ANALYT MESSTECHNIK



REFERENCE GUIDE

GASTEC detector tubes

Measuring ranges, pump strokes, colour changes, shelf lives and exposure limits of the GASTEC detector tubes for more than 280 gases and vapours, with the Dosi-tube, Pyrotec, Polytec, Airtec, injection-method and solution tubes, and how to measure with the GASTEC gas sampling pump.

AMTC-RF-0009

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About this guide

This guide tells you which GASTEC detector tube measures the gas or vapour you are interested in, over which range, with how many pump strokes, and how the tube changes colour. It also gives each tube's shelf life and the exposure limit of the substance, so that you can choose a tube whose range covers the limit you need to check.

Most tubes are used with the GASTEC gas sampling pump: “Detector tubes for the gas sampling pump” (p. 13) lists them by substance. Separate chapters cover the passive Dosi-tubes, the tubes approved for the 30 m extension hose, the Pyrotec and Polytec systems, injection-method tubes, tubes for substances dissolved in water, the Airtec tubes for compressed breathing air and the tubes for the GSP-501FT automatic air sampling pump. If you know the tube number, start from the Index by tube number (p. 52).

Before your first measurement, read “Using this guide” (p. 6) for how to read the tables, the symbols and notes, the abbreviations (TLV, TWA, STEL, ppm) and the units, and “Measuring with the gas sampling pump” (p. 11) for the procedure. Each box of tubes also contains an instruction sheet for that tube; its instructions take precedence.

The data in this guide follow the 27th edition of GASTEC's detector tube list (November 2025). Analyt-MTC supplies GASTEC detector tubes, pumps and accessories. For questions about choosing and using them, including correction factors for substances not shown here, contact Analyt-MTC.

How this guide marks information

⚠ WARNING

A hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

A hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Practices not related to personal injury — damage to the product, the process or the sample.

Note

Information that helps understanding; never a hazard.

Document information

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2	October 2026	Quality programme: new document type, number and identity pages.
1	October 2026	First issue.

Data basis: GASTEC detector tube list, 27th edition, November 2025

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Contents

1 **Using this guide** 6
- Safety 6
- Reading the tables 6
- Symbols and notes 6
- Correction factors and charts 7
- Exposure limits 7
- Units and conversions 7
- Storage and disposal 8

2 **What's new in the 27th edition** 9
- New tubes 9
- Changes from the 26th edition 9

3 **Measuring with the gas sampling pump** 11
- Leak check before each measurement 11
- Preparing the tube 11
- Taking the sample 12
- Reading the tube 12

4 **Detector tubes for the gas sampling pump** 13

5 **Passive Dosi-tubes** 36
- Measuring with a Dosi-tube 38

6 **Detector tubes for the 30 m extension hose** 39

7 **Pyrotec systems** 42
- Sulphuryl fluoride: pyrolyzer No. 860 42
- Pyrolyzer No. 840 42

8 **Polytec tubes for qualitative analysis** 43
- Reaction layers of the Polytec tubes IV and V 43

9 **Injection-method tubes and tubes for dissolved substances** 44
- Injection-method tubes 44
- Tubes for substances dissolved in water 44

10 **Airtec tubes for compressed breathing air** 46
- Compressed breathing air kit CG-1 47

11 **Automatic air sampling pump and sorbent tubes** 48
- Detector tubes for the automatic air sampling pump 48
- Automatic air sampling pump GSP-501FT 49
- Sorbent tubes 50

12 Index by tube number 52

13 Contacts 60

CHAPTER 1

Using this guide

How to read the tables, what the symbols mean, how to convert between concentration units, and how to store, use and dispose of detector tubes safely.

Safety

⚠ WARNING

GASTEC detector tubes and GASTEC pumps are made to be used together as one system. Another maker's tube, pump or part can cause damage to property, serious injury or death, and the readings are no longer valid. Use GASTEC detector tubes only with a GASTEC pump, and a GASTEC pump only with GASTEC detector tubes. Do not mix in parts or components from other makers. For warranty, Analyt-MTC's terms of sale apply.

Note
Most tubes work between 0 and 40 °C and between 0 and 90 % relative humidity. Some tubes have a different temperature or humidity range; it is given in the instruction sheet that comes with the tubes.

Reading the tables

The main table, “Detector tubes for the gas sampling pump” (p. 13), lists substances in alphabetical order. Each entry gives:

Table 1-1 Table columns

Column	Meaning
Gas or vapour, formula	The substance to be measured and its chemical formula. Where a substance is better known under another name, a "See" line sends you to the entry that holds the data.
Tube No., tube name	The GASTEC detector tube to use. Ten tubes come in a box.
Measuring range	The concentrations the tube can measure, in ppm unless another unit is given. One tube can have several ranges, one per line.
Pump strokes	The number of pump strokes for the range on the same line. One stroke draws 100 mL of air; a half stroke (1/2) draws 50 mL. The **bold** number is the standard number of strokes, for which the scale on the tube is printed; the other ranges are reached with more or fewer strokes.
Colour change	The colour of the unused reagent (original) and of the stained layer after sampling.
Shelf life	In months. The actual expiry date is printed on each box at final inspection.
Notes	Symbols, explained below.
TLV	The ACGIH threshold limit value for 2025, in ppm unless another unit is given; see “Exposure limits” (p. 7).

Symbols and notes

Table 1-2 Symbols and notes

Symbol	Meaning
T	Temperature correction: the reading needs a correction factor or table for the true concentration.
H	Humidity correction: the reading needs a correction factor or table for the true concentration.

Symbol	Meaning
+	Twin tubes: a primary (pretreatment) tube and an analyser tube are joined for the measurement; one box is enough for five tests.
++	Nine tests (tubes) per box.
⊕	Tube No. 31B only: a long glass detector tube; one box is enough for five tests.
P	Pyrotec tube: use it with the Pyrotec pyrolyzer No. 840 and the GASTEC gas sampling pump; see “Pyrotec systems” (p. 42).
M	The tube can measure benzene even when other aromatic hydrocarbons are present.
F	30 m extension hose table only: a correction factor may apply when the tube is used with the tubing; see “Detector tubes for the 30 m extension hose” (p. 39).
*	Next to the shelf life: refrigerated storage — keep the tubes at 10 °C (50 °F) or below.
shaded row	The tube was made for another substance and measures this one with a correction factor or chart; see “Correction factors and charts” (p. 7).
bold	In the pump strokes column: the standard number of strokes.

Correction factors and charts

Every detector tube is designed for one substance, but many tubes also respond to substances with similar chemical properties. For those, the reading on the tube's scale is converted with a correction factor or chart. A correction factor is a number by which you multiply the concentration read from the end of the stain. Where the relation is not linear, a correction chart is printed instead. The factor or chart comes with each box of tubes.

Treat the measuring ranges of shaded rows as a guide. The factor can vary slightly from one production lot to the next; if you need a more precise factor for your lot, ask Analyt-MTC.

Exposure limits

The TLV column gives the threshold limit values adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) for 2025. They help you choose a tube whose range covers the limit you want to check; your national limits may differ.

- **TLV-TWA** (a plain number): the time-weighted average concentration for a normal 8-hour working day and a 40-hour working week to which nearly all workers can be exposed day after day without adverse effect.
- **TLV-C** (a number after "C"): the ceiling, a concentration that must not be exceeded at any time during the working exposure.
- Values marked STEL, and letters in brackets after a value, such as (IFV) or (EX), are printed as in the ACGIH list.

Units and conversions

Table 1-3 Units

Unit	Definition
%	Volume of the substance ÷ volume of the medium × 100
ppm	Volume of the substance ÷ volume of the medium × 10^6
ppb	Volume of the substance ÷ volume of the medium × 10^9
mg/m^3	Mass of the substance in mg per 1 m^3 (1000 L) of the medium; mainly for particulate matter, also for gases and vapours

Unit	Definition
mg/L	Mass of the substance in mg per 1 L of the medium; mainly for particulate matter, also for gases and vapours
lb/MMCF	Mass of the substance in pounds per million cubic feet of the medium. 1 mg/L = 1000 mg/m^3 = 1358 ppm = 62.3 lb/MMCF (25 °C, 1013 hPa)

Table 1-4 Conversions

Conversions	
ppm = % × 10 000	% = ppm × 0.0001
ppb = % × 10 000 000	% = ppb × 0.000 000 1
mg/m^3 = ppm × *M*/22.4 × 273/(273 + *t*) × *P*/1013	ppm = mg/m^3 × 22.4/*M* × (273 + *t*)/273 × 1013/*P*
mg/L = % × *M*/22.4 × 273/(273 + *t*) × 10	% = mg/L × 22.4/*M* × (273 + *t*)/273 × 1/10

M molecular weight; 22.4 L volume of one mole at 0 °C (32 °F) and 1 atm; 273 + *t* absolute temperature in K, with *t* in °C; 1013 hPa = 1 atm; *P* atmospheric pressure at the time of measurement, in hPa.

Storage and disposal

⚠ CAUTION

Detector tubes contain sensitive reagents, and some reagents are corrosive. Store and dispose of the tubes with care. Keep the tubes out of direct sunlight and out of the reach of children.

Each tube must be stored as specified for it: either in a cool, dark place at 15 to 25 °C (59 to 77 °F), or in a refrigerator at 0 to 10 °C (32 to 50 °F). Tubes marked * in the shelf-life column must go in the refrigerator, at 10 °C (50 °F) or below. Keeping all tubes in a refrigerator at 0 to 10 °C (32 to 50 °F) is best.

Dispose of used and expired tubes as your local regulations require. If you are unsure, ask Analyt-MTC.

CHAPTER 2

What's new in the 27th edition

The tubes GASTEC introduced or highlighted in the 27th edition of its list (November 2025), and every change from the 26th edition (April 2023). If you work from an older list, check the substances below.

New tubes

Table 2-1 New tubes

Tube No.	Substance	Scale on the tube (ppm)	Measuring range (ppm)	Colour change	Shelf life (months)	Notes
7LAN	Phosphine (p. 31) Mercury-free successor of No. 7LA	0.1–2.0	0.04–8.4	Yellow → Pink	24	
92LA	Acetaldehyde (p. 13)	1–30	0.3–30	Pink → Yellow	24	T
166	Methyl tert-butyl ether (p. 27)	10–200	10–660	Yellow → Pale blue	24	T
234L	Methyl isothiocyanate (p. 28) Twin tube with pretreatment tube	(0.3)–10	0.07–25	Pink → Yellow	24	+T
72LN	Ethyl mercaptan (p. 23) Mercury-free successor of No. 72L	(0.5)–25	0.15–57.5	Yellow → Pink	24	T

The scale is the range printed on the tube for the standard number of strokes; values in brackets are printed in brackets on the tube. The measuring range covers all stroke numbers.

Changes from the 26th edition

Tubes added

- No. 92LA for acetaldehyde (p. 13).
- No. 7LAN for phosphine (p. 31).
- Nos. 180 and 180L for N,N-dimethylisopropylamine (p. 21).
- No. 142L for methyl isopropyl ketone (p. 28).
- Dosi-tube No. 3DL for dimethylamine (p. 36).
- Approved for the 30 m extension hose: Nos. 92LA (acetaldehyde), 8La and 8LL (chlorine) and 7LAN (phosphine); see “Detector tubes for the 30 m extension hose” (p. 39).

Measuring ranges changed

Table 2-2 Measuring ranges changed

Substance	Tube No.	26th edition (ppm)	27th edition (ppm)
GAS SAMPLING PUMP			
Acrylonitrile (p. 14)	**191**	120–360	120–384
Allyl amine (p. 14)	**180**	8.5–170	6–120
Ammonia (p. 14)	**3M**	10–50	7–50
N,N-Dimethyl acetamide (p. 20)	**184**	60–240	60–174

Substance	Tube No.	26th edition (ppm)	27th edition (ppm)
Ethylene glycol monomethyl ether acetate (p. 22) (2-methoxyethyl acetate)	**113L**	300–1300	17.5–430
N-Methyl pyrrolidone (p. 29)	**180**	13.5–270	30–270
α-Pinene (p. 31)	**121**	95–1140	140–1680
Tetrachloroethylene (p. 33)	**133HA**	7–20	7.4–20
Toluene (p. 33)	**122**	5–10 and 300–690	4–10 and 300–600
Toluene	**122L**	1–2	0.82–2
Xylene (p. 35)	**123**	5–10 and 250–625	4–10 and 250–900
Xylene	**123L**	100–200	100–220
30 M EXTENSION HOSE			
Ammonia	**3M**	10–1000	7–1000
Toluene	**122**	5–690	4–600
Toluene	**122L**	1–100	0.82–100
Xylene	**123**	5–625	4–900
Xylene	**123L**	2–200	2–220

Other changes

- Renamed: "Diethylaminoethanol" and "Diethylethanolamine" are now listed as 2-Diethylaminoethanol (p. 20).
- Deleted: divinyl methoxysilane.
- New: the Pyrotec pyrolyzer No. 840 system; see “Pyrotec systems” (p. 42).
- Updated: the compliance standards of the GSP-501FT automatic air sampling pump; see “Automatic air sampling pump GSP-501FT” (p. 49).

CHAPTER 3

Measuring with the gas sampling pump

The basic procedure with the GASTEC gas sampling pump GV-100 or GV-110 (ordered as the sets GV-100S and GV-110S): check the pump for leaks, prepare the tube, draw the sample and read the stain.

Note
This chapter is an overview. Before you measure, read the instruction sheet that comes with the detector tubes and the instruction manual of the pump; they take precedence.

Leak check before each measurement

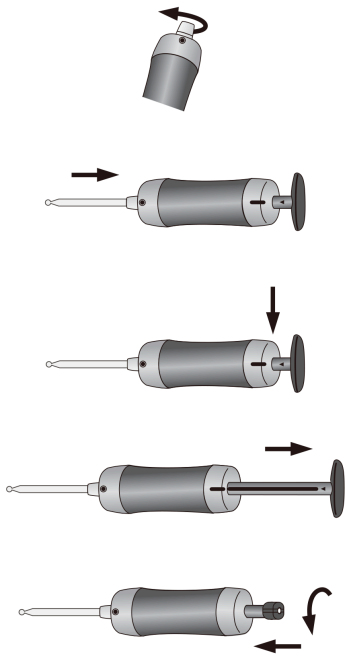


Figure 3-1. From top: tightening the inlet clamping nut (step 1), pushing the handle in (2), aligning the guide marks (3), pulling the handle out until it locks (4), unlocking the handle and guiding it back (5).

1. Check that the inlet clamping nut is tightened firmly.
2. Push the handle fully in, so that the guide line on the shaft cannot be seen. Insert a fresh, unopened detector tube into the rubber inlet.
3. Align the red guide line on the back plate with the guide mark ▯100 on the handle.
4. Hold the pump cylinder firmly and pull the handle fully out along the red guide line until it locks. Wait 1 minute; the flow finish indicator must not pop out. With a GV-110, do not hold the counter: this can hamper the counter and cause a malfunction.

CAUTION

After unlocking, the vacuum in the pump pulls the handle back. If you let go, the handle snaps back and can damage the pump or injure you. Keep a hand on the handle and guide it back slowly against slight resistance.

5. Turn the handle more than a quarter turn to unlock it, and let it return slowly. Check that the flow finish indicator has popped out again.
6. The pump is tight if the handle goes back to its starting position and the guide line on the shaft cannot be seen. If the handle stops short, the pump is not tight.

If the pump leaks, follow the maintenance procedures in the pump's instruction manual. A fault in the flow finish indicator can also cause a leak; if you find one, contact Analyt-MTC at once.

Preparing the tube

Single tube (for example No. 1HH, carbon monoxide): break off both tips of a fresh tube; it is then ready to go into the pump.

Twin tube (Note +, for example No. 163L, ethylene oxide): the box contains pretreatment tubes, detector tubes and rubber connectors. Break off the tips of both tubes and join them with a rubber connector, the ends marked © meeting in the connector. Insert the pair with the detector tube on the pump side: pretreatment tube – rubber connector – detector tube – pump.

Taking the sample

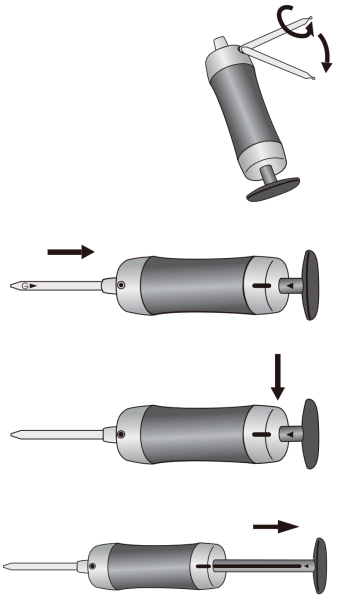
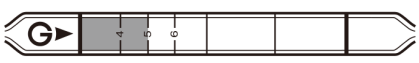


Figure 3-2. From top: breaking a tip in the tube tip breaker (steps 1–3), inserting the tube (4), aligning the guide marks (5) and pulling the handle (6).

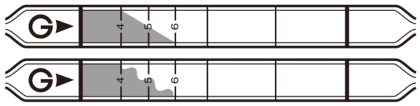
1. Push one end of the tube straight into the tube tip breaker of the pump.
2. Turn the tube so that the diamond cutter scores the glass.
3. Hold the tube firmly close to the breaker and bend it towards you to snap off the tip. Break the other end in the same way.
4. Push the handle fully in, so that the guide line cannot be seen. Insert the tube into the rubber inlet with the arrow (▯) on the tube pointing towards the pump.
5. Align the red guide line on the back plate with the guide mark ▯100 or ▯50 on the handle, as the tube's instruction sheet specifies.
6. Point the open end of the tube at the measuring point. Pull the handle along the guide line until it locks: fully out for 100 mL, halfway for 50 mL.
7. Wait for the sampling time given in the tube's instruction sheet. The flow finish indicator or the handle play shows when the 100 mL or 50 mL sample has been drawn; see the pump's instruction manual. Repeat for the number of pump strokes you need.

Reading the tube

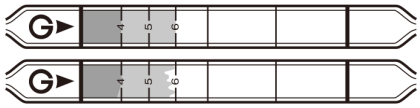
Read the concentration on the tube's scale where the stained layer ends. In all three examples below the reading is 5 %.



Flat end. The stain ends in a straight line across the tube: read at that line.



Slanted end. The stain ends at an angle: read at the middle of the slant.



Pale end. A dark layer is followed by a paler one: read midway between the end of the dark layer and the end of the pale layer.

CHAPTER 4

Detector tubes for the gas sampling pump

All substances measurable with GASTEC detector tubes and the GASTEC gas sampling pump, in alphabetical order. A substance can have several tubes; each tube has one or more measuring ranges, each set by a number of pump strokes.

Bold stroke count: standard number of pump strokes. Shaded row: the tube is read with a correction factor or chart (enclosed with the tubes). Notes: T temperature correction, H humidity correction, + twin tubes (five tests per box), ++ nine tests (tubes) per box, P Pyrotec pyrolyzer No. 840 needed, M also measures benzene in the presence of other aromatic hydrocarbons, ⊕ long glass tube, five tests per box (No. 31B only). * Refrigerated storage. Details: “Symbols and notes” (p. 6).

