

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

1. PERFORMANCE:

Gas to be measured	Nitrogen dioxide	Iodine (*)
Measuring Range	0.5 - 30 ppm (**)	0.7 - 42 ppm
Sampling stroke	2 pump strokes	1 pump stroke
(*) Iodine can be obtained with the Temperature Correction Table for Iodine conversion.		
(**) Graduations on the detector tube are based on 2 pump strokes of Nitrogen Dioxide.		
Sampling Time	1.5 minutes	45 seconds
Colour Change	White → Yellowish orange	White → Yellow
Detectable Limit	0.1 ppm (Nitrogen dioxide)	
Operating Temperature	0 - 40 °C (32-104°F)	10 - 40 °C (50-104°F)
	(Temperature correction is necessary.)	(Temperature correction is necessary.)
Aspirating Pump	Model AP-20, AP-20S, 400B, AP-1 or AP-1S	

⚠ 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. USE ONLY WITH PUMP MODELS AP-20, AP-20S, 400B, AP-1 OR AP-1S. OTHERWISE, CONSIDERABLE ERROR IN INDICATION MAY OCCUR.
2. 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.
3. DO NOT USE THIS TUBE OUTSIDE THE STATED OPERATING TEMPERATURE RANGE.
4. 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.
5. PRIOR TO USE, READ ITEM 9. USER RESPONSIBILITY CAREFULLY.
6. READ THE CONCENTRATION IMMEDIATELY AFTER DRAWING THE SAMPLE.

2. SAMPLING AND MEASUREMENT:

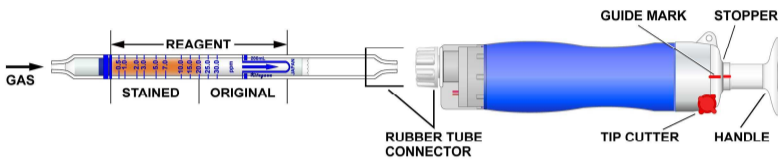


Fig.1

- ① Break both ends of the detector tube.

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

- ② Insert the detector tube into the aspirating pump securely as shown in Fig.1. (Arrow mark shall point to the pump.)
- ③ Align the guide marks on the shaft and stopper of the aspirating pump.
- ④ Pull the pump handle at full stroke until it locks and wait for 45 seconds 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 Turn the pump handle right or left by 1/4 (90°), push it towards the pump without removing the detector tube from the inlet and turn it right or left by 1/4 (90°) and repeat the steps ③ to ④ once again.
- ⑥ On completion of sampling, read the scale at the maximum point of the stained layer.

(Note) For the measurement of Iodine, perform the steps ③ to ④ once only.

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; Correct the tube reading by following temperature correction table.

Temperature Correction Table for Nitrogen Dioxide					
Tube Readings (ppm)	Corrected Concentration (ppm)				
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
30.0	16.0	22.0	30.0	30.0	30.0
25.0	14.0	19.0	25.0	25.0	25.0
20.0	12.5	16.0	20.0	20.0	20.0
15.0	11.0	13.0	15.0	15.0	15.0
10.0	9.0	10.0	10.0	10.0	10.0
7.0	7.0	7.0	7.0	7.0	7.0
5.0	5.0	5.0	5.0	5.0	5.0
3.0	3.0	3.0	3.0	3.0	3.0
2.0	2.0	2.0	2.0	2.0	2.0
1.0	1.0	1.0	1.0	1.0	1.0
0.5	0.5	0.5	0.5	0.5	0.5

- ② Humidity; No correction is necessary.

- ③ Atmospheric Pressure;

$$\text{True Concentration} = \text{Tube reading} \times \frac{1013}{\text{Atmospheric pressure (in hPa)}}$$

4. IODINE CONVERSION:

When measuring Iodine, obtain the Iodine concentration by using the following Temperature Correction Table for Iodine Conversion from the tube readings.

Temperature Correction Table for Iodine Conversion				
Tube Readings (ppm)	Corrected Concentration (ppm)			
	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
30.0	63.0	42.0	29.4	18.9
25.0	52.5	35.0	24.5	15.8
20.0	42.0	28.0	19.6	12.6
15.0	31.5	21.0	14.7	9.5
10.0	21.0	14.0	9.8	6.3
7.0	14.7	10.0	6.9	4.5
5.0	10.5	7.0	4.9	3.2
3.0	6.3	4.2	2.9	2.0
2.0	4.2	2.8	2.0	1.3
1.0	2.1	1.4	1.0	0.7
0.5	1.1	0.7	0.6	0.3

5. INTERFERENCE:

Chlorine, Bromine or Iodine produces a similar stain and coexistence of more than 2 ppm respectively with Nitrogen dioxide will give higher reading.

Nitrogen monoxide does not change the reagent by itself but coexistence of more than 15 ppm with Nitrogen dioxide will give higher reading.

6. CHEMICAL REACTION IN THE DETECTOR TUBE:

By reacting with o-Tolidine, Nitroso-o-Tolidine (dyestuff) is produced.

7. DISPOSAL OF TUBES:

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

8. HAZARDOUS AND DANGEROUS PROPERTIES OF NITROGEN DIOXIDE AND IODINE:

TLV-TWA ◆ Nitrogen dioxide : 0.2 ppm
Iodine : 0.01 ppm

Explosion range in air : —

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2021.

9. 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.

10. 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, AP-1 or AP-1S 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.