



# INSTRUCTION MANUAL HYDROGEN FLUORIDE DETECTOR TUBE

No.770

- ★ THIS DETECTOR TUBE IS USED WITH THE EXCLUSIVE USE MODEL S-20 SERIES 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.

## 1. PERFORMANCE:

Measuring Range	: 0.05 - 1.0 ppm
Sampling Volume	: 2.5L
Sampling Time	: 250mL/min × 10 min.
Colour Change	: Yellow → Pink
Detectable Limit	: 0.02ppm
Operating Temperature	: 10 - 35 °C (50 - 95°F) (Temperature correction is necessary.)
Operating Humidity	: 20 - 80%R.H. (Humidity correction is necessary.)
Sampling Pump	: Model S-20 Series air sampler

### CAUTION

1. THE DETECTOR 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 PROCEEDED 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 AND HUMIDITY 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:

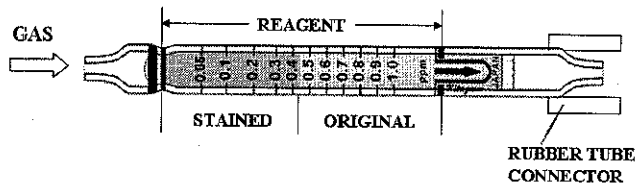


Fig.1

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

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

- ② Connect the detector tube into the rubber tube connector of the Model S-20 series air sampler as shown in Fig. 1 (Arrow mark shall point to the sampler.), and fix it into the detector tube holder.
- ③ Turn ON power of the air sampler.
- ④ In accordance with instruction manual of each air sampler, preset the TIMER at 10 minutes and adjust the flow rate at 250mL/min.
- ⑤ After completion of sampling (10 minutes), remove the detector tube from the tube holder and read the scale at the maximum point of a stained layer.

- 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 and Humidity; To correct for temperature and humidity, multiply the tube readings by the following factors.

Relative Humidity	Correction Factor Table					
	Temperature					
	10 °C (50°F)	15 °C (59°F)	20 °C (68°F)	25 °C (77°F)	30 °C (86°F)	35 °C (95°F)
20%	0.79	0.74	0.70	0.66	0.62	0.59
30%	0.90	0.85	0.80	0.75	0.69	0.64
40%	1.02	0.96	0.90	0.84	0.78	0.72
50%	1.17	1.09	1.00	0.94	0.87	0.81
60%	1.40	1.31	1.21	1.10	0.99	0.88
70%	1.66	1.53	1.40	1.26	1.12	0.98
75%	2.00	1.85	1.69	1.50	1.30	1.07
80%	-	2.86	2.52	2.13	1.71	1.25

True concentration (ppm) = Readings (ppm) × Correction factor for temperature and humidity

In case of 40%R.H. on 20 °C, the arrows pointed 0.90 in the table is the coefficient for temperature and humidity correction.

Procedure to get correction factor for temperature and humidity from the table.

Relative Humidity	Correction Factor Table			
	Temperature			
	10 °C (50°F)	15 °C (59°F)	20 °C (68°F)	25 °C (77°F)
20%	0.79	0.74	0.70	0.66
30%	0.90	0.85	0.80	0.75
40%	1.02	0.96	0.90	0.84

- ② Atmospheric Pressure;

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

## 4. INTERFERENCE:

More than 0.1 ppm of Hydrogen chloride produces a similar stain and gives higher readings. More than 0.1 ppm of Nitric acid produces a similar stain and gives higher readings. More than 0.5 mg/m<sup>3</sup> of Sulphuric acid produces a similar stain and gives higher readings.

## 5. CHEMICAL REACTION IN THE DETECTOR TUBE:

PH indicator is discoloured by Hydrogen fluoride.

## 6. DISPOSAL OF TUBES

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

## 7. HAZARDOUS AND DANGEROUS PROPERTIES OF HYDROGEN FLUORIDE:

TLV-TWA ◆ : 0.5ppm

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2009.

## 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-20 series 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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