Table 4-1 Detector tubes for the gas sampling pump

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
A									
Acetaldehyde CH_3CHO	**92**	Acetaldehyde	300–750 10–300 5–10	1 **2** 4	Yellow	Red	36*		C 25
	92M	Acetaldehyde	5–100 2.5–5	**1** 2	Yellow	Red	24*		
	92L	Acetaldehyde	1–20	1	Yellow	Reddish brown	24*	T	
	92LA	Acetaldehyde	1–30 0.3–1	**1** 2	Pink	Yellow	24	T	
Acetic acid CH_3CO_2H	**81**	Acetic acid	50–100 2–50 1–2	1/2 **1** 2	Pink	Yellow	36	H	10
	81L	Acetic acid	10–23.0 0.25–10 0.125–0.25	1/2 **1** 2	Pink	Pale yellow	24*	T	
Acetic anhydride $(CH_3CO)_2O$	**81**	Acetic acid	0.6–15	1	Pink	Yellow	36	H	1
	81L	Acetic acid	0.15–6	1	Pink	Pale yellow	24*	T	
Acetone CH_3COCH_3	**151**	Acetone	0.8–2.0 % 0.05–0.8 %	1 **2**	Yellowish brown	Greenish brown	36	T	250
	151L	Acetone	4000–12000 50–4000	1 **2**	Yellow	Red	24*	T	
Acetone cyanohydrin $(CH_3)_2C(OH)(CN)$	**12L**	Hydrogen cyanide	2.5–60	1	Yellow	Pink	24	T	C 5 mg/m^3
Acetonitrile CH_3CN	**52**	Nitro compounds (Pyrotec tube)	3–180	1	White	Yellowish orange	36	P	20
Acetylene HC⍁CH	**171**	Acetylene	2.0–4.0 % 0.1–2.0 % 0.05–0.1 %	1/2 **1** 2	White	Brown	36	T	
	103	Hydrocarbons (Lower class)	1.8–3.6 % 0.15–1.8 % 0.075–0.15 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	
	172	Ethylene	32.5–1040	1	Pale yellow	Blue	36	T	
Acetylene dichloride	See 1,2-Dichloroethylene (p. 19)								
Acid gases	**80**	Acid gases	40–80 2–40 1–2	1 **2** 4	Pale bluish purple	Yellow	24		
Acrolein CH_2:CHCHO	**93**	Acrolein	10–800 3.3–10	**2** 4	Yellow	Red	24*	T	C 0.05
Acrylic acid CH_2:$CHCO_2H$	**81**	Acetic acid	2–50	1	Pink	Yellow	36	H	2
	81L	Acetic acid	0.45–18	1	Pink	Pale yellow	24*	T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Acrylonitrile CH_2:CHCN	**191**	Acrylonitrile	120–384 5–120 2–5	1 **2** 4	Yellow	Red	36	+T	2
	191L	Acrylonitrile	6–18 0.2–6 0.1–0.2	1 **2** 4	Yellow	Pink	36	+	
	102L	Hexane	600–14400	1	Yellowish brown	Greenish brown	36		
Aliphatic hydrocarbons	**140**	Aliphatic hydrocarbons	1000–3000 20–1000 6–20	1/2 **1** 2	Yellow	Blackish brown	24	T	
Allyl amine CH_2:$CHCH_2NH_2$	**180**	Amines	6–120	1	Pink	Yellow	36	TH	
	180L	Amines	0.4–8	1	Pink	Pale yellowish orange	36	T	
Allyl isothiocyanate CH_2:$CHCH_2NCS$	**149**	Methyl methacrylate	4.4–88	2	Yellow	Pale blue	24	T	
Allyl chloride CH_2:$CHCH_2Cl$	**101L**	Gasoline (Petrol)	0.1–3.4 %	1/2	Yellowish brown	Greenish brown	36		1
	131L	Vinyl chloride	3.2–48	2	Yellow	Reddish brown	30*	+T	
Amines CH_3NH_2 calibration	**180**	Amines	5–100	1	Pink	Yellow to Brown	36	TH	
	180L	Amines	0.5–10	1	Pink	Yellow to Pale yellowish orange or Grayish purple	36	T	
2-Aminoethanol	See Ethanolamine (p. 21)								
Ammonia NH_3	**3H**	Ammonia	16–32 % 1–16 % 0.2–1 %	1/2 **1** 2–5	Purple	Yellow	36		25
	3HM	Ammonia	1.6–3.52 % 0.05–1.6 %	1/2 **1**	Pink	Greenish grey	36		
	3M	Ammonia	500–1000 50–500 7–50	1/2 **1** 2–5	Purple	Yellow	36		
	3La	Ammonia	100–220 5–100 2.5–5	1/2 **1** 2	Purple	Yellow	36	T	
	3L	Ammonia	30–78 1–30 0.5–1	1/2 **1** 2	Pink	Yellow	36	T	
	180	Amines	1.5–30	1	Pink	Yellow	36	T	
Amyl acetate $CH_3CO_2(CH_2)_4CH_3$	**147**	Amyl acetate	10–200	2	Yellow	Pale blue	24	T	50
Aniline $C_6H_5NH_2$	**181**	Aniline	30–60 2.5–30 1.25–2.5	2 **3** 5	Pale yellow	Pale green	36		2
Aromatic hydrocarbons	**120**	Aromatic hydrocarbons	100–200 2–100 0.4–2	1/2 **1** 2–5	White	Brown	36		
Arsine AsH_3	**19LA**	Arsine	2.4–10 1.5–2.4 0.1–1.5 0.04–0.1	1 3 **5** 10	Yellow	Red	27		0.005
B									
Benzaldehyde C_6H_5CHO	**91L**	Formaldehyde	4–92	1	Yellow	Reddish brown	36*	T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Benzene C_6H_6	**121S**	Benzene	120–312 5–120 2–5	1 **2** 4	White	Dark green	36	+M	0.02
	121	Benzene	60–120 5–60 2.5–5	1 **2** 4	White	Dark green	36		
	121SL	Benzene	20–100 1–20	1 **5**	White	Dark green	36	+M	
	121SP	Benzene	20–66 0.2–20	1 **3**	White	Brown	24	+M	
	121L	Benzene	10–65 0.1–10	1 **5**	White	Dark green	36	+	
	171	Acetylene	0.03–0.6 %	4	White	Brown	36	T	
Benzyl bromide $C_6H_5CH_2Br$	**136L**	Methyl bromide	11–100	1	White	Yellow	27	+	
Benzyl chloride $C_6H_5CH_2Cl$	**132L**	Trichloroethylene	1.6–20	2	Yellow	Purple	30*	T	1
Boron trichloride BCl_3	**12L**	Hydrogen cyanide	2.25–54	1	Yellow	Pink	24	T	C 0.7
Bromine Br_2	**8La**	Chlorine	0.05–0.8	4	White	Pale pink	36		0.1
Bromochloromethane	See Chlorobromomethane (p. 18)								
Bromoform $CHBr_3$	**136L**	Methyl bromide	1–50	1	White	Yellow	27	+	0.5
1,3-Butadiene CH_2:CHCH:CH_2	**174**	1,3-Butadiene	50–800	1	Pale yellow	White	36	T	2
	174L	1,3-Butadiene	5–100 2.5–5	**4** 8	Pale yellow	White	36		
	174LL	1,3-Butadiene	0.5–5.0	1	Pink	Pale yellow	36*	+	
Butane C_4H_{10}	**104**	Butane	25–1400	1	Yellowish brown	Greenish brown	36		STEL 1000 (EX)
	103	Hydrocarbons (Lower class)	0.84–1.68 % 0.07–0.84 % 0.035–0.07 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	
1-Butanol $CH_3CH_2CH_2CH_2OH$	**114**	1-Butanol	10–150	3	Yellow	Pale blue	36	T	20
2-Butanol $CH_3CH_2CH(OH)CH_3$	**115**	2-Butanol	5–150	3	Yellow	Pale blue	36	T	100
2-Butanone	See Methyl ethyl ketone (MEK) (p. 28)								
Butyl acetate $CH_3CO_2(CH_2)_3CH_3$	**142**	Butyl acetate	0.05–0.8 %	2	Orange	Greenish brown	36	T	50
	142L	Butyl acetate	10–300	2	Yellow	Blackish brown (Pale blue after few minutes)	24	T	
tert-Butyl alcohol $(CH_3)_3COH$	**102L**	Hexane	500–12000	2	Yellowish brown	Greenish brown	36		100
Butyl acrylate CH_2:$CHCO_2C_4H_9$	**142L**	Butyl acetate	7–210	2	Yellow	Blackish brown (Pale blue after few minutes)	24	T	2
Butylamine $CH_3(CH_2)_3NH_2$	**180**	Amines	8–160	1	Pink	Grayish red to Brown	36	TH	C 5
	180L	Amines	0.55–11	1	Pink	Pale yellowish orange	36	T	
tert-Butylamine $(CH_3)_3CNH_2$	**180**	Amines	5.5–110	1	Pink	Pale brown	36	TH	
n-Butyl bromide C_4H_9Br	**136H**	Methyl bromide	24–360	1	White	Yellow	36	+	
	136L	Methyl bromide	10–100	1	White	Yellow	27	+	
	136LA	Methyl bromide	2.4–43.2 1–18	1 2	White	Yellow	36	+	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Butyl mercaptan $CH_3(CH_2)_3SH$	**70L**	Mercaptans	6.4–12.8 0.8–6.4 0.32–0.8 0.16–0.32	1/2 1 2 4	Yellow	Red	24		0.5
tert-Butyl mercaptan $(CH_3)_3CSH$	**75**	tert-Butyl mercaptan	60–150 mg/m^3 30–60 mg/m^3 2.5–30 mg/m^3	1/2 1 **2**	Yellow	Red	36	T	
	75N	tert-Butyl mercaptan	50–250 mg/m^3 2.5–50 mg/m^3 1.25–2.5 mg/m^3	1/2 **1** 2	Yellow	Pink	24	TH	
	75L	tert-Butyl mercaptan	15–30 mg/m^3 1–15 mg/m^3 0.5–1 mg/m^3	1/2 **1** 2	Yellow	Pink	24*	T	
tert-Butyl mercaptan $(CH_3)_3CSH$	**75LN**	tert-Butyl mercaptan	15–39 mg/m^3 1–15 mg/m^3 0.5–1 mg/m^3	1/2 **1** 2	Yellow	Pink	24*	TH	
	77	TBM and DMS	1–15 mg/m^3	1	Yellow	Pink	24*	+T	
	70L	Mercaptans	4–8 0.5–4 0.2–0.5 0.1–0.2	1/2 1 2 4	Yellow	Red	24		
	70LN	Mercaptans	1–40	1	Yellow	Pink	24*		
Butyric acid $CH_3CH_2CH_2CO_2H$	**81L**	Acetic acid	0.325–13	1	Pink	Pale yellow	24*	T	
Butyronitrile $CH_3CH_2CH_2CN$	**191L**	Acrylonitrile	6–180	1	Yellow	Pink	36	+	
C									
Carbon dioxide CO_2	**2HH**	Carbon dioxide	5–40 % 2.5–5 %	**1/2** 1	Orange	Yellow	36		5000
	2H	Carbon dioxide	10–20 % 1–10 % 0.5–1 %	1/2 **1** 2	White	Purple	36		
	2L	Carbon dioxide	3–6 % 0.25–3 % 0.13–0.25 %	1/2 **1** 2	White	Purple	36		
	2LL	Carbon dioxide	300–5000	1	Pale blue	Purple	36		
	2LC	Carbon dioxide	2000–4000 100–2000	1/2 **1**	Pale vermilion	Orange	24		
Carbon disulphide CS_2	**13M**	Carbon disulphide	1600–5120 50–1600 15–50	1/2 **1** 2	Purple	Yellow	36	+T	1
	13	Carbon disulphide	50–100 2.5–50 1.25–2.5 0.63–1.25	1/2 **1** 2 4	Blue	Yellow	36	+T	
	13L	Carbon disulphide	3.0–8.1 0.1–3.0	1 **2**	Bluish purple	White	36	+T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change		Shelf life (months)	Notes	TLV (ppm)
					Original	Stain			
Carbon monoxide CO	**1HH**	Carbon monoxide	2–50 % 1–2 %	**1/2** 1	White	Blackish brown	36		25
	1H	Carbon monoxide	5–10 % 0.2–5 % 0.1–0.2 %	1/2 **1** 2	White	Blackish brown	36		
	1M	Carbon monoxide	2–4 % 0.1–2 % 0.05–0.1 %	1/2 **1** 2	White	Pale brown	36		
	1LM	Carbon monoxide (in Hydrogen)	1000–2000 50–1000 25–50	1/2 **1** 2	White	Pale brown/Pale green (dual layers)	36		
	1L	Carbon monoxide	1000–2000 25–1000 2.5–25	1/2 **1** 2–10	Yellow	Blackish brown	36		
	1La	Carbon monoxide	500–1000 25–500 12.5–25 8–12.5	1/2 **1** 2 3	Yellow	Blackish brown	36	T	
Carbon monoxide CO	**1LK**	Carbon monoxide (in Hydrogen)	300–600 100–300 5–100	1/2 1 **3**	White	Pale brown/Pale green (dual layers)	36		25
	1LKC	Carbon monoxide (in Hydrogen with Hydrocarbons)	5–100	3	White	Pale brown/Pale green (dual layers)	36	+	
	1LL	Carbon monoxide	5–50	2	Yellow	Blackish brown	36		
	1LC	Carbon monoxide	1–30	1	White	Pale pink	24	T	
Carbon tetrachloride CCl_4	**134**	Carbon tetrachloride	2.5–60 0.5–2.5	**1** 2–5	White	Yellow	12*	+	5
	134L	Carbon tetrachloride	5.0–11 0.25–5.0	1 **2**	White	Yellow	12*	+	
Carbonyl chloride	See Phosgene (p. 31)								
Carbonyl sulphide COS	**21**	Carbonyl sulphide	100–200 10–100 5–10	1/2 **1** 2	Blue	Yellow	30*	+	5
	21LA	Carbonyl sulphide	50–125 5–50 2–5	1/2 **1** 2	Bluish purple	White	36*	+T	
Chlorine Cl_2	**8HH**	Chlorine	0.5–10 % 0.25–0.5 %	**1/2** 1	Reddish purple	Yellow	36		0.1
	8H	Chlorine	500–1000 50–500 25–50	1/2 **1** 2	White	Reddish orange	36		
	8La	Chlorine	8.0–16 0.5–8.0 0.1–0.5	1/2 **1** 2–5	White	Pale pink	36		
	8LL	Chlorine	1.0–2.0 0.05–1.0 0.025–0.05	1/2 **1** 2	White	Pale green	12*		
	80	Acid gases	0.7–14	2	Pale bluish purple	White	24		
Chlorine dioxide ClO_2	**23M**	Chlorine dioxide	5.0–10 0.5–5.0 0.1–0.5	1/2 **1** 2–5	White	Pale pink	36		C 0.1
	23L	Chlorine dioxide	0.6–1.2 0.05–0.6 0.025–0.05	1/2 **1** 2	White	Pale green	12*		
	8H	Chlorine	45–450	1	White	Reddish orange	36		
	8La	Chlorine	0.3–4.8	1	White	Pale pink	36		
Chlorobenzene C_6H_5Cl	**126**	Chlorobenzene	200–500 5–200 2–5	1/2 **1** 2	White	Grayish brown	36		10
	126L	Chlorobenzene	10–57 0.5–10	1 **3**	Yellow	Pale bluish purple	24*	T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Chlorobromomethane CH_2BrCl	**135**	1,1,1-Trichloroethane (Methyl chloroform)	22–110	1	White	Reddish orange	36	+T	200
	136H	Methyl bromide	18–270	1	White	Yellow	36	+	
	136L	Methyl bromide	11–110	1	White	Yellow	27	+	
	136LA	Methyl bromide	0.7–12.6	2	White	Yellow	36	+	
Chlorocyclohexane $C_6H_{11}Cl$	**102L**	Hexane	50–1200	2	Yellowish brown	Greenish brown	36		
Chlorodifluoromethane (R22) $CHClF_2$	**51H**	Fluorochlorocarbons (Pyrotec tube)	0.8–2.4 % 0.1–0.8 %	1/2 1	White	Reddish orange	36	+P	1000
	51	Fluorochlorocarbons (Pyrotec tube)	25–1000	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	50–135 2.5–50	1 2	Yellow	Reddish purple	36	+P	
1-Chloro-2,3-epoxy propane	See Epichlorohydrin (p. 21)								
2-Chloroethanol	See Ethylene chlorohydrin (p. 22)								
Chloroethylene	See Vinyl chloride (p. 35)								
Chloroform $CHCl_3$	**137**	Chloroform	100–400 10–100 4–10	3 **5** 7	White	Orange	36	+H	10
	137LA	Chloroform	12–30 2–12 0.5–2	1 **2** 4	White	Pale purple	12*	+T	
	137LL	Chloroform	0.3–4.5	4	White	Pale purple	12*	+T	
Chloropicrin Cl_3CNO_2	**233**	Chloropicrin	10–22 0.1–10 0.045–0.1	1/2 **1** 2	White	Yellow	12	+	0.1
	134	Carbon tetrachloride	2.5–60	1	White	Yellow	12*	+	
	134L	Carbon tetrachloride	0.28–5.5	2	White	Yellow	12*	+	
2-Chloro-1,1,1,2-tetrafluoroethane (R124) $CHClFCF_3$	**51**	Fluorochlorocarbons (Pyrotec tube)	45–1800	1	Yellow	Reddish purple	36	+P	
m-Cresol $C_6H_4(CH_3)OH$	**61**	o-Cresol	1–25	2	Pale yellow	Gray	24*	T	20 mg/m^3 (IFV)
o-Cresol $C_6H_4(CH_3)OH$	**61**	o-Cresol	25–67.5 1–25 0.35–1	1 **2** 4	Pale yellow	Gray	24*	T	20 mg/m^3 (IFV)
p-Cresol $C_6H_4(CH_3)OH$	**61**	o-Cresol	1–25	2	Pale yellow	Gray	24*	T	20 mg/m^3 (IFV)
Cumene $C_6H_5CH(CH_3)_2$	**122L**	Toluene	2–100	2	White	Brown	36		5
Cyclohexane C_6H_{12}	**102H**	Hexane	0.6–1.2 % 0.03–0.6 % 0.015–0.03 %	1/2 1 2	Yellowish brown	Greenish brown	36		100
	102L	Hexane	60–1440	1	Yellowish brown	Greenish brown	36		
Cyclohexanol $C_6H_{11}OH$	**118**	Cyclohexanol	5–100	2	Yellow	Pale blue	24	T	50
Cyclohexanone $C_6H_{10}O$	**154**	Cyclohexanone	30–72 2–30	2 **4**	Pale yellow	Yellow	24*	T	20
	91L	Formaldehyde	10–470	1/2	Yellow	Reddish brown	36*	T	
Cyclohexene C_6H_{10}	**151**	Acetone	0.05–0.8 %	1	Yellowish brown	Greenish brown	36	T	20
Cyclohexylamine $C_6H_{13}N$	**180**	Amines	7–140	1	Pink	Pale yellowish orange	36	TH	10
	180L	Amines	0.5–10	1	Pink	Pale yellowish orange	36	T	
Cymene $C_{10}H_{14}$	**141L**	Ethyl acetate	2.4–96	2	Yellow	Blackish brown	24	T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
D									
n-Decane $CH_3(CH_2)_8CH_3$	**105**	Hydrocarbons (Higher class)	400–6000 200–400	1 2	White	Blackish brown	36		
Diacetone alcohol $(CH_3)_2C(OH)CH_2COCH_3$	**154**	Cyclohexanone	2–100	2	Pale yellow	Yellow	24*	T	10
Diacetyl $CH_3COCOCH_3$	**92**	Acetaldehyde	25–1500	3	Yellow	Red	36*		0.01
1,2-Diaminoethane	See Ethylenediamine (p. 22)								
Diborane B_2H_6	**22**	Diborane	2–5 0.05–2 0.02–0.05	1 **2** 5	Yellow	Red	24	T	0.1
1,1-Dibromoethane CH_3CHBr_2	**136L**	Methyl bromide	7–70	1	White	Yellow	27	+	
1,2-Dibromoethane	See Ethylene dibromide (p. 22)								
Dibromomethane CH_2Br_2	**136L**	Methyl bromide	5–50	1	White	Yellow	27	+	
Di-n-butylamine $(CH_3CH_2CH_2CH_2)_2NH$	**180**	Amines	5–100	1	Pink	Pale orange	36	TH	
	180L	Amines	0.4–8	1	Pink	Pale yellowish orange	36	T	
m-Dichlorobenzene $C_6H_4Cl_2$	**127**	o-Dichlorobenzene	2.5–300	2	White	Light brown	36	T	
o-Dichlorobenzene $C_6H_4Cl_2$	**127**	o-Dichlorobenzene	2.5–300	2	White	Light brown	36	T	25
p-Dichlorobenzene $C_6H_4Cl_2$	**127**	o-Dichlorobenzene	2.5–300	2	White	Light brown	36	T	10
Dichlorodifluoro-methane (R12) CCl_2F_2	**51H**	Fluorochlorocarbons (Pyrotec tube)	2600–7800 325–2600	1/2 1	White	Reddish orange	36	+P	1000
	51	Fluorochlorocarbons (Pyrotec tube)	11–440	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	36–97.2 1.8–36	1 2	Yellow	Reddish purple	36	+P	
1,1-Dichloroethane CH_3CHCl_2	**135**	1,1,1-Trichloroethane (Methyl chloroform)	90–450	1	White	Reddish orange	36	+T	100
1,2-Dichloroethane	See Ethylene dichloride (p. 22)								
1,1-Dichloroethylene	See Vinylidene chloride (p. 35)								
1,2-Dichloroethylene ClCH:CHCl	**139**	1,2-Dichloroethylene	100–250 10–100 5–10	1/2 **1** 2	Yellow	Reddish purple	30*	T	200
	132HA	Trichloroethylene	80–800	1	Yellow	Reddish purple	24*	T	
	132LL	Trichloroethylene	0.375–6.0	1	Yellow	Purple	24*	T	
1,1-Dichloro-1-fluoroethane (R141b) CH_3CCl_2F	**51**	Fluorochlorocarbons (Pyrotec tube)	400–1000 10–400	1/2 1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	1.1–22	2	Yellow	Reddish purple	36	+P	
Dichloromethane	See Methylene chloride (p. 28)								
Dichloropentafluoro-propane (R225)	**51**	Fluorochlorocarbons (Pyrotec tube)	20–800	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	1.4–28	2	Yellow	Reddish purple	36	+P	
1,2-Dichloropropane	See Propylene dichloride (p. 31)								
1,3-Dichloropropene $ClCH_2CH:CHCl$	**132HA**	Trichloroethylene	45–450	2	Yellow	Reddish purple	24*	T	1
	131La	Vinyl chloride	0.5–10	2	Yellow	Reddish brown	24*	+	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change		Shelf life (months)	Notes	TLV (ppm)
					Original	Stain			
1,2-Dichloro-1,1,2,2-tetrafluoroethane (R114) $CClF_2CClF_2$	**51H**	Fluorochlorocarbons (Pyrotec tube)	3800–11 400 475–3800	1/2 1	White	Reddish orange	36	+P	1000
	51	Fluorochlorocarbons (Pyrotec tube)	20–800	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	36–97.2 1.8–36	1 2	Yellow	Reddish purple	36	+P	
2,2-Dichloro-1,1,1-trifluoroethane (R123) $CHCl_2CF_3$	**51**	Fluorochlorocarbons (Pyrotec tube)	560–1600 14–560	1/2 1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	1.4–28	2	Yellow	Reddish purple	36	+P	
Dichlorvos $C_4H_7Cl_2O_4P$	**132LL**	Trichloroethylene	0.11–1.8	2	Yellow	Purple	24*	T	0.1 mg/m^3 (IFV)
Diethylamine $(C_2H_5)_2NH$	**180**	Amines	5.5–110	1	Pink	Pale brown	36	TH	5
	180L	Amines	0.45–9	1	Pink	Pale yellowish orange	36	T	
2-Diethylaminoethanol $(C_2H_5)NCH_2CH_2OH$	**180**	Amines	6–120	1	Pink	Pale brown	36	TH	2
	180L	Amines	0.6–12	1	Pink	Pale yellowish orange	36	T	
Diethyl benzene $C_6H_4(C_2H_5)_2$	**122L**	Toluene	2–150	4	White	Brown	36		
Diethylenetriamine $H_2NCH_2CH_2NHCH_2CH_2NH_2$	**180L**	Amines	0.95–19	1	Pink	Grayish purple (Pale yellowish orange at the end of staining)[1]	36	T	1
[1] Pale yellowish orange at low concentrations.									
Diethyl ether	See Ethyl ether (p. 23)								
Diethyl ketone $C_5H_{10}O$	**142L**	Butyl acetate	5–513	2	Yellow	Blackish brown (Pale blue after few minutes)	24	T	200
Diisobutylene $(CH_3)_3CCH{:}C(CH_3)_2$	**121**	Benzene	45–540	1	White	Dark green	36		
Diisobutyl ketone $[(CH_3)_2CHCH_2]_2CO$	**102L**	Hexane	0.2–1 %	2	Yellowish brown	Greenish brown	36		25
	91L	Formaldehyde	0.58–29	4	Yellow	Reddish brown	36*	T	
Diisopropylamine $[(CH_3)_2CH]_2NH$	**180**	Amines	5–100	1	Pink	Pale orange	36	TH	5
	180L	Amines	0.3–6	1	Pink	Pale yellowish orange	36	T	
Diisopropyl benzene $C_6H_5N\ [CH(CH_3)_2]_2$	**141L**	Ethyl acetate	16–108	2	Yellow	Blackish brown	24	T	
1,2-Dimethoxyethane $C_4H_{10}O_2$	**114**	1-Butanol	100–1030	1	Yellow	Pale blue	36	T	
N,N-Dimethyl acetamide $CH_3CON(CH_3)_2$	**184**	N,N-Dimethyl acetamide	60–174 5–60 1.5–5	1 **2** 4	Pink	Pale yellow	36	T	10
Dimethylamine $(CH_3)_2NH$	**3H**	Ammonia	1.2–19.2 %	1	Purple	Yellow	36		5
	180	Amines	5.5–110	1	Pink	Pale yellowish orange	36	TH	
	180L	Amines	0.45–9	1	Pink	Pale yellowish orange	36	T	
2-Dimethylaminoethanol $(CH_3)_2NCH_2CH_2OH$	**180**	Amines	6.5–130	1	Pink	Pale orange to Yellow	36	TH	
	180L	Amines	0.65–13	1	Pink	Pale yellowish orange	36	T	
Dimethylaminopropyl-amine $(CH_3)_2NCH_2CH_2CH_2NH_2$	**180**	Amines	8–160	1	Pink	Grayish red	36	TH	
	180L	Amines	0.6–12	1	Pink	Pale yellowish orange	36	T	
N,N-Dimethylaniline $C_6H_5N(CH_3)_2$	**181**	Aniline	2.5–30	3	Pale yellow	Pale green	36		5

