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**Gas detector tube measurement
system (Length-of-stain type)**

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Contents

	Page
Introduction.....	1
1 Scope.....	1
2 Normative references	1
3 Terms and definitions	1
4 Classification	2
4.1 Classification of sampling pumps	2
4.2 Classification of detector tubes	3
5 Quality and performance.....	4
5.1 Quality and performance of sampling pump	4
5.2 Quality and performance of detector tube	5
6 Construction	6
6.1 Sampling pump	6
6.2 Detector tube and pre-treatment tube	6
7 Test method.....	6
7.1 Inspection method	6
7.2 Standard atmospheric conditions for testing	7
7.3 Appearance	7
7.4 Performance	7
8 Marking.....	10
8.1 Sampling pump	10
8.2 Marking on direct reading system detector tube, concentration chart of concentration chart system detector tube and storage box for detector tube	10
9 Instruction manual.....	10
9.1 Sampling pump	10
9.2 Detector tube.....	11
Annex A (informative) Target gases, examples of standard gases for testing and approximate measuring ranges	12
Annex B (normative) Test gases	18
Bibliography	21

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Safety Appliances Association (JSAA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS K 0804:1998** is replaced with this Standard.

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Gas detector tube measurement system (Length-of-stain type)

Introduction

This Japanese Industrial Standard was established in 1985 and has gone through three revisions since then. The revision at this time is to respond to changes in the technology that took place after the last revision made in 1998.

No corresponding International Standard has been established at this point.

1 Scope

This Standard specifies the length-of-stain type short-term gas detector tubes (hereafter referred to as “detector tubes”) that are intended for short-term measurement of concentration up to about 15 min in measuring time.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7516 *Metal rules*

JIS K 0055 *General rules for calibration method of gas analyzer*

JIS Z 8703 *Standard atmospheric conditions for testing*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions apply.

3.1 gas detector tube measurement system

gas measurement system composed of a detector tube and a detector tube sampling pump (hereafter referred to as “sampling pump”)

3.2 length-of-stain type detector tube

detector tube filled with the reagent which reacts promptly with the target component in sample gas to form the interface between the stained and unstained portions, the length of the stain caused by the reaction being indicative of the gas concentration

3.3 pre-treatment tube

tube filled with the pre-treating agent for sample gas such as dehumidifying agent or decomposition reaction agent, etc. and used by connecting to detector tube

3.4 internal volume (of sampling pump)

volume of sample gas aspirated by one stroke of the sampling pump

3.5 airtightness (of sampling pump)

volume of gas leakage from a sampling pump which has been left to stand under either a pressurized or decompressed condition for a certain period of time

3.6 shelf life

period of time in which the product remains in conformance with the quality and performance criteria given in 5.2 when stored by the method stated in the marking specified in 8.2

4 Classification

4.1 Classification of sampling pumps

Table 1 shows classification of sampling pumps.

Table 1 Classification of sampling pumps

Classification		Gas sampling system	Reference
Cylinder type	Vacuum system	A system wherein a pull of a piston creates a complete vacuum inside the cylinder of a sampling pump, which in turn aspirates the sample gas into the detector tube.	Figure 1
	Injection system	A system wherein a sample gas is first drawn into the cylinder of the sampling pump before being injected into the detector tube by the push of the piston.	Figure 2
Bellows type		A system wherein a decompressed condition is created inside the compressed bellows by the stress exerted by inner spring or the like, which in turn aspirates the sample gas into the detector tube.	Figure 3

