

# GASTEC

## GAS DETECTOR TUBE SYSTEM



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## Detector Tube System

Gastec Detector Tubes indicate concentrations directly by way of a calibrated scale printed on the tubes. At Gastec, we endeavour to achieve highest quality detector tubes for analysing airborne gases/vapours, as well as pollutants in soil and water through our advanced

state-of-the-art research and development. Through our efforts we have acquired a solid reputation among our customers in virtually all sectors of industry, commerce and society. Tubes are now available for more than 500 different applications.

One



Break off the both ends of the detector tube by using the built-in diamond tip breaker. Confirm the pump handle is fully pushed in. Then insert the detector tube into the rubber inlet with G ► mark towards the gas sampling pump.

Two



Align the guide marks on the pump shaft red (▲) 100 or 50 mL, and pull out the handle until it is locked. Wait until the sampling time has elapsed. With an easy-to-see flow finish indicator (white disk pops out when the prescribed volume has been fully drawn), the operator is assured that the sampling is complete.

Three



The colour in the detector tube changes as the gas is drawn in. Wait the required sampling time and read the measurement at the end of the coloured layer. (Please note the concentration or mark the colour change demarcation on the glass tube with a pen immediately).

### FIRE AND RESCUE SERVICES

Gastec Polytec Gas Detector Tubes with Gastec Sampling Pump GV-100 or GV-110, and TG-1 system provide advanced quick and accurate qualitative and quantitative analysis of unknown gases and vapours.

### MARINE AND SHIPPING TECHNOLOGIES

No batteries or special training required Gastec Gas Detector Tubes and Sampling Pumps provide highly accurate measurements on site for applications such as fumigation or detection of chemicals on tankers. Gastec tubes are available in most ports through world wide retailing channels.

### OIL REFINING, CHEMICAL PLANTS

A non sparking design makes the Gastec Sampling Pumps the ideal measurement tool in environments classed for intrinsic safety.

### MINING AND UNDERGROUND

With less pump strokes Gastec Detector Tubes provide immediate measurement results with clear colour demarcations for applications such as emission test for vehicle underground.

### GOVERNMENTS

Weighting a mere 245g, Gastec Sampling Pumps are light enough

to be easily carried to any site and get measurement results in a few minutes.

### LABORATORIES

Gastec enables quick and accurate analysis with access to timely technical support.

### SCHOOLS

Gastec Gas Detector Tube System is also applicable to all grade levels and can be used to demonstrate the principals of photosynthesis, respiration, combustion, or for field projects such as global warming.





## Sampling Pump (for short-term measurements)



The built-in tip breaker incorporates a diamond edge for maximum durability that cuts the surface of the detector tube. This makes the tip breaking much easier, safer and convenient. Discarded tips are deposited in a storage bin for safe and easy disposal.



The pump piston has been designed with a smaller diameter so that the handle can be pulled out with even less effort. This permits anyone to operate the pump easily. Also Gastec pump Model GV-110 and GV-100 meet the leakage test of EN1231, Workplace atmospheres-Short term detector tube measurement systems-Requirements and test methods, 4.2 Detector tube pump, 4.2.2 Leakage "The detector tube pump with the closed detector tube connection shall be tight, so that during the first minute of a pump stroke the leakage rate does not exceed 3mL/min." The Gastec pump shaft shows you the leakage rates with red line.



The pump body is covered with a soft elastomer, with the middle portion narrower than the ends to ensure a firm grip on the pump cylinder. The other outer surfaces of the pump are made of non sparking materials of ABS resin except for the opening of the tube tip cutter that is made of chromed stainless steel.



The full-stroke (100mL) and the half-stroke (50mL) positions are marked exactly by the red line on the pump shaft, and the handle is precisely locked at those positions. The attached flow finish indicator tells you automatically when the stroke is complete. When the white disk pops out, the sample is complete.



The automatic stroke counter built in the model GV-110 (in Model GV-110S) gas sampling pump can track up to ten pump strokes automatically so there is no chance of miscounting.