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Dimethylbenzene	See Xylene (p. 35)								
Dimethyl disulphide $(CH_3)_2S_2$	**53**	Dimethyl sulphide (Pyrotec tube)	0.3–6	3	Bluish purple	White	24	+TP	0.5
Dimethylethanolamine	See 2-Dimethylaminoethanol (p. 20)								
N,N-Dimethylethylamine $C_2H_5N(CH_3)_2$	**180**	Amines	4–80	1	Pink	Yellow	36	TH	
	180L	Amines	0.3–6	1	Pink	Pale yellowish orange	36	T	
N,N-Dimethyl formamide $HCON(CH_3)_2$	**183**	N,N-Dimethyl formamide	30–90 2–30 0.8–2	1/2 **1** 2	Pink	Pale vermilion	36	T	5
2,6-Dimethyl-4-heptanone	See Diisobutyl ketone (p. 20)								
Dimethylhydrazine $NH_2N(CH_3)_2$	**185**	Hydrazine	0.1–2	5	Pink	Yellow	36	TH	0.01
N,N-Dimethylisopropyl-amine $C_5H_{13}N$	**180**	Amines	3.7–74	1	Pink	Pale yellowish orange	36	TH	
	180L	Amines	0.465–9.3	1/2	Pink	Pale yellowish orange	36	T	
Dimethyl sulphide $(CH_3)_2S$	**53**	Dimethyl sulphide (Pyrotec tube)	0.5–10 0.15–0.5	**3** 5	Bluish purple	White	24	+TP	10
	77	TBM and DMS	1–15 mg/m^3	1	Pink	Pale yellow	24*	+	
1,4-Dioxane $C_4H_8O_2$	**159**	Tetrahydrofuran	25–144	2	Pale vermilion	Pale blue	36	T	20
	163	Ethylene oxide	0.1–6.0 %	1	Orange	Green	36		
Dipropylamine $(CH_3CH_2CH_2)_2NH$	**180**	Amines	4–80	1	Pink	Yellow	36	TH	
	180L	Amines	0.35–7	1	Pink	Pale yellowish orange	36	T	
Divinyl benzene $C_6H_4(CH{:}CH_2)_2$	**124L**	Styrene	1–15	3	White	Yellow	36		10
E									
Enflurane (2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether) $CHClFCF_2OCHF_2$	**51**	Fluorochlorocarbons (Pyrotec tube)	110–1230	1	Yellow	Reddish purple	36	+P	50
	51L	Fluorochlorocarbons (Pyrotec tube)	25–145	2	Yellow	Reddish purple	36	+P	
Epichlorohydrin CH_2OCHCH_2Cl	**163L**	Ethylene oxide	1.2–120	2	Yellow	Reddish brown	12*	+T	0.1
1,2-Epoxypropane	See Propylene oxide (p. 32)								
Ethanethiol	See Ethyl mercaptan (p. 23)								
Ethanol C_2H_5OH	**112**	Ethanol	2.5–7.5 % 0.05–2.5 % 0.01–0.05 %	1/2 **1** 2	Pale vermilion	Pale blue	36	T	STEL 1000
	112L	Ethanol	100–2000 50–100	**1** 2	Pale vermilion	Pale blue	36	T	
Ethyl alcohol	See Ethanol (p. 21)								
Ethanolamine (Monoethanolamine) $H_2NCH_2CH_2OH$	**180**	Amines	7–140	3	Pink	Yellow	36	TH	3
	180L	Amines	1.95–39	1	Pink	Grayish purple (Pale yellowish orange at the end of staining)[1]	36	T	
[1] Pale yellowish orange at low concentrations.									
Ethyl acetate $CH_3CO_2C_2H_5$	**141**	Ethyl acetate	0.1–1.5 %	1	Yellowish brown	Greenish brown	36	T	400
	141L	Ethyl acetate	20–800	2	Yellow	Blackish brown	24	T	
Ethyl acrylate $CH_2{:}CHCO_2C_2H_5$	**141L**	Ethyl acetate	8.4–336	2	Yellow	Blackish brown	24	T	5

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change		Shelf life (months)	Notes	TLV (ppm)
					Original	Stain			
Ethylamine $C_2H_5NH_2$	**180**	Amines	5–100	1	Pink	Yellow	36	TH	5
	180L	Amines	0.45–9	1	Pink	Pale yellowish orange	36	T	
Ethyl benzene $C_6H_5C_2H_5$	**122**	Toluene	11–330	1	White	Brown	36		20
	122L	Toluene	1–70	2	White	Brown	36		
p-Ethyl benzylchloride $C_6H_4(C_2H_5)CH_2Cl$	**131La**	Vinyl chloride	2.5–50	2	Yellow	Reddish brown	24*	+	
Ethyl bromide C_2H_5Br	**136L**	Methyl bromide	100–200 10–100 2.5–10	1/2 1 4	White	Yellow	27	+	5
Ethyl chloroformate $ClCO_2C_2H_5$	**131La**	Vinyl chloride	7–140	2	Yellow	Reddish brown	24*	+	
Ethyl chloride C_2H_5Cl	**138**	Methylene chloride	15–150	1	White	Pale pink	36	+T	100
Ethylene $CH_2{:}CH_2$	**172**	Ethylene	800–1680 25–800	1/2 **1**	Pale yellow	Blue	36	T	200
	172L	Ethylene	50–100 0.2–50	2 **4**	Pale yellow	Blue	36	T	
	103	Hydrocarbons (Lower class)	8.4–16.8 % 0.7–8.4 % 0.35–0.7 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	
	171	Acetylene	0.1–2.0 %	1	White	Brown	36	T	
Ethylene chlorohydrin $ClCH_2CH_2OH$	**111L**	Methanol	80–200	3	Pale vermilion	Pale blue	36	T	C 1
Ethylenediamine $H_2NCH_2CH_2NH_2$	**180**	Amines	14–280	1	Pink	Yellow	36	TH	10
	180L	Amines	0.9–18	1	Pink	Pale yellowish orange	36	T	
Ethylene dibromide $BrCH_2CH_2Br$	**136H**	Methyl bromide	14–210	1	White	Yellow	36	+	
	136L	Methyl bromide	8–80	1	White	Yellow	27	+	
Ethylene dichloride $ClCH_2CH_2Cl$	**232**	1,2-Dichloroethane	15–39 1–15	1 **2**	White	Pale purple	12*	+T	10
	135	1,1,1-Trichloroethane (Methyl chloroform)	400–2000	1	White	Reddish orange	36	+T	
	135L	1,1,1-Trichloroethane (Methyl chloroform)	104–1040	1	White	Pale pink	27	+T	
Ethylene glycol $HOCH_2CH_2OH$	**165L**	Ethylene glycol	10–100 mg/m^3	2	Yellow	Reddish brown	36*	+T	25 (V)
Ethylene glycol monobutyl ether $CH_3(CH_2)_3OCH_2CH_2OH$	**113L**	Isopropyl alcohol	200–1000	2	Pale vermilion	Pale blue	36	T	20
	113LL	Isopropyl alcohol	60–400	2	Pale vermilion	Pale blue	24	T	
Ethylene glycol monoethyl ether $C_2H_5OCH_2CH_2OH$	**113L**	Isopropyl alcohol	110–1000	2	Pale vermilion	Pale blue	36	T	5
	113LL	Isopropyl alcohol	46–460	2	Pale vermilion	Pale blue	24	T	
Ethylene glycol monomethyl ether $CH_3OCH_2CH_2OH$	**113L**	Isopropyl alcohol	75–760	2	Pale vermilion	Pale blue	36	T	0.1
	113LL	Isopropyl alcohol	44–440	2	Pale vermilion	Pale blue	24	T	
Ethylene glycol monomethyl ether acetate $CH_3CO_2CH_2OCH_3$	**113L**	Isopropyl alcohol	17.5–430	2	Pale vermilion	Pale blue	36	T	0.1
Ethylene oxide C_2H_4O	**163**	Ethylene oxide	0.05–3.0 %	1	Orange	Green	36		1
	163L	Ethylene oxide	100–550 1–100 0.4–1	1 **2** 4	Yellow	Reddish brown	12*	+T	
	163LL	Ethylene oxide	5.0–10 0.1–5.0	2 **4**	Yellow	Pale orange	12*	+T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Ethyl ether $(C_2H_5)_2O$	**161**	Ethyl ether	0.04–1.0 % 0.2–1.0 %	1 **2**	Yellowish brown	Greenish brown	36	T	400
	161L	Ethyl ether	400–1120 10–400	1 **2**	Yellow	Pale blue	24	T	
Ethylidene chloride	See 1,1-Dichloroethane (p. 19)								
Ethyl mercaptan C_2H_5SH	**72**	Ethyl mercaptan	5–120 0.5–5	**1** 2–10	White	Yellow	36	T	0.5
	72L	Ethyl mercaptan	30–75 0.5–30 0.2–0.5	1/2 **1** 2	Yellow	Red	24	T	
	72LN	Ethyl mercaptan	25–57.5 0.5–25 0.15–0.5	1/2 **1** 2	Yellow	Pink	24	T	
	70	Mercaptans	5–120 0.5–5	1 2–10	White	Yellow	36	T	
	70L	Mercaptans	4–8 0.5–4 0.2–0.5 0.1–0.2	1/2 1 2 4	Yellow	Red	24		
	70LN	Mercaptans	4.4–10.4 0.55–4.4 0.25–0.55 0.13–0.25	1/2 1 2 4	Yellow	Pink	24*		
	71H	Methyl mercaptan	100–3800	1	White	Yellow	36		
N-Ethyl morpholine $C_6H_{13}NO$	**180**	Amines	5–100	1	Pink	Yellow	36	TH	5
	180L	Amines	0.3–6	1	Pink	Pale yellowish orange	36	T	
F									
Fluorine F_2	**17**	Hydrogen fluoride	0.5–50	1	Yellow	Brown	36	H	0.1
Fluorotrichloromethane	See Trichlorofluoromethane (R11) (p. 34)								
Formaldehyde HCHO	**91M**	Formaldehyde	2000–6400 20–2000 8–20	1/2 **1** 2	Yellow	Red	24*	T	0.1
	91	Formaldehyde	50–100 20–50 2–20	1/2 1 **2**	White	Brown	36	+	
	91L	Formaldehyde	5.0–45.0 0.1–5.0	1 **5**	Yellow	Reddish brown	36*	T	
	91LL	Formaldehyde	0.05–1	5	Yellowish brown	Pale pink	12*	T	
Formic acid HCO_2H	**81**	Acetic acid	5.2–130	1	Pink	Yellow	36	H	5
	81L	Acetic acid	0.5–20	1	Pink	Pale yellow	24*	T	
Furfural $C_5H_4O_2$	**154**	Cyclohexanone	2–30	4	Pale yellow	Yellow	24*	T	0.2
G									
Gasoline (Petrol) CnHm	**101**	Gasoline (Petrol)	0.6–1.2 % 0.03–0.6 % 0.015–0.03 %	1/2 **1** 2	Yellowish brown	Greenish brown	36		300
	101L	Gasoline (Petrol)	1000–2000 30–1000	1 **2**	Yellowish brown	Greenish brown	36		
	1M	Carbon monoxide	0.1–2 %	1	White	Pale brown	36		
H									
Halothane (2-Bromo-2-chloro-1,1,1-trifluoroethane) $CF_3CHBrCl$	**51H**	Fluorochlorocarbons (Pyrotec tube)	800–6400	1	White	Reddish orange	36	+P	5
	51	Fluorochlorocarbons (Pyrotec tube)	24–960	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	3–60	2	Yellow	Reddish purple	36	+P	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Heptane $CH_3(CH_2)_5CH_3$	**101**	Gasoline (Petrol)	0.6–1.2 % 0.03–0.6 % 0.015–0.03 %	1/2 1 2	Yellowish brown	Greenish brown	36		200
	101L	Gasoline (Petrol)	1000–2000 30–1000	1 2	Yellowish brown	Greenish brown	36		
	103	Hydrocarbons (Lower class)	0.84–1.68 % 0.07–0.84 % 0.035–0.07 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	
	105	Hydrocarbons (Higher class)	180–2700 90–180	1 2	White	Blackish brown	36		
Hexamethylenediamine $H_2N(CH_2)_6NH_2$	**180L**	Amines	1.55–31	1	Pink	Grayish purple (Pale yellowish orange at the end of staining)[1]	36	T	0.5
[1] Pale yellowish orange at low concentrations.									
Hexane $CH_3(CH_2)_4CH_3$	**102H**	Hexane	0.6–1.2 % 0.03–0.6 % 0.015–0.03 %	1/2 **1** 2	Yellowish brown	Greenish brown	36		50
	102L	Hexane	50–1200 25–50 9–25 3.5–9	**1** 2 4 8	Yellowish brown	Greenish brown	36		
	103	Hydrocarbons (Lower class)	0.6–1.2 % 0.05–0.6 % 0.025–0.05 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	
	105	Hydrocarbons (Higher class)	160–2400 80–160	1 2	White	Blackish brown	36		
Hexone	See Methyl isobutyl ketone (p. 28)								
2-Hexyl alcohol $CH_3(CH_2)_3CH(OH)CH_3$	**141L**	Ethyl acetate	168–1680	2	Yellow	Blackish brown	24	T	
Hexylamine $CH_3(CH_2)_5NH_2$	**180**	Amines	9–180	1	Pink	Pale orange	36	TH	
	180L	Amines	0.65–13	1	Pink	Pale yellowish orange	36	T	
Hydrazine N_2H_4	**185**	Hydrazine	0.1–2 0.04–0.1	**5** 10	Pink	Yellow	36	TH	0.01
Hydrocarbons (Higher class)	**105**	Hydrocarbons (Higher class)	200–3000 100–200	**1** 2	White	Blackish brown	36		
Hydrocarbons (Lower class)	**103**	Hydrocarbons (Lower class)	1.2–2.4 % 0.1–1.2 % 0.05–0.1 %	1/2 **1** 2	Yellowish brown	Greenish brown	30	++	
Hydrogen H_2	**30**	Hydrogen	0.5–2 %	1	Yellow	Yellowish brown	36		
Hydrogen bromide HBr	**15L**	Nitric acid	0.8–16	1	Yellow	Reddish purple	36	H	C 2
Hydrogen chloride HCl	**14R**	Hydrogen chloride (for Low Humidity)	200–5000 50–200	**1** 2–4	Purple	[2] Yellow/Pale pink	36		C 2
	14M	Hydrogen chloride	500–1000 20–500 10–20	1/2 **1** 2	Yellow	Red	36		
	14L	Hydrogen chloride	20–76 1–20 0.2–1	1/2 **1** 2–5	Yellow	Pink	36		
	8HH	Chlorine	1.5–30 %	1/2	Reddish purple	Yellow	36		
	80	Acid gases	8–160	2	Pale bluish purple	Pale reddish purple	24		
[2] Yellow below about 500 ppm; pale pink above about 500 ppm.									

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change		Shelf life (months)	Notes	TLV (ppm)
					Original	Stain			
Hydrogen cyanide HCN	**12H**	Hydrogen cyanide	0.05–1.6 %	1	Yellow	White	36	T	C 4.7
	12M	Hydrogen cyanide	800–2400 50–800 17–50	1/2 **1** 2	Yellow	Red	36		
	12L	Hydrogen cyanide	60–150 2.5–60 1.25–2.5 0.5–1.25	1/2 **1** 2 5	Yellow	Pink	24	T	
	12LL	Hydrogen cyanide	5.0–10 0.2–5.0	1 **2**	Yellow	Pink	24		
Hydrogen fluoride HF	**17**	Hydrogen fluoride	20–100 0.5–20 0.25–0.5	1 **4** 7	Yellow	[3] Brown/Deep pink	36	H	0.5
	17L	Hydrogen fluoride	10–72 0.2–10 0.09–0.2	1 **3** 5	Yellow	Brown	30	H	
	17LL	Hydrogen fluoride	6.9–24 3.0–6.9 0.05–3.0	1 3 **5**	Yellow	Brown	24	TH	
[3] May turn deep pink at high concentrations.									
Hydrogen peroxide H_2O_2	**32**	Hydrogen peroxide	0.5–10	5	White	Yellow	36	T	1
Hydrogen sulphide H_2S	**4HT**	Hydrogen sulphide	20–40 % 2–20 % 1–2 %	1/2 **1** 2	Pale blue	Blackish brown	36		1
	4HP	Hydrogen sulphide	10–20 % 0.5–10 % 0.25–0.5 %	1/2 **1** 2	Pale blue	Blackish brown	36		
	4HH	Hydrogen sulphide	2–4 % 0.1–2 %	1/2 **1**	Pale blue	Blackish brown	36		
	4H	Hydrogen sulphide	2000–4000 100–2000 10–100	1/2 **1** 2–10	White	Brown	36		
	4HM	Hydrogen sulphide	800–1600 50–800 25–50	1/2 **1** 2	White	Brown	36		
	4M	Hydrogen sulphide	250–500 25–250 12.5–25	1/2 **1** 2	White	Brown	36		
	4L	Hydrogen sulphide	120–240 10–120 1–10	1/2 **1** 2–10	White	Brown	36		
	4LL	Hydrogen sulphide	60–120 2.5–60 0.25–2.5	1/2 **1** 2–10	White	Brown	36		
	4LK	Hydrogen sulphide	20–40 2–20 1–2	1/2 **1** 2	White	Brown	36		
	4LB	Hydrogen sulphide	6–12 1–6 0.5–1	1/2 **1** 2	Yellow	Pink	24		
	4LT	Hydrogen sulphide	2.0–4.0 0.1–2.0 0.05–0.1	1/2 **1** 2	Yellow	Pink	24*		
	45S	Hydrogen sulphide, Sulphur dioxide (Separate quantification)	H_2S: 60–120 2.5–60 1.25–2.5	1/2 **1** 2	White	Brown	36	+	
Hydrogen sulphide + Sulphur dioxide (Total Quantification) H_2S+SO_2	**45H**	Hydrogen sulphide + Sulphur dioxide	4.0–8.0 % 0.2–4.0 % 0.02–0.2 %	1/2 **1** 2–10	Brown	Pale yellow	36		
4-Hydroxy-4-methyl-2-pentanone	See Diacetone alcohol (p. 19)								

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
I									
Iodine I_2	**9L**	Nitrogen dioxide	0.2–12	2	White	Yellowish orange	36		0.001 (IFV)
	80	Acid gases	0.12–2.4	2	Pale bluish purple	Light bluish grey	24		
Isoamyl acetate $CH_3CO_2(CH_2)_2CH(CH_3)_2$	**148**	Isoamyl acetate	10–200	2	Yellow	Pale blue	24	T	50
Isoamyl alcohol $(CH_3)_2CH(CH_2)_2OH$	**117**	Isoamyl alcohol	5–300	2	Yellow	Pale blue	36	T	100
Isobutane $(CH_3)_3CH$	**103**	Hydrocarbons (Lower class)	0.84–1.68 % 0.07–0.84 % 0.035–0.07 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	STEL 1000 (EX)
	104	Butane	55–3080	1	Yellowish brown	Greenish brown	36		
Isobutene $(CH_3)_2C{:}CH_2$	**101L**	Gasoline (Petrol)	0.07–2.2 %	1	Yellowish brown	Greenish brown	36		250
Isobutyl acetate $CH_3CO_2CH_2CH(CH_3)_2$	**144**	Isobutyl acetate	10–300	2	Yellow	Blackish brown	24	T	50
Isobutyl acrylate $CH_2{:}CHCO_2$ $CH_2CH(CH_3)_2$	**142L**	Butyl acetate	5.5–165	2	Yellow	Blackish brown (Pale blue after few minutes)	24	T	
Isobutyl alcohol $(CH_3)_2CHCH_2OH$	**116**	Isobutyl alcohol	10–150 3.7–10	**2** 4	Yellow	Pale blue	36	T	50
Isooctane $(CH_3)_3CCH_2CH(CH_3)_2$	**101**	Gasoline (Petrol)	0.027–0.54 %	1	Yellowish brown	Greenish brown	36		300
Isopentane $(CH_3)_2CHCH_2CH_3$	**103**	Hydrocarbons (Lower class)	1.08–2.16 % 0.09–1.08 % 0.045–0.09 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	1000
Isopentyl acetate	See Isoamyl acetate (p. 26)								
Isopentyl alcohol	See Isoamyl alcohol (p. 26)								
Isophorone $C_9H_{14}O$	**154**	Cyclohexanone	2–30	8	Pale yellow	Yellow	24*	T	C 5
Isopropyl acetate $CH_3CO_2CH(CH_3)_2$	**146**	Isopropyl acetate	10–500	2	Yellow	Blackish brown	24	T	100
Isopropyl alcohol $CH_3CH(OH)CH_3$ (i-C_3H_7OH)	**113**	Isopropyl alcohol	2.5–5.0 % 0.04–2.5 % 0.02–0.04 %	1/2 **1** 2	Pale vermilion	Pale blue	36	T	200
	113L	Isopropyl alcohol	50–800 20–50	**1** 2	Pale vermilion	Pale blue	36	T	
	113LL	Isopropyl alcohol	200–460 20–200	1 **2**	Pale vermilion	Pale blue	24	T	
Isopropyl amine $(CH_3)_2CHNH_2$	**180**	Amines	5.5–110	1	Pink	Pale yellowish orange	36	TH	2
	180L	Amines	0.45–9	1	Pink	Pale yellowish orange	36	T	
Isopropyl ether $[(CH_3)_2(CH)]_2O$	**141L**	Ethyl acetate	17.6–704	2	Yellow	Blackish brown	24	T	20
	161	Ethyl ether	0.018–0.45 %	2	Yellowish brown	Greenish brown	36	T	
Isopropyl mercaptan $(CH_3)_2CHSH$	**70**	Mercaptans	10–240	1	White	Yellow	36	T	
Isovaleric acid $(CH_3)_2CHCH_2CO_2H$	**81**	Acetic acid	2–50	1	Pink	Yellow	36	H	
	81L	Acetic acid	0.38–15	1	Pink	Pale yellow	24*	T	
L									
LPG (Liquified petroleum gas)	**100A**	LPG	0.02–0.8 %	1	Yellowish brown	Greenish brown	36		
M									
Maleic anhydride $C_4H_2O_3$	**81**	Acetic acid	0.8–20	1	Pink	Yellow	36	H	0.01 mg/m^3 (IFV)