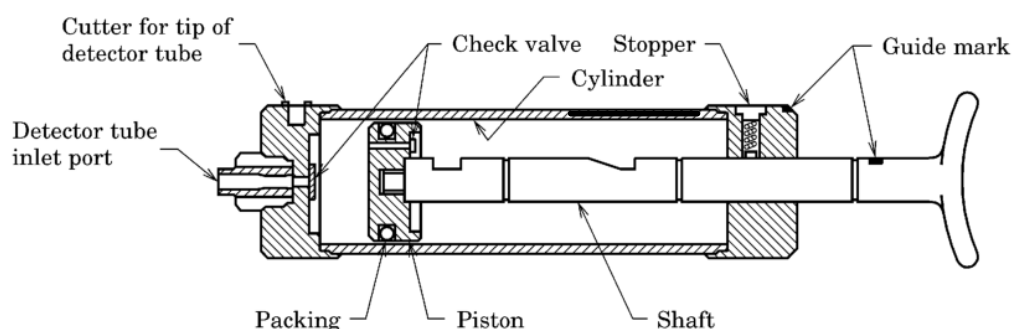


Figure 1 Example of vacuum system sampling pump

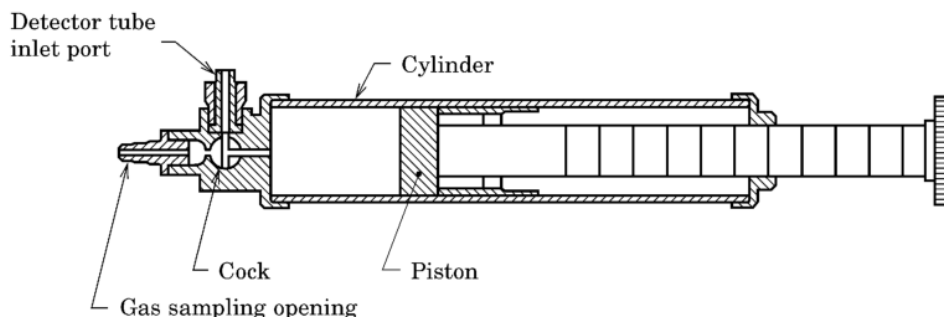


Figure 2 Example of injection system sampling pump

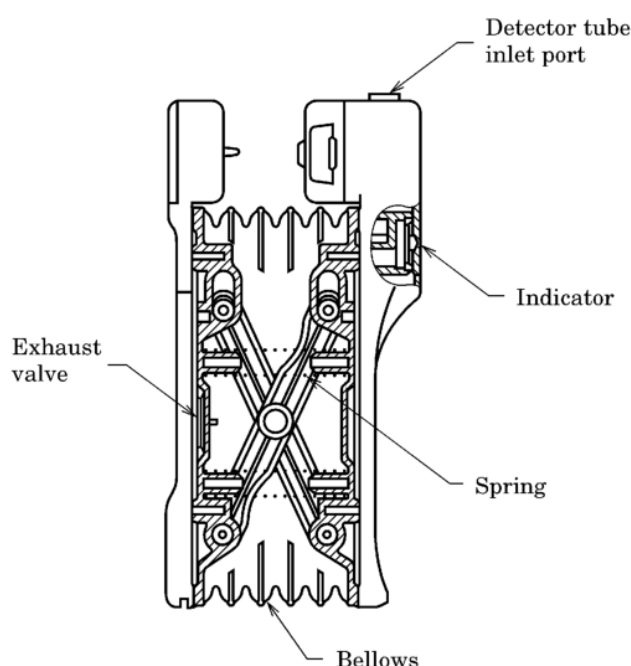


Figure 3 Example of bellows type sampling pump

4.2 Classification of detector tubes

4.2.1 Classification according to reading system

Table 2 shows the classification of detector tubes according to the reading system.

Table 2 Classification of detector tubes according to reading system

Classification	Reading system	NOTE
Direct reading system	A system wherein the interface of the stain is read directly on the concentration scale printed on the surface of the detector tube to determine the concentration of the target gas.	Figure 4
Concentration chart system	A system wherein the stain length of the detecting agent is compared with the appended concentration chart ^{a)} to determine the concentration of the target gas.	Figure 5 Figure 6
Note ^{a)} The chart is provided with the concentration scale intended for correction for the stain length due to the variation in the glass tube bore diameter.		

