

# Detector Tube Technical Information

*There are certain rules and guidelines to be followed to ensure proper usage and correct results when using Draeger Detector Tubes, including the tubes found in the Simultaneous Test Sets provided with the CDS Kit.*

## Detector Tube Storage

To guarantee the accuracy of the tube indication throughout the shelf life, Draeger-Tubes should be stored in the original package at room temperature (approximately 20 °C). A note on the package indicates a maximum storage temperature of 25 °C (i.e. 77 °F). Avoid excessively low (less than 35 °F) or higher (greater than 77 °F) temperatures during storage and do not subject the tubes to light for prolonged periods.

## Detector Tube Use in Cold Temperatures

Since some of the reagents can freeze below 0 °C it is almost impossible to give correction factors for the use of detector tubes in cold temperature. However, there is a simple answer to the problem, namely to ensure that the temperature in the tube remains within the operating range (see operating instructions) during the measurement. The easiest way to do this is to keep the tube warm by holding it closely in the hand. This technique is useful down to -20 °C (i.e. -4 °F). Sports mittens with a slit in the palm work well at the lower temperatures.

## Detector Tube Disposal

Do not dispose of used or expired Draeger-Tubes in domestic waste. Draeger-Tubes must be disposed of properly, since the reagent system of the tube contains chemicals, even though the chemicals are present in extremely small amounts.

The storage or disposal of chemicals must be conducted according to local, state and federal regulations. Draeger Safety can provide the tube user a letter with general comments on disposal requirements as well as an attachment listing the pre-use contents of each of 15 defined groups of tubes (based on chemical reactants).

The U.S. Environmental Protection Agency maintains a toll-free telephone service called the RCRA Hotline, which provides guidance on regulatory issues. The number for the RCRA Hotline is 800-424-9346.

## **Supplemental Short Term Detector Tubes**

*The tubes in the Simultaneous Test Sets of the CDS Kit are characterized as “semi-quantitative”, providing rough estimations on the concentrations of 8 chemical agents. Draeger has nearly 200 short-term tube options capable of detecting over 1,000 different chemicals.*

*There is space in the CDS Kit for 6 additional boxes of individual detector tubes, which are also used with the accuro sampling pump provided. Selection of these tubes is an individual choice and is influenced by what chemicals might be expected to be present in a certain area. For example, if there is a nearby industrial facility that has certain chemicals in use for their processes, tubes for those specific chemicals would be a likely choice.*

*There are certain common chemical or chemical families for which individual tubes most often may be selectively added to the CDS Kit. An overview of some of these, and relevant tubes to respond, is presented here. More detailed information is always available from Draeger Safety or our Authorized Distributors.*

### **Ammonia**

Ammonia is the 3<sup>rd</sup> largest volume chemical produced in the United States and is used in a large variety of applications. Draeger manufactures 5 different short-term ammonia tubes able to detect from 0.25 to 100,000 ppm. The tube with the most utility within the TLV and IDLH ranges is the Ammonia 5/a (P/N CH20501), which can measure between 5-700 ppm. The tube can also detect other basic gases such as organic amines.

### **Chlorine**

Chlorine is the 9<sup>th</sup> highest volume chemical produced in the United States, still most commonly used in water purification. Draeger manufactures 3 different short-term tubes able to detect from 0.02 to 500 ppm. The recommended tube would be the Chlorine 0.2/a (P/N CH24301) capable of measuring between 0.02-30 ppm. This tube is also capable of estimating levels of chlorine dioxide if present. Additionally, it has sensitivity to bromine and nitrogen dioxide.

### **Carbon Monoxide**

May be present in toxic concentrations at the site of a fire. Draeger provides 5 different short-term tubes for the detection of CO, including the Carbon Monoxide 10/b (P/N CH20601). This tube is capable of measuring from 10 to 3000 ppm CO. As the tube has sensitivity to a number of hydrocarbons a carbon pre-tube can be provided to remove interfering substances.

### **Hydrogen Sulfide**

Draeger provides 10 different tubes for the measurement of hydrogen sulfide, which is highly flammable and toxic by inhalation. TLV is 10 ppm in air. The Hydrogen Sulfide 5/b tube (P/N CH29801) has a detection range of 5-600 ppm.