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Mercaptans R·SH	**70**	Mercaptans	5–120 0.5–5	**1** 2–10	White	Yellow	36	T	
	70L	Mercaptans	4.0–8.0 0.5–4.0 0.2–0.5 0.1–0.2	1/2 **1** 2 4	Yellow	Red	24		
	70LN	Mercaptans	4.0–8.0 0.5–4.0 0.2–0.5 0.1–0.2	1/2 **1** 2 4	Yellow	Pink	24*		
2-Mercaptoethanol $HSCH_2CH_2OH$	**75L**	tert-Butyl mercaptan	0.5–7.5	1	Yellow	Pink	24*	T	
Mercury vapour Hg	**40**	Mercury vapour	6–13.2 mg/m^3 0.25–6 mg/m^3 0.05–0.25 mg/m^3	1/2 **1** 5	White	Pale orange	36		0.025 mg/m^3
Mesityl oxide $(CH_3)_2C:CHCOCH_3$	**141L**	Ethyl acetate	72–1080	2	Yellow	Blackish brown	24	T	1
Methacrylic acid $CH_2:C(CH_3)COOH$	**81**	Acetic acid	1.8–45	1	Pink	Yellow	36	H	20
	81L	Acetic acid	0.35–14	1	Pink	Pale yellow	24*	T	
Methacrylonitrile $CH_2:C(CH_3)CN$	**192**	Methacrylonitrile	10–32 0.5–10 0.2–0.5	1 **2** 4	Yellow	Red	36	+	1
Metaldehyde $(CH_3CHO)n$	**91L**	Formaldehyde	0.065–3.25	3	Yellow	Reddish brown	36*	T	
Methanethiol	See Methyl mercaptan (p. 29)								
Methanol CH_3OH	**111**	Methanol	1.5–6.0 % 0.02–1.5 % 0.007–0.02 % 0.002–0.007 %	1/2 **1** 2 4	Pale vermilion	Pale blue	36	T	200
	111L	Methanol	40–1000 20–40	**1** 2	Pale vermilion	Pale blue	36	T	
	111LL	Methanol	20–62 2–20	2 **4**	Pale yellow	Pale bluish green	24	T	
2-Methoxyethyl acetate	See Ethylene glycol monomethyl ether acetate (p. 22)								
1-Methoxy-2-propanol $CH_3OCH_2CH(OH)CH_3$	**113LL**	Isopropyl alcohol	26–260	2	Pale vermilion	Pale blue	24	T	50
Methyl alcohol	See Methanol (p. 27)								
Methyl acrylate $CH_2:CHCO_2CH_3$	**141L**	Ethyl acetate	7.2–288	2	Yellow	Blackish brown	24	T	2
2-Methyl allyl chloride $CH_2:C(CH_3)CH_2Cl$	**131La**	Vinyl chloride	2.8–55	1	Yellow	Reddish brown	24*	+	
Methylamine CH_3NH_2	**180**	Amines	5–100	1	Pink	Pale brown to Yellow	36	TH	5
	180L	Amines	0.5–10	1	Pink	Pale yellowish orange	36	T	
N-Methyl aniline $C_6H_5NHCH_3$	**181**	Aniline	3.5–42	2	Pale yellow	Pale green	36		0.5
Methyl bromide CH_3Br	**136H**	Methyl bromide	300–600 20–300 10–20	1/2 **1** 2	White	Yellow	36	+	1
	136L	Methyl bromide	100–200 10–100 2.5–10	1/2 **1** 4	White	Yellow	27	+	
	136LA	Methyl bromide	18–36 1–18	1 **2**	White	Yellow	36	+	
	136LL	Methyl bromide	1.2–3.0 0.1–1.2	1 **2**	White	Pale purple	24	+T	
2-Methyl-3-butenenitrile $CH_2:CHCH(CH_3)CN$	**191L**	Acrylonitrile	0.4–12	2	Yellow	Pink	36	+	
Methyl tert-butyl ether $CH_3OC(CH_3)_3$	**166**	Methyl tert-butyl ether	200–660 10–200	1 **2**	Yellow	Pale blue	24	T	50

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Methyl chloride CH_3Cl	**51**	Fluorochlorocarbons (Pyrotec tube)	12–480	1	Yellow	Reddish purple	36	+P	50
	51L	Fluorochlorocarbons (Pyrotec tube)	32–86.4 1.6–32	1 2	Yellow	Reddish purple	36	+P	
Methyl chloroform	See 1,1,1-Trichloroethane (p. 34)								
Methyl chloroformate $ClCO_2CH_3$	**131La**	Vinyl chloride	58–1160	5	Yellow	Reddish brown	24*	+	
Methylcyclohexane $C_6H_{11}CH_3$	**102H**	Hexane	0.04–0.84 %	1	Yellowish brown	Greenish brown	36		100
Methylcyclohexanol $CH_3C_6H_{10}OH$	**119**	Methylcyclohexanol	5–100	2	Yellow	Pale blue	24	T	50
Methylcyclohexanone $C_7H_{12}O$	**155**	Methylcyclohexanone	50–80 2–50	2 **3**	Pale yellow	Yellow	24*	T	20
Methylene chloride CH_2Cl_2	**138**	Methylene chloride	50–500 30–50	**1** 2	White	Pale pink	36	+T	50
	138L	Methylene chloride	60–150 10–60 4–10	1 **2** 4	White	Pale pink	24	+T	
	51L	Fluorochlorocarbons (Pyrotec tube)	20–54 1–20	1 2	Yellow	Reddish purple	36	+P	
Methylene iodide CH_2I_2	**121L**	Benzene	0.22–22	5	White	Dark green	36	+	
Methyl ether CH_3OCH_3	**161**	Ethyl ether	0.034–0.85 %	1	Yellowish brown	Greenish brown	36	T	
Methyl ethyl ketone $CH_3COC_2H_5$	**152**	Methyl ethyl ketone	0.02–0.6 %	2	Yellowish brown	Greenish brown	36	T	75
	152L	Methyl ethyl ketone	120–384 10–120	1/2 **1**	Yellow	Reddish purple	24*	+T	
	151L	Acetone	21–1680	5	Yellow	Red	24*	T	
Methyl hydrazine H_2NNHCH_3	**185**	Hydrazine	0.6–12	5	Pink	Yellow	36	TH	0.01
Methyl iodide CH_3I	**230H**	Methyl iodide	15000–34800 6000–15000 100–6000	1/2 1 **2**	White	Dark brown	24	T	2
	230	Methyl iodide	46–108 20–46 1–20 0.5–1	1/2 1 **2** 4	White	Gray	24*	T	
	121L	Benzene	0.32–32	5	White	Dark green	36	+	
Methyl isobutyl ketone $(CH_3)_2CHCH_2COCH_3$	**153**	Methyl isobutyl ketone	0.05–0.6 %	2	Orange	Greenish brown	36	T	20
	153L	Methyl isobutyl ketone	50–130 2.5–50	1/2 **1**	Pale yellow	Pale blue	12	T	
Methyl isopropyl ketone $C_5H_{10}O$	**142L**	Butyl acetate	18–300	2	Yellow	Blackish brown (Pale blue after few minutes)	24	T	20
Methyl isothiocyanate CH_3NCS	**166**	Methyl tert-butyl ether	88.3–1766 39.8–796	1/2 1	Yellow	Pale blue	24	T	
	141L	Ethyl acetate	5.4–216	2	Yellow	Blackish brown	24	T	
	234L	Methyl isothiocyanate	10–25 0.3–10 0.07–0.3	1/2 **1** 2	Pink	Yellow	24	+T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Methyl mercaptan CH_3SH	**71H**	Methyl mercaptan	1000–2700 50–1000 20–50	1/2 **1** 2	White	Yellow	36		0.5
	71	Methyl mercaptan	70–140 2.5–70 0.25–2.5	1/2 **1** 2–10	White	Yellow	36	T	
	70	Mercaptans	3.5–84 0.35–3.5	1 2–10	White	Yellow	36	T	
	70L	Mercaptans	4–8 0.5–4 0.2–0.5 0.1–0.2	1/2 1 2 4	Yellow	Red	24		
	70LN	Mercaptans	4–8 0.5–4 0.2–0.5 0.1–0.2	1/2 1 2 4	Yellow	Pink	24*		
Methyl methacrylate $CH_2{:}C(CH_3)CO_2CH_3$	**149**	Methyl methacrylate	200–500 10–200	1 **2**	Yellow	Pale blue	24	T	50
N-Methyl morpholine $CH_3N(C_2H_4)_2O$	**180**	Amines	5–100	1	Pink	Yellow	36	TH	
	180L	Amines	0.3–6	1	Pink	Pale yellowish orange	36	T	
4-Methyl pyridine C_6H_7N	**182**	Pyridine	0.38–10.5	1	Pink	Yellow	36	T	
N-Methyl pyrrolidone C_5H_9NO	**180**	Amines	30–270	1	Pink	White	36	TH	
Monochlorobenzene	See Chlorobenzene (p. 17)								
Morpholine $NH(C_2H_4)O$	**180**	Amines	9–180	1	Pink	Yellow	36	TH	20
	180L	Amines	0.5–10	1	Pink	Pale yellowish orange	36	T	
N									
Naphthalene $C_{10}H_8$	**60**	Phenol	0.5–14	2	Pale yellow	Gray	24*	T	10
Nitric acid HNO_3	**15L**	Nitric acid	20–40 1–20 0.1–1	1/2 **1** 2–10	Yellow	Reddish purple	36	H	2
	80	Acid gases	5–100	2	Pale bluish purple	Pale reddish purple	24		
Nitroethane $CH_3CH_2NO_2$	**52**	Nitro compounds (Pyrotec tube)	4–240	1	White	Yellowish orange	36	P	100
Nitrogen dioxide NO_2	**9L**	Nitrogen dioxide	30–125 0.5–30	1 **2**	White	Yellowish orange	36		0.2
	10	Nitrogen oxides (NO & NO2) (Separate quantification)	2.5–200	1	White	Yellowish orange	36	+	
	80	Acid gases	0.2–4	2	Pale bluish purple	Pinkish grey	24		
	52	Nitrogen compounds (Pyrotec tube)	0.5–30	1	White	Yellowish orange	36	P	
Nitrogen oxide NO	**10**	Nitrogen oxides (NO & NO2) (Separate quantification)	5–200 2.5–5	**1** 2	White	Yellowish orange	36	+T	25
Nitrogen oxides $NO+NO_2$	**11HA**	Nitrogen oxides (NO+NO2) (Total quantification)	50–2500	1	White	Green	24		NO: 25 NO_2: 0.2
	11S	Nitrogen oxides (NO+NO2) (Total quantification)	250–625 10–250 5–10	1/2 **1** 2	White	Pale green	24		
	11L	Nitrogen oxides (NO+NO2) (Total quantification)	5.0–14 0.2–5.0 0.06–0.2 0.03–0.06	1 **2** 4 8	White	Yellowish orange	36		

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Nitromethane CH_3NO_2	**52**	Nitro compounds (Pyrotec tube)	5–300	1	White	Yellowish orange	36	P	20
1-Nitropropane $CH_3CH_2CH_2NO_2$	**52**	Nitro compounds (Pyrotec tube)	4.2–252	1	White	Yellowish orange	36	P	25
2-Nitropropane $(CH_3)_2CHNO_2$	**52**	Nitro compounds (Pyrotec tube)	3.7–222	1	White	Yellowish orange	36	P	10
Nitrotrichloromethane	See Chloropicrin (p. 18)								
Nonane $CH_3(CH_2)_7CH_3$	**105**	Hydrocarbons (Higher class)	260–3900 130–260	1 2	White	Blackish brown	36		200
O									
Octane $CH_3(CH_2)_6CH_3$	**101**	Gasoline (Petrol)	0.036–0.72 %	1	Yellowish brown	Greenish brown	36		300
	105	Hydrocarbons(Higher class)	200–3000 100–200	1 2	White	Blackish brown	36		
Oxygen O_2	**31B**	Oxygen	6–24 % 3–6 %	**1/2** 1	Black	White	36	⊕	
Ozone O_3	**18M**	Ozone	200–400 20–200 4–20	1/2 **1** 2–5	Orange	Pale yellow	36		0.05–0.20, by workload (see below)
	18L	Ozone	3–6 0.6–3 0.05–0.6 0.025–0.05	1/2 1 **5** 10	Blue	White	36		
TLV for ozone (ppm) by workload: heavy work 0.05, moderate work 0.08, light work 0.10, any workload for 2 hours or less 0.20.									
P									
Pentachloroethane Cl_2CHCCl_3	**133L**	Tetrachloroethylene	40–500	1	Yellow	Pink	30*	T	
1,3-Pentadiene $CH_3CH{:}CHCH{:}CH_2$	**174**	1,3-Butadiene	250–4000	1	Pale yellow	White	36	T	
	174L	1,3-Butadiene	42.5–850	4	Pale yellow	White	36		
Pentamethylene-diamine $H_2N(CH_2)_5NH_2$	**180L**	Amines	0.75–15	1	Pink	Grayish purple (Pale yellowish orange at the end of staining)[1]	36	T	
[1] Pale yellowish orange at low concentrations.									
n-Pentane $CH_3(CH_2)_3CH_3$	**103**	Hydrocarbons (Lower class)	0.9–1.8 % 0.075–0.9 % 0.0375–0.075 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	1000
	104	Butane	30–1680	1	Yellowish brown	Greenish brown	36		
2-Pentenenitrile $CH_3CH_2CH{:}CHCN$	**193**	2-Pentenenitrile	6–15 0.5–6	2 **4**	Yellow	Red	36	+T	
	191L	Acrylonitrile	0.24–7.2	2	Yellow	Pink	36	+	
3-Pentenenitrile $CH_3CH{:}CHCH_2CN$	**191L**	Acrylonitrile	0.4–12	2	Yellow	Pink	36	+	
Pentyl acetate	See Amyl acetate (p. 14)								
Perchloroethylene	See Tetrachloroethylene (p. 33)								
Petroleum benzine	**106**	Petroleum naphtha	14–28 mg/L 1–14 mg/L 0.5–1 mg/L	1/2 1 2	Yellowish brown	Greenish brown	36		
Petroleum distillates	See Gasoline (Petrol) (p. 23)								
Petroleum ether	**106**	Petroleum naphtha	14–28 mg/L 1–14 mg/L 0.5–1 mg/L	1/2 1 2	Yellowish brown	Greenish brown	36		
Petroleum naphtha	**106**	Petroleum naphtha	14–28 mg/L 1–14 mg/L 0.5–1 mg/L	1/2 **1** 2	Yellowish brown	Greenish brown	36		

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Phenol C_6H_5OH	**60**	Phenol	70–183 25–70 1–25 0.12–1	1/2 1 **2** 4	Pale yellow	Gray	24*	T	5
Phenylethylene	See Styrene (p. 32)								
Phosgene $COCl_2$	**16**	Phosgene	5.0–20 0.1–5.0 0.05–0.1	1 **5** 10	White	Yellow	18*	T	C 0.02
Phosphine PH_3	**7H**	Phosphine	2500–5500 200–2500	1/2 **1**	Yellow	Blackish brown	36	T	0.05
	7J	Phosphine	500–1000 25–500 2.5–25	1/2 **1** 2–10	White	Pale yellow	36		
	7	Phosphine	50–100 5–50 2.5–5	1 **2** 4	White	Pale yellow	36		
	7L	Phosphine	0.3–5.0 0.15–0.3	**5** 10	Pale yellow	Purple	36		
	7LA	Phosphine	2.5–9.8 1.5–2.5 0.1–1.5 0.05–0.1	1 3 **5** 10	Yellow	Red	24		
	7LAN	Phosphine	3.8–8.4 2.0–3.8 0.1–2.0 0.06–0.1 0.04–0.06	1/2 1 **2** 3 4	Yellow	Pink	24		
α-Pinene $C_{10}H_{16}$	**121**	Benzene	140–1680	3	White	Dark green	36		20
Propane $CH_3CH_2CH_3$	**103**	Hydrocarbons(Lower class)	1.2–2.4 % 0.1–1.2 % 0.05–0.1 %	1/2 1 2	Yellowish brown	Greenish brown	30	++	
1-Propanethiol	See Propyl mercaptan (p. 32)								
Propionaldehyde CH_3CH_2CHO	**91L**	Formaldehyde	0.76–38	1	Yellow	Reddish brown	36*	T	20
	151L	Acetone	24–1880	2	Yellow	Red	24*	T	
Propionic acid CH_3CH_2COOH	**81**	Acetic acid	3–75	1	Pink	Yellow	36	H	10
	81L	Acetic acid	0.25–10	1	Pink	Pale yellow	24*	T	
Propionitrile CH_3CH_2CN	**191**	Acrylonitrile	50–1200	4	Yellow	Red	36	+T	
Propyl acetate $CH_3CO_2CH_2CH_2CH_3$	**145**	Propyl acetate	20–500	2	Yellow	Blackish brown	24	T	100
Propyl alcohol $CH_3(CH_2)_2OH$	**113**	Isopropyl alcohol	0.04–2.5 %	1	Pale vermilion	Pale blue	36	T	100
	113L	Isopropyl alcohol	130–560	1	Pale vermilion	Pale blue	36	T	
	113LL	Isopropyl alcohol	55–170	2	Pale vermilion	Pale blue	24	T	
Propylamine $CH_3(CH_2)_2NH_2$	**180**	Amines	6–120	1	Pink	Pale yellowish orange	36	TH	
	180L	Amines	0.5–10	1	Pink	Pale yellowish orange	36	T	
n-Propyl bromide $CH_3(CH_2)_2Br$	**136LA**	Methyl bromide	1–18	2	White	Yellow	36	+	0.1
Propylene $CH_3CH{:}CH_2$	**100A**	LPG	0.02–0.8 %	1	Yellowish brown	Greenish brown	36		500
Propylene dichloride $CH_3CHClCH_2Cl$	**131La**	Vinyl chloride	40–800	2	Yellow	Reddish brown	24*	+	10
Propylene imine CH_3CHCH_2NH	**180**	Amines	5.5–110	1	Pink	Yellow	36	TH	0.2
	180L	Amines	0.35–7	1	Pink	Pale yellowish orange	36	T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Propylene oxide CH_3CHCH_2O	**163**	Ethylene oxide	0.065–3.9 %	1	Orange	Green	36		2
	163L	Ethylene oxide	1–100	1	Yellow	Reddish brown	12*	+T	
Propyl mercaptan $CH_3(CH_2)_2SH$	**70**	Mercaptans	22.5–540	1	White	Yellow	36	T	
	70L	Mercaptans	4.8–9.6 0.6–4.8 0.24–0.6 0.12–0.24	1/2 1 2 4	Yellow	Red	24		
	70LN	Mercaptans	1–25	1	Yellow	Pink	24*		
Pyridine C_5H_5N	**182**	Pyridine	14–36.4 0.5–14 0.2–0.5	1/2 **1** 2	Pink	Yellow	36	T	1
S									
Stoddard solvent	**128**	Stoddard solvent	50–8000 mg/m^3	1	White	Brown (ring)	36		100
Styrene $C_6H_5CH{:}CH_2$	**124**	Styrene	500–1500 20–500 10–20	1/2 **1** 2	White	Yellow	36		10
	124L	Styrene	25–100 2–25	1 **4**	White	Yellow	36		
	153	Methyl isobutyl ketone	0.15–2.3 %	2	Orange	Greenish brown	36	T	
Sulphur dioxide SO_2	**5H**	Sulphur dioxide	4–8 % 0.5–4 % 0.05–0.5 %	1/2 **1** 2–10	Orange	Green	36		STEL 0.25
	5M	Sulphur dioxide	1800–3600 100–1800 20–100	1/2 **1** 4	Purple	Yellow	36	T	
	5L	Sulphur dioxide	100–200 5–100 2.5–5 1.25–2.5	1/2 **1** 2 4	Blue	Yellow	36		
	5La	Sulphur dioxide	30–60 2–30 1–2 0.5–1	1 **2** 4 8	Blue	Yellow	36		
	5LC	Sulphur dioxide	10–22 0.25–10 0.1–0.25	1 **2** 4	Bluish purple	White	36	T	
	5Lb	Sulphur dioxide	5–10 0.2–5 0.1–0.2 0.05–0.1	1 **2** 4 8	Yellowish green	Yellow	36		
	45S	Hydrogen sulphide, Sulphur dioxide (Separate quantification)	SO_2: 10–20 0.5–10 0.25–0.5	1/2 **1** 2	Yellowish green	Yellow	36	+	
	80	Acid gases	1.5–30	2	Pale bluish purple	Yellow	24		
Sulphur dioxide + Hydrogen sulphide (Total Quantification) SO_2+H_2S	**45H**	Hydrogen sulphide + Sulphur dioxide	4.0–8.0 % 0.2–4.0 % 0.02–0.2 %	1/2 **1** 2–10	Brown	Pale yellow	36		
Sulphuric acid H_2SO_4	**35**	Sulphuric acid	0.5–5.0 mg/m^3	5	Pale yellow	Reddish purple	24	T	0.2 mg/m^3 (T)
Sulphuryl fluoride	See Sulphuryl fluoride measurement system (p. 42)								
T									
1,1,2,2-Tetrabromoethane $Br_2CHCHBr_2$	**135L**	1,1,1-Trichloroethane (Methyl chloroform)	0.92–9.2	4	White	Pale Pink	27	+T	0.1

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
1,1,2,2-Tetrachloro-1,2-difluoroethane (R112) CCl_2FCCl_2F	**51H**	Fluorochlorocarbons (Pyrotec tube)	1000–3000 125–1000	1/2 1	White	Reddish orange	36	+P	50
	51	Fluorochlorocarbons (Pyrotec tube)	7–280	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	20–54 1–20	1 2	Yellow	Reddish purple	36	+P	
1,1,2,2-Tetrachloroethane $Cl_2CHCHCl_2$	**131L**	Vinyl chloride	2–30	2	Yellow	Reddish brown	30*	+T	1
Tetrachloroethylene $Cl_2C{:}CCl_2$	**133HA**	Tetrachloroethylene	300–900 20–300 7.4–20	1/2 **1** 2	Yellow	Reddish purple	30*	T	25
	133M	Tetrachloroethylene	100–220 5–100 2–5	1/2 **1** 2	Yellow	Reddish purple	30*	T	
	133L	Tetrachloroethylene	25–75 2–25 1–2	1/2 **1** 2	Yellow	Pink	30*	T	
	133LL	Tetrachloroethylene	3.0–6.6 0.2–3.0 0.1–0.2	1/2 **1** 2	Yellow	Purple	24*	T	
	132HH	Trichloroethylene	0.075–1.5 %	1	White	Yellowish brown	36	T	
Tetrachloromethane	See Carbon tetrachloride (p. 17)								
Tetrahydrofuran C_4H_8O	**159**	Tetrahydrofuran	50–800 25–50	**1** 2	Pale vermilion	Pale blue	36	T	50
	159L	Tetrahydrofuran	80–232 5–80	1/2 **1**	Pale yellow	Pale blue	12*	T	
	161	Ethyl ether	0.056–1.4 %	1	Yellowish brown	Greenish brown	36	T	
Tetrahydrothiophene C_4H_8S	**76H**	Tetrahydrothiophene	10–200	1	Pink	Pale yellow	24	+T	
	76	Tetrahydrothiophene	1–10	4	Pink	Pale yellow	24	+T	
	76M	Tetrahydrothiophene	10–100 mg/m^3	2	Pink	Pale yellow	24	+T	
Tetramethylenediamine $H_2N(CH_2)_4NH_2$	**180**	Amines	8.5–170	1	Pink	Purple to yellow	36	TH	
	180L	Amines	0.8–16	1	Pink	Grayish purple (Pale yellowish orange at the end of staining)[1]	36	T	
[1] Pale yellowish orange at low concentrations.									
Thionyl chloride $SOCl_2$	**5La**	Sulphur dioxide	1.44–21.6	2	Blue	Yellow	36		C 0.2
Toluene $C_6H_5CH_3$	**122**	Toluene	300–600 10–300 4–10	1/2 **1** 2	White	Brown	36		20
	122L	Toluene	50–100 2–50 0.82–2	1 **2** 4	White	Brown	36		
	161	Ethyl ether	0.02–0.8 %	1	Yellowish brown	Greenish brown	36	T	
Toluol	See Toluene (p. 33)								
o-Toluidine $C_6H_4(CH_3)(NH_2)$	**181**	Aniline	5–60	2	Pale yellow	Pale green	36		2
Trichloroacetic acid CCl_3COOH	**15L**	Nitric acid	1–37	1	Yellow	Reddish purple	36	H	0.5
1,2,4-Trichlorobenzene $C_6H_3Cl_3$	**131La**	Vinyl chloride	0.65–13	4	Yellow	Reddish brown	24*	+	C 5