## Detector Tube (for short-term measurements)

■ High quality glass tube

■ Calibration scale (in ppm, mg/m<sup>3</sup>, mg/L or % depending on the substance to be measured and its concentration). Printed in an ink that permits high legibility against the colour change layer. The scale is determined for each production lot that has passed Gastec's exacting qualification tests.

■ Standard number of pump strokes (n). The number of pump strokes required to collect the standard volume of sample air for this tube.

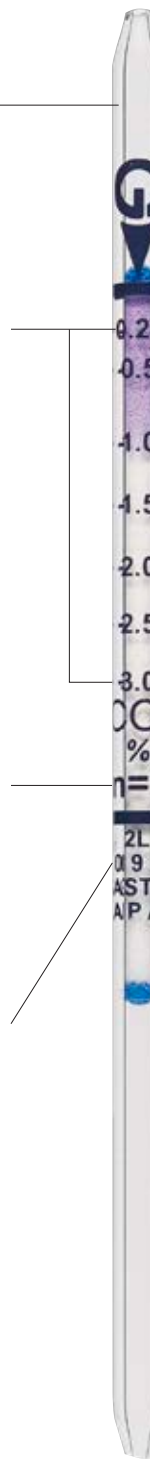
■ Quality control number (QC No.). Gastec's quality assurance number is printed on every Gastec detector tube. Detector tubes of the same production lot have the same QC No. When a QC No. is registered, sample tubes with that QC No. will be kept and monitored periodically to verify the quality.

■ Distinct layer of colour change.

■ Reliable detecting reagents that comply with the Gastec's stringent quality standards (regulating the length of colour change layer, the clearness of demarcation, and the tone and brightness of colour change).

■ Chemical formula of the substance to be measured. An abbreviation is used for a long formula.

■ Detector tube number. The numeral represents the kind of substance the tube can measure, and the letter specifies the level of concentrations the tube can determine. For Example, H, M and L respectively indicate high, middle, and low level concentrations.

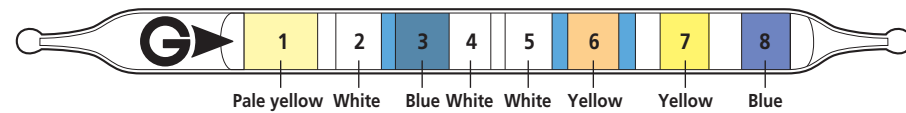


- Qualitative Analysis System for Unknown Gases



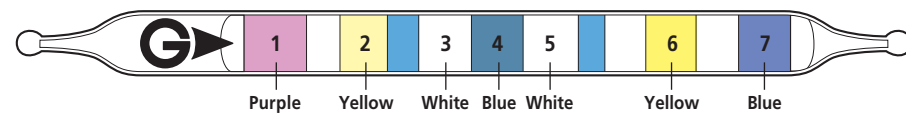
The Gastec Polytec System consists of the Model GV-100 or GV-110 Gas Sampling Pump and the Polytec Tubes. The Polytec Tubes are unique detector tubes, each having 1 to 8 reaction layers to determine multiple unknown substances in the sample simultaneously. When you pull the handle of the Pump and wait for a predetermined sampling time, the colour(s) of the Polytec tube's layer(s) change uniquely according to the contents of the sample. Six types of Polytec Tubes are available: Polytec I (No. 107), Polytec II (No. 25), Polytec III (No. 26), Polytec IV (No. 27), Polytec V (No.28), and Qualitative Analysis Tube for Fire Investigation (No.108). Detailed descriptions are given in the instruction sheets included with individual Polytec Tubes.

