Instruction for Use
Microgen GN A + B ID System

Cat. No.: MID64; MID65

PERFORMANCE TESTED
AOAC
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GOLD STANDARD DIAGNOSTICS

MICROGEN
BIOPRODUCTS

GOLD STANDARD DIAGNOSTICS

MICROGEN BIOPRODUCTS

MICROGEN GN A+B ID

Quick Reference

	GN A	GN A+B	GN A+B
OXIDASE	**NEGATIVE**	**NEGATIVE**	**POSITIVE**
INOCULUM	1 colony in 3ml saline	1 colony in 5ml saline	1 colony in 5ml saline Add 1 drop sterile horse serum /ml saline if ***Actinobacillus*** or ***Pasteurella spp.*** suspected.
INOCULATION	3-4 drops (100µl) per well	3-4 drops (100µl) per well	3-4 drops (100µl) per well
OVERLAY WITH OIL	Well 1 – Lysine Well 2 – Ornithine Well 3 – H_2S Well 9 - Urease	Wells 1, 2, 3 and 9 plus **Well 20 – Arabinose** Well 24 – Arginine	**Wells 1, 2, 3 and 9 plus** Well 24 – Arginine
INCUBATION TIME	18 - 24 hours	18 - 24 hours	48 hours
TEMPERATURE	35 - 37°C	35 - 37°C	35 - 37°C (25°C for ***Ps. fluorescens***)
INITIAL READINGS	Well 8: Indole - Add 2 drops Kovac's reagent. Read after 60 seconds		
ADDITION OF REAGENTS	Well 10: VP – Add 1 drop VPI reagent and 1 drop VPII reagent. Read after 15-30mins Well 12: TDA – Add 1 drop of TDA reagent and read after 60 seconds	As for GN A Gelatin: Interpret at 24 hours Well 24: Arginine - Yellow = Negative Green/Blue = Positive	As for GN A Well 7 – record ONPG result. Add 1 drop Nitrate A+1 drop Nitrate B – read after 60 seconds Gelatin – interpret at 48 hours Well 24: Arginine - Yellow = Negative Blue = Positive
FINAL READING (Optional Microgen Software)			

Note: A black circle around the top of a well indicates a well requiring the addition of mineral oil prior to incubation. A broken black circle around a well requires the addition of mineral oil prior to incubation only if the isolate is oxidase negative. A green circle around the top of a well indicates a well requiring addition of reagents after incubation.

Contents

1 INTRODUCTION

The Microgen GN-ID system employs 12 (GN A) or 24 (GN A+B) standardised biochemical substrates in microwells to identify the family *Enterobacteriaceae* and other non-fastidious Gram-negative bacilli (oxidase negative and positive). The kit is intended for professional laboratory use only.

2 PRINCIPLE

The Microgen GN-ID system comprises two separate microwell test strips GN A and GN B. Each Microwell test strip contains 12 standardised biochemical substrates which have been selected on the basis of extensive computer analysis (1)) of published databases for the identification of the family *Enterobacteriaceae* and commonly encountered non-fastidious oxidase positive and negative Gram-negative bacilli (2; 3; 4). The dehydrated substrates in each well are reconstituted with a saline suspension of the organism to be identified. If the individual substrates are metabolised by the organism, a colour change occurs during incubation or after addition of specific reagents (see SUBSTRATE REFERENCE TABLE). The permutation of metabolised substrates can be interpreted using the Microgen Identification System Software (MID60) to identify the test organism.

The GN A microwell test strip is intended for the identification of oxidase negative, nitrate positive glucose fermenters comprising the most commonly occurring genera of the family *Enterobacteriaceae*. The GN A and GN B microwell test strips are used together to produce a 24 substrate system to identify non-fastidious Gram-negative bacilli (oxidase negative and positive) in addition to all currently recognised species of the family *Enterobacteriaceae* (28 genera) - see data tables.

THE GN B MICROWELL TEST STRIP IS DESIGNED TO BE USED IN CONJUNCTION WITH THE GN A STRIP AND NOT ON ITS OWN.