## Petroleum Hydrocarbons

The Draeger Petroleum Hydrocarbons 10/a tube (P/N 8101691) has specific sensitivities to hexane, heptane, octane and other hydrocarbons. The standard calibration is for n-octane at 10 to 300 ppm. This tube is therefore capable of general measurement of a number of common substances such as gasoline, kerosene/aviation fuel, diesel fuel and various solvents/spirits.

## Chlorinated Hydrocarbons

Different chlorinated hydrocarbons still have a number of applications including dry cleaning (perchloroethylene), solvents (trichloroethane), degreasing (trichloroethylene) and adhesive production (vinyl chloride). Draeger manufactures tubes for all these specific compounds. The two most commonly used in HazMat Response have been the Perchloroethylene 2/a (P/N 8101501), range of 2-300 ppm, and the Trichloroethylene 10/a (P/N CH24401), which can measure 50-2000 ppm of TCE.

## BTEX Compounds

The aromatic compounds benzene, toluene, ethyl benzene and xylene have a large presence in the chemical/petrochemical markets in a wide variety of uses. The tube with the most utility in quantifying all BTEX compounds except benzene is the Toluene 5/b tube (P/N 8101661). Of the 5 different tubes offered for benzene measurement (collective range of 0.5 to 420 ppm), the most benzene specific is the Benzene 0.5/c (P/N 8101841), which can measure from 0.5 to 200 ppm.

## Hydrochloric Acid

Hydrochloric acid is the 25<sup>th</sup> highest volume chemical produced in the United States and commonly is used in food processing, steel pickling, metal cleaning and various acidizing applications. Measurement of the gaseous hydrogen chloride fraction is done with either of two hydrochloric acid tubes. The lower range Hydrochloric Acid 1/a (P/N CH29501) covers the range of 0.1 to 100 ppm.

Other chemical specific tubes that are available to complement the semi-quantitative tubes found in the Civil Defense Simultest Kit and help pinpoint levels of potential toxic substances include the following:

<u>TUBE</u>	<u>PART #</u>	<u>RANGE</u>
• Nitrous Fumes 2/a (NO + NO <sub>2</sub> )	CH31001	2-150 ppm
• Nitrogen Dioxide 2/c	6719101	2-100 ppm
• Nitric Acid 1/a	6728311	1-50 ppm
• Hydrocyanic Acid 2/a	CH25701	2-150 ppm
• Sulfur Dioxide 0.5/a	CH31701	0.5-25 ppm
• Carbon Dioxide 0.1%/a	CH23501	1000-60,000 ppm
• Phosgene 0.25/c	CH28301	0.25-25 ppm
• Acetone 100/b (Ketones)	CH22901	100-12,000 ppm
• Alcohol 25/a	8101631	25-5000 ppm
• Petroleum Hydrocarbons 100/a	6730201	100-2,500 (n-Octane)

### **Simultaneous Test Set I for Inorganic Gases - 8101735**

<b>Gas</b>	<b>1<sup>st</sup> Scale Mark</b>	<b>2<sup>nd</sup> Scale Mark</b>
Acid Gases	5 ppm	25 ppm
Hydrocyanic Acid	10 ppm	50 ppm
Carbon Monoxide	30 ppm	150 ppm
Basic Gases	50 ppm	250 ppm
Nitrous Gases	5 ppm	25 ppm

### **Simultaneous Test Set II for Inorganic Gases - 8101736**

<b>Gas</b>	<b>1<sup>st</sup> Scale Mark</b>	<b>2<sup>nd</sup> Scale Mark</b>
Sulfur Dioxide	---	25 ppm
Chlorine	---	2.5 ppm
Hydrogen Sulfide	10 ppm	50 ppm
Carbon Dioxide	5,000 ppm	25,000 ppm
Phosgene	---	0.5 ppm

### **Simultaneous Test Set III for Organic Vapors - 8101770**

<b>Gas</b>	<b>1<sup>st</sup> Scale Mark</b>	<b>2<sup>nd</sup> Scale Mark</b>
Ketones	1,000 ppm	5,000 ppm
Aromatics	100 ppm	500 ppm
Alcohols	200 ppm	1,000 ppm
Aliphatics	50 ppm	100 ppm
Chlorinated Hydrocarbons	50 ppm	100 ppm