## Polytec V (No.28)



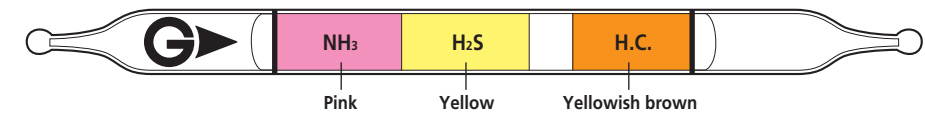
Detecting layer	1	2	3	4	5	6	7	8
Original colour	Pale yellow	White	Blue	White	White	Yellow	Yellow	Blue
Colour change	Red	Yellow	Yellow	Yellow	Brown	Pink	Blackish brown, Gray, Yellowish orange	Brown
Substance	Hydrogen chloride	Phosgene, Chlorine, Nitrogen dioxide	Sulphur dioxide	Nitrogen dioxide	Hydrogen sulphide	Hydrogen sulphide, Hydrogen cyanide, Hydrogen phosphide	Carbon monoxide, Hydrogen, Hydrogen phosphide, Acetylene, Ethylene, Propylene, Methyl mercaptan	Carbon dioxide

## Polytec IV (No.27)



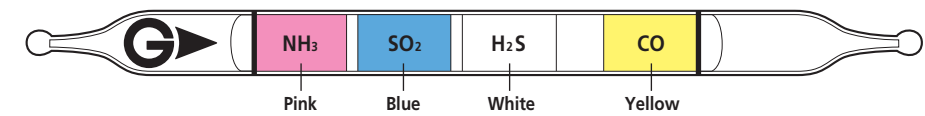
Detecting layer	1	2	3	4	5	6	7
Original colour	Purple	Yellow	White	Blue	White	Yellow	Blue
Colour change	Yellow	Red	Brown	Yellow, Purple	Yellow, Yellowish orange	Blackish brown, Gray, Yellowish orange	Brown
Substance	Ammonia, Diethylamine	Hydrogen chloride	Hydrogen sulphide	Chlorine, Sulphur dioxide, Nitrogen dioxide	Chlorine, Nitrogen dioxide	Hydrogen sulphide, Carbon monoxide, Hydrogen, Phosphine, Acetylene, Ethylene, Propylene, Methyl mercaptan	Carbon dioxide

## Polytec III (No.26)



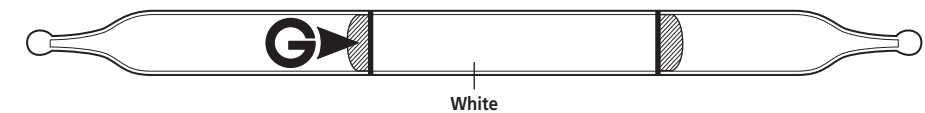
<b>Detecting layer</b>	NH <sub>3</sub>	H <sub>2</sub> S	H.C.
<b>Original colour</b>	Pink	Yellow	Yellowish brown
<b>Colour change</b>	Yellow	Red	Blackish brown, Greenish brown
<b>Substance</b>	Ammonia	Hydrogen chloride, Chlorine, Sulphur dioxide, Nitrogen dioxide, Hydrogen sulphide	LPG, Gasoline, Butane

## Polytec II (No.25)



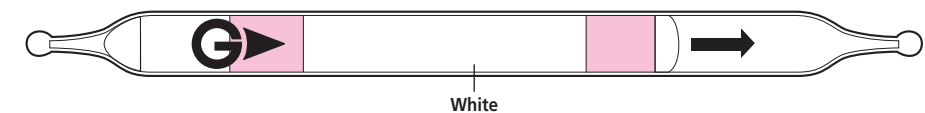
<b>Detecting layer</b>	NH <sub>3</sub>	SO <sub>2</sub>	H <sub>2</sub> S	CO
<b>Original colour</b>	Pink	Blue	White	Yellow
<b>Colour change</b>	Yellow	Yellow, Purple	Brown	Blackish brown
<b>Substance</b>	Ammonia	Hydrogen chloride, Chlorine, Sulphur dioxide, Nitrogen dioxide	Hydrogen sulphide	Carbon monoxide, Hydrogen, Olefin HCs, Mercaptans

Polytec I (No.107)



