



Hazmatcad™

Hazardous Material Chemical Agent Detector

A Guide for First Responders

Chemical warfare agents (CWAs) and toxic industrial chemicals (TICs) are potential weapons in a terrorist's arsenal, ranging from sophisticated nerve agents such as GB (Sarin) to commonly available chemicals such as chlorine. This broad range of

threats has led to the development of the Hazmatcad line of Advanced Hazardous Material Chemical Agent Detectors. This document is designed to help users develop standard operating procedures for using the Hazmatcad and Hazmatcad Plus

Detectors. These units are designed for ease-of-use and for competency with minimal training.

MSA
The Safety Company

Hazmatcad™

Hazardous Material Chemical Agent Detector for First Responders

Understanding the Technology

First responders to a chemical attack may be police, firefighters or emergency medical technicians. Their specialties require a wide range of talents and skills. However, analytical methods of chemical weapons identification may be unfamiliar.

Hazmatcad Detector function is based upon surface acoustic wave (SAW) technology. The unit incorporates an array of three small solid state sensors coated with specific polymers. Time, amplitude, and signal patterns from all three SAW detectors are used to determine if a nerve or blister agent is present and to eliminate false alarms.

The Hazmatcad Plus Detector incorporates electrochemical cells in addition to SAW sensors to detect the presence of hydrogen cyanide (blood agent), phosgene (choke agent), halogen gases (chlorine, nitrogen dioxide, fluorine) and hydride gases (arsine, hydrogen sulfide). Electrochemical cells are a common and well-defined detection method. While they are less specific than SAW sensors, they provide reliable results for classes of TIC gases and vapors.

For the initial assessment of a potential chemical warfare agent attack or toxic industrial chemical spill, a Hazmatcad Detector is the instrument of choice.

Deploying the Hazmatcad Detector

If evidence at the scene determines a potential use of chemical warfare agents or toxic industrial chemicals, a Hazmatcad Detector should be selected for site entry and deployed in the following manner:

1. Remove the Hazmatcad Detector unit from the storage case and open the battery compartment door. Insert two fully-charged Sony lithium-ion model NP-550 into the battery compartment and close the battery door.

2. Slide the three-position sample port cover, at the top of the instrument, to the **DUST FILTER** position to help prevent particulates from entering the unit.
3. Press the **ON** button. The Hazmatcad Detector will begin a series of diagnostic selfchecks.
4. Upon successful completion of the self-test, the green **SYS. OK** status LED will begin flashing, indicating the Hazmatcad Detector unit is functioning properly. Should a fault be detected, the Hazmatcad Detector will display the fault information on the display.



Additionally, the remaining battery power will be indicated on the display as a 12-line bar graph (more lines mean more battery life).

5. Next the current mode of operation (**FAST MODE** or **HI S MODE**) will flash on the display. The default mode is **FAST**.
6. At this point the Hazmatcad Detector unit will perform a system purge to make sure the instrument is free of contaminants that may have accumulated over time. During this initial start-up, **WARM UP** will flash on the display.

Analytical instruments available to first responders fall into three general categories:

Detectors look for specific chemicals and alert the user if they are present in a sample. They show little or no interference and are used in a go/no-go type evaluation. Detectors are generally smaller, lighter and easier to use than monitors and analyzers but, have limited flexibility. Hazmatcad Detectors are included within this equipment class. Detectors are best suited for the personal protection role.

Monitors generally are employed when a chemical is known to be present and its concentration must be measured and monitored. This type of equipment quantifies the concentration of a specific chemical and is generally more sensitive to a specific chemical than a detector. Monitors can report false positives when non-target chemicals are present. An example of a monitor is an ion mobility spectrometer. Monitors are the first choice in decontamination of victims and equipment.

Analyzers are the most sophisticated of the three instrument categories. Most have the ability to identify and quantify several vapors or compounds simultaneously. Analyzers are more expensive and require more training than detectors and monitors. Mass spectrometers or gas chromatographs are examples of this category of instrument. Analyzers are best suited to the evidence recovery or forensic investigation phases of an incident.

7. When the display goes blank, the unit is operational. Additionally, the **SYS. OK** status LED will flash a green light and the first sample analysis will begin. After the analysis is complete, the Hazmatcad Detector will have a steady green **ALL CLEAR** LED light if the safe zone area has no contamination, or it will alarm if a hazardous agent is present.