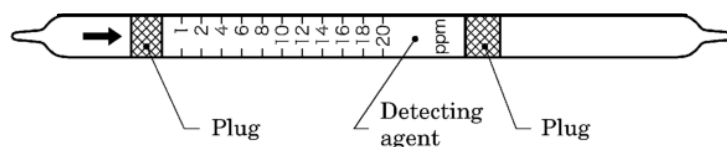


Figure 4 Example of direct reading system detector tube

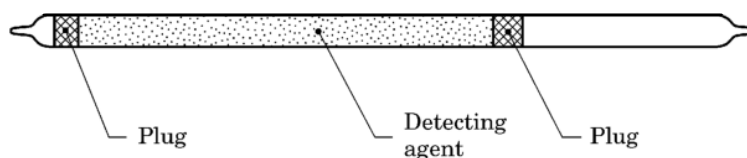


Figure 5 Example of concentration chart system detector tube

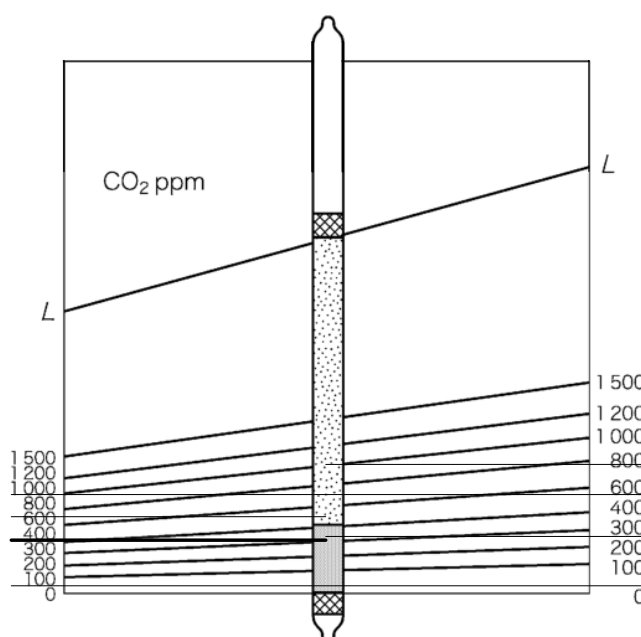


Figure 6 Example of concentration chart and method of use

4.2.2 Classification according to target gas

Classification is expressed by prefixing the name of the target gas (see Annex A).

5 Quality and performance

5.1 Quality and performance of sampling pump

Table 3 shows the required quality and performance of the sampling pump.

Table 3 Quality and performance of sampling pump

Items		Quality and performance	Tests
Appearance		Rubber of the detector tube inlet port shall be free from cracks, deformation, or other defects.	7.3
Internal volume		Tolerance on the indication value of 9.1 a) $\pm 5 \%$.	7.4.1 a)
Airtightness	Vacuum system	The ratio of the gas leakage volume to the actually measured internal volume 3% max.	7.4.1 b) 1)
	Injection system	The ratio of the gas leakage volume to the actually measured internal volume 3% max.	7.4.1 b) 2)
	Bellows type	The ratio of the gas leakage volume to the actually measured internal volume 3% max.	7.4.1 b) 1)
Gas flowrate		For gas samplers with a built-in aspiration speed regulator, the permitted deviation from the gas flow volume stated in 9.1 c) $\pm 10 \%$	7.4.1 c)
Durability		After 1 000 pump strokes, the sampling pump shall still satisfy the internal volume, air-tightness and gas flowrate requirements.	7.4.1 d)

5.2 Quality and performance of detector tube

Table 4 shows the quality and performance criteria of the detector tube.

Table 4 Quality and performance of detector tube

Items	Quality and performance	Tests
Appearance	The appearance shall be free from pinholes, cracks, flaws, or other defects and the scale provided on a direct reading system detector tube shall be intelligible.	7.3
Indication precision	Deviation from the test gas concentration of at least 1/3 the scale range Indication value of detector tube 25% max. Mean of indication values 15% max.	7.4.2 a)
	Deviation from the test gas concentration of at most 1/3 the scale range Indication value of detector tube 35% max. Mean of indication values 25% max.	
	Deviation from the test gas concentration for detector tubes for oxygen concentration measurement of 18 % to 21 % Indication value of detector tube 8% max. Mean of indication values 5% max.	
Effect of temperature	The specified indication precision shall be satisfied at a temperature of $10\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $30\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.	7.4.2 b)
Slant of end point of stain	The value of $\Delta L/M$ as shown in Figure 9 20% max.	7.4.2 c)
Slant of end point of the detecting agent at the gas inlet side	The value of Δl as shown in Figure 10 2 mm max.	7.4.2 d)