3 REAGENTS

GN-ID A Panel Contents (60 tests)

- 60 GN-A ID microwell test strips (microwell test strips containing 12 biochemical substrates)
- Result forms
- Holding frame microwell test strip

GN-ID B Panel Contents (24 tests)

- 24 GN-B ID microwell test strips (microwell test strips containing 12 biochemical substrates to be used with GN A microwell test strip for identification of GN B organisms).

Additional Materials Required (**not supplied in the kit**)

To ensure the correct colour response items b-g should be purchased from Gold Standard Diagnostics, see catalogue numbers (MID61X) specified below:

a. Microgen Identification System Software (MID60)
b. Oxidase Strips (5), recommended MID61G
c. Mineral Oil, recommended MID61H
d. VP I and VP II Reagents (6), recommended MID61C and MID61D
e. Nitrate A and B Reagents, only in combination with MID65 (7), recommended MID61A and MID61B
f. TDA Reagent (8), recommended MID61E
g. Kovacs's Reagent (9), recommended MID61F
h. Colour chart for reading results (included in IFU)
i. Sterile 0.85% saline
j. Sterile pipettes and bacteriological loops
k. Incubator, not fan-assisted (35-37°C)
l. Motility medium

m. Sterile horse serum (if *Actinobacillus spp*. or *Pasteurella spp*. are suspected)
n. Bunsen burner

4 WARNINGS AND PRECAUTIONS

4.1 SAFETY

1. This procedure uses / detects pathogenic microorganisms and / or their metabolic products. Care should be taken to avoid ingestion or inhalation of potentially infectious aerosols or contact with the skin. Laboratory personnel should follow appropriate laboratory safety precautions and have ready access to associated material safety data sheets (SDS, please refer to Gold Standard Diagnostics repository: https://www.goldstandarddiagnostics.com/document-repository). While handling pathogens, personnel should use appropriate biosafety containment (https://www.cdc.gov/labs/BMBL.html) and be provided with appropriate personal protective equipment including clothing, protective gloves and appropriate eye protection.
2. The Microgen GN A ID system is intended for use by qualified laboratory personnel (professional use only) and this kit is not intended for Clinical/ Medical purposes.
3. Take appropriate precautions when handling or disposing of potential pathogens.
4. After use, dispose of all contaminated materials by autoclaving, incineration, or immersion in an appropriate disinfectant, e.g., sodium hypochlorite at a final concentration of 3% for 30 minutes. Liquid waste containing acid must be neutralized before treatment.
5. Dispose of according to local, national, or regional regulations. The waste generated should be disposed of following the Company's infectious/pathogenic material disposal procedure.

4.2 PROCEDURAL

1. The Microgen GN-ID system should be used according to the kit instructions.
2. The microwell test strips **must not** be incubated in a CO_2 incubator.
3. Due to their more demanding nutritional requirements, *Actinobacillus spp.* and *Pasteurella spp.* will require the addition of some form of enrichment to the inoculum. The addition of 1 drop of sterile inactivated horse serum per mL of sterile saline when preparing the inoculum is recommended.
4. If *Pseudomonas fluorescens* is suspected, the microwell test strips A & B should be incubated at 25°C.
5. Incorrect incubation, inadequate filling of wells, or inadequate inoculum density may give false results.

5 STORAGE AND SHELF LIFE

The Microgen GN-A ID and Microgen GN-B ID microwell test strips are stable in unopened foil pouches at 2-8°C until the expiry date on the label. Do not freeze. Opened and partially used pouches of microwell test strips can be stored for up to 14 days at 2-8°C provided that the pouch is resealed and contains the desiccant sachets.

6 PROCEDURE

6.1 SPECIMENS

A pure 18–24-hour culture of the bacterial isolate to be identified must always be used. An oxidase test must be carried out on the isolate prior to microwell test strip inoculation.