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
1,1,1-Trichloroethane (Methyl chloroform) CH_3CCl_3	**135**	1,1,1-Trichloroethane (Methyl chloroform)	500–2000 100–500	1/2 **1**	White	Reddish orange	36	+T	350
	135L	1,1,1-Trichloroethane (Methyl chloroform)	200–900 20–200 6–20	1/2 **1** 2	White	Pale pink	27	+T	
	171	Acetylene	0.06–1.2 %	1	White	Brown	36	T	
1,1,2-Trichloroethane Cl_2CHCH_2Cl	**135**	1,1,1-Trichloroethane (Methyl chloroform)	220–750	2	White	Reddish orange	36	+T	10
Trichloroethylene $Cl_2C{:}CHCl$	**132HH**	Trichloroethylene	1–2.5 % 0.05–1 %	1/2 **1**	White	Yellowish brown	36	T	10
	132HA	Trichloroethylene	500–1300 50–500 20–50	1/2 **1** 2	Yellow	Reddish purple	24*	T	
	132M	Trichloroethylene	100–270 5–100 2–5	1/2 **1** 2	Yellow	Reddish purple	30*	T	
	132L	Trichloroethylene	25–90 2–25 0.8–2	1/2 **1** 2	Yellow	Purple	30*	T	
	132LL	Trichloroethylene	4.0–8.8 0.25–4.0 0.125–0.25	1/2 **1** 2	Yellow	Purple	24*	T	
Trichlorofluoromethane (R11) CCl_3F	**51H**	Fluorochlorocarbons (Pyrotec tube)	2200–6600 275–2200	1/2 1	White	Reddish orange	36	+P	C 1000
	51	Fluorochlorocarbons (Pyrotec tube)	8–320	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	16–43.2 0.8–16	1 2	Yellow	Reddish purple	36	+P	
Trichloromethane	See Chloroform (p. 18)								
Trichloronitromethane	See Chloropicrin (p. 18)								
1,2,3-Trichloropropane $CH_2ClCHClCH_2Cl$	**135L**	1,1,1-Trichloroethane (Methyl chloroform)	36–360	4	White	Pale pink	27	+T	0.005
1,1,2-Trichloro-1,2,2-trifluoroethane (R113) $CClF_2CCl_2F$	**51H**	Fluorochlorocarbons (Pyrotec tube)	2000–6000 250–2000	1/2 **1**	White	Reddish orange	36	+P	1000
	51	Fluorochlorocarbons (Pyrotec tube)	10–400	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	20–54 1–20	1 **2**	Yellow	Reddish purple	36	+P	
1,1,1-Trichloro-2,2,2-trifluoroethane (R113a) CCl_3CF_3	**51H**	Fluorochlorocarbons (Pyrotec tube)	1600–4800 200–1600	1/2 1	White	Reddish orange	36	+P	
	51	Fluorochlorocarbons (Pyrotec tube)	10–400	1	Yellow	Reddish purple	36	+P	
	51L	Fluorochlorocarbons (Pyrotec tube)	16–43.2 0.8–16	1 2	Yellow	Reddish purple	36	+P	
Triethylamine $(C_2H_5)_3N$	**180**	Amines	4.5–90	1	Pink	Yellow	36	TH	0.5
	180L	Amines	0.3–6	1	Pink	Pale yellowish orange	36	T	
Trimethylamine $(CH_3)_3N$	**3M**	Ammonia	25–250	1	Purple	Yellow	36		5
	180	Amines	3.5–70	1	Pink	Yellow	36	TH	
	180L	Amines	0.25–5	1	Pink	Pale yellowish orange	36	T	
Trimethyl benzene $C_6H_3(CH_3)_3N$	**123**	Xylene	10–300	2	White	Brown	36		10
V									
Valeric acid $CH_3(CH_2)_3COOH$	**81L**	Acetic acid	0.38–15	1	Pink	Pale yellow	24*	T	

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change Original	 Stain	Shelf life (months)	Notes	TLV (ppm)
Vinyl acetate $CH_3CO_2CH:CH_2$	**143**	Vinyl acetate	100–250 10–100 5–10	1 **2** 4	White	Brown	36	+	10
	141	Ethyl acetate	0.06–0.9 %	1	Yellowish brown	Greenish brown	36	T	
Vinyl benzene	See Styrene (p. 32)								
Vinyl chloride $CH_2:CHCl$	**131**	Vinyl chloride	1–2 % 0.05–1 % 0.025–0.05 %	1/2 **1** 2	Yellowish brown	Greenish brown	36		1
	131LB	Vinyl chloride	20–70 1–20 0.4–1	1 **2** 4	Yellow	Purple	24*	T	
	131La	Vinyl chloride	20–54 1–20 0.5–1 0.25–0.5	1/2 **1** 2 4	Yellow	Reddish brown	24*	+	
	131L	Vinyl chloride	3–6.9 0.2–3 0.1–0.2	1 **2** 4	Yellow	Reddish brown	30*	+T	
Vinyl cyanide	See Acrylonitrile (p. 14)								
Vinylidene chloride $CH_2:CCl_2$	**130L**	Vinylidene chloride	14–40.6 1–14 0.4–1	1/2 **1** 2	Yellow	Reddish brown	24*	+	5
Vinyl trimethoxysilane $CH_2:CHSi(OCH_3)_3$	**113L**	Isopropyl alcohol	6.5–25.0	2	Pale vermilion	Pale blue	36	T	
W									
Water vapour H_2O	**6**	Water vapour	18–32 mg/L 1–18 mg/L 0.5–1 mg/L	1/2 **1** 2	Yellowish green	Purple	36	T	
	6L	Water vapour	1–2 mg/L 0.05–1 mg/L	1/2 **1**	Yellow	Purple	36		
	6LP	Pipeline Dew Point Tube	40–100 lb/MMCF 3–40 lb/MMCF	1/2 **1**	Yellow	[4] Greenish purple	36	T	
	6LLP	Pipeline Dew Point Tube	2–10 lb/MMCF	2	Yellow	Green	36	T	
[4] May turn purple at high humidity.									
X									
Xylene $C_6H_4(CH_3)_2$	**123**	Xylene	250–900 10–250 4–10	1/2 **1** 2	White	Brown	36		20
	123L	Xylene	100–220 2–100	1 **2**	White	Brown	36		
	100A	LPG	0.1–1.2 %	2	Yellowish brown	Greenish brown	36		
	122L	Toluene	100–200 4–100 2–4	1 2 4	White	Brown	36		

CHAPTER 5

Passive Dosi-tubes

Dosi-tubes are passive detector tubes: they need no pump and give the time-weighted average concentration over the sampling time. Read the tube at the end of the sampling time.

Shaded row: the tube is read with a correction factor or chart. Notes: T temperature correction, H humidity correction. * Refrigerated storage. Details: “Symbols and notes” (p. 6).

Table 5-1 Passive Dosi-tubes

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Sampling time (h)	Colour change		Shelf life (months)	Notes	TLV (ppm)
					Original	Stain			
A									
Acetaldehyde CH_3CHO	**91D**	Formaldehyde	0.1–20	1–10	Yellow	Reddish brown	12*		C 25
	151D	Acetone	4–1200	1–10	Yellow	Reddish brown	24*	T	
	152D	Methyl ethyl ketone	1.2–360	1–10	Yellow	Reddish brown	24*	T	
Acetic acid CH_3CO_2H	**81D**	Acetic acid	0.5–100	1–10	Purple	Yellow	36	T	10
Acetic anhydride $(CH_3CO)_2O$	**81D**	Acetic acid	0.3–60	1–10	Purple	Yellow	36	T	1
Acetone CH_3COCH_3	**151D**	Acetone	5–1500	1–10	Yellow	Reddish brown	24*	T	250
	152D	Methyl ethyl ketone	1.4–420	1–10	Yellow	Reddish brown	24*	T	
Ammonia NH_3	**3D**	Ammonia	2.5–1000	0.5–10	Purple	Yellow	36	T	25
	3DL	Ammonia	0.1–10	1–10	Pink	Yellow	24	TH	
B									
Benzene C_6H_6	**122DL**	Toluene	2.4–600	1–10	White	Brown	24		0.02
1,3-Butadiene $CH_2{:}CHCH{:}CH_2$	**174D**	1,3-Butadiene	1.3–200	1–8	Reddish purple	Pale brown	30	T	2
C									
Carbon dioxide CO_2	**2D**	Carbon dioxide	0.02–12 %	0.5–10	Pale vermilion	Yellow	30	T	5000
Carbon monoxide CO	**1D**	Carbon monoxide	1.04–2000	0.5–48	Pale yellow	Brown	24		25
	1DL	Carbon monoxide	0.4–400	0.5–24	Pale yellow	Brown	24*		
Chlorine Cl_2	**8D**	Chlorine	0.08–100	0.5–24	White	Yellow	24		0.1
	132D	Trichloroethylene	2.4–240	1–8	Yellow	Purple	15*	T	
Cumene $C_6H_5CH(CH_3)_2$	**122DL**	Toluene	3.4–850	1–10	White	Brown	24		5
D									
trans-1,2-Dichloroethylene ClCH:CHCl	**174D**	1,3-Butadiene	3.8–600	1–8	Reddish purple	Pale brown	30	T	200
1,2-Dichloroethylene ClCH:CHCl	**132D**	Trichloroethylene	6–600	1–8	Yellow	Purple	15*	T	200
Dimethylamine $(CH_3)_2NH$	**3D**	Ammonia	1.9–750	0.5–10	Purple	Yellow	36	T	5
	3DL	Ammonia	0.29–29	1–10	Pink	Yellow	24	TH	
N,N-Dimethylethylamine $C_2H_5N(CH_3)_2$	**3D**	Ammonia	4–1600	0.5–10	Purple	Yellow	36	T	
E									
Ethanol C_2H_5OH	**112D**	Ethanol	100–25000	1–10	Yellow	Brown	36		STEL 1000

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Sampling time (h)	Colour change		Shelf life (months)	Notes	TLV (ppm)
					Original	Stain			
Ethyl benzene $C_6H_5C_2H_5$	**122DL**	Toluene	2.8–700	1–10	White	Brown	24		20
Ethylene CH_2:CH_2	**174D**	1,3-Butadiene	1.5–240	1–8	Reddish purple	Pale brown	30	T	200
F									
Formaldehyde HCHO	**91D**	Formaldehyde	0.1–20	1–10	Yellow	Reddish brown	12*		0.1
Formic acid HCO_2H	**81D**	Acetic acid	0.55–110	1–10	Purple	Yellow	36	T	5
Furfural $C_5H_4O_2$	**91D**	Formaldehyde	0.3–60	1–10	Yellow	Reddish brown	12*		0.2
H									
Hydrazine N_2H_4	**3D**	Ammonia	1.6–650	0.5–10	Purple	Yellow	36	T	0.01
Hydrogen chloride HCl	**14D**	Hydrogen chloride	1–100	1–10	Yellow	Purple	36	TH	C 2
	132D	Trichloroethylene	1.8–180	1–8	Yellow	Purple	15*	T	
	17D	Hydrogen fluoride	0.4–40	1–10	Yellow	Purple	36	TH	
Hydrogen cyanide HCN	**12D**	Hydrogen cyanide	1–200	1–10	Yellow	Pink	24		C 4.7
Hydrogen fluoride HF	**17D**	Hydrogen fluoride	1–100	1–10	Yellow	Purple	36	TH	0.5
	14D	Hydrogen chloride	2.5–250	1–10	Yellow	Purple	36	TH	
Hydrogen peroxide H_2O_2	**32D**	Hydrogen peroxide	0.5–40	1–10	White	Yellow	36	T	1
Hydrogen sulphide H_2S	**4D**	Hydrogen sulphide	0.2–200	1–48	White	Brown	36		1
I									
Isoprene CH_2:$C(CH_3)CH$:CH_2	**174D**	1,3-Butadiene	2.5–400	1–8	Reddish purple	Pale brown	30	T	
M									
Methylamine CH_3NH_2	**3DL**	Ammonia	0.19–19	1–10	Pink	Yellow	24	TH	5
Methyl ethyl ketone $CH_3COC_2H_5$	**152D**	Methyl ethyl ketone	2–600	1–10	Yellow	Reddish brown	24*	T	75
	91D	Formaldehyde	0.125–25	1–10	Yellow	Reddish brown	12*		
	151D	Acetone	6.5–1950	1–10	Yellow	Reddish brown	24*	T	
Methyl isobutyl ketone $(CH_3)_2CHCH_2COCH_3$	**151D**	Acetone	11.5–3450	1–10	Yellow	Reddish brown	24*	T	20
	152D	Methyl ethyl ketone	4–1200	1–10	Yellow	Reddish brown	24*	T	
N									
Nitric acid HNO_3	**14D**	Hydrogen chloride	0.8–80	1–10	Yellow	Purple	36	TH	2
	17D	Hydrogen fluoride	0.32–32	1–10	Yellow	Purple	36	TH	
Nitrogen dioxide NO_2	**9D**	Nitrogen dioxide	0.1–30	1–10	White	Yellow	12*	T	0.2
	9DL	Nitrogen dioxide	0.01–3.0	1–24	White	Green	12*		
S									
Styrene C_6H_5CH:CH_2	**122DL**	Toluene	26–6500	1–10	White	Brown	24		10
Sulphur dioxide SO_2	**5DH**	Sulphur dioxide	10–600	1–5	Bluish purple	White	36	T	STEL 0.25
	5D	Sulphur dioxide	0.2–100	1–10	Green	Yellow	36		
T									
Tetrachloroethylene Cl_2C:CCl_2	**133D**	Tetrachloroethylene	3–150	1–8	Yellow	Purple	15*	T	25
	132D	Trichloroethylene	1.5–150	1–8	Yellow	Purple	15*	T	
Toluene $C_6H_5CH_3$	**122DL**	Toluene	2–500	1–10	White	Brown	24		20
Trichloroethylene Cl_2C:CHCl	**132D**	Trichloroethylene	3–300	1–8	Yellow	Purple	15*	T	10

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Sampling time (h)	Colour change		Shelf life (months)	Notes	TLV (ppm)
					Original	Stain			
Triethylamine $(C_2H_5)_3N$	**3D**	Ammonia	5.3–2100	0.5–10	Purple	Yellow	36	T	0.5
Trimethylamine $(CH_3)_3N$	**3DL**	Ammonia	0.23–23	1–10	Pink	Yellow	24	TH	5
V									
Vinyl chloride CH_2:CHCl	**174D**	1,3-Butadiene	1.5–240	1–8	Reddish purple	Pale brown	30	T	1
X									
Xylene $C_6H_4(CH_3)_2$	**122DL**	Toluene	3.4–850	1–10	White	Brown	24		20

Measuring with a Dosi-tube

1. Write the start time of the measurement on an adhesive label (each box of Dosi-tubes contains labels) and stick the label on the tube.
2. Insert the end of the Dosi-tube marked G into the tube holder No. 710 and break off the tube end at the breaking line (A). Remove the broken end from the tube holder.
3. Push the Dosi-tube fully into the tube holder.
4. For personal sampling, attach the tube holder with the Dosi-tube to the shirt collar; for area monitoring, place it at a suitable measuring point in the workplace.
5. When the measurement is finished, write the finish time on the label and work out the actual sampling time: finish time − start time.
6. Work out the time-weighted average concentration (TWA value): TWA value (ppm) = Dosi-tube reading (ppm·h) ÷ actual sampling time (h).

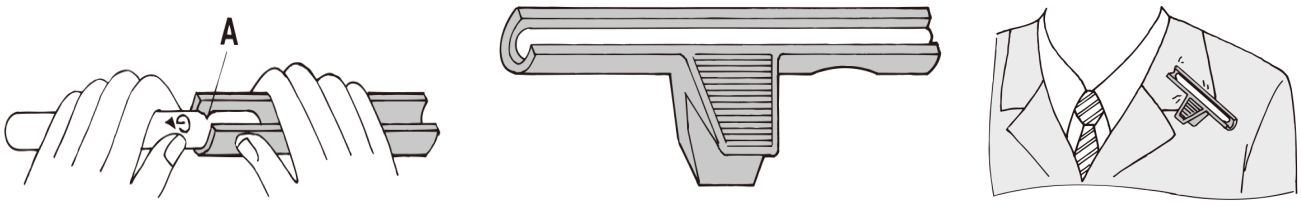


Figure 5-1. Breaking the tube at the breaking line (A) in the tube holder (step 2), the Dosi-tube pushed fully into the tube holder (3) and the tube holder on the shirt collar (4).

CHAPTER 6

Detector tubes for the 30 m extension hose

The 30 m extension hose No. 351A-30 connects to the inlet of the gas sampling pump and lets you take samples remotely, downward, from up to 30 m. Only the detector tubes in this table are approved for use with the tubing.

For twin tubes (Note +), order the extension hose guard rubber No. 358 as well. When the tip of the extension hose needs replacing, order the replacement extension hose guard rubber No. 359. For a tube that is not in the table, ask Analyt-MTC before you measure: see Contacts (p. 60).

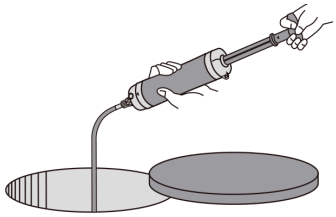


Figure 6-1. Gas sampling pump with the extension hose No. 351A-30, sampling downward.

Note
With the tubing, a tube marked F may need a correction factor, and its measuring range changes when the factor is applied. Follow the instruction manual of the extension hose No. 351A-30.

Notes: T temperature correction, H humidity correction, + twin tubes, ++ nine tests (tubes) per box, F correction factor may apply with the tubing. * Refrigerated storage. [5] Box sufficient for four tests.

Table 6-1 Detector tubes for the 30 m extension hose

Gas or vapour	Formula	Tube No.	Tube name	Measuring range (ppm)	Shelf life (months)	Notes
Acetaldehyde	CH_3CHO	**92M**	Acetaldehyde	2.5–100	24*	F
		92LA	Acetaldehyde	0.3–30	24	T
Acetic acid	CH_3CO_2H	**81L**	Acetic acid	0.125–23	24*	TF
Acetone	CH_3COCH_3	**151L**	Acetone	50–12 000	24*	T
Acrylonitrile	CH_2:CHCN	**191L**	Acrylonitrile	0.1–18	36	+
Ammonia	NH_3	**3M**	Ammonia	7–1000	36	
		3La	Ammonia	2.5–220	36	T
		3L	Ammonia	0.5–78	36	TF
Aromatic hydrocarbons		**120**	Aromatic hydrocarbons	0.4–200	36	F
Arsine	AsH_3	**19LA**	Arsine	0.04–10	27	
Benzene	C_6H_6	**121S**	Benzene	2–312	36	+F
		121	Benzene	2.5–120	36	F
		121SL	Benzene	1–100	36	+F
		121L	Benzene	0.1–65	36	+F
1,3-Butadiene	CH_2:CHCH:CH_2	**174**	1,3-Butadiene	50–800	36	T
		174L	1,3-Butadiene	2.5–100	36	
Butyl acetate	$CH_3CO_2(CH_2)_3CH_3$	**142L**	Butyl acetate	10–300	24	TF
tert-Butyl mercaptan	$(CH_3)_3CSH$	**75N**	tert-Butyl mercaptan	1.25–250 mg/m^3	24	TH
		75LN	tert-Butyl mercaptan	0.5–39 mg/m^3	24*	THF

Gas or vapour	Formula	Tube No.	Tube name	Measuring range (ppm)	Shelf life (months)	Notes
Carbon dioxide	CO_2	**2HH**	Carbon dioxide	2.5–40 %	36	F
		2H	Carbon dioxide	0.5–20 %	36	F
		2L	Carbon dioxide	0.13–6 %	36	
		2LL	Carbon dioxide	300–5000	36	
		2LC	Carbon dioxide	100–4000	24	
Carbon monoxide	CO	**1L**	Carbon monoxide	2.5–2000	36	F
		1LK	Carbon monoxide	5–600	36	
		1LL	Carbon monoxide	5–50	36	F
Chlorine	Cl_2	**8La**	Chlorine	0.1–16	36	
		8LL	Chlorine	0.025–2.0	12*	F
Chloropicrin	Cl_3CNO_2	**134**	Carbon tetrachloride	2.5–60	12*	+F
		134L	Carbon tetrachloride	0.28–5.5	12*	+F
		233	Chloropicrin	0.045–22	12	+F
Cyclohexanol	$C_6H_{11}OH$	**118**	Cyclohexanol	5–100	24	TF
1,2-Dichloroethylene	ClCH:CHCl	**139**	1,2-Dichloroethylene	5–250	30*	T
1,3-Dichloropropene	$ClCH_2CH:CHCl$	**131La**	Vinyl chloride	0.5–10	24*	+F
Dichlorvos	$C_4H_7Cl_2O_4P$	**132LL**	Trichloroethylene	0.11–1.8	24*	TF
Ethanol	C_2H_5OH	**112**	Ethanol	0.01–7.5 %	36	TF
		112L	Ethanol	50–2000	36	TF
Ethyl acetate	$CH_3CO_2C_2H_5$	**141L**	Ethyl acetate	20–800	24	T
Ethylene	$CH_2{:}CH_2$	**172**	Ethylene	25–1680	36	TF
		172L	Ethylene	0.2–100	36	TF
Ethylene dichloride	$ClCH_2CH_2Cl$	**232**	1,2-Dichloroethane	1–39	12*	+TF
Ethylene glycol	$HOCH_2CH_2OH$	**165L**	Ethylene glycol	10–100 mg/m^3	36*	+TF
Ethyl mercaptan	C_2H_5SH	**72**	Ethyl mercaptan	0.5–120	36	TF
		72LN	Ethyl mercaptan	0.15–57.5	24	T
Ethylene oxide	C_2H_4O	**163**	Ethylene oxide	0.05–3.0 %	36	F
		163L	Ethylene oxide	0.4–550	12*	+TF
		163LL	Ethylene oxide	0.1–10	12*	+TF
Ethyl ether	$(C_2H_5)_2O$	**161**	Ethyl ether	0.04–1 %	36	TF
Formaldehyde	HCHO	**91L**	Formaldehyde	0.1–45.0	36*	TF
Gasoline	C_nH_m	**101L**	Gasoline	30–2000	36	F
Hexane	$CH_3(CH_2)_4CH_3$	**102L**	Hexane	3.5–1200	36	F
Hydrocarbons (Higher class)		**105**	Hydrocarbons (Higher class)	100–3000	36	
Hydrocarbons (Lower class)		**103**	Hydrocarbons (Lower class)	0.05–2.4 %	30	++
Hydrogen	H_2	**30**	Hydrogen	0.5–2 %	36	
Hydrogen sulphide	H_2S	**4HH**	Hydrogen sulphide	0.1–4 %	36	
		4H	Hydrogen sulphide	10–4000	36	
		4HM	Hydrogen sulphide	25–1600	36	
		4M	Hydrogen sulphide	12.5–500	36	
		4L	Hydrogen sulphide	1–240	36	
		4LL	Hydrogen sulphide	0.25–120	36	
		4LK	Hydrogen sulphide	1–40	36	
		4LB	Hydrogen sulphide	0.5–12	24	
		4LT	Hydrogen sulphide	0.05–4.0	24*	
Isoamyl alcohol	$(CH_3)_2CHCH_2CH_2OH$	**117**	Isoamyl alcohol	5–300	36	TF
LPG		**100A**	LPG	0.02–0.8 %	36	

Gas or vapour	Formula	Tube No.	Tube name	Measuring range (ppm)	Shelf life (months)	Notes
Mercaptans	R · SH	**70**	Mercaptans	0.5–120	36	T
		70L	Mercaptans	0.1–8.0	24	
		70LN	Mercaptans	0.1–8.0	24*	
Mercury vapour	Hg	**40**	Mercury vapour	0.05–13.2 mg/m^3	36	F
Methanol	CH_3OH	**111**	Methanol	0.002–6.0 %	36	TF
		111L	Methanol	20–1000	36	TF
Methyl bromide	CH_3Br	**136H**	Methyl bromide	10–600	36	+
		136L	Methyl bromide	2.5–200	27	+
		136LA	Methyl bromide	1–36	36	+F
		136LL	Methyl bromide	0.1–3.0	24	+T
Methyl tert-butyl ether	$CH_3OC(CH_3)_3$	**166**	Methyl tert-butyl ether	10–660	24	T
Methyl iodide	CH_3I	**230H**	Methyl iodide	100–34800	24	TF
		230	Methyl iodide	0.5–108	24*	TF
Methyl isothiocyanate	CH_3NCS	**141L**	Ethyl acetate	5.4–216	24	TF
		234L	Methyl isothiocyanate	0.07–25	24	+TF
Nitric acid	HNO_3	**15L**	Nitric acid	0.1–40	36	HF
Nitrogen dioxide	NO_2	**9L**	Nitrogen dioxide	0.5–125	36	F
Nitrogen oxides	$NO+NO_2$	**11L**	Nitrogen oxides	0.03–14	36	F
Petroleum naphtha		**106**	Petroleum naphtha	0.5–28 mg/L	36	
Phenol	C_6H_5OH	**60**	Phenol	0.12–183	24*	TF
Phosphine	PH_3	**7H**	Phosphine	200–5500	36	T
		7J	Phosphine	2.5–1000	36	F
		7	Phosphine	2.5–100	36	
		7L	Phosphine	0.15–5.0	36	
		7LA	Phosphine	0.05–9.8	24	
		7LAN	Phosphine	0.04–8.4	24	F
Styrene	$C_6H_5CH:CH_2$	**124**	Styrene	10–1500	36	F
		124L	Styrene	2–100	36	F
Sulphur dioxide	SO_2	**5La**	Sulphur dioxide	0.5–60	36	
		5LC	Sulphur dioxide	0.1–22	36	T
		5Lb	Sulphur dioxide	0.05–10.0	36	F
Sulphuric acid	H_2SO_4	**35**	Sulphuric acid	0.5–5.0 mg/m^3	24	T
Sulphuryl fluoride	SO_2F_2	**231**	Sulphuryl fluoride	1–20	24	+T [5]
Toluene	$C_6H_5CH_3$	**122**	Toluene	4–600	36	F
		122L	Toluene	0.82–100	36	F
1,1,1-Trichloroethane	CH_3CCl_3	**135**	1,1,1-Trichloroethane	100–2000	36	+T
Vinyl chloride	$CH_2:CHCl$	**131**	Vinyl chloride	0.025–2.0 %	36	F
		131LB	Vinyl chloride	0.4–70	24*	TF
		131La	Vinyl chloride	0.25–54	24*	+
		131L	Vinyl chloride	0.1–6.9	30*	+TF
Water vapour	H_2O	**6L**	Water vapour	0.05–2.0 mg/L	36	
Xylene	$C_6H_4(CH_3)_2$	**123**	Xylene	4–900	36	F
		123L	Xylene	2–220	36	F

CHAPTER 7

Pyrotec systems

Some substances cannot be measured directly with a detector tube. A Pyrotec pyrolyzer breaks them down by heat into a gas that a tube can measure. The pyrolyzer sits between the tubes and the gas sampling pump.

