heat as this could raise the internal temperature of the cartridges to levels that could adversely affect the product's shelf life. Always check the expiry date on the product packaging or consult with the manufacturer to ensure the product is within its usable period. If possible, keep the cartridges in their original packaging to prevent any damage or accidental ignition.

Specific use(s) - Only trained personnel over 21 years and with specialised knowledge or under direct supervision. The cartridges should not be stored or used in proximity to incompatible materials such as strong oxidizing agents, acids, bases, or sources of ignition. They should also be kept away from heat sources, open flames, and sparks. Always follow the manufacturer's guidelines for safe storage and handling.
8. **EXPOSURE CONTROLS/PERSONAL PROTECTION**

Exposure limit values - No OEL prescribed. Refer to specific OELs for combustion by products.

Exposure controls
Occupational exposure controls.

 - Respiratory Protection: Regular inhalation of normal firing products is not considered hazardous. However, cartridges should not be used in confined spaces, and good ventilation should be ensured during use.
 - Hand Protection: Use working gloves with appropriate sensitivity when handling cartridges.
 - Eye Protection: Safety glasses and/or a face shield should be worn during firings.
 - Skin Protection: Standard protection equipment should be used to protect the skin.
 - Head Protection: A protective hat should be worn during firing.
 - Hearing Protection: Use hearing protection that provides at least 50db(A) attenuation or use percussion valve type earmuffs. Frequent exposure to impact noise without suitable hearing protection may result in permanent hearing damage.

Environmental exposure controls.

 - Properly dispose of all residual parts of fired cartridges in accordance with the environmental laws in force.
 - Please note that these are general guidelines, and specific situations may require additional or different protective measures.

**** Trade Secret Claims:** Certain specific formulations or processes used in the creation of the AUTOSTEM cartridges may be considered proprietary or trade secrets of Non-Detonating Solutions (Pty) Ltd. These specifics are not disclosed to protect the company's intellectual property rights and maintain a competitive advantage in the market. However, all necessary safety and handling information is provided in accordance with regulatory requirements.

9. PHYSICAL AND CHEMICAL PROPERTIES

Important health, safety, and environmental information (refer to the PPAN)

The PPAN is a uniform mixture of ammonium nitrate with compatible inorganic material. It takes the form of coarse, porous, hardened spherical particles, obtained by spraying the molten material. The material is free-flowing, white to cream-colored particles, free from grit, visible impurities, and foreign matter. It does not contain any anti-caking or coating agents.

Important health, safety, and environmental information (refer to the smokeless powder)

The smokeless powder is a chemical composition used in small arms ammunition and/or mining, generating excess gas during ignition. It is a glazed spherical ball powder.

Important health, safety, and environmental information (refer to the initiator)

The initiator used in the standard cartridge is a mild steel skeleton with two electrodes bridged by a wire. The electrodes/wires are coated with a pyrotechnic composition ("pill"). For the Booster cartridge, a rimfire initiator – blank brass cartridges are used. The firing pin is made of polymer: polypropylene/polyethylene.

10. STABILITY AND REACTIVITY

Chemical Stability - The AUTOSTEM cartridges are designed for minimal clearance, allowing for use closer to communities, infrastructure, and buildings. This reduces the potential hazard and risk of damage to people or property.

Conditions to avoid - To maintain the integrity of the cartridges, avoid excessive heating (above ambient temperature), moisture, and shocks as much as possible. Avoid exposing the cartridges to direct sunlight or any other source of radiant heat. The internal temperature of the cartridges may rise to levels that could adversely affect the product's shelf life. Prolonged exposure to water or high humidity can adversely affect the functioning of the cartridges.

Materials to avoid - Do not use any cartridges in an environment containing flammable gasses or dusts and/or in immediate contact with combustible materials.

Hazardous decomposition products - Under normal storage conditions, the cartridges do not present any relevant decomposition products.