6.2 INOCULATION AND INCUBATIONS

1. Carry out an oxidase test on the isolate. Oxidase positive organisms can only be identified by inoculating both GN A and GN B microwell test strips.
2. Emulsify a single colony from an 18-24 hours culture in 3mL sterile 0.85% saline for the GN A microwell test strip. If both GN A and GN B microwell test strips are to be inoculated, the colony should be emulsified in 3-5mL sterile 0.85% saline. Mix thoroughly.
3. Carefully peel back the adhesive tape sealing the microwell test strip (s). **Do NOT discard the sealing strip(s) as they will be required later.**
4. Using a sterile pasteur pipette, add 3-4 drops (approximately 100µL) of the bacterial suspension to each well of the microwell test strip(s).
5. As a purity check, transfer 1 drop of the bacterial suspension on to a purity plate using a non-selective differential medium. Incubate the plate aerobically at 35-37°C for 18-24 hours.
6. After inoculation, overlay wells 1,2,3 and 9 (GN A microwell test strip counting from the tabbed end) and wells 20 and 24 (GN B microwell test strip - well 13 is at the tabbed end) with 3-4 drops of mineral oil. (**Do NOT overlay well 20 if isolate is oxidase positive**).
7. These wells are highlighted with a black circle (broken black circle in the case of well 20) around the well to assist in decision making in respect of oil overlays.
8. Seal the top of the microwell test strip (s) with the adhesive tape removed earlier and incubate at 35-37°C**. Ensure that the punctures in the adhesive tape are over wells 7, 11 and 12 in the GN A strip and over well 14 in the GN B strip.**
9. The GN A and GN B microwell test strips are read after 18-24 hours of incubation for *Enterobacteriaceae*, and after 48 hours for oxidase positive isolates.

6.3 READING AND ADDITION OF REAGENTS

6.3.1 GN A STRIP

1. Remove the adhesive tape and record all positive reactions with the aid of the colour chart (included in this booklet). Record the results on the forms provided.
2. Add the appropriate reagents to the following microwells:

   a) Add 2 drops of Kovacs's reagent to well 8. Read and record the results after 60 seconds. Formation of a red colour indicates a positive result.
   b) Add 1 drop of VP I reagent and 1 drop of VP II reagent to well 10 and read after 15-30 minutes. Formation of a deep pink/red colour indicates a positive result.
   c) Add 1 drop of TDA reagent to well 12 and read after 60 seconds. Formation of a cherry red/dark brown colour indicates a positive result.

3. For oxidase positive organisms, perform the nitrate reduction test on well 7 after reading and recording the ONPG result.
   a) Add 1 drop of Nitrate A reagent and 1 drop of Nitrate B reagent to the well and read after 60 seconds. The development of a red colour indicates that nitrate has been reduced to nitrite. If well 7 remains yellow or colourless after addition of nitrate reagents, add a small amount of zinc powder. This will indicate whether nitrate has been completely reduced to nitrogen gas.
      - i.e. After addition of Nitrate A + B:
        - Red = Positive
        - Colourless/Yellow = Negative
      - After addition of zinc powder:
        - Colourless/Yellow = Positive
        - Red = Negative.
4. Record these additional results on the forms provided.

6.3.2 GN B STRIP

1. Remove the adhesive tape and record all positive reactions with the aid of the colour chart. Record the results on the forms provided.
2. Read specific well as follows:
    a. the gelatine well (no.13) must be read after 18-24 hours for *Enterobacteriaceae* and after 48 hours for oxidase positive isolates. A positive gelatine liquefaction result is indicated by black particles visible throughout the well.
    b. The arginine well is interpreted differently after 24 hours and 48 hours incubations:
        - 24 hours (*Enterobacteriaceae*)
            - Yellow = Negative
            - Green/Blue = Positive
        - 48 hours (Oxidase positive organisms)
            - Yellow/Green = Negative
            - Blue = Positive