Substance	Concentration	Colour change	Substance	Concentration	Colour change
Acetylene	≥ 10 ppm	} Brown or Green	Ethylene	≥ 70 ppm	Brown or Green
Acetone	≥ 1000 ppm		Gasoline	≥ 100 ppm	Brown
Acrylonitrile	≥ 500 ppm	Yellowish brown	n-Hexane	≥ 1800 ppm	} Green
Benzene	≥ 20 ppm	} Brown	Hydrogen sulphide	≥ 1 ppm	
tert-Butyl alcohol	≥ 1500 ppm		Propane, Propylene	≥ 100 ppm	Brown
Carbon monoxide	≥ 10 ppm	Green or Brown	Trichloroethylene	≥ 15 ppm	Pale brown
Carbon disulphide	≥ 1 ppm	} Green	Toluene, Xylene	≥ 10 ppm	Purple
Cyclohexane	≥ 6000 ppm		Styrene	≥ 10 ppm	Yellow or Brown

## Qualitative analysis tube for fire investigation (No.108)



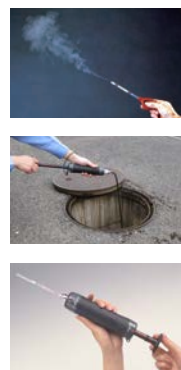
Substance	Changes colour from white to	
	Low concentration	High concentration
Kerosene	Brown (inlet) and Yellowish brown	Brown (inlet) and Pale brown
Gasoline	Brown	Yellow (inlet) and Brown

# Measurement Procedure with GASTEC Detector Tube System



The primary step is providing countermeasures against hazardous gas generation for occupational hygiene control and pollution control is to acquire accurate data regarding gas types and their concentration levels. Our Toxic Gas Detection Kit includes 12 detection tubes.

- 1 Confirm the direction of air flow at the measurement site by using the No.500 Smoke Tester Set.
- 2 Connect the No.351A-5 Extension Hose to the Model GV-100 Gas Sampling Pump, when necessary.
- 3 Break off both ends of a Polytec Tube No.107 and connect the tube to the Pump, or to the end of the Extension Hose when it is used.
- 4 Pull out the handle of the Pump, wait for the predetermined sampling time and examine the tube for colour change.
- 5 Proceed with the measurements by using all 12 kinds of detector tubes as shown in the following toxic gas determination flowchart.
- 6 Finally, determine the pollutants from the measurement results.