Sulphuryl fluoride: pyrolyzer No. 860

Sulphuryl fluoride is measured with the Pyrotec tube No. 231, the Pyrotec pyrolyzer No. 860 and the GASTEC gas sampling pump. The pyrolyzer converts the sulphuryl fluoride into a gas the tube reacts to. The set-up is the same as for the pyrolyzer No. 840 (Figure 7-1 (p. 42)): connecting tube, pretreatment tube and detector tube on the inlet side, the pump on the outlet side.

Table 7-1 Sulphuryl fluoride: pyrolyzer No. 860

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Pump strokes	Colour change		Shelf life (months)	Notes
					Original	Stain		
Sulphuryl fluoride SO_2F_2	**231**	Sulphuryl fluoride	1–20	3	Bluish purple	White	24	+T[5]

Notes: + twin tubes, T temperature correction. [5] Box sufficient for four tests.

Pyrolyzer No. 840

The Pyrotec pyrolyzer No. 840 breaks down fluorochlorocarbons and other halogenated hydrocarbons by heat. It is used with the Pyrotec tubes below. The substances each tube can measure are in “Detector tubes for the gas sampling pump” (p. 13), marked P in the Notes column.

Table 7-2 Pyrolyzer No. 840

Tube No.	Pyrotec tube	Measuring range (ppm)	Pump strokes	Colour change		Shelf life (months)	Notes
				Original	Stain		
51H	Fluorochlorocarbons	2000–6000 250–2000	1/2 **1**	White	Reddish orange	36	+
51	Fluorochlorocarbons	10–400	1	Yellow	Reddish purple	36	+
51L	Fluorochlorocarbons	20–54 1–20	1 **2**	Yellow	Reddish purple	36	+
52	Nitro compounds	0.5–30	1	White	Yellowish orange	36	
53	Dimethyl sulphide	0.5–10 0.15–0.5	**3** 5	Bluish purple	White	24	+T

Bold: standard number of pump strokes. Notes: + twin tubes, T temperature correction.

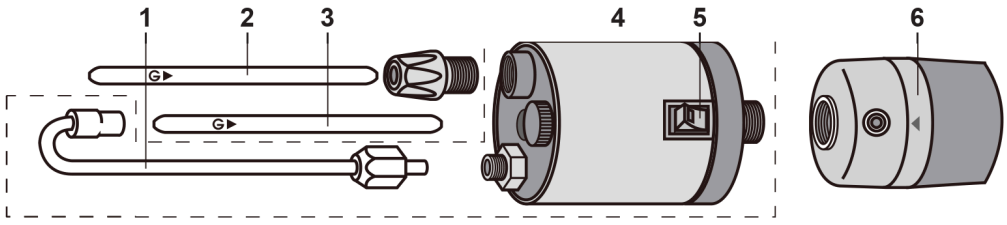


Figure 7-1. Pyrotec set-up with the pyrolyzer No. 840: 1 connecting tube, 2 pretreatment tube, 3 detector tube, 4 Pyrotec pyrolyzer, 5 on-off switch, 6 gas sampling pump.

CHAPTER 8

Polytec tubes for qualitative analysis

Polytec tubes tell you which substances are present when you do not know what is in the air. Each tube has one to eight reaction layers; after sampling, the colour of each layer shows whether its substance group is present.

Polytec tubes are used with the GASTEC gas sampling pump GV-100; if you have the pump, you only need the tubes. Draw the sample with the number of pump strokes in the table, wait for the sampling time, and compare the colours of the layers with the instruction sheet that comes with each tube. There are six types.

Table 8-1 Polytec tubes for qualitative analysis

Substances indicated	Tube No.	Tube name	Pump strokes	Shelf life (months)
NH_3, SO_2, H_2S, CO, NO_2, R·SH	**25**	Polytec tube-II	1	24
NH_3, H_2S, C_nH_m	**26**	Polytec tube-III	1	24
NH_3, HCl, H_2S, SO_2, NO_2, CO, CO_2	**27**	Polytec tube-IV	1	18
HCl, $COCl_2$, SO_2, NO_2, H_2S, HCN, CO, CO_2	**28**	Polytec tube-V	1	18
Unknown gases	**107**	Polytec tube-I	3	36
Kerosene, gasoline	**108**	Qualitative analysis tube for fire investigation	1	36

Polytec tubes indicate which substances are present; they do not measure concentrations.

Reaction layers of the Polytec tubes IV and V

Table 8-2 Polytec tube-IV, No. 27

Layer	Colour change	Substances
1	Purple → Yellow	Ammonia, diethylamine
2	Yellow → Red	Hydrogen chloride
3	White → Brown	Hydrogen sulphide
4	Blue → Yellow, purple	Chlorine, sulphur dioxide, nitrogen dioxide
5	White → Yellow, yellowish orange	Chlorine, nitrogen dioxide
6	Yellow → Blackish brown, grey, yellowish orange	Hydrogen sulphide, carbon monoxide, hydrogen, phosphine, acetylene, ethylene, propylene, methyl mercaptan
7	Blue → Brown	Carbon dioxide

Table 8-3 Polytec tube-V, No. 28

Layer	Colour change	Substances
1	Pale yellow → Red	Hydrogen chloride
2	White → Yellow	Phosgene, chlorine, nitrogen dioxide
3	Blue → Yellow	Sulphur dioxide
4	White → Yellow	Nitrogen dioxide
5	White → Brown	Hydrogen sulphide
6	Yellow → Pink	Hydrogen sulphide, hydrogen cyanide, hydrogen phosphide
7	Yellow → Blackish brown, grey, yellowish orange	Carbon monoxide, hydrogen, hydrogen phosphide, acetylene, ethylene, propylene, methyl mercaptan
8	Blue → Brown	Carbon dioxide

Layers numbered as in the tube's instruction sheet. Hydrogen phosphide is another name for phosphine.

CHAPTER 9

Injection-method tubes and tubes for dissolved substances

Two kinds of tube that are not used with the gas sampling pump: injection-method tubes, into which a syringe pushes a gas sample, and tubes that measure substances dissolved in water by immersion.

Injection-method tubes

For high concentrations of carbon dioxide and propane, a 20 mL gas sample is drawn into a syringe and injected into the tube at a set rate: No. 100B with syringe No. 601, No. 2HT with syringe No. 611.

Table 9-1 Injection-method tubes

Gas Formula	Tube No.	Tube name	Measuring range (%)	Sample volume / injection time (mL / s)	Colour change		Shelf life (months)
					Original	Stain	
Carbon dioxide CO_2	**2HT**	Carbon dioxide	10–100 %	20 mL / 20 s	White	Purple	36
Propane $CH_3CH_2CH_3$	**100B**	Propane	0.1–2 %	20 mL / 120 s	Brown	Blackish green	36

1. Break off both ends of the tube with the tube tip cutter.
2. Fit the syringe inlet to the syringe and pull the piston to draw 20 mL of sample.
3. Insert the tube into the syringe inlet with the arrow on the tube pointing away from the syringe. Push the sample through the tube in 2 minutes (No. 100B) or 20 seconds (No. 2HT), then read the tube.

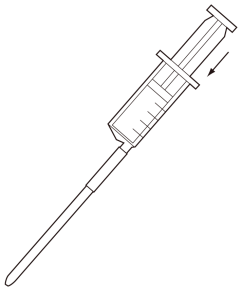


Figure 9-1. Injecting the sample from the syringe into the tube (step 3).

Tubes for substances dissolved in water

Stand the tube upright in the solution, with the arrow on the tube pointing upwards. The liquid rises through the tube by capillary action and stains the reagent; read the length of the stain on the scale. All tubes in this table are used by immersion.

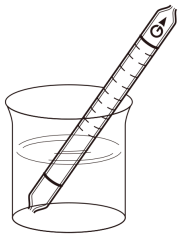


Figure 9-2. Tube standing in the solution, arrow pointing upwards.

Table 9-2 Tubes for substances dissolved in water

Substance in solution Ion	Tube No.	Tube name	Measuring range (ppm)	Colour change		Shelf life (months)
				Original	Stain	
Sulphide ion in solution S^{2-}	**211H**	Sulphide ion tube	10–1000	White	Brown	36
	211M	Sulphide ion tube	2–300	White	Brown	36
	211	Sulphide ion tube	1–100	White	Brown	36
	211LL	Sulphide ion tube	0.5–20	White	Brown	36
Ozone in solution O_3	**218**	Ozone tube	1–10 mg/L	Pale blue	White	36
Bromide ion in solution Br^-	**221L**	Chloride ion tube	55–2200 mg/L	Brown	White	36
	221LL	Chloride ion tube	24–480 mg/L	Brown	White	36
Chloride ion in solution Cl^-	**221L**	Chloride ion tube	25–1000 mg/L	Brown	White	36
	221LL	Chloride ion tube	10–200 mg/L	Brown	White	36
Free residual chlorine ClO^-	**222**	Free residual chlorine tube	0.1–10 mg/L	White	Reddish orange	30
Mercury in solution Hg^{2+}	**271**	Mercury tube	1–20 mg/L	Pale orange	Bluish purple	36
Chromium(VI) in solution Cr^{6+}	**273**	Chromium (VI) tube	0.5–50 mg/L	White	Yellow	36
Iron in solution Fe^{2+}	**281**	Iron tube	5–50 mg/L	White	Orange	36
Copper in solution Cu^{+}+Cu^{2+}	**284**	Copper tube	1–20 mg/L	White	Orange	24*
Zinc in solution Zn^{2+}	**285**	Zinc tube	3–20 mg/L	Pale orange	Reddish purple	36
Nickel in solution Ni^{2+}	**291**	Nickel tube	5–50 mg/L	White	Red	36

* Refrigerated storage. The Chloride ion tubes Nos. 221L and 221LL measure both bromide and chloride ions, each with its own range.

CHAPTER 10

Airtec tubes for compressed breathing air

Airtec tubes check the quality of compressed breathing air for carbon monoxide, carbon dioxide, water vapour, nitrogen oxides and oil mist. Contaminants drawn into a compressor or produced by it can harm the wearer and the breathing equipment.

Airtec tubes are not used with the gas sampling pump. The air comes from the high-pressure source — a compressor, a cylinder or an air line — through a pressure reducer and a flowmeter set to the flow rate in the table.

Table 10-1 Airtec tubes for compressed breathing air

Contaminant Formula	Tube No.	Tube name	Measuring range (ppm)	Flow rate (mL/min)	Sampling time (min)	Colour change		Shelf life (months)
						Original	Stain	
Carbon monoxide CO	**1A**	Carbon monoxide Airtec tube	5–50	100	3	Yellow	Blackish brown	36
Carbon dioxide CO_2	**2A**	Carbon dioxide Airtec tube	250–3000	100	5	Yellowish orange	Yellow	36
	2Ag	Carbon dioxide Airtec tube	200–3000	100	1.5	Pale blue	Purple	36
Water vapour H_2O	**6AH**	Water vapour Airtec tube	500–5000	300	1	Green	Purple	36
	6A	Water vapour Airtec tube	10–80 mg/m^3	100	5	Yellow	Green	36
	6Ag	Water vapour Airtec tube	150–3000 mg/m^3	300	1	Green	Purple	36
Nitrogen oxides $NO+NO_2$	**11A**	Nitrogen oxides Airtec tube	0.06–2 0.02–0.7	100 100	2 5	White	Bluish green	36
Oil mist	**109AD**	Oil mist Airtec tube	0.2–5.0 mg/m^3 0.1–0.2 mg/m^3	1000 1000	20 40	Pale vermilion	Pale blue	24
	109A	Oil mist Airtec tube	0.3–1.5 mg/m^3	1000	60	White	Greenish brown	30

Testing the air from a cylinder, compressor or air line

1. Fit a pressure reducer with gauge and flowmeter to the cylinder, compressor or air line, and set the flowmeter.
2. Break both tips of a fresh tube with the tube tip breaker and fit the tube into a tube holder.
3. Connect the rubber tube holder to the flowmeter outlet, with the arrow on the tube pointing downwards.
4. Open the cylinder or start the compressor, and check that the flowmeter is set to the flow rate for this Airtec tube.
5. Time the sampling with a stopwatch.
6. When the sampling time is over, shut off the air supply, take out the tube and read the stain at once.

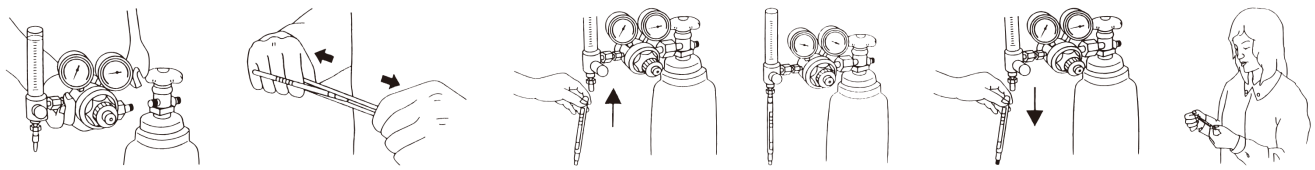


Figure 10-1. Airtec test, steps 1 to 6 from left to right.

Compressed breathing air kit CG-1

The CG-1 measures carbon monoxide, carbon dioxide, water vapour and oil mist at the same time in compressed breathing air from a cylinder or a compressor. It uses four Airtec tubes, each in its own rubber shroud; the flow rates and sampling times differ from those above.

Table 10-2 Compressed breathing air kit CG-1

Contaminant Formula	Tube No.	Tube name	Measuring range (ppm)	Flow rate (mL/min)	Sampling time (min)	Colour change		Shelf life (months)
						Original	Stain	
Carbon monoxide CO	**1A**	Carbon monoxide Airtec tube	5–50	100	5	Yellow	Blackish brown	36
Carbon dioxide CO_2	**2A**	Carbon dioxide Airtec tube	250–3000	190	5	Yellowish orange	Yellow	36
Water vapour H_2O	**6A**	Water vapour Airtec tube	10–80 mg/m^3	120	5	Yellow	Green	36
Oil mist	**109AD**	Oil mist Airtec tube	0.2–5.0 mg/m^3 0.1–0.2 mg/m^3	3000 3000	10 20	Pale vermilion	Pale blue	24

1. **Leak test.** Connect the measuring device to the pressure reducer and push it fully home until it locks; leave the rubber shrouds disconnected. Open the air supply slowly and wait 1 minute. Close the supply completely and wait 6 minutes. The pressure must not drop by 5 % or more.
2. **Shrouds.** With the main valve closed, connect each rubber shroud to the measuring device and push it fully home until it locks. Air escapes from the device.
3. **Purge.** Open the supply valve slowly to purge the supply system. Wait 5 minutes, then close the valve.
4. **Tubes.** Break both tips of each tube with the tube tip holder. Fit each tube into the rubber shroud marked for it on the device, with both tube ends covered by the shrouds. Open the valve and start a stopwatch.
5. **Reading.** After 5 minutes, disconnect the shrouds of tubes 1A, 2A and 6A; after 10 minutes, or 20 minutes for 0.1–0.2 mg/m^3, disconnect the shroud of tube 109AD. Take the tubes out of the shrouds and read each one at once. Multiply the 20-minute reading of tube 109AD by the correction factor 0.5.

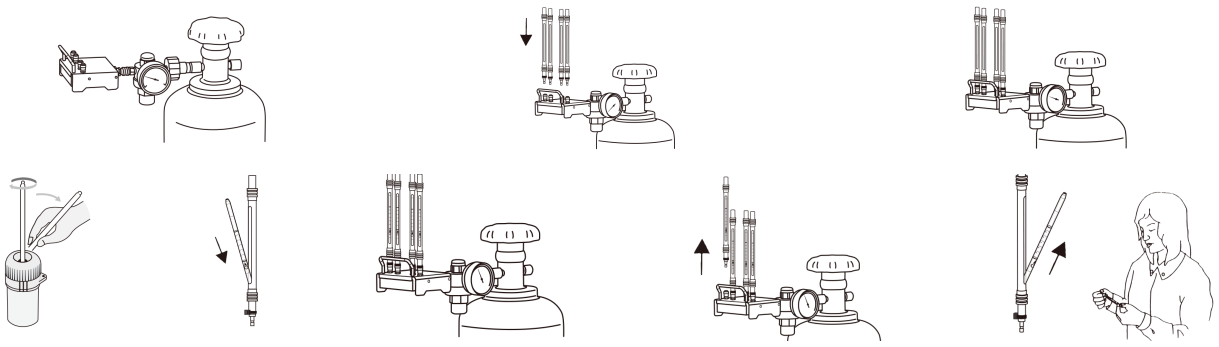


Figure 10-2. CG-1 measurement. Top: steps 1, 2 and 3. Bottom: step 4 (breaking the tips in the tube tip holder, setting a tube in its shroud, tubes in place) and step 5 (disconnecting the shrouds, taking out and reading the tubes).

CHAPTER 11

Automatic air sampling pump and sorbent tubes

Detector tubes for the GASTEC automatic air sampling pump GSP-501FT, which draws the sample at a set flow rate for a set time, the pump itself, and the sorbent tubes for sampling with laboratory analysis.

Detector tubes for the automatic air sampling pump

Shaded row: the tube is read with a correction factor or chart. Notes: T temperature correction, H humidity correction, + twin tubes. * Refrigerated storage. Details: "Symbols and notes" (p. 6).