11. TOXICOLOGICAL INFORMATION

Routes of Exposure, Related Symptoms, Acute and Chronic Effects - Inhalation of combustion products may lead to headaches. If this occurs, move to an area with fresh air and ensure sufficient ventilation in the work area before resuming work. Individuals who have inhaled large quantities of ignition gases should be placed under medical observation for at least 24 hours. This is primarily a precaution against the potential toxic effects of nitrogen oxides.

12. ECOLOGICAL INFORMATION

Ecotoxicity - No data available.

Mobility - Not applicable.

Persistence and degradability - The cartridge case is not biodegradable. The double base powder is resistant to rapid degradation in relevant environmental media, either through biodegradation or other processes such as oxidation or hydrolysis. Ammonium nitrate becomes deliquescent in the presence of moisture, indicating it may dissolve and disperse in water environments.

Bioaccumulative potential - No data available.

Other adverse effects - No other known adverse effects on the environment have been identified.

13. DISPOSAL CONSIDERATIONS

Cartridges should be sent to a suitably qualified and equipped authority for disposal. This could be a local waste management facility, a recycling centre, or a hazardous materials disposal facility. If feasible, return the cartridges to the manufacturer in their original packaging, clearly indicating that the material is intended for disposal. In the event of accidental release, the recovered smokeless powder should also be sent to a suitably qualified and equipped authority for disposal. Always adhere to any relevant local community provisions relating to waste. In their absence, comply with national or regional provisions in force. Remember, proper disposal of these cartridges is crucial to prevent any potential environmental impact and ensure safety.

14. TRANSPORT INFORMATION

Shipping name - AutoStem Cartridges.

UN Number - 0323 (Cartridges, Power Device)

Classification - Class 1

Hazard Division - 1.4S

Signal Word - Warning

Symbol - 1.4S Diamond Symbol

Packaging Group - II

Packaging Code - 4G - Corrugated Fibreboard Boxes

Gross Mass - The gross mass per box, including the packaging weight, is less than or equal to 25 kg.

Packaging Weight and Details - The weight of the packaging is 1.39 kg. The packaging consists of a fibreboard box (520 x 375 x 285 mm) containing 2 poly woven bags. Not exceeding 25 kilograms.

Certification and Compliance - The packaging is certified by TEN – E Packaging Services (Pty) Ltd (ZA/TE7620) and fully complies with UN, IMDG, ICAO, and IATA Regulations for Transport of Dangerous Goods. This classification indicates that it's a substance or article that presents only a small hazard in the event of ignition or initiation during transport.

End User Responsibility - The end user is responsible for obtaining the necessary authorization for use.

15. REGULATORY INFORMATION

The product label for the AUTOSTEM cartridges displays safety and environmental information in compliance with the CLP Regulation (EC) No 1272/2008.

This includes the symbol for "Explosive" and the following hazard statements:

- H204: Indicates a fire or projection hazard.
- P210: Advises to keep away from heat, sparks, open flames, and hot surfaces, and prohibits smoking.

These statements provide essential safety information for the handling and use of the cartridges. Always refer to the product label for specific safety instructions and regulatory information. It's important to follow these guidelines to ensure safe usage and handling of the product.

16. OTHER INFORMATION

The information provided in this data sheet is compiled from the following key sources:

- The UN Publication: "Recommendations on the Transport of Dangerous Goods", 22nd revised edition, published in February 2022.
- The South African Bureau of Standards Code of Practice for the Identification and Classification of Dangerous Substances and Goods, SABS 0228, with the latest edition published as SANS 10228 in 2012.
- The Occupational Health and Safety Amendment Act, No. 181 of 1993, and the Occupational Health and Safety Amendment Act, No. 72 of 2005.
- COMMISSION DIRECTIVE 91/155/EEC of 5 March 1991, which was amended by Commission Directive 93/112/EC of 10 December 1993 and Commission Directive 2001/58/EC of 27 July 2001. This directive was later repealed by Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Please note that this information is subject to change and should always be verified with the most recent sources.

Always follow the manufacturer's instructions and local regulations when handling the product.