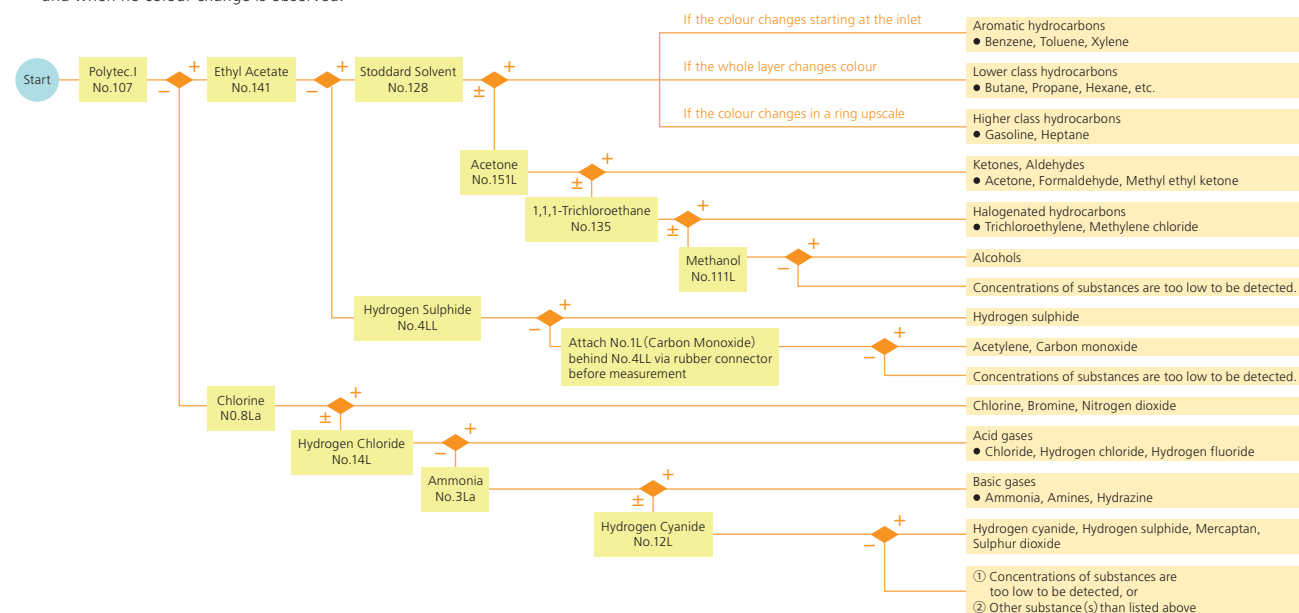


## Toxic Gas Detection System (Gastec TG-1 System)

- Provides immediate identification of unknown gases on the spot by just following the flowchart
- No batteries or electrical power required
- Requires fewer pump strokes and provides faster results
- Gastec sampling pumps and detector tubes are pre-calibrated and are always ready to use

## ■ Toxic gas detection flowchart

- ◆ represents the decision whether or not the colour change is observed.
- + shows that this route is to be taken only when the colour change is observed.
- shows that this route is to be taken only when no colour change is observed.
- ± shows that this route is to be taken both when the colour change is observed and when no colour change is observed.



# Other Detector Tubes



## Passive Dosimeter-Tube (for long-term measurements)

The TWA measurement system consists of Gastec Dosi-Tubes and the No. 710 Tube Holder. Direct reading Passive Dosimeter-Tubes are specially designed tubes for measuring time-weighted average gas concentrations (TWA values). They can be attached to a pocket or collar using the No. 710 Tube Holder to measure the breathing zone of people in a work place for a prolonged period of time (1 to 10 hours) to determine personal exposure values. With this system day-to-day gas concentration fluctuation or gas concentration distribution in the workplace can be easily obtained. Measurement values can be used to assess the working environment by comparing them with the Threshold Limit Values (TLV-TWA) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH).



## Airtec Tube for analysis of Breathing Air/airline test

Airtec tubes are a convenient and simple system for testing gas cylinders, compressed breathing air and air lines. Industrial operations often produce, or are performed in the presence of harmful airborne contaminants. When self contained breathing apparatus or other devices are used for respiratory protection, the quality of the breathing air requires special attention. Contaminants entering the compressor or contaminants generated by the compressor or cylinder can be harmful to the worker and the respiratory equipment.



## Compressed Breathing Air Measurement Kit CG-1

Gastec CG-1 system can simply, quickly, and simultaneously measure 4 kinds of harmful contaminants (CO, CO<sub>2</sub>, Water vapour, and Oil mist) contained in compressed breathing air (cylinder or compressor). The measurement can be done in 10 minutes without any electricity or power source. The optional conversion adaptors provide flexibility in several connection standards including CGA.



## Tubes for Substance in Solution

Dissolved substances in solution can be measured by simply immersing a Gastec Dissolved Substance Detector Tube (with both ends broken) into a solution, with directional arrow (►) pointing upward, the solution will rise up through the tube due to capillary action and react with the reagent in the tube. Tubes are available for measuring Sulphide Ion (S<sup>2-</sup>), Chloride Ion (Cl<sup>-</sup>), Mercury (Hg), Iron Ion (Fe<sup>2+</sup>), Copper ion (Cu<sup>2+</sup>), Zinc (Zn), Nickel (Ni), Chromium (VI) Ion (Cr<sup>6+</sup>), Ozone (O<sub>3</sub>), dissolved in water. Place the sample water in a container. Break off both ends of the detector tube and immerse. The sample water is drawn into the tube by capillary action.

\* Adjustment of pH is required when measuring with liquid detector tubes.



## ■ GASTEC Gas Detector Tube System Product Overview

### GASTEC Sampling Pump Set



GV-1005



GV-1105

### Accessories



#### Extension Hose No.351A-5/351A-10/351A-30

Extension hoses are available to be attached to the inlet of the gas sampling pump (Model GV-100) and used for remote downward measurement in confined spaces, such as manholes, tanks, etc.