7 IDENTIFICATION

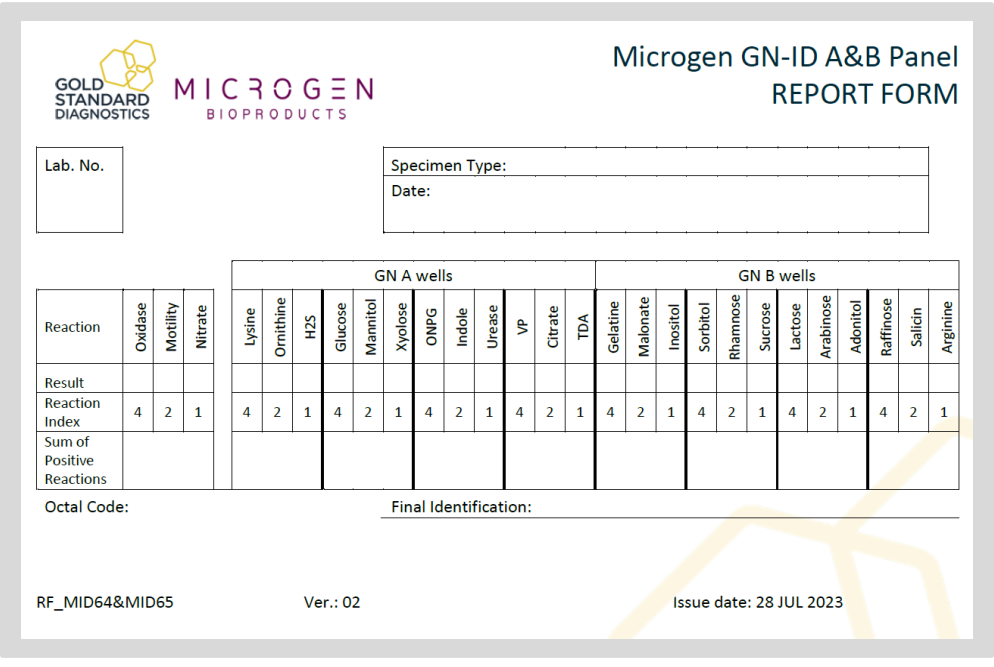
On the Microgen GN-ID A+B Report Form, the substrates have been organised into triplets (sets of 3 reactions) with each substrate assigned a numerical value (1, 2 or 4). The sum of the positive reactions for each triplet forms a single digit of the Octal Code that is used to determine the identity of the isolate. The Octal Code is entered into the Microgen Identification System Software (MID60), which generates a report of the five most likely organisms in the selected database.

The software provides an identification based on probability, % probability and likelihood with an analysis of the quality of differentiation. Full definition of these terms and an explanation of their usefulness in interpretation is provided with the software Help manual.

Note: For oxidase positive organisms (miscellaneous Gram-negative bacilli):

- Record weak reactions as negative
- The results for oxidase, nitrate reduction and motility must be included to form a 9 digit Octal Code

8 REPORT FORM



Microgen GN-ID A&B Panel
REPORT FORM

Lab. No.	Specimen Type: Date:

				GN A wells											GN B wells												
Reaction	Oxidase	Motility	Nitrate	Lysine	Ornithine	H2S	Glucose	Mannitol	Xylolose	ONPG	Indole	Urease	VP	Citrate	TDA	Gelatine	Malonate	Inositol	Sorbitol	Rhamnose	Sucrose	Lactose	Arabinose	Adonitol	Raffinose	Salicin	Arginine
Result																											
Reaction Index	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1
Sum of Positive Reactions																											

Octal Code: Final Identification:

RF_MID64&MID65 Ver.: 02 Issue date: 28 JUL 2023

Oxidase, motility and nitrate tests only need to be performed once and recorded once (for GN-ID A) because it can mis-interpreted to perform and record in both GNA and B. This would mean having a 9 or 10-digit octal code instead of a 8 or 9-digits octal code for GNA+B.

Important:
The Microgen GN-ID A microwell test strip will generate a 4 digits Octal Code.
The Microgen GN-ID A+B microwell test strips will generate an 8 digits Octal Code.
The Microgen GN-ID A+B microwell test strips will generate a 9 digits Octal Code for oxidase positive isolates.