Table 11-1 Detector tubes for the automatic air sampling pump

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Flow rate (mL/min)	Sampling time (min)	Colour change		Notes	Shelf life (months)
						Original	Stain		
Acetone CH_3COCH_3	**151TP**	Acetone	25–800	100	10	Yellow	Red	T	27*
Acrylonitrile CH_2:CHCN	**191TP**	Acrylonitrile	3.0–12.6 0.2–3.0	50 100	10 10	Yellow	Pink	+T	24
Ammonia NH_3	**3S**	Ammonia	0.5–5.0	150	5	Pink	Yellow		36
Benzene C_6H_6	**121P**	Benzene	250–3000 µg/m^3	50	60	White	Brown	+	30
	121TP	Benzene	5.0–14.5 0.1–5.0	50 100	10 10	White	Brown	+	27
Carbon disulphide CS_2	**13TP**	Carbon disulphide	1.0–2.4 0.05–1.0	50 100	10 10	Blue	Yellowish green	+	24
Chlorine Cl_2	**8TP**	Chlorine	0.05–0.6	100	10	Pink	White		30
p-Dichlorobenzene $C_6H_4Cl_2$	**127P**	p-Dichlorobenzene	100–3000 µg/m^3	100	30	Yellow	Pale reddish purple	+T	24
N,N-Dimethylacetamide $CH_3CON(CH_3)_2$	**183TP**	N,N-Dimethylformamide	3.0–57.5	100	10	Pink	Yellow	T	24
N,N-Dimethylformamide $HCON(CH_3)_2$	**183TP**	N,N-Dimethylformamide	15–30 0.5–15	50 100	10 10	Pink	Yellow	T	24
Ethyl benzene $C_6H_5C_2H_5$	**122P**	Toluene	110–2750 µg/m^3	200	30	White	Pale brown	+	24
Ethylene oxide C_2H_4O	**163TPM**	Ethylene oxide	1–50	50	10	Yellow	Reddish brown	+T	12*
	163TP	Ethylene oxide	0.1–5.0	50	10	Yellow	Pale orange	+T	12*
Formaldehyde HCHO	**91P**	Formaldehyde	0.4–1.44 0.02–0.4	200 200	10 30	Yellow	Pink	T	12*
	91PL	Formaldehyde	0.20–0.80 0.01–0.20	200 200	10 30	Pale Yellow	Pink	T	12*
	91TP	Formaldehyde	0.50–1.75 0.01–0.50	50 100	10 10	Yellow	Pale orange	T	12*
Hexane $CH_3(CH_2)_4CH_3$	**102TP**	Hexane	2–80	100	10	Yellowish brown	Greenish brown		36
Hydrogen cyanide HCN	**12TP**	Hydrogen cyanide	4.5–9.0 0.3–4.5	50 100	10 10	Yellow	Pink		12
Hydrogen fluoride HF	**17TP**	Hydrogen fluoride	3.0–9.0 0.05–3.0	50 100	10 10	Yellow	Brown	TH	30

Gas or vapour Formula	Tube No.	Tube name	Measuring range (ppm)	Flow rate (mL/min)	Sampling time (min)	Colour change		Notes	Shelf life (months)
						Original	Stain		
Hydrogen sulphide H_2S	**4TP**	Hydrogen sulphide	1.6–2.88 0.1–1.6	50 100	10 10	Yellow	Pink		24
	4S	Hydrogen sulphide	10–200 ppb	150	5	Yellow	Purple	+T	18*
Isopropyl alcohol $CH_3CH(OH)CH_3$	**113TP**	Isopropyl alcohol	200–400 20–200	100 100	5 10	Pale vermilion	Pale blue	T	36
Methanol CH_3OH	**111TP**	Methanol	20–300	50	10	Pale vermilion	Pale blue	T	24
Methyl ethyl ketone $CH_3COC_2H_5$	**152TP**	Methyl ethyl ketone	20–300	100	10	Yellow	Red	T	24*
Nitrogen dioxide NO_2	**9P**	Nitrogen dioxide	0.02–0.20	100	30	White	Orangish brown	T	30
Styrene $C_6H_5CH{:}CH_2$	**124S**	Styrene	0.2–4.0	200	5	White	Yellow	+	36
Tetrachloroethylene $Cl_2C{:}CCl_2$	**133P**	Tetrachloroethylene	300–720 µg/m^3 20–300 µg/m^3	100 100	15 30	Yellow	Purple	+T	24
	133TP	Tetrachloroethylene	40–84 2.5–40	50 100	10 10	Yellow	Reddish purple	+T	24
Toluene $C_6H_5CH_3$	**122P**	Toluene	2500–7000 µg/m^3 100–2500 µg/m^3	200 200	10 30	White	Pale brown	+	24
	122TP	Toluene	2–80	100	10	White	Brown	+	36
Trichloroethylene $Cl_2C{:}CHCl$	**132P**	Trichloroethylene	500–1200 µg/m^3 20–500 µg/m^3	100 100	15 30	Yellow	Purple	+T	24
	132TP	Trichloroethylene	15–33 1–15	50 100	10 10	Yellow	Reddish purple	+T	24
Vinyl chloride $CH_2{:}CHCl$	**131P**	Vinyl chloride	50–1500 µg/m^3	100	30	Yellow	Pale reddish purple	+T	24
	131TP	Vinyl chloride	3.0–9.6 0.2–3.0	50 100	10 10	Yellow	Reddish purple	T	36
Xylene $C_6H_4(CH_3)_2$	**123TP**	Xylene	2–80	100	10	White	Brown	+	24
	122P	Toluene	540–13 500 µg/m^3	200	30	White	Pale brown	+	24

Automatic air sampling pump GSP-501FT

The GSP-501FT is a small pump with a built-in flowmeter, for hand-held, personal or area sampling. It keeps the flow constant for up to 20 hours of continuous sampling, runs quietly, and stops by itself at a preset time (timer mode) or a preset volume (volume mode), from the integrated flow and the elapsed time.

Table 11-2 Automatic air sampling pump GSP-501FT

Specification	GSP-501FT
Stop settings	Timer mode: stops at the set time, 1 minute–30 hours Volume mode: stops at the set volume, 0.010–900 L
Flow rate setting	Timer mode: 50–500 mL/min Volume mode: 10–500 mL/min (10–49 mL/min: intermittent operation at 50 mL/min)
Constant-flow range (suction pressure)	10–49 mL/min: 0.0–5.0 kPa · 50 mL/min: 0.0–40.0 kPa · 100 mL/min: 0.0–37.0 kPa · 200 mL/min: 0.0–30.0 kPa · 300 mL/min: 0.0–23.0 kPa · 400 mL/min: 0.0–16.0 kPa · 500 mL/min: 0.0–10.0 kPa
Display	Backlit LCD, 0–600 mL/min
Functions	Constant flow (built-in set-flow holding circuit); auto start after a set standby time; program mode with 5 sampling settings
Pump	Diaphragm pump

Specification	GSP-501FT
Accuracy	Flow rate, 50–500 mL/min: ±5 % Integrated volume, 50–500 mL/min: ±5 % Integrated volume, volume mode only, 10–49 mL/min: ±(2.5 × sampling time in min) mL
Operating conditions	0–40 °C; 10–90 % RH, non-condensing
Power supply	2 × AA alkaline batteries (supplied) or 2 × AA NiMH rechargeable batteries; both commercially available
Operating time	20 h continuous with 2 × AA alkaline (200 mL/min, suction pressure ≤ 2 kPa, 25 °C)
Dimensions and weight	80 (W) × 40 (D) × 126 (H) mm; 280 g with batteries
Supplied with	2 × AA alkaline batteries, detector tube adaptor, tube tip holder, dust filters (5), instruction manual, warranty certificate, inspection certificate
EU directives	2014/30/EU (EMC); 2011/65/EU and (EU) 2015/863 (RoHS); (EU) 2023/1542 (batteries)
Standards	EMC: EN 61326-1:2013 (harmonised standard); RoHS: EN IEC 63000:2018 (designated standard)

Intermittent operation at low flow rates

In volume mode, a flow rate of 10 to 49 mL/min is reached by sampling at 50 mL/min in intervals. Example: at 10 mL/min for 0.1 L, the pump samples at 50 mL/min for about 12 seconds and pauses for about 48 seconds, and repeats this until 0.1 L has been drawn — about 10 minutes in all.

NOTICE

At these flow rates the pump samples in intervals, not continuously. If the concentration changes suddenly, or the sampling time is short, this can give a large error.

Measuring with a detector tube

1. Break both tips of the tube with the tube tip holder.
2. Insert the tube into the inlet of the rubber tube holder. Switch the pump on, set the flow rate, check the timer setting and press start. Take the flow rate and time from the tube's instruction sheet.
3. When sampling has finished, take out the tube and read the concentration.

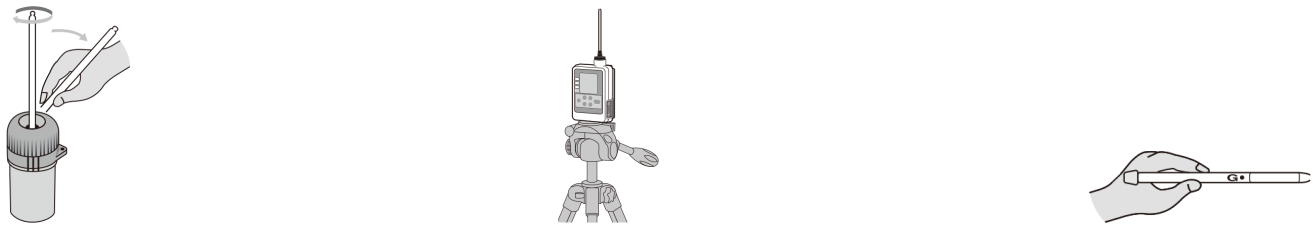


Figure 11-1. Breaking the tube tips in the tube tip holder (step 1), the pump with the tube in the rubber tube holder (2) and reading the tube (3).

Sorbent tubes

Sorbent tubes are glass tubes filled with a sorbent — activated charcoal or silica gel — that collects toxic gases from the sampled air. Break off both ends and connect the tube to a sampling pump. In the laboratory, the collected substances are extracted with a solvent and analysed by gas chromatography.

Table 11-3 Sorbent tubes

Sorbent tube	Tube No.	Layers	Filling quantity	Size (dia. × length, mm)	Per box	Shelf life (months)
Activated charcoal tube	**251S-20**	2	100/50	5.6 × 100	20	60
	251S2-20	1	150	5.6 × 100	20	60
Activated charcoal tube (bead-shaped)	**258-20**	2	100/50	5.6 × 100	20	60
	258A-20	2	400/200	7.0 × 105	20	60
	258S2-20	1	150	5.6 × 100	20	60
Silica-gel tube	**252S-20**	2	400/200	7.0 × 105	20	60
	252S2-20	1	600	7.0 × 105	20	60
	252S3-20	2	150/75	5.6 × 100	20	60
	252S4-20	1	300	5.6 × 100	20	60

Filling quantity per layer, as printed in GASTEC's list (two values for two-layer tubes).

CHAPTER 12

Index by tube number

Every tube in this guide, by tube number, with the substances it measures, its full measuring range for that substance and the page of the table entry. A shaded row means the tube measures that substance with a correction factor or chart.

Table 12-1 Index by tube number

Tube No.	Gas or vapour	Range (ppm)	Page
1A	Carbon monoxide (Airtec)	5–50	46
1D	Carbon monoxide (Dosi-tube)	1.04–2000	36
1DL	Carbon monoxide (Dosi-tube)	0.4–400	36
1H	Carbon monoxide	0.1–10 %	17
1HH	Carbon monoxide	1–50 %	17
1L	Carbon monoxide	2.5–2000	17
1La	Carbon monoxide	8–1000	17
1LC	Carbon monoxide	1–30	17
1LK	Carbon monoxide	5–600	17
1LKC	Carbon monoxide	5–100	17
1LL	Carbon monoxide	5–50	17
1LM	Carbon monoxide	25–2000	17
1M	Carbon monoxide	0.05–4 %	17
1M	Gasoline (Petrol)	0.1–2 %	23
2A	Carbon dioxide (Airtec)	250–3000	46
2Ag	Carbon dioxide (Airtec)	200–3000	46
2D	Carbon dioxide (Dosi-tube)	0.02–12 %	36
2H	Carbon dioxide	0.5–20 %	16
2HH	Carbon dioxide	2.5–40 %	16
2HT	Carbon dioxide (injection method)	10–100 %	44
2L	Carbon dioxide	0.13–6 %	16
2LC	Carbon dioxide	100–4000	16
2LL	Carbon dioxide	300–5000	16
3D	Ammonia (Dosi-tube)	2.5–1000	36
3D	Dimethylamine (Dosi-tube)	1.9–750	36
3D	Hydrazine (Dosi-tube)	1.6–650	37
3D	N,N-Dimethylethylamine (Dosi-tube)	4–1600	36
3D	Triethylamine (Dosi-tube)	5.3–2100	38
3DL	Ammonia (Dosi-tube)	0.1–10	36
3DL	Dimethylamine (Dosi-tube)	0.29–29	36
3DL	Methylamine (Dosi-tube)	0.19–19	37
3DL	Trimethylamine (Dosi-tube)	0.23–23	38
3H	Ammonia	0.2–32 %	14
3H	Dimethylamine	1.2–19.2 %	20
3HM	Ammonia	0.05–3.52 %	14
3L	Ammonia	0.5–78	14
3La	Ammonia	2.5–220	14
3M	Ammonia	7–1000	14
3M	Trimethylamine	25–250	34
3S	Ammonia (automatic pump)	0.5–5.0	48
4D	Hydrogen sulphide (Dosi-tube)	0.2–200	37
4H	Hydrogen sulphide	10–4000	25
4HH	Hydrogen sulphide	0.1–4 %	25
4HM	Hydrogen sulphide	25–1600	25
4HP	Hydrogen sulphide	0.25–20 %	25
4HT	Hydrogen sulphide	1–40 %	25
4L	Hydrogen sulphide	1–240	25
4LB	Hydrogen sulphide	0.5–12	25
4LK	Hydrogen sulphide	1–40	25
4LL	Hydrogen sulphide	0.25–120	25
4LT	Hydrogen sulphide	0.05–4.0	25
4M	Hydrogen sulphide	12.5–500	25
4S	Hydrogen sulphide (automatic pump)	10–200 ppb	49
4TP	Hydrogen sulphide (automatic pump)	0.1–2.88	49
5D	Sulphur dioxide (Dosi-tube)	0.2–100	37
5DH	Sulphur dioxide (Dosi-tube)	10–600	37
5H	Sulphur dioxide	0.05–8 %	32
5L	Sulphur dioxide	1.25–200	32
5La	Sulphur dioxide	0.5–60	32
5La	Thionyl chloride	1.44–21.6	33
5Lb	Sulphur dioxide	0.05–10	32
5LC	Sulphur dioxide	0.1–22	32
5M	Sulphur dioxide	20–3600	32
6	Water vapour	0.5–32 mg/L	35
6A	Water vapour (Airtec)	10–80 mg/m^3	46
6Ag	Water vapour (Airtec)	150–3000 mg/m^3	46
6AH	Water vapour (Airtec)	500–5000	46
6L	Water vapour	0.05–2 mg/L	35
6LLP	Water vapour	2–10 lb/MMCF	35
6LP	Water vapour	3–100 lb/MMCF	35
7	Phosphine	2.5–100	31
7H	Phosphine	200–5500	31
7J	Phosphine	2.5–1000	31
7L	Phosphine	0.15–5.0	31
7LA	Phosphine	0.05–9.8	31
7LAN	Phosphine	0.04–8.4	31
8D	Chlorine (Dosi-tube)	0.08–100	36

Tube No.	Gas or vapour	Range (ppm)	Page
8H	Chlorine	25–1000	17
8H	Chlorine dioxide	45–450	17
8HH	Chlorine	0.25–10 %	17
8HH	Hydrogen chloride	1.5–30 %	24
8La	Bromine	0.05–0.8	15
8La	Chlorine	0.1–16	17
8La	Chlorine dioxide	0.3–4.8	17
8LL	Chlorine	0.025–2.0	17
8TP	Chlorine (automatic pump)	0.05–0.6	48
9D	Nitrogen dioxide (Dosi-tube)	0.1–30	37
9DL	Nitrogen dioxide (Dosi-tube)	0.01–3.0	37
9L	Iodine	0.2–12	26
9L	Nitrogen dioxide	0.5–125	29
9P	Nitrogen dioxide (automatic pump)	0.02–0.20	49
10	Nitrogen dioxide	2.5–200	29
10	Nitrogen oxide	2.5–200	29
11A	Nitrogen oxides (Airtec)	0.02–2	46
11HA	Nitrogen oxides	50–2500	29
11L	Nitrogen oxides	0.03–14	29
11S	Nitrogen oxides	5–625	29
12D	Hydrogen cyanide (Dosi-tube)	1–200	37
12H	Hydrogen cyanide	0.05–1.6 %	25
12L	Acetone cyanohydrin	2.5–60	13
12L	Boron trichloride	2.25–54	15
12L	Hydrogen cyanide	0.5–150	25
12LL	Hydrogen cyanide	0.2–10	25
12M	Hydrogen cyanide	17–2400	25
12TP	Hydrogen cyanide (automatic pump)	0.3–9.0	48
13	Carbon disulphide	0.63–100	16
13L	Carbon disulphide	0.1–8.1	16
13M	Carbon disulphide	15–5120	16
13TP	Carbon disulphide (automatic pump)	0.05–2.4	48
14D	Hydrogen chloride (Dosi-tube)	1–100	37
14D	Hydrogen fluoride (Dosi-tube)	2.5–250	37
14D	Nitric acid (Dosi-tube)	0.8–80	37
14L	Hydrogen chloride	0.2–76	24
14M	Hydrogen chloride	10–1000	24
14R	Hydrogen chloride	50–5000	24
15L	Hydrogen bromide	0.8–16	24
15L	Nitric acid	0.1–40	29
15L	Trichloroacetic acid	1–37	33
16	Phosgene	0.05–20	31
17	Fluorine	0.5–50	23
17	Hydrogen fluoride	0.25–100	25
17D	Hydrogen chloride (Dosi-tube)	0.4–40	37
17D	Hydrogen fluoride (Dosi-tube)	1–100	37
17D	Nitric acid (Dosi-tube)	0.32–32	37
17L	Hydrogen fluoride	0.09–72	25
17LL	Hydrogen fluoride	0.05–24	25
17TP	Hydrogen fluoride (automatic pump)	0.05–9.0	48

Tube No.	Gas or vapour	Range (ppm)	Page
18L	Ozone	0.025–6	30
18M	Ozone	4–400	30
19LA	Arsine	0.04–10	14
21	Carbonyl sulphide	5–200	17
21LA	Carbonyl sulphide	2–125	17
22	Diborane	0.02–5	19
23L	Chlorine dioxide	0.025–1.2	17
23M	Chlorine dioxide	0.1–10	17
25	NH_3, SO_2, H_2S, CO, NO_2, R·SH (qualitative)	qualitative	43
26	NH_3, H_2S, C_nH_m (qualitative)	qualitative	43
27	NH_3, HCl, H_2S, SO_2, NO_2, CO, CO_2 (qualitative)	qualitative	43
28	HCl, $COCl_2$, SO_2, NO_2, H_2S, HCN, CO, CO_2 (qualitative)	qualitative	43
30	Hydrogen	0.5–2 %	24
31B	Oxygen	3–24 %	30
32	Hydrogen peroxide	0.5–10	25
32D	Hydrogen peroxide (Dosi-tube)	0.5–40	37
35	Sulphuric acid	0.5–5.0 mg/m^3	32
40	Mercury vapour	0.05–13.2 mg/m^3	27
45H	Hydrogen sulphide + Sulphur dioxide (Total Quantification)	0.02–8.0 %	25
45H	Sulphur dioxide + Hydrogen sulphide (Total Quantification)	0.02–8.0 %	32
45S	Hydrogen sulphide	H_2S: 60–120 2.5–60 1.25–2.5	25
45S	Sulphur dioxide	SO_2: 10–20 0.5–10 0.25–0.5	32
51	1,1,1-Trichloro-2,2,2-trifluoroethane (R113a)	10–400	34
51	1,1,2,2-Tetrachloro-1,2-difluoroethane (R112)	7–280	33
51	1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	10–400	34
51	1,1-Dichloro-1-fluoroethane (R141b)	10–1000	19
51	1,2-Dichloro-1,1,2,2-tetrafluoroethane (R114)	20–800	20
51	2,2-Dichloro-1,1,1-trifluoroethane (R123)	14–1600	20
51	2-Chloro-1,1,1,2-tetrafluoroethane (R124)	45–1800	18
51	Chlorodifluoromethane (R22)	25–1000	18
51	Dichlorodifluoromethane (R12)	11–440	19
51	Dichloropentafluoropropane (R225)	20–800	19
51	Enflurane (2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether)	110–1230	21
51	Halothane (2-Bromo-2-chloro-1,1,1-trifluoroethane)	24–960	23
51	Methyl chloride	12–480	28
51	Trichlorofluoromethane (R11)	8–320	34
51H	1,1,1-Trichloro-2,2,2-trifluoroethane (R113a)	200–4800	34
51H	1,1,2,2-Tetrachloro-1,2-difluoroethane (R112)	125–3000	33

Tube No.	Gas or vapour	Range (ppm)	Page
51H	1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	250–6000	34
51H	1,2-Dichloro-1,1,2,2-tetrafluoroethane (R114)	475–11 400	20
51H	Chlorodifluoromethane (R22)	0.1–2.4 %	18
51H	Dichlorodifluoromethane (R12)	325–7800	19
51H	Halothane (2-Bromo-2-chloro-1,1,1-trifluoroethane)	800–6400	23
51H	Trichlorofluoromethane (R11)	275–6600	34
51L	1,1,1-Trichloro-2,2,2-trifluoroethane (R113a)	0.8–43.2	34
51L	1,1,2,2-Tetrachloro-1,2-difluoroethane (R112)	1–54	33
51L	1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	1–54	34
51L	1,1-Dichloro-1-fluoroethane (R141b)	1.1–22	19
51L	1,2-Dichloro-1,1,2,2-tetrafluoroethane (R114)	1.8–97.2	20
51L	2,2-Dichloro-1,1,1-trifluoroethane (R123)	1.4–28	20
51L	Chlorodifluoromethane (R22)	2.5–135	18
51L	Dichlorodifluoromethane (R12)	1.8–97.2	19
51L	Dichloropentafluoropropane (R225)	1.4–28	19
51L	Enflurane (2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether)	25–145	21
51L	Halothane (2-Bromo-2-chloro-1,1,1-trifluoroethane)	3–60	23
51L	Methyl chloride	1.6–86.4	28
51L	Methylene chloride	1–54	28
51L	Trichlorofluoromethane (R11)	0.8–43.2	34
52	1-Nitropropane	4.2–252	30
52	2-Nitropropane	3.7–222	30
52	Acetonitrile	3–180	13
52	Nitroethane	4–240	29
52	Nitrogen dioxide	0.5–30	29
52	Nitromethane	5–300	30
53	Dimethyl disulphide	0.3–6	21
53	Dimethyl sulphide	0.15–10	21
60	Naphthalene	0.5–14	29
60	Phenol	0.12–183	31
61	m-Cresol	1–25	18
61	o-Cresol	0.35–67.5	18
61	p-Cresol	1–25	18
70	Ethyl mercaptan	0.5–120	23
70	Isopropyl mercaptan	10–240	26
70	Mercaptans	0.5–120	27
70	Methyl mercaptan	0.35–84	29
70	Propyl mercaptan	22.5–540	32
70L	Butyl mercaptan	0.16–12.8	16
70L	Ethyl mercaptan	0.1–8	23
70L	Mercaptans	0.1–8.0	27
70L	Methyl mercaptan	0.1–8	29
70L	Propyl mercaptan	0.12–9.6	32
70L	tert-Butyl mercaptan	0.1–8	16
70LN	Ethyl mercaptan	0.13–10.4	23
70LN	Mercaptans	0.1–8.0	27
70LN	Methyl mercaptan	0.1–8	29
70LN	Propyl mercaptan	1–25	32
70LN	tert-Butyl mercaptan	1–40	16
71	Methyl mercaptan	0.25–140	29
71H	Ethyl mercaptan	100–3800	23
71H	Methyl mercaptan	20–2700	29
72	Ethyl mercaptan	0.5–120	23
72L	Ethyl mercaptan	0.2–75	23
72LN	Ethyl mercaptan	0.15–57.5	23
75	tert-Butyl mercaptan	2.5–150 mg/m^3	16
75L	2-Mercaptoethanol	0.5–7.5	27
75L	tert-Butyl mercaptan	0.5–30 mg/m^3	16
75LN	tert-Butyl mercaptan	0.5–39 mg/m^3	16
75N	tert-Butyl mercaptan	1.25–250 mg/m^3	16
76	Tetrahydrothiophene	1–10	33
76H	Tetrahydrothiophene	10–200	33
76M	Tetrahydrothiophene	10–100 mg/m^3	33
77	Dimethyl sulphide	1–15 mg/m^3	21
77	tert-Butyl mercaptan	1–15 mg/m^3	16
80	Acid gases	1–80	13
80	Chlorine	0.7–14	17
80	Hydrogen chloride	8–160	24
80	Iodine	0.12–2.4	26
80	Nitric acid	5–100	29
80	Nitrogen dioxide	0.2–4	29
80	Sulphur dioxide	1.5–30	32
81	Acetic acid	1–100	13
81	Acetic anhydride	0.6–15	13
81	Acrylic acid	2–50	13
81	Formic acid	5.2–130	23
81	Isovaleric acid	2–50	26
81	Maleic anhydride	0.8–20	26
81	Methacrylic acid	1.8–45	27
81	Propionic acid	3–75	31
81D	Acetic acid (Dosi-tube)	0.5–100	36
81D	Acetic anhydride (Dosi-tube)	0.3–60	36
81D	Formic acid (Dosi-tube)	0.55–110	37
81L	Acetic acid	0.125–23.0	13
81L	Acetic anhydride	0.15–6	13
81L	Acrylic acid	0.45–18	13
81L	Butyric acid	0.325–13	16
81L	Formic acid	0.5–20	23
81L	Isovaleric acid	0.38–15	26
81L	Methacrylic acid	0.35–14	27
81L	Propionic acid	0.25–10	31
81L	Valeric acid	0.38–15	34
91	Formaldehyde	2–100	23
91D	Acetaldehyde (Dosi-tube)	0.1–20	36