\* For twin tube operation, order the Extension hose guard rubber (No.358) . When the extension hose tip needs to be replaced, order the Replacement extension hose guard rubber (No.359) .

\*\*351A-30: Currently applicable tubes are limited. For the details, please contact GASTEC or Gastec representatives.

351A-5 (for 5m long), 351A-10 (for 10m long), 351A-30 (for 30m long)



#### One Hand Operation Adapter GV-700

Gastec Model GV-700 Adapter can maintain a vacuum of 50mL or 100mL in the pump body. This allows the user to attach the appropriate tube to the pump, and then in situations where it is necessary, to take the sample using one hand. In the body of the Adapter there is a small rod which can be moved in or out quite easily with one finger.



#### Tube Tip Holder No.722

The Tip Holder functions as a tip breaker for the detector tubes and also stores the broken tips, thereby preventing glass fragments from scattering. It can hold about 260 broken tips.



#### Twin Tube Holder GV500

The twin tube holder protects twin tubes from drop and damage or prevents injury to the user during a measurement.

### Gastec Handbook

The Handbook is designed to be easier to use and more informative for a wide variety of people who are responsible for the management of not only work places and offices, but also of public facilities and premises (including air, water, and the soil). The information is presented in a format that we feel useful to both the beginner and the experienced health and safety professional.



### Smoke Tester Set No.500

This set allows the operator to test air flows in workplaces accurately and easily. Just break off both ends of a No.501 Smoke Generation Tube (6 tubes/box) and connect the tube to the rubber bulb. Squeezing the bulb provides atmospheric moisture that reacts with the reagent in the tube, generating a white smoke. A single No.501 tube can be used repeatedly for 50 to 100 tests by sealing the tube ends with the rubber caps after each test.



### Pyrotec Pyrolyzer No.840 (for Tube 51H, 51, 51L, 52, 53)

Gastec developed the Pyrotec Pyrolyzer which converts the fluorochlorocarbon gas family and halogenated hydrocarbons by thermally cracking them into a gas which can be easily measured. Now, fluorochlorocarbon gases are easy and precisely measured by simply using a Pyrotec Tube with the Pyrotec Pyrolyzer.



### Sulphuryl Fluoride measurement system

GASTEC developed the Pyrotec Pyrolyzer system to enable precise and easy detection of Sulphuryl Fluoride. It converts Sulphuryl Fluoride (using a process known as thermal cracking) into an easily measurable gas.

\*Use Sulphuryl Fluoride pyrotube No.231, Pyrotec Pyrolyzer No.860, and GASTEC gas sampling pump.



### Fumigation Probe No.380

GASTEC fumigation probe is connected to gas detector tube and inserted through rubber seal of the closed container to measure residue fumigants. Currently applicable tubes are limited. For the details, please contact GASTEC or Gastec representatives.



### Hot Probe No.340 Hot Probe Holder No.345A

A cooling fin accessory for measuring high temperature gases (up to approx. 600 /1112 ) such as furnace and automotive exhaust gases. The sample is cooled to ambient temperature for accurate concentration measurements. Use hot probe holder (No.345A) to attach the hot probe for better stability.

\*Hot probe holder (No.345A) can not be used with Twin-tubes and Oxygen tube No.31B.



### Extension Sampling Pole No.350BP-2

A telescopic glass fibre probe suitable for horizontal or upward extension to sample gases and vapours in narrow spaces. The length of the pole can be adjusted from 62.5cm to 2.8m (2.1 to 9.2ft). It weighs only 590g (1.3 lb).

1. No.350BP-2 Extension Sampling Pole
2. Gastec Standard Detector Tube System attached to the No.350BP-2 Extension Sampling Pole.



## GAS DETECTOR TUBE SYSTEM

Specifications and appearance are subject to change without notice.  
Read and understand the instruction manuals completely before operating.  
The actual products may differ slightly from the pictures shown.



For all types of gas and vapour SINCE 1970

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