8. As the response team develops its entry plan, let the Hazmatcad Detector unit continue to run. The instrument will be ready for use in under two minutes. *(In low temperatures, it is advisable to start up the unit in a warm environment to minimize battery drain and maximize performance.)*

9. Lastly, before leaving the safe zone, test the Hazmatcad Detector to make sure it is properly detecting nerve and blister agents by exposing the unit to the vapor simulatant check source using the following procedure:

- Slide the three-position sample port cover to the **OPEN** position.
- Remove both caps from the simulatant check source and firmly place the tube against the sample inlet port for 3 to 4 seconds while the sampling pump is operating. *(Sampling longer may require running the unit for several minutes to clear out high levels of simulatant.)*
- If functioning correctly, the chemical contained in the tube, DMMP (dimethylmethylphosphonate), will cause the Hazmatcad Detector to display a **G** alarm. A **G** alarm on the instrument indicates it is properly detecting both nerve and blister agents.
- Continue running the Hazmatcad Detector until the **ALL CLEAR** status LED displays a steady green light.

e. Slide the three position sample port cover back to the **DUST FILTER** position.

f. **NOTE:** To check the unit's halogen cell response, use chlorine bleach on a cotton swab held close to, but not touching the sample inlet port then repeat steps d) and e).

10. **The Hazmatcad Detector is now ready for use.** As you proceed into the potentially hazardous area, the Hazmatcad Detector will respond with either a continued **ALL CLEAR** response or with an alarm. An alarm is indicated by a **red LED** and the associated type and level of the chemical agent.



Toggles between detected level (LOW, MED or HIGH), and chemical agent code (G, H, or TOX, BLoD, CHOK, HYdr, or HALO)

Instrument Decontamination

After the unit has been deployed and been in contact with a chemical warfare agent or other unknown compounds, it is necessary to check the Hazmatcad Detector for contamination:

- Allow the instrument to run in clean air for 15 minutes or longer to purge trace contaminants from inside the Hazmatcad Detector.
- Turn off the Hazmatcad Detector and slide the three-position sample port cover to the **CLOSED** position.
- The Hazmatcad Detector can now be wiped down with soapy water or if dictated, a 10% bleach solution.
- The rubber boot should be properly discarded if it shows any visible staining.
- Remove any residual liquids then wipe down the Hazmatcad Detector with clean water.

The best method of determining whether the decontamination was successful is to place the Hazmatcad Detector in a large plastic bag and seal it tightly. After 60 minutes, sample the air in the bag with another Hazmatcad Detector or any other appropriate instrument. If any trace contamination is detected, repeat the instrument decontamination process or contact MSA for help.

Training

In order to become competent with any tool, a certain amount of training is necessary. Hazmatcad Detectors are designed to minimize this time with simple one button activation. Familiarization with the instrument, its capabilities and its limitations can be often accomplished in less than one hour.

It is difficult to perform drills with equipment that does not provide real-world feedback. To provide first responders with realistic training, a Training Mode is included in all new Hazmatcad Detectors, allowing instruments to respond to common chemicals as if they were chemical warfare agents.

Follow this process to provide realistic training opportunities using the Hazmatcad Detector in Training Mode:

1. Follow the normal start up procedures.
2. When the LED display indicates the first bars of the battery life indicator, press and hold the **MODE** button until the LED display shows the mode of operation (e.g. **FAST MODE**). The audible alarm will activate periodically, indicating that the Hazmatcad Detector unit is in Training Mode.
3. To activate a chemical warfare agent alarm use several drops (very small amounts) of the of the following products:
 - Alcohols such as isopropyl will produce a **G** or nerve agent alarm.
 - Gasoline or other fuels will produce a **H** or blister alarm.
4. To deactivate the Training Mode, turn off the Hazmatcad Detector. The next time the unit is turned on, it will return

to the default detection mode.

The Training Mode allows instructors to develop more realistic simulations and increase first responder capabilities. Older or existing Hazmatcad Detectors can be upgraded with this capability at no charge by contacting MSA.

Conclusion

Hazmatcad and Hazmatcad Plus Detectors are easy to use, reliable and dependable detectors designed for the first responder community. These instruments provide the ability to screen for many chemical threats, including the most likely chemical warfare agents as well as some of the most toxic industrial chemicals.



Note: This Bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.



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