

- ★ READ THIS INSTRUCTION MANUALS AND THE INSTRUCTIONS OF THE ASPIRATING PUMP AND FLOW CONTROL ORIFICE PRIOR TO USING THIS PRODUCT.
- ★ DO NOT DISCARD CAREFULLY THIS INSTRUCTION MANUAL UNTIL ALL THE TUBES IN THIS BOX ARE USED UP.

1. PERFORMANCE:	Acetylene	Ethylene
Measuring Range	: 20 - 300 ppm	200 - 2000 ppm
and Pump Stroke	: 1 pump stroke	
Sampling Time	: 3 minutes (use of the air flow control orifice)	
Colour Change	: Yellow → Dark brown	Pale yellow → Blue
Detectable Limit	: 0.1 ppm	1 ppm
Operating Temperature	: 10 - 40 °C (50 - 104°F)	10 - 40 °C (50 - 104°F)
	No correction is necessary.	Temperature correction is necessary.
Aspirating Pump	: Model AP-20, AP-20S, 400B, AP-1, AP-1S or 400A	

⚠ CAUTION

1. THE DETECTOR TUBES CONTAIN 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. USE ONLY WITH PUMP MODELS AP-20, AP-20S, 400B, AP-1, AP-1S OR 400A. OTHERWISE, CONSIDERABLE ERROR IN INDICATION MAY OCCUR.
2. THE FLOW CONTROL ORIFICE SHOULD BE ATTACHED INTO THE ASPIRATING PUMP BEFORE SAMPLING.
3. BEFORE TESTING, CHECK THE ASPIRATING PUMP FOR LEAKS. (REFER TO ITEM 8. INSPECTION OF ASPIRATING PUMP.) ANY PUMPS SHOWING SIGNS OF LEAKAGE SHOULD BE CORRECTED BEFORE USE.
4. DO NOT USE THIS TUBE OUTSIDE THE STATED OPERATING TEMPERATURE RANGE.
5. 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.
6. PRIOR TO USE, READ ITEM 9. USER RESPONSIBILITY CAREFULLY.
7. READ THE CONCENTRATION IMMEDIATELY AFTER DRAWING THE SAMPLE.
8. USE AN ACETYLENE DETECTOR TUBE AND AN ETHYLENE TUBE IN A SAME TUBE BOX AS A PAIR. DO NOT USE THE ETHYLENE DETECTOR TUBE ALONE. THE ACETYLENE DETECTOR TUBE CAN BE USED ALONE.

2. SAMPLING AND MEASUREMENT:

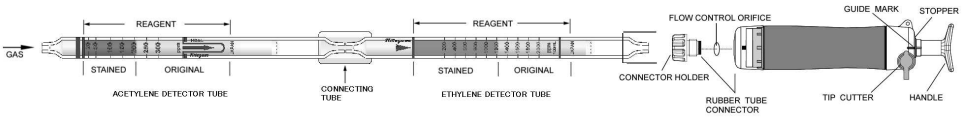


Fig. 1

- ① Break both ends of the detector tubes and connect each end of the detector tubes with connecting tube as shown in Fig.1.

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

- ② Insert the end of the detector tube into the aspirating pump securely as shown in Fig.1. (Arrow marks shall point to the pump.)
- ③ Align the guide marks on the handle and stopper of the aspirating pump.
- ④ Pull the pump handle at a full stroke until it locks and wait for 3 minutes or until the completion of sampling is confirmed with the flow indicator of the pump. (See descriptions about the flow indicator in the instruction manual of the pump.)
- ⑤ On completion of sampling, read the scales at the maximum point of the stained layer.

SPECIAL NOTE: I. The scales are 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; Correct the tube reading for Ethylene detector tube by following temperature correction table.

Tube Readings (ppm)	Corrected Concentration (ppm)		
	10 °C (50°F)	20 °C (68°F)	30 - 40 °C (86°F) (104°F)
2000	1550	2000	-
1800	1400	1800	2050
1600	1300	1600	1900
1400	1150	1400	1600
1200	1000	1200	1400
1000	900	1000	1200
800	750	800	950
600	600	600	700

- ② Humidity; No correction is necessary.

- ③ Atmospheric Pressure;

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

4. INTERFERENCE:

Acetylene detector tube : Coexistence of more than 10ppm of Carbon monoxide with Acetylene gives higher readings. Coexistence of less than 5000ppm of Hydrogen or 2000ppm of Ethylene with Acetylene does not affect on the readings.

Ethylene detector tube : Coexistence of more than 1350ppm of Carbon monoxide or 370ppm of Acetylene with Ethylene gives higher readings. Propylene produces a similar stain and coexistence of them gives higher readings.

5. CHEMICAL REACTION IN THE DETECTOR TUBE:

Acetylene : $\text{HC} \equiv \text{CH} + \text{K}_2\text{Pd}(\text{SO}_3)_2 \rightarrow \text{Pd}$

Ethylene : $\text{H}_2\text{C}=\text{CH}_2 + \text{PdSO}_4 + (\text{NH}_4)_2\text{MoO}_4 \rightarrow \text{Mo}_2\text{O}_3$

6. DISPOSAL OF TUBES:

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

7. HAZARDOUS AND DANGEROUS PROPERTIES OF ACETYLENE AND ETHYLENE:

TLV-TWA ◆ : Acetylene : — ppm Ethylene : 200ppm

Explosion range in air : Acetylene : 1.5 - 100% Ethylene : 2.7 - 36 %

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2016.

8. INSPECTION OF ASPIRATING PUMP:

Checking for leaks;

- ① Insert a sealed, unbroken detector tube into the pump.

- ② Align the guide marks on the shaft and stopper of the pump.

- ③ Pull the handle to a full stroke and wait for 1 minute.

- ④ Unlock the handle and allow it to return slowly into the pump by holding the cylinder and handle securely.

CAUTION HANDLE WILL TEND TO SNAP BACK INTO THE PUMP QUICKLY.

- ⑤ If the handle returns completely to the original position, the performance is satisfactory. Otherwise, refer to maintenance procedures shown in the instruction manual of the pump to correct the leakage.

9. 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 AP-20, AP-20S, 400B, AP-1, AP-1S or 400A aspirating pump, and that detector tubes are not used beyond their expiration date or have a colour change different to that stated in the Performance specifications.

The Manufacturer and Manufacturer's Distributors shall not be otherwise liable for any incorrect measurement or any damages, whether damages result from negligence or otherwise.

※ Product specifications are subject to change without any prior notice.