Tube No.	Gas or vapour	Range (ppm)	Page
91D	Formaldehyde (Dosi-tube)	0.1–20	37
91D	Furfural (Dosi-tube)	0.3–60	37
91D	Methyl ethyl ketone (Dosi-tube)	0.125–25	37
91L	Benzaldehyde	4–92	14
91L	Cyclohexanone	10–470	18
91L	Diisobutyl ketone	0.58–29	20
91L	Formaldehyde	0.1–45.0	23
91L	Metaldehyde	0.065–3.25	27
91L	Propionaldehyde	0.76–38	31
91LL	Formaldehyde	0.05–1	23
91M	Formaldehyde	8–6400	23
91P	Formaldehyde (automatic pump)	0.02–1.44	48
91PL	Formaldehyde (automatic pump)	0.01–0.80	48
91TP	Formaldehyde (automatic pump)	0.01–1.75	48
92	Acetaldehyde	5–750	13
92	Diacetyl	25–1500	19
92L	Acetaldehyde	1–20	13
92LA	Acetaldehyde	0.3–30	13
92M	Acetaldehyde	2.5–100	13
93	Acrolein	3.3–800	13
100A	LPG (Liquified petroleum gas)	0.02–0.8 %	26
100A	Propylene	0.02–0.8 %	31
100A	Xylene	0.1–1.2 %	35
100B	Propane (injection method)	0.1–2 %	44
101	Gasoline (Petrol)	0.015–1.2 %	23
101	Heptane	0.015–1.2 %	24
101	Isooctane	0.027–0.54 %	26
101	Octane	0.036–0.72 %	30
101L	Allyl chloride	0.1–3.4 %	14
101L	Gasoline (Petrol)	30–2000	23
101L	Heptane	30–2000	24
101L	Isobutene	0.07–2.2 %	26
102H	Cyclohexane	0.015–1.2 %	18
102H	Hexane	0.015–1.2 %	24
102H	Methylcyclohexane	0.04–0.84 %	28
102L	Acrylonitrile	600–14400	14
102L	Chlorocyclohexane	50–1200	18
102L	Cyclohexane	60–1440	18
102L	Diisobutyl ketone	0.2–1 %	20
102L	Hexane	3.5–1200	24
102L	tert-Butyl alcohol	500–12000	15
102TP	Hexane (automatic pump)	2–80	48
103	Acetylene	0.075–3.6 %	13
103	Butane	0.035–1.68 %	15
103	Ethylene	0.35–16.8 %	22
103	Heptane	0.035–1.68 %	24
103	Hexane	0.025–1.2 %	24
103	Hydrocarbons (Lower class)	0.05–2.4 %	24
103	Isobutane	0.035–1.68 %	26
103	Isopentane	0.045–2.16 %	26
103	n-Pentane	0.0375–1.8 %	30
103	Propane	0.05–2.4 %	31
104	Butane	25–1400	15
104	Isobutane	55–3080	26
104	n-Pentane	30–1680	30
105	Heptane	90–2700	24
105	Hexane	80–2400	24
105	Hydrocarbons (Higher class)	100–3000	24
105	n-Decane	200–6000	19
105	Nonane	130–3900	30
105	Octane	100–3000	30
106	Petroleum benzine	0.5–28 mg/L	30
106	Petroleum ether	0.5–28 mg/L	30
106	Petroleum naphtha	0.5–28 mg/L	30
107	Unknown gases (qualitative)	qualitative	43
108	Kerosene, gasoline (qualitative)	qualitative	43
109A	Oil mist (Airtec)	0.3–1.5 mg/m^3	46
109AD	Oil mist (Airtec)	0.1–5.0 mg/m^3	46
111	Methanol	0.002–6.0 %	27
111L	Ethylene chlorohydrin	80–200	22
111L	Methanol	20–1000	27
111LL	Methanol	2–62	27
111TP	Methanol (automatic pump)	20–300	49
112	Ethanol	0.01–7.5 %	21
112D	Ethanol (Dosi-tube)	100–25000	36
112L	Ethanol	50–2000	21
113	Isopropyl alcohol	0.02–5.0 %	26
113	Propyl alcohol	0.04–2.5 %	31
113L	Ethylene glycol monobutyl ether	200–1000	22
113L	Ethylene glycol monoethyl ether	110–1000	22
113L	Ethylene glycol monomethyl ether	75–760	22
113L	Ethylene glycol monomethyl ether acetate	17.5–430	22
113L	Isopropyl alcohol	20–800	26
113L	Propyl alcohol	130–560	31
113L	Vinyl trimethoxysilane	6.5–25.0	35
113LL	1-Methoxy-2-propanol	26–260	27
113LL	Ethylene glycol monobutyl ether	60–400	22
113LL	Ethylene glycol monoethyl ether	46–460	22
113LL	Ethylene glycol monomethyl ether	44–440	22
113LL	Isopropyl alcohol	20–460	26
113LL	Propyl alcohol	55–170	31
113TP	Isopropyl alcohol (automatic pump)	20–400	49
114	1,2-Dimethoxyethane	100–1030	20
114	1-Butanol	10–150	15
115	2-Butanol	5–150	15
116	Isobutyl alcohol	3.7–150	26
117	Isoamyl alcohol	5–300	26
118	Cyclohexanol	5–100	18
119	Methylcyclohexanol	5–100	28
120	Aromatic hydrocarbons	0.4–200	14

Tube No.	Gas or vapour	Range (ppm)	Page
121	Benzene	2.5–120	15
121	Diisobutylene	45–540	20
121	α-Pinene	140–1680	31
121L	Benzene	0.1–65	15
121L	Methyl iodide	0.32–32	28
121L	Methylene iodide	0.22–22	28
121P	Benzene (automatic pump)	250–3000 µg/m^3	48
121S	Benzene	2–312	15
121SL	Benzene	1–100	15
121SP	Benzene	0.2–66	15
121TP	Benzene (automatic pump)	0.1–14.5	48
122	Ethyl benzene	11–330	22
122	Toluene	4–600	33
122DL	Benzene (Dosi-tube)	2.4–600	36
122DL	Cumene (Dosi-tube)	3.4–850	36
122DL	Ethyl benzene (Dosi-tube)	2.8–700	37
122DL	Styrene (Dosi-tube)	26–6500	37
122DL	Toluene (Dosi-tube)	2–500	37
122DL	Xylene (Dosi-tube)	3.4–850	38
122L	Cumene	2–100	18
122L	Diethyl benzene	2–150	20
122L	Ethyl benzene	1–70	22
122L	Toluene	0.82–100	33
122L	Xylene	2–200	35
122P	Ethyl benzene (automatic pump)	110–2750 µg/m^3	48
122P	Toluene (automatic pump)	100–7000 µg/m^3	49
122P	Xylene (automatic pump)	540–13 500 µg/m^3	49
122TP	Toluene (automatic pump)	2–80	49
123	Trimethyl benzene	10–300	34
123	Xylene	4–900	35
123L	Xylene	2–220	35
123TP	Xylene (automatic pump)	2–80	49
124	Styrene	10–1500	32
124L	Divinyl benzene	1–15	21
124L	Styrene	2–100	32
124S	Styrene (automatic pump)	0.2–4.0	49
126	Chlorobenzene	2–500	17
126L	Chlorobenzene	0.5–57	17
127	m-Dichlorobenzene	2.5–300	19
127	o-Dichlorobenzene	2.5–300	19
127	p-Dichlorobenzene	2.5–300	19
127P	p-Dichlorobenzene (automatic pump)	100–3000 µg/m^3	48
128	Stoddard solvent	50–8000 mg/m^3	32
130L	Vinylidene chloride	0.4–40.6	35
131	Vinyl chloride	0.025–2 %	35
131L	1,1,2,2-Tetrachloroethane	2–30	33
131L	Allyl chloride	3.2–48	14
131L	Vinyl chloride	0.1–6.9	35
131La	1,2,4-Trichlorobenzene	0.65–13	33
131La	1,3-Dichloropropene	0.5–10	19

Tube No.	Gas or vapour	Range (ppm)	Page
131La	2-Methyl allyl chloride	2.8–55	27
131La	Ethyl chloroformate	7–140	22
131La	Methyl chloroformate	58–1160	28
131La	p-Ethyl benzylchloride	2.5–50	22
131La	Propylene dichloride	40–800	31
131La	Vinyl chloride	0.25–54	35
131LB	Vinyl chloride	0.4–70	35
131P	Vinyl chloride (automatic pump)	50–1500 µg/m^3	49
131TP	Vinyl chloride (automatic pump)	0.2–9.6	49
132D	1,2-Dichloroethylene (Dosi-tube)	6–600	36
132D	Chlorine (Dosi-tube)	2.4–240	36
132D	Hydrogen chloride (Dosi-tube)	1.8–180	37
132D	Tetrachloroethylene (Dosi-tube)	1.5–150	37
132D	Trichloroethylene (Dosi-tube)	3–300	37
132HA	1,2-Dichloroethylene	80–800	19
132HA	1,3-Dichloropropene	45–450	19
132HA	Trichloroethylene	20–1300	34
132HH	Tetrachloroethylene	0.075–1.5 %	33
132HH	Trichloroethylene	0.05–2.5 %	34
132L	Benzyl chloride	1.6–20	15
132L	Trichloroethylene	0.8–90	34
132LL	1,2-Dichloroethylene	0.375–6.0	19
132LL	Dichlorvos	0.11–1.8	20
132LL	Trichloroethylene	0.125–8.8	34
132M	Trichloroethylene	2–270	34
132P	Trichloroethylene (automatic pump)	20–1200 µg/m^3	49
132TP	Trichloroethylene (automatic pump)	1–33	49
133D	Tetrachloroethylene (Dosi-tube)	3–150	37
133HA	Tetrachloroethylene	7.4–900	33
133L	Pentachloroethane	40–500	30
133L	Tetrachloroethylene	1–75	33
133LL	Tetrachloroethylene	0.1–6.6	33
133M	Tetrachloroethylene	2–220	33
133P	Tetrachloroethylene (automatic pump)	20–720 µg/m^3	49
133TP	Tetrachloroethylene (automatic pump)	2.5–84	49
134	Carbon tetrachloride	0.5–60	17
134	Chloropicrin	2.5–60	18
134L	Carbon tetrachloride	0.25–11	17
134L	Chloropicrin	0.28–5.5	18
135	1,1,1-Trichloroethane (Methyl chloroform)	100–2000	34
135	1,1,2-Trichloroethane	220–750	34
135	1,1-Dichloroethane	90–450	19
135	Chlorobromomethane	22–110	18
135	Ethylene dichloride	400–2000	22
135L	1,1,1-Trichloroethane (Methyl chloroform)	6–900	34
135L	1,1,2,2-Tetrabromoethane	0.92–9.2	32
135L	1,2,3-Trichloropropane	36–360	34
135L	Ethylene dichloride	104–1040	22

Tube No.	Gas or vapour	Range (ppm)	Page
136H	Chlorobromomethane	18–270	18
136H	Ethylene dibromide	14–210	22
136H	Methyl bromide	10–600	27
136H	n-Butyl bromide	24–360	15
136L	1,1-Dibromoethane	7–70	19
136L	Benzyl bromide	11–100	15
136L	Bromoform	1–50	15
136L	Chlorobromomethane	11–110	18
136L	Dibromomethane	5–50	19
136L	Ethyl bromide	2.5–200	22
136L	Ethylene dibromide	8–80	22
136L	Methyl bromide	2.5–200	27
136L	n-Butyl bromide	10–100	15
136LA	Chlorobromomethane	0.7–12.6	18
136LA	Methyl bromide	1–36	27
136LA	n-Butyl bromide	1–43.2	15
136LA	n-Propyl bromide	1–18	31
136LL	Methyl bromide	0.1–3.0	27
137	Chloroform	4–400	18
137LA	Chloroform	0.5–30	18
137LL	Chloroform	0.3–4.5	18
138	Ethyl chloride	15–150	22
138	Methylene chloride	30–500	28
138L	Methylene chloride	4–150	28
139	1,2-Dichloroethylene	5–250	19
140	Aliphatic hydrocarbons	6–3000	14
141	Ethyl acetate	0.1–1.5 %	21
141	Vinyl acetate	0.06–0.9 %	35
141L	2-Hexyl alcohol	168–1680	24
141L	Cymene	2.4–96	18
141L	Diisopropyl benzene	16–108	20
141L	Ethyl acetate	20–800	21
141L	Ethyl acrylate	8.4–336	21
141L	Isopropyl ether	17.6–704	26
141L	Mesityl oxide	72–1080	27
141L	Methyl acrylate	7.2–288	27
141L	Methyl isothiocyanate	5.4–216	28
142	Butyl acetate	0.05–0.8 %	15
142L	Butyl acetate	10–300	15
142L	Butyl acrylate	7–210	15
142L	Diethyl ketone	5–513	20
142L	Isobutyl acrylate	5.5–165	26
142L	Methyl isopropyl ketone	18–300	28
143	Vinyl acetate	5–250	35
144	Isobutyl acetate	10–300	26
145	Propyl acetate	20–500	31
146	Isopropyl acetate	10–500	26
147	Amyl acetate	10–200	14
148	Isoamyl acetate	10–200	26
149	Allyl isothiocyanate	4.4–88	14

Tube No.	Gas or vapour	Range (ppm)	Page
149	Methyl methacrylate	10–500	29
151	Acetone	0.05–2.0 %	13
151	Cyclohexene	0.05–0.8 %	18
151D	Acetaldehyde (Dosi-tube)	4–1200	36
151D	Acetone (Dosi-tube)	5–1500	36
151D	Methyl ethyl ketone (Dosi-tube)	6.5–1950	37
151D	Methyl isobutyl ketone (Dosi-tube)	11.5–3450	37
151L	Acetone	50–12 000	13
151L	Methyl ethyl ketone	21–1680	28
151L	Propionaldehyde	24–1880	31
151TP	Acetone (automatic pump)	25–800	48
152	Methyl ethyl ketone	0.02–0.6 %	28
152D	Acetaldehyde (Dosi-tube)	1.2–360	36
152D	Acetone (Dosi-tube)	1.4–420	36
152D	Methyl ethyl ketone (Dosi-tube)	2–600	37
152D	Methyl isobutyl ketone (Dosi-tube)	4–1200	37
152L	Methyl ethyl ketone	10–384	28
152TP	Methyl ethyl ketone (automatic pump)	20–300	49
153	Methyl isobutyl ketone	0.05–0.6 %	28
153	Styrene	0.15–2.3 %	32
153L	Methyl isobutyl ketone	2.5–130	28
154	Cyclohexanone	2–72	18
154	Diacetone alcohol	2–100	19
154	Furfural	2–30	23
154	Isophorone	2–30	26
155	Methylcyclohexanone	2–80	28
159	1,4-Dioxane	25–144	21
159	Tetrahydrofuran	25–800	33
159L	Tetrahydrofuran	5–232	33
161	Ethyl ether	0.04–1.0 %	23
161	Isopropyl ether	0.018–0.45 %	26
161	Methyl ether	0.034–0.85 %	28
161	Tetrahydrofuran	0.056–1.4 %	33
161	Toluene	0.02–0.8 %	33
161L	Ethyl ether	10–1120	23
163	1,4-Dioxane	0.1–6.0 %	21
163	Ethylene oxide	0.05–3.0 %	22
163	Propylene oxide	0.065–3.9 %	32
163L	Epichlorohydrin	1.2–120	21
163L	Ethylene oxide	0.4–550	22
163L	Propylene oxide	1–100	32
163LL	Ethylene oxide	0.1–10	22
163TP	Ethylene oxide (automatic pump)	0.1–5.0	48
163TPM	Ethylene oxide (automatic pump)	1–50	48
165L	Ethylene glycol	10–100 mg/m^3	22
166	Methyl isothiocyanate	39.8–1766	28
166	Methyl tert-butyl ether	10–660	27
171	1,1,1-Trichloroethane (Methyl chloroform)	0.06–1.2 %	34
171	Acetylene	0.05–4.0 %	13

Tube No.	Gas or vapour	Range (ppm)	Page
171	Benzene	0.03–0.6 %	15
171	Ethylene	0.1–2.0 %	22
172	Acetylene	32.5–1040	13
172	Ethylene	25–1680	22
172L	Ethylene	0.2–100	22
174	1,3-Butadiene	50–800	15
174	1,3-Pentadiene	250–4000	30
174D	1,3-Butadiene (Dosi-tube)	1.3–200	36
174D	Ethylene (Dosi-tube)	1.5–240	37
174D	Isoprene (Dosi-tube)	2.5–400	37
174D	trans-1,2-Dichloroethylene (Dosi-tube)	3.8–600	36
174D	Vinyl chloride (Dosi-tube)	1.5–240	38
174L	1,3-Butadiene	2.5–100	15
174L	1,3-Pentadiene	42.5–850	30
174LL	1,3-Butadiene	0.5–5.0	15
180	2-Diethylaminoethanol	6–120	20
180	2-Dimethylaminoethanol	6.5–130	20
180	Allyl amine	6–120	14
180	Amines	5–100	14
180	Ammonia	1.5–30	14
180	Butylamine	8–160	15
180	Cyclohexylamine	7–140	18
180	Di-n-butylamine	5–100	19
180	Diethylamine	5.5–110	20
180	Diisopropylamine	5–100	20
180	Dimethylamine	5.5–110	20
180	Dimethylaminopropylamine	8–160	20
180	Dipropylamine	4–80	21
180	Ethanolamine (Monoethanolamine)	7–140	21
180	Ethylamine	5–100	22
180	Ethylenediamine	14–280	22
180	Hexylamine	9–180	24
180	Isopropyl amine	5.5–110	26
180	Methylamine	5–100	27
180	Morpholine	9–180	29
180	N,N-Dimethylethylamine	4–80	21
180	N,N-Dimethylisopropylamine	3.7–74	21
180	N-Ethyl morpholine	5–100	23
180	N-Methyl morpholine	5–100	29
180	N-Methyl pyrrolidone	30–270	29
180	Propylamine	6–120	31
180	Propylene imine	5.5–110	31
180	tert-Butylamine	5.5–110	15
180	Tetramethylenediamine	8.5–170	33
180	Triethylamine	4.5–90	34
180	Trimethylamine	3.5–70	34
180L	2-Diethylaminoethanol	0.6–12	20
180L	2-Dimethylaminoethanol	0.65–13	20
180L	Allyl amine	0.4–8	14
180L	Amines	0.5–10	14
180L	Butylamine	0.55–11	15
180L	Cyclohexylamine	0.5–10	18
180L	Di-n-butylamine	0.4–8	19
180L	Diethylamine	0.45–9	20
180L	Diethylenetriamine	0.95–19	20
180L	Diisopropylamine	0.3–6	20
180L	Dimethylamine	0.45–9	20
180L	Dimethylaminopropylamine	0.6–12	20
180L	Dipropylamine	0.35–7	21
180L	Ethanolamine (Monoethanolamine)	1.95–39	21
180L	Ethylamine	0.45–9	22
180L	Ethylenediamine	0.9–18	22
180L	Hexamethylenediamine	1.55–31	24
180L	Hexylamine	0.65–13	24
180L	Isopropyl amine	0.45–9	26
180L	Methylamine	0.5–10	27
180L	Morpholine	0.5–10	29
180L	N,N-Dimethylethylamine	0.3–6	21
180L	N,N-Dimethylisopropylamine	0.465–9.3	21
180L	N-Ethyl morpholine	0.3–6	23
180L	N-Methyl morpholine	0.3–6	29
180L	Pentamethylenediamine	0.75–15	30
180L	Propylamine	0.5–10	31
180L	Propylene imine	0.35–7	31
180L	Tetramethylenediamine	0.8–16	33
180L	Triethylamine	0.3–6	34
180L	Trimethylamine	0.25–5	34
181	Aniline	1.25–60	14
181	N,N-Dimethylaniline	2.5–30	20
181	N-Methyl aniline	3.5–42	27
181	o-Toluidine	5–60	33
182	4-Methyl pyridine	0.38–10.5	29
182	Pyridine	0.2–36.4	32
183	N,N-Dimethyl formamide	0.8–90	21
183TP	N,N-Dimethylacetamide (automatic pump)	3.0–57.5	48
183TP	N,N-Dimethylformamide (automatic pump)	0.5–30	48
184	N,N-Dimethyl acetamide	1.5–174	20
185	Dimethylhydrazine	0.1–2	21
185	Hydrazine	0.04–2	24
185	Methyl hydrazine	0.6–12	28
191	Acrylonitrile	2–384	14
191	Propionitrile	50–1200	31
191L	2-Methyl-3-butenenitrile	0.4–12	27
191L	2-Pentenenitrile	0.24–7.2	30
191L	3-Pentenenitrile	0.4–12	30
191L	Acrylonitrile	0.1–18	14
191L	Butyronitrile	6–180	16
191TP	Acrylonitrile (automatic pump)	0.2–12.6	48
192	Methacrylonitrile	0.2–32	27

Tube No.	Gas or vapour	Range (ppm)	Page
193	2-Pentenenitrile	0.5–15	30
211	Sulphide ion in solution	1–100	45
211H	Sulphide ion in solution	10–1000	45
211LL	Sulphide ion in solution	0.5–20	45
211M	Sulphide ion in solution	2–300	45
218	Ozone in solution	1–10 mg/L	45
221L	Bromide ion in solution	55–2200 mg/L	45
221L	Chloride ion in solution	25–1000 mg/L	45
221LL	Bromide ion in solution	24–480 mg/L	45
221LL	Chloride ion in solution	10–200 mg/L	45
222	Free residual chlorine	0.1–10 mg/L	45
230	Methyl iodide	0.5–108	28
230H	Methyl iodide	100–34 800	28
231	Sulphuryl fluoride (Pyrotec)	1–20	42
232	Ethylene dichloride	1–39	22
233	Chloropicrin	0.045–22	18
234L	Methyl isothiocyanate	0.07–25	28
271	Mercury in solution	1–20 mg/L	45
273	Chromium(VI) in solution	0.5–50 mg/L	45
281	Iron in solution	5–50 mg/L	45
284	Copper in solution	1–20 mg/L	45
285	Zinc in solution	3–20 mg/L	45
291	Nickel in solution	5–50 mg/L	45

CHAPTER 13

Contacts

Ordering and support

ANALYT-MTC Messtechnik GmbH

German Headquarters

Klosterrunsstraße 18, 79379 Müllheim
Germany

+49 7631 5545

info@analyt-mtc.de

French Subsidiary

175 Avenue d'Alsace, 68000 Colmar
France

+33 3 89 41 47 78

info@analyt-mtc.fr

www.analyt-mtc.com

When you order or ask

Please tell Analyt-MTC:

- the substance and the concentration range you expect;
- the tube number from this guide, if you know it;
- for a reading in question: the tube number, the lot number on the box, the number of pump strokes and the temperature and humidity at the time of measurement.

ANALYT-MTC Messtechnik GmbH

Sales, service and calibration

German Headquarters
Klosterrunsstraße 18, 79379 Müllheim
Germany
+49 7631 5545
info@analyt-mtc.de

French Subsidiary
175 Avenue d'Alsace, 68000 Colmar
France
+33 3 89 41 47 78
info@analyt-mtc.fr

www.analyt-mtc.com

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