9 LIMITATIONS OF USE

1. Results should be interpreted in the context of all available laboratory information.
2. The Microgen ID system is intended for identification of those organisms included in the database. It should not be used to identify any other bacteria.
3. Test only pure, single colonies since mixed colonies may give erroneous results.
4. Reactions obtained using Microgen GN-ID may differ from published data obtained using alternative substrate formulations or reagents.
5. Some bacterial strains may have atypical biochemical reactions and may be difficult to identify.
6. Computer generated identification results should be interpreted by suitably trained personnel.
7. When determining the final identification of an isolate, the source of the isolate, Gram staining, colonial morphology, additional tests and tests against the suggested identification should be considered.
8. Motility and nitrate tests must be performed on oxidase positive, Gram-negative bacilli. A 9 digit Octal Code is required to interpret the results using the Microgen Identification System Software.
9. The GN-ID A microwell test strip may not be able to differentiate accurately between *Klebsiella spp*, *Enterobacter spp* and *Serratia spp*. Species within these three genera may be differentiated by using GN-ID A+B. Alternatively, additional tests such as motility and DNAse tests can be used.
10. The confirmation of *Salmonella spp.* and the full identification requires the performance of serotyping. Whenever the Microgen Identification Software suggests an identification of *Salmonella*, the following additional comment will be displayed: 'Salmonella cannot be fully identified using biochemistry alone. Perform Polyvalent 'O' and 'H' slide agglutination to confirm and serotype.
11. The full identification of *Shigella spp.* requires the performance of serotyping. Whenever the Microgen Identification Software suggests an identification of *Shigella*, the following additional comment will be displayed: '*Shigella* species cannot be identified using biochemistry alone, perform serology to confirm the species type.'
12. If the Glucose reaction is negative for any isolate being identified using the oxidase negative databases, the Microgen Identification Software will display a comment stating: 'Isolate is GLUCOSE NEGATIVE – it is recommended that you check it is not OXIDASE POSITIVE'

10 QUALITY CONTROL

The performance of the Microgen GN-ID system should be monitored using appropriate control strains. The following cultures are recommended for independent laboratory assessment:

- *Acinetobacter baumannii* ATCC 19606
- *Proteus mirabilis* NCIMB 13283
- *Escherichia coli* ATCC 25922
- *P. stuartii* ATCC 49809

	GNA														GNB											
	LYS	ORN	H2S	GLU	MAN	XYL	ONP	IND	URE	VP	CIT	TDA	NIT	GEL	MAL	INO	SOR	RHA	SUC	LAC	ARA	ADO	RAF	SAL	ARG
A.baumannii ATCC 19606	-	-	-	+	-	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	-
P.mirabilis NCIMB 13283	-	+	+	+	-	+	-	-	+	+	V	+	+	+	-	-	-	-	-	-	-	-	-	-	-
E.coli ATCC 25922	+	+	-	+	+	+	+	+	-	-	-	-	+	-	-	-	+	+	-	+	+	-	-	-	+
P. stuartii ATCC 49809	-	-	-	+	-	-	-	+	-	-	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-

11 DATABASE

The Microgen GN-ID systems are based on standard biochemical testing methods. The data provided for interpretation of reaction profiles is based on established literature sources (2; 3; 4)

12 WASTE DISPOSAL

Dispose of according to any local, national, or regional regulations.

13 PRODUCT WARRANTIES, SATISFACTION GUARANTEE

Gold Standard Diagnostics Budapest ("GSDB") warrants that the products manufactured by it will be free of defects in materials and workmanship, when used in accordance with the applicable instructions before the expiration date marked on the product packaging, and when stored under the storage conditions recommended in the instructions and/or on the package.

GSDB makes no other warranty, expressed or implied.

GSDB's sole obligation shall be, at its option, to either replace or to refund the purchase price of the product(s) or part thereof that proves defective in materials or workmanship within the warranty period, provided the customer notifies GSDB promptly of any such defect within a reasonable time and with solid proof of the defect.

GSDB shall investigate the defect locally and will justify the approval or disapproval of the complaint. GSDB shall not be liable for any direct, indirect or consequential damages resulting from economic loss or property damages sustained by buyer or any customer from the use of the product(s).

A copy of the terms and conditions can be obtained on request and is also provided in our price lists.

14 IMPORTANT NOTES

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15 REFERENCES

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16 SUBSTRATE REFERENCE TABLE

Well	Reaction	Description	Positive	Negative
1	Lysine	Lysine decarboxylase - Bromothymol blue changes to green/blue indicating the production of the amine cadaverine.	Green / Blue	Yellow
2	Ornithine	Ornithine decarboxylase - Bromothymol blue changes to blue indicating the production of the amine putrescine.	Blue	Yellow / Green
3	H_2S	H_2S production - Thiosulphate is reduced to H_2S that reacts with ferric salts producing a black precipitate.	Brown/ Black	Straw
4	Glucose	Fermentation - Bromothymol blue changes from blue to yellow as a result of acid produced from the carbohydrate fermentation.	Yellow	Blue / Green
5	Mannitol			
6	Xylose			
7	ONPG	Hydrolysis - ONPG hydrolysis by B-galactosidase results in the production of yellow ortho-nitrophenol.	Yellow	Colourless
7a	NITRATE (for oxidase positive organisms)	Reduction of Nitrate to Nitrite is indicated by the formation of a red colour on addition of Nitrate A and B Reagents	Red	Colourless /yellow
7b	NITRATE (for oxidase positive organisms)	If nitrate has been completely reduced to Nitrogen, 7a will remain colourless/yellow – addition of zinc powder will confirm complete reduction	Colourless/ yellow	Red
8	Indole	Indole is produced from tryptophan and gives a pink/red complex when Kovac's reagent is added.	Pink / Red	Colourless
9	Urease	Hydrolysis of urea results in the formation of ammonia leading to an increase in pH which turns phenol red from yellow to pink / red.	V. Deep Pink	Straw to pale salmon pink colour
10	VP	Acetoin production from glucose is detected by the formation of a pink / red complex after the addition of alpha naphthol and creatine in the presence of KOH.	Deep Pink / Red	Colourless to Pale Pink

Well	Reaction	Description	Positive	Negative
11	Citrate	Utilisation of citrate (only carbon source) leading to a pH increase giving a colour change in bromothymol blue from green to blue.	Blue	Yellow/ Green
12	TDA	Indolepyruvic acid is produced from tryptophan by tryptophan deaminase giving a cherry red colour when ferric ions are added. Indole positive isolates may give a brown colour – this is a negative result.	Cherry red/dark brown	Straw colour
13	Gelatin	Proteolytic enzymes liquefy gelatin resulting in black particles being dispersed throughout the well.	Black	Colourless
14	Malonate	Inhibition of the conversion of succinic acid to fumaric acid occurs when sodium malonate is the only source of carbon. An isolate incapable of using this substrate results in the accumulation of succinic acid and the organism does not grow. A positive reaction is the result of the use of sodium malonate at the same time that ammonium sulphate is used as the nitrogen source giving sodium hydroxide which increases the alkalinity giving a blue colour.	Blue	Yellow
15	Inositol	Fermentation - Bromothymol blue changes from blue to yellow as a result of acid produced from the carbohydrate fermentation.	Yellow	Blue
16	Sorbitol			
17	Rhamnose			
18	Sucrose			
19	Lactose			
20	Arabinose			
21	Adonitol			
22	Raffinose			
23	Salicin			
24	Arginine	Arginine is converted to ornithine, ammonia and CO_2 by arginine dihydrolase resulting in an increase in pH and a change in colour of the bromothymol blue from green to blue. At 48 hours green reactions are negative.	Green-Blue	Yellow-Green

17 LIST OF SPECIES INDENTIFIED

17.1 SPECIES IDENTIFIED USING GN A MICROWELL TEST STRIP

Acinetobacter baumannii
Shigella Serogroups A,B and C
Salmonella species
Acinetobacter lwoffii
Shigella sonnei (Group D)
Salmonella typhi/ Salmonella enterica subsp. enterica serovar Typhi
Acinetobacter haemolyticus
Hafnia alvei
Salmonella cholerae-suis / Salmonella enterica subsp. enterica serovar Choleraesuis
Citrobacter freundii
Klebsiella pneumoniae
Salmonella paratyphi A / Salmonella enterica subsp. enterica serovar Paratyphi A
Citrobacter diversus/ koseri
Klebsiella oxytoca
Salmonella gallinarum / Salmonella enterica subsp. enterica serovar Gallinarum
Edwardsiella tarda
Klebsiella ozaenae
Salmonella pullorum / Salmonella enterica subsp. enterica serovar Pullorum
Enterobacter aerogenes / Klebsiella aerogenes
Klebsiella rhinoscleromatis / Klebsiella pneumoniae subsp. rhinoscleromatis
Salmonella arizonae / Salmonella enterica subsp. arizonae
Enterobacter cloacae
Morganella morganii
Serratia marcescens
Pantoea agglomerans
Proteus mirabilis
Serratia liquefaciens
Enterobacter gergoviae / Pluralibacter gergoviae
Proteus vulgaris
Serratia rubidaea
Enterobacter sakazakii / Cronobacter sakazakii
Providencia rettgeri
Yersinia enterocolitica
Escherichia coli
Providencia stuartii
Escherichia coli – inactive
Providencia alcalifaciens

17.2 SPECIES IDENTIFIED USING THE GN A + GN B MICROWELL TEST STRIPS.

In addition to the species listed above, the following species may be identified using the combined GN A + B microwell test strips.

17.2.1 OXIDASE NEGATIVE NON-FASTIDIOUS GRAM-NEGATIVE BACILLI

Acinetobacter baumannii
Acinetobacter lwoffii
Acinetobacter haemolyticus
Averyella dalhousiensis
Budvicia aquatica
Buttiauxella agrestis
Buttiauxella brennerae
Buttiauxella ferragutiae
Buttiauxella gaviniae
Buttiauxella izardi
Buttiauxalla noackiae
Butiauxella wamboldiae
Cedecea davisae
Cedecea lapagei
Cedecea neteri
Cedecea sp 3
Cedecea sp 5
Citrobacter freundii
Citrobacter diversus/koseri
Citrobacter amalonaticus
Citrobacter farmeri
Citrobacter youngae
Citrobacter braakii
Citrobacter werkmanii
Citrobacter sedlakii
Citrobacter rodentium
Citrobacter gillenii
Citrobacter Group 137
Edwardsiella tarda
Edwardsiella tarda biogp 1
Edwardsiella hoshinae
Edwardsiella ictaluri
Enterobacter aerogenes
Enterobacter cloacae
Enterobacter agglomerans
Enterobacter gergoviae/ Pluralibacter gergoviae
Enterobacter sakazakii
Enterobacter taylorae (cancerogenus)
Enterobacter amnigenus biogp 1
Enterobacter amnigenus biogp 2
Enterobacter asburiae
Enterobacter hormaechei
Enterobacter cancerogenus
Enterobacter dissolvens
Enterobacter nimipressuralis
Enterobacter pyrinus / Pluralibacter pyrinus
Escherichia coli
Escherichia coli - inactive
Escherichia fergusonii
Escherichia hermannii
Escherichia vulneris
Escherichia blattae / Shimwellia blattae
Shigella Serogroups A,B,C
Shigella sonnei (Group D)
Ewingella americana
Hafnia alvei
Hafnia alvei biogp 1
Klebsiella pneumoniae
Klebsiella oxytoca
Klebsiella ornithinolytica / Raoultella ornithinolytica
Klebsiella ozaenae
Klebsiella rhinoscleromatis/ Klebsiella pneumoniae