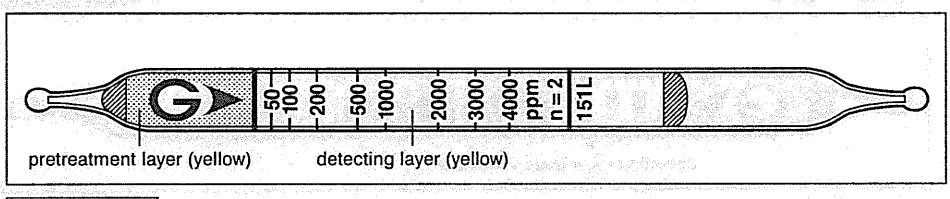
Acetone CH_3COCH_3 No.151L



Performance

Measuring range	50 to 4000 ppm	4000 to 12000 ppm
Number of pump strokes	2 (200 ml)	1 (100 ml)
Correction factor	1	3
Sampling time	4 min	2 min

Detecting limit : 5 ppm (2 pump strokes)
Colour change : Yellow → Red
Corrections for temperature & humidity : Temperature correction is necessary.
Relative standard deviation : 15 %(for 50 to 500 ppm), 10 %(for 500 to 4000 ppm)
Shelf life : 2 years (in the refrigerator)

Reaction principle

$3CH_3COCH_3 + (NH_2OH)_3H_3PO_4 \rightarrow H_3PO_4$
H_3PO_4 + Base → Phosphate

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Acetaldehyde	≧ 1/10	+	Red
Acrolein	≧ 1/10	+	
Methyl ethyl ketone		+	
Methyl isobutyl Ketone		+	
Aromatic hydrocarbons		No	No

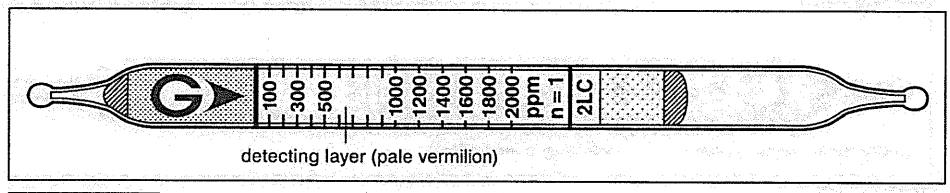
Other substances measurable with this detector tube

Substance	Correction	No. of pump strokes	Measuring range
Methyl ethyl ketone	Factor : 0.42	5	21 to 1680 ppm
Propionaldehyde	Factor : 0.47	2	24 to 1880 ppm

Calibration gas generation

Diffusion tube method

Carbon Dioxide CO_2 No.2LC



Performance

Measuring range	100 to 2000 ppm	2000 to 4000 ppm
Number of pump strokes	1 (100 ml)	1/2 (50 ml)
Correction factor	1	2
Sampling time	2 min	1 min

Detecting limit : 20 ppm (1 pump stroke)
Colour change : Pale vermilion → Orange
Corrections for temperature & humidity : Unnecessary
Relative standard deviation : 10 %(for 100 to 600 ppm), 5 %(for 600 to 2000 ppm)
Shelf life : 2 years

Reaction principle

$CO_2 + 2KOH \rightarrow K_2CO_3 + H_2O$

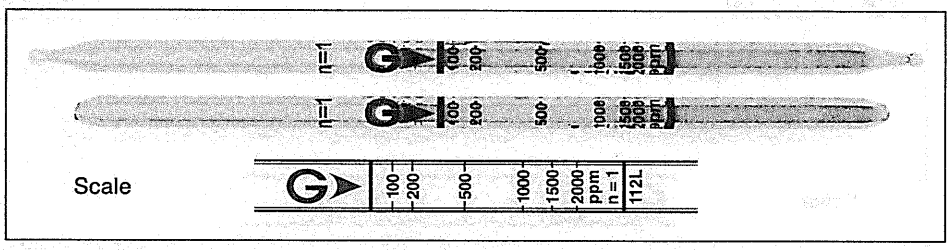
Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Ammonia	≦ 1000 ppm	No	No (≦ 1000 ppm)
Hydrogen chloride	≦ 500 ppm	No	No (≦ 500 ppm)
Chlorine	≦ 20 ppm	No	No (≦ 10 ppm)
Hydrogen cyanide	≦ 100 ppm	No	No (≦ 50 ppm)
Hydrogen sulphide	≦ 100 ppm	No	No (≦ 50 ppm)
Sulphur dioxide	≦ 25 ppm	No	No (≦ 25 ppm)
Nitrogen dioxide	≦ 20 ppm	No	No (≦ 20 ppm)

Calibration gas generation

High pressure gas cylinder method

Ethanol C_2H_5OH No.112L



Performance

Measuring range	50 to 100 ppm	100 to 2000 ppm
Number of pump strokes	2 (200 mL)	1 (100 mL)
Correction factor	1/2	1
Sampling time	4 min	2 min

Detecting limit : 15 ppm (2 pump strokes)
Colour change : Pale vermilion → Pale blue
Operating conditions : Temperature 0 to 40 °C (32 to 104 °F) correction used
Relative humidity 20 to 90 % correction not used
Relative standard deviation : 10 %(for 100 to 500 ppm), 5 %(for 500 to 2000 ppm)
Tube quantity and number of tests per box : 10 tubes for 10 tests
Shelf life : 36 months

Reaction principle

$C_2H_5OH + Cr^{6+} + H_2SO_4 \rightarrow Cr^{3+}$

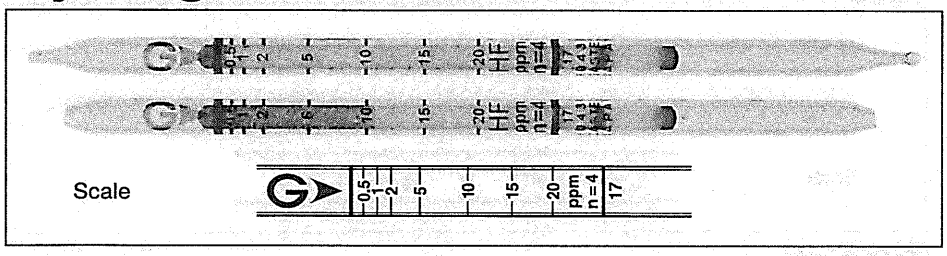
Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Alcohols		+	Pale blue
Acetone	≦ 1000 ppm	No	No (≦ 1000 ppm)
Ethyl acetate	≦ 500 ppm	No	No (≦ 500 ppm)
Toluene	≦ 300 ppm	No	No (≦ 300 ppm)
Benzene	≦ 70 ppm	No	No

Calibration gas generation

Diffusion tube method

Hydrogen Fluoride HF No.17



Performance

Measuring range	0.25 to 0.5 ppm	0.5 to 20 ppm	20 to 100 ppm
Number of pump strokes	7 (700 mL)	4 (400 mL)	1 (100 mL)
Correction factor	1/2	1	5
Sampling time	6 min	3 min	45 sec

Detecting limit : 0.1 ppm (7 pump strokes)
Colour change : Yellow → Brown
*May produce "Deep Pink" colour at higher concentration.
Operating conditions : Temperature 0 to 40 °C (32 to 104 °F) correction not used
Relative humidity 30 to 80 % correction used
Relative standard deviation : 10 % (for 0.5 to 5 ppm), 5 % (for 5 to 20 ppm)
Tube quantity and number of tests per box : 10 tubes for 10 tests
Shelf life : 36 months

Reaction principle

HF + Indicator → Reaction product

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Chlorine	≧ 1/10	+	Brown
Hydrogen chloride	≧ 1/5	+	
Nitric acid	≧ 1/5	+	
Nitrogen dioxide	≧ 1/10	+	

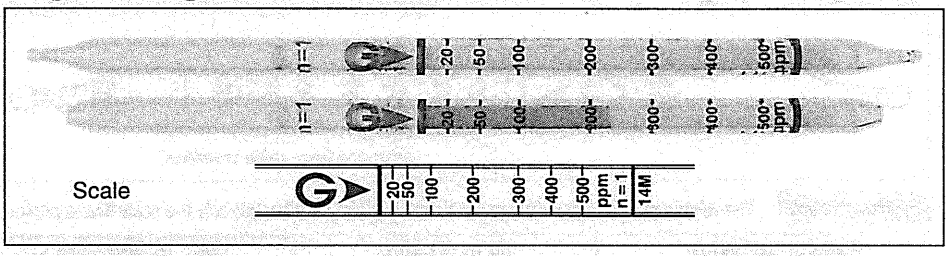
Other substance measurable with this detector tube

Substance	Correction Factor	Pump strokes	Temperature	Absolute Humidity	Colour Change
Fluorine	2.5	1	20 °C (68 °F)	9mg/L	Produces brown stain
	1.0	1	20 °C (68 °F)	3mg/L	Produces a brown ring stain

Calibration gas generation

Permeation tube method

Hydrogen Chloride HCl No.14M



Performance

Measuring range	10 to 20 ppm	20 to 500 ppm	500 to 1000 ppm
Number of pump strokes	2 (200 mL)	1 (100 mL)	1/2 (50 mL)
Correction factor	1/2	1	2
Sampling time	1.5 min	45 sec	30 sec

Detecting limit : 2.5 ppm (2 pump strokes)
Colour change : Yellow → Red
Operating conditions : Temperature 0 to 40 °C (32 to 104 °F) correction not used
Relative humidity 0 to 90 % correction not used
Relative standard deviation : 10 %(for 20 to 100 ppm), 5 %(for 100 to 500 ppm)
Tube quantity and number of tests per box : 10 tubes for 10 tests
Shelf life : 36 months

Reaction principle

HCl + Base → Chloride

Possible coexisting substances and their interferences

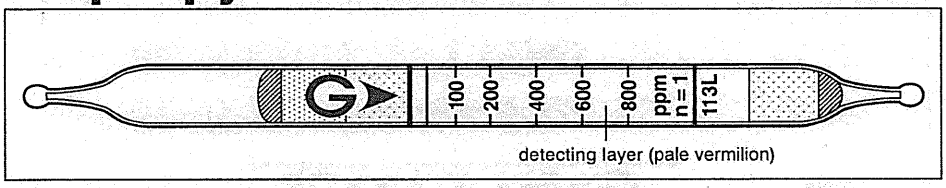
Substance	Concentration	Interference	Changes colour by itself to
Hydrogen fluoride	≦ 600 ppm	No	Red (≧ 600 ppm)
Nitric acid	≧ 1/10	+	Red
Nitrogen dioxide	≦ 1/2	No	Red (≧ 500 ppm)

Water vapour and up to 600 ppm of hydrogen fluoride are trapped in the pretreatment (white) layer.

Calibration gas generation

High pressure gas cylinder method

Isopropyl Alcohol $CH_3CH(OH)CH_3$ or $i\text{-}C_3H_7OH$ No. 113L



Performance The minimum scale value (50ppm) is not printed on the tube, but only the scale line is printed.

Measuring range	20 to 50 ppm	(50) to 800 ppm
Number of pump strokes	2 (200 ml)	1 (100 ml)
Correction factor	0.4	1
Sampling time	4 min	2 min

Detecting limit : 15 ppm (2 pump strokes)
Colour change : Pale vermilion → Pale blue
Corrections for temperature & humidity : Temperature correction is necessary.
Relative standard deviation : 10 %(for 50 to 200 ppm), 5 %(for 200 to 800 ppm)
Shelf life : 3 years

Reaction principle

$CH_3CH(OH)CH_3 + Cr^{6+} + H_2SO_4 \rightarrow Cr^{3+}$

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Alcohols		+	Pale blue
Acetone	≦ 1200 ppm	No	No (≦1200 ppm)
Ethyl acetate	≦ 450 ppm	No	No (≦450 ppm)
Toluene	≦ 230 ppm	No	No (≦230 ppm)
Benzene	≦ 75 ppm	No	No

Other substances measurable with this detector tube

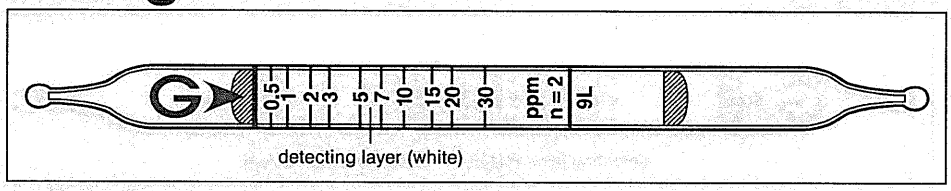
Substance	Correction	No. of pump strokes	Measuring range
Propyl alcohol	by scale	1	130 to 560 ppm
Vinyl trimethoxysilane	by scale	2	6.5 to 25.0 ppm
Divinyl methoxysilane	by scale	2	6.5 to 25.0 ppm
Ethylene glycol MME	by scale	2	75 to 760 ppm
Ethylene glycol MEE	by scale	2	110 to 1000 ppm
Ethylene glycol MBE	by scale	2	200 to 1000 ppm
Ethylene glycol MMEAc (2-Methoxyethyl acetate)	by scale	2	300 to 1300 ppm

MBE : monobutyl ether, MEE : monoethyl ether
MME : monomethyl ether, MMEAc : monomethyl ether acetate

Calibration gas generation

Diffusion tube method

Nitrogen Dioxide NO_2 No.9L



Performance

Measuring range	0.5 to 30 ppm	30 to 125 ppm
Number of pump strokes	2 (200 ml)	1 (100 ml)
Correction factor	1	by scale
Sampling time	1 min	30 sec

Detecting limit : 0.1 ppm (2 pump strokes)
Colour change : White → Yellowish orange
Corrections for temperature & humidity : Unnecessary
Relative standard deviation : 10 % (for 0.5 to 10 ppm), 5 % (for 10 to 30 ppm)
Shelf life : 3 years

Reaction principle

NO_2 + o-Tolidine → Nitroso-o-Tolidine

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Bromine, Chlorine	≧ 1/5	+	Yellowish orange
Nitric oxide	≧ 50 ppm	Unclear demarcation	Pale red
Ammonia		No	No
Carbon dioxide		No	
Carbon monoxide		No	
Organic gases and vapour		No	
Sulphur dioxide	≧ 10 ppm	− (Bleaching)	

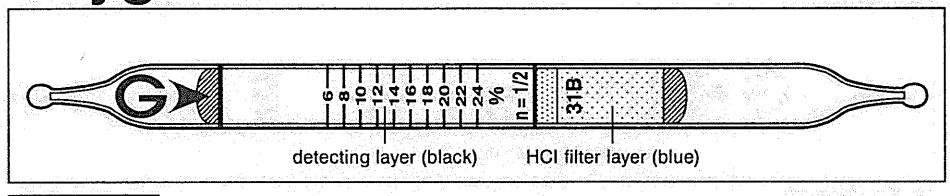
Other substance measurable with this detector tube

Substance	Correction	No. of pump strokes	Measuring range
Iodine	Factor : 0.4	2	0.2 to 12 ppm

Calibration gas generation

Permeation tube method

Oxygen O_2 No.31B



Performance

Measuring range	3 to 6 %	6 to 24 %
Number of pump strokes	1 (100 ml)	1/2 (50 ml)
Correction factor	1/2	1
Sampling time	1 min	30 sec

Detecting limit : 2 % (1 pump stroke)
Colour change : Black → White
Corrections for temperature & humidity : Unnecessary
Relative standard deviation : 5 % (for 6 to 24 %)
Shelf life : 3 years

Reaction principle

$O_2 + 4TiCl_3 + 6H_2O \rightarrow 4TiO_2 + 12HCl$

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Carbon dioxide	≧ 40%	+	No
Carbon monoxide		No	

Hydrogen chloride is trapped in the HCl filter layer.

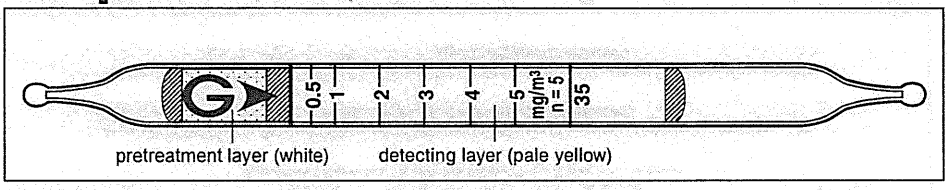
Calibration gas generation

Dynamic gas dilution method

Special note

If more than 40% carbon dioxide is coexisted, the tube reading will be 1% higher than the true concentration. (At 21% oxygen concentration tube 31B indicates 22%)

Sulphuric Acid H_2SO_4 No.35



Performance

Measuring range	0.5 to 5 mg/m³
Number of pump strokes	5 (500 ml)
Correction factor	1
Sampling time	5 min

Detecting limit : 0.2 mg/m³ (5 pump strokes)
Colour change : Pale yellow → Reddish purple
Corrections for temperature & humidity : Temperature correction is necessary.
Relative standard deviation : 10 % (for 0.5 to 2 mg/m³), 5 % (for 2 to 5 mg/m³)
Shelf life : 2 years

Reaction principle

$H_2SO_4 + BaCl_2 \rightarrow 2HCl$
HCl + Base → Chloride

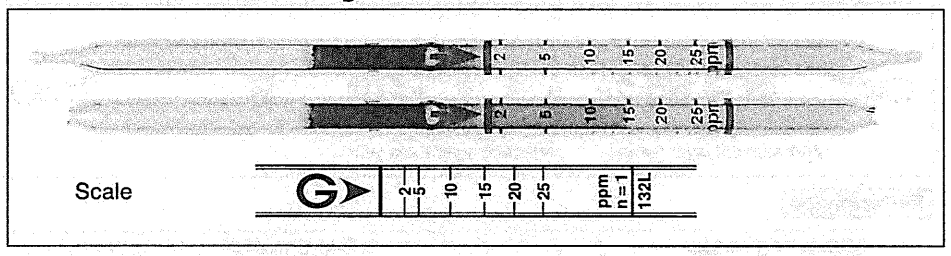
Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Hydrogen chloride	≧ 0.05ppm	+	Reddish purple
Chlorine	≧ 1.5ppm	+	
Sulphur dioxide		No	No
Nitrogen dioxide	≧ 4 ppm	+	Reddish purple
Hydrogen fluoride	≧ 0.5 ppm	+	

Calibration gas generation

Bubbling method

Trichloroethylene $Cl_2C{:}CHCl$ No.132L



Performance

Measuring range	0.8 to 2 ppm	2 to 25 ppm	25 to 90 ppm
Number of pump strokes	2 (200 mL)	1 (100 mL)	1/2 (50 mL)
Correction factor	0.4	1	3.6
Sampling time	1.5 min	45 sec	30 sec

Detecting limit : 0.4 ppm (2 pump strokes)
Colour change : Yellow → Purple
Operating conditions : Temperature 0 to 40 °C (32 to 104 °F) correction used
Relative humidity 0 to 90 % correction not used
Relative standard deviation : 10 % (for 2 to 5 ppm), 5 % (for 5 to 25 ppm)
Tube quantity and number of tests per box : 10 tubes for 10 tests
Shelf life : 30 months (in the refrigerator)

Reaction principle

$Cl_2C{:}CHCl + PbO_2 + H_2SO_4 \rightarrow HCl$
$HCl + Base \rightarrow Chloride$

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Bromine, Chlorine		+	Purple
Hydrogen chloride		+	
Unsaturated halogenated hydrocarbons		+	
Acetone	≦ 200 ppm	No	No
Aromatic hydrocarbons	≧ 100 ppm	−	
Nitric oxide		No	
Nitrogen dioxide		No	

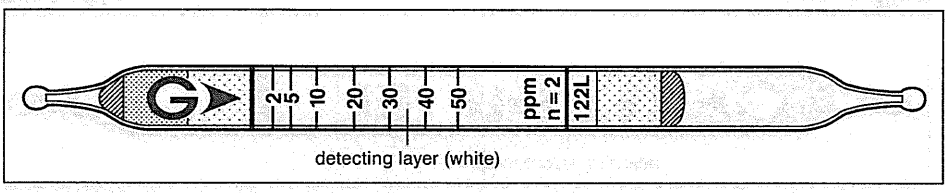
Other substance measurable with this detector tube

Substance	Correction	No. of pump strokes	Measuring range
Benzyl chloride	Factor : 0.8	2	1.6 to 20 ppm

Calibration gas generation

Diffusion tube method

Toluene $C_6H_5CH_3$ No.122L



Performance

Measuring range	1 to 2 ppm	2 to 50 ppm	50 to 100 ppm
Number of pump strokes	4 (400 ml)	2 (200 ml)	1 (100 ml)
Correction factor	1/2	1	2
Sampling time	6 min	3 min	1.5 min

Detecting limit : 0.5 ppm (4 pump strokes)
Colour change : White → Brown
Corrections for temperature & humidity : Unnecessary
Relative standard deviation : 10 % (for 2 to 20 ppm), 5 % (for 20 to 50 ppm)
Shelf life : 3 years

Reaction principle

$C_6H_5CH_3 + I_2O_5 + H_2SO_4 \rightarrow I_2$

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Aromatic hydrocarbons		+	Brown
Acetylene, Ethylen, Hexane		No	No
Alcohols,Esters,Ketones		No	

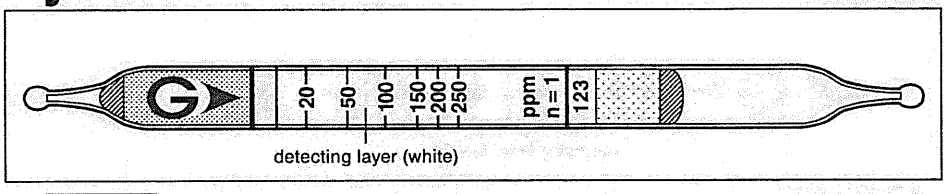
Other substances measurable with this detector tube

Substance	Correction	No. of pump strokes	Measuring range
Cumene	by scale	2	2 to 100 ppm
Diethyl benzene	by scale	4	2 to 150 ppm
Ethyl benzene	by scale	2	1 to 70 ppm
Xylene	Factor : 4	1	100 to 200 ppm
	Factor : 2	2	4 to 100 ppm
	Factor : 1	4	2 to 4 ppm

Calibration gas generation

Diffusion tube method

Xylene $C_6H_4(CH_3)_2$ No.123



Performance The minimum scale value (10ppm) is not printed on the tube, but only the scale line is printed.

Measuring range	5 to 10 ppm	(10) to 250 ppm	250 to 625 ppm
Number of pump strokes	2 (200 ml)	1 (100 ml)	1/2 (50 ml)
Correction factor	1/2	1	2.5
Sampling time	3 min	1.5 min	1 min

Detecting limit : 1 ppm (2 pump strokes)
Colour change : White → Brown
Corrections for temperature & humidity : Unnecessary
Relative standard deviation : 10 %(for 10 to 50 ppm), 5 %(for 50 to 250 ppm)
Shelf life : 3 years

Reaction principle

$C_6H_4(CH_3)_2 + I_2O_5 + H_2SO_4 \rightarrow I_2$

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Changes colour by itself to
Toluene	≧ 1/5	+	Brown
Acetylene, Hexane	≧ 2000 ppm	+(Two layers)	Pale brown (Whole layer)
Carbon monoxide	≧ 1000 ppm	+(Two layers)	
Benzene	≧ 1/5	+	Pale yellow

Other substance measurable with this detector tube

Substance	Correction	No. of pump strokes	Measuring range
Trimethylbenzene	by scale	2	10 to 300 ppm

Calibration gas generation

Diffusion tube method

Pre- qualification criteria

Material: Gastec Gas Detector Tube:- Acetone, Carbon Dioxide, Ethanol, Hydrogen Fluride, Hydrogen Chloride, Isopropyl Alchol, Nitrogen Dioxide, Oxygen, Sulphuric Acid, Trichlorethylene, Toluene, Xylene

The Bidder should submit the following documents along with the Quotation, in order to consider the offer. Offer without the following documents will be rejected.

Sl.No	DESCRIPTION	Vendor to confirm	Vendor's Reply (To be filled)
1	The vendor should enclose a purchase order copy from 1st Jan 2018 (01.012018) against their experience for the supply of Gastec Tubes.	Yes/No	

Delivery Period

Sl.No	DESCRIPTION	Vendor to confirm	Vendor's Reply (To be filled)
1	Delivery Schedule- 100% Quantity shall be delivered within 90 days from the date of PO.	Yes/No	

INDENTER SIGN

22/03/2022

Dr. B. RAJKUMAR
SR. DY. GENERAL MANAGER
NATIONAL MODEL CENTRE FOR
OCCUPATIONAL HEALTH SERVICES
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