



INSTRUCTION MANUAL TETRACHLOROETHYLENE DETECTOR TUBE

No.760

- ★ THIS DETECTOR TUBE IS USED WITH THE EXCLUSIVE USE MODEL S-21 or 23E AIR SAMPLER.
- ★ READ CAREFULLY THIS INSTRUCTION MANUAL AND THE INSTRUCTIONS OF THE SAMPLING PUMP PRIOR TO USING THIS PRODUCT.
- ★ DO NOT DISCARD THIS INSTRUCTION MANUAL UNTIL ALL THE TUBES IN THIS BOX ARE USED UP.

L. PERFORMANCE:

Measuring Range	: 30 - 400 $\mu\text{g}/\text{m}^3$ (Printed scale)	69 - 920 $\mu\text{g}/\text{m}^3$ (2.3×Temperature corrected value)
Sampling Volume	: 3L	1.5L
Sampling Time	: 100mL × 30 min.	100mL × 15 min.
Colour Change	: Yellow → Purple red	
Detectable Limit	: 5 $\mu\text{g}/\text{m}^3$ (at 30 min. sampling)	
Operating Temperature	: 0 - 40 °C (32 - 104°F) (Temperature correction is necessary.)	
Operating Humidity	: 0 - 70%R.H. (No correction is necessary.)	
Sampling Pump	: Model S-21 or 23E air sampler	

CAUTION

1. THE DETECTOR TUBE AND PRETREAT TUBE CONTAINS CHEMICAL REAGENTS.
2. DO NOT TOUCH THESE REAGENTS DIRECTLY ONCE TUBES WERE BROKEN.
3. KEEP THE TUBES OUT OF THE REACH OF CHILDREN.

NOTICE

1. AS THE SAMPLING AND MEASUREMENT PROCEDURE OF EACH SAMPLER IS DIFFERENT, READ THE INSTRUCTION MANUAL OF EACH SAMPLER CAREFULLY BEFORE USE AND THEN MAKE A MEASUREMENT.
2. DO NOT USE THIS TUBE OUTSIDE THE STATED OPERATING TEMPERATURE RANGE.
3. STORE TUBES IN A COOL AND DARK PLACE (0-25 °C/32-77°F), AND USE BEFORE EXPIRATION DATE PRINTED ON THE TOP OF THE BOX.
4. PRIOR TO USE, READ CAREFULLY ITEM 8. USER RESPONSIBILITY.
5. READ THE CONCENTRATION IMMEDIATELY AFTER MEASUREMENT.

2. SAMPLING AND MEASUREMENT:

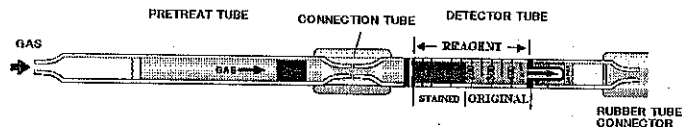


Fig.1

- ① Break both ends of the detector tube and pretreat tube with attached ampule cutter.

CAUTION SAFETY GLASSES AND GLOVES SHOULD BE WORN TO PREVENT INJURY FROM SPLINTERING GLASS.

- ② Connect each end of the detector tube and pretreat tube with connecting tube as shown in Fig.1.
- ③ Connect the detector tube into the rubber tube connector of the Model S-21 or 23E air sampler as shown in Fig. 1 (Arrow marks shall point to the sampler.), and fix it into the detector tube holder.
- ④ Turn ON power of the air sampler.
- ⑤ In accordance with instruction manual of each air sampler, preset the TIMER at 30 minutes and adjust the flow rate at 100mL/min.
- ⑥ After completion of sampling (30 minutes), remove the detector tube from the tube holder and read the scale at the maximum point of a stained layer.
- ⑦ When the concentrations are over the scale range (400 $\mu\text{g}/\text{m}^3$), 15 minutes sampling time can be used to determine these higher concentrations. In this case, the following equation is available to obtain a true concentration. True concentration = Temperature corrected concentration × 2.3

- SPECIAL NOTE:**
- I. The scale is calibrated at 20 °C (68°F), 50 %R.H. and 1013hPa. Readings obtained in other circumstances should be corrected (REFER TO ITEM 3. CORRECTION FOR AMBIENT CONDITIONS).
 - II. When the maximum point of the stained layer is unclear or oblique, read the scale at the centre between the longest and shortest points.

3. CORRECTION FOR AMBIENT CONDITIONS:

- ① Temperature: The scale is calibrated based on the temperature of 20 °C (68°F). Readings obtained in other circumstances should be corrected with the following table.

Table of the coefficient for temperature correction (based on 20 °C)

Temperature (°C)	0	1	2	3	4	5	6	7	8	9
0	1.71	1.66	1.62	1.58	1.54	1.50	1.46	1.42	1.39	1.35
10	1.31	1.28	1.24	1.21	1.18	1.15	1.12	1.09	1.06	1.03
20	1.00	0.97	0.95	0.92	0.90	0.87	0.85	0.83	0.81	0.79
30	0.77	0.75	0.73	0.71	0.70	0.68	0.67	0.65	0.64	0.63
40	0.61	-	-	-	-	-	-	-	-	-

Procedure of temperature correction: True concentration can be obtained by multiplying the readings of tubes by coefficient for temperature correction shown in the above. Therefore,

$$\text{True concentration (ppm)} = \text{Readings (ppm)} \times \text{Coefficient for temperature correction}$$

In case of temperature of 23 °C, the arrow pointed 0.92 which is found by proportional allotment of 20 °C and 3 °C in the table is the coefficient for temperature correction.

Procedure to get coefficient for temperature correction from the table.

Table of the coefficient for temperature correction

Temperature (°C)	0	1	2	3	4
0	1.71	1.66	1.62	1.58	1.54
10	1.31	1.28	1.24	1.21	1.18
20	1.00	0.97	0.95	0.92	0.90

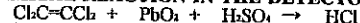
- ② Humidity; No correction is necessary. (0 - 70%R.H.)
- ③ Atmospheric Pressure;

$$\text{True concentration} = \text{Temperature corrected concentration} \times \frac{1013}{\text{Atmospheric pressure (in hPa)}}$$

4. INTERFERENCE:

Vinyl chloride, 1,2-Dichloroethylene or Trichloroethylene produces a similar stain and gives higher readings.

5. CHEMICAL REACTION IN THE DETECTOR TUBE:



6. DISPOSAL OF TUBES

USED TUBES SHOULD BE DISPOSED CAREFULLY ACCORDING TO RELEVANT REGULATIONS, IF ANY.

7. HAZARDOUS AND DANGEROUS PROPERTIES OF TETRACHLOROETHYLENE:

- TLV-TWA ♦ : 25 ppm
- Explosion range in air : 10.8 - 54.5 % (in Oxygen)
- ♦ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2008.

8. USER RESPONSIBILITY:

It is the sole responsibility of the user of this equipment to ensure that the equipment is operated, maintained, and repaired in strict accordance with these instructions and the instructions provided with each Model S-21 or 23E air sampler, and that detector tubes are not used which are either beyond their expiration date or have a colour change different to that stated in the Performance specifications. The Manufacturer and Manufacturer's Distributor shall not be otherwise liable for any incorrect measurement or any damages, whether damages result from negligence or otherwise.

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