

GASTEC Instructions for No.91PL Formaldehyde Detector Tube

FOR SAFE OPERATION :

Carefully read this manual and the instruction manual of your Gastec Gas Sampling Pump.

⚠ CAUTION : If you do not observe the following precautions, you may suffer injuries or damage the product.

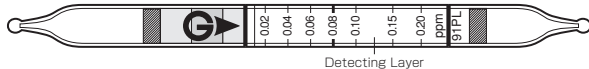
1. When breaking the tube ends, keep away from eyes.
2. Do not touch the broken glass tubes, broken pieces and reagent with bare hand(s).

△ NOTES : For maintaining performance and reliability of the test results, observe the following.

1. Recommend to use Gastec Gas Sampling device Model GSP-300FT-2 (if not available use the air sampler of equivalent to sample for 200 mL/min) together with Gastec Detector Tubes only for the purposes specified in the instruction manual of the detector tube.
2. Use this tube within the temperature range of 5 – 35°C (41 - 95°F).
3. Use this tube within the relative humidity range of 20 - 90%.
4. This tube may be interfered with by the coexisting gases. Please refer to the table "INTERFERENCES" below.
5. The shelf life and storage condition of the tube are marked on the label of the tube box.

APPLICATION OF THE TUBE : Use this tube for detecting Formaldehyde in the air or in industrial areas and for determining the environmental atmospheric condition.

SPECIFICATION : (Because of Gastec's commitment to continued improvement, specifications are subject to change without notice.)



Measuring Range	(0.01) - 0.20 ppm	0.20 - 0.80 ppm
Sampling Rate	200 mL/min	200 mL/min
Correction Factor	1	4
Sampling Time	30 min	10 min
Detection Limit	0.005 ppm (6000 mL)	
Colour Change	Pale Yellow → Pink	
Reaction Principle	$3\text{HCHO} + (\text{NH}_4\text{OH})_2\text{H}_2\text{PO}_4 \rightarrow \text{H}_2\text{PO}_4^-$ $\text{H}_2\text{PO}_4^- + \text{Base} \rightarrow \text{Phosphate}$	

Coefficient of Variation : 10% (for 0.01 to 0.06 ppm), 5% (for 0.06 to 0.2 ppm)

**** Shelf Life: Please refer to the validity date printed on the tube box.**

**** Store the tubes at 10°C (50°F) or below in the refrigerator.**

CORRECTION FOR TEMPERATURE, HUMIDITY AND PRESSURE :

Temperature : Correct for temperature by the tables below :

Tips: Apply correction factor in the cell which is ones digit and tens digit of ambient temperature crossing. For example, if the temperature is 15°C, the correction factor is the number in the cell where "10" row of tens digit and "5" row of ones digit crossing. In this case, the correction factor is 1.15.

Correction table 1 (30 minutes measurement)

		Ones digit(°C)									
		0	1	2	3	4	5	6	7	8	9
Tens digit (°C)	0	—	—	—	—	—	1.63	1.56	1.50	1.44	1.39
	10	1.34	1.29	1.25	1.22	1.18	1.15	1.12	1.09	1.06	1.03
	20	1.00	0.97	0.94	0.92	0.89	0.86	0.83	0.80	0.78	0.75
	30	0.72	0.69	0.66	0.64	0.61	0.58	—	—	—	—

Correction table 2 (10 minutes measurement)

		Ones digit(°C)									
		0	1	2	3	4	5	6	7	8	9
Tens digit (°C)	0	—	—	—	—	—	3.18	2.80	2.50	2.24	2.00
	10	1.80	1.64	1.50	1.39	1.29	1.22	1.15	1.10	1.06	1.03
	20	1.00	0.98	0.96	0.94	0.92	0.90	0.88	0.86	0.84	0.82
	30	0.80	0.78	0.76	0.74	0.72	0.70	—	—	—	—

Temperature conversion chart

°F	41	42	43	44	45	46	47	48	49	50	51	52	53	54
°C	5.0	5.6	6.1	6.7	7.2	7.8	8.3	8.9	9.4	10.0	10.6	11.1	11.7	12.2

°F	55	56	57	58	59	60	61	62	63	64	65	66	67	68
°C	12.8	13.3	13.9	14.4	15.0	15.6	16.1	16.7	17.2	17.8	18.3	18.9	19.4	20.0

°F	69	70	71	72	73	74	75	76	77	78	79	80	81	82
°C	20.6	21.1	21.7	22.2	22.8	23.3	23.9	24.4	25.0	25.6	26.1	26.7	27.2	27.8

°F	83	84	85	86	87	88	89	90	91	92	93	94	95	
°C	28.3	28.9	29.4	30.0	30.6	31.1	31.7	32.2	32.8	33.3	33.9	34.4	35.0	

Humidity : No correction is required.

Pressure : To correct for pressure, use the formula below.

$$\frac{\text{Tube Reading (ppm)} \times 1013 \text{ (hPa)}}{\text{Atmospheric Pressure (hPa)}}$$

MEASUREMENT PROCEDURE :

If automatic air sampler Model GSP-300FT-2 is used

1. Prior to operation please confirm if black colour inlet rubber tube holder is equipped with the sampler.
2. Break both end of the tips of the detector tube by the tube tip holder supplied. Connect the detector tube to the pump with arrow **G** on the tube pointing toward pump.
3. Set the flow meter at 200 mL/min and timer to "30 minutes" of the sampler. Press the start switch of the sampler to start the sampling.
4. After the sampling, remove the detector tube from the sampler.
5. Read the concentration level at the interface where the stained reagent meets the unstained reagent.
6. For measurements higher than 0.2 ppm, prepare a fresh tube. Set the flow meter at 200 mL/min and timer to "10 minutes" of the sampler and start the sampling again.
7. If necessary, multiply the readings by the correction factors of the temperature, sampling rate and atmospheric pressure.

Conversion factor of ppm and $\mu\text{g}/\text{m}^3$

$$\mu\text{g}/\text{m}^3 = \text{measurement (ppm)} \times \frac{30.03}{22.4} \times \frac{273}{(273+t)} \times 1000$$

30.03 : molecular weight of formaldehyde

22.4(L) : molecular volume at 1bar, 0°C.

273(K) : K is absolute temperature and 0°C is 273.15K

Thus, t°C is converted to (273+ t)K

INTERFERENCES :

Substance	Concentration	Interference	Interference gas only
Ammonia	≦ 2 ppm	No	No discolouration
Nitrogen Dioxide	≦ 1 ppm	No	No discolouration
Acetaldehyde		+	Pink
Acetone	≦ 0.3 ppm	No	Pink at inlet
Ethyl Alcohol		No	No discolouration
Ethyl Acetate		No	No discolouration
p-Dichlorobenzene		No	No discolouration
Toluene		No	No discolouration

Notes : Scrubber (Black colour) : Removes Acetone.

Scrubber (Purple colour): Removes Ammonia and Nitrogen Dioxide.

This layer turns to yellow by Ammonia, and dark purple by Nitrogen Dioxide.

This table of interference gases primarily expresses the interference of each coexisting gas in the concentration range, that is equivalent to the gas concentration. Therefore, the test result may show positive results due to other substances not listed in the table. If more information is needed, please contact us or our distributors in your territory.

DANGEROUS AND HAZARDOUS PROPERTIES :

Threshold Limit Value-Ceiling by ACGIH (2010): 0.3 ppm

INSTRUCTIONS ON DISPOSAL : The reagent of the tube does not use toxic substance.

When disposing the tube regardless of whether it has been used or not, follow the rules and regulations of your local government.

WARRANTY : If you have any questions regarding gas detection and the quality of the tubes, please feel free to contact your Gastec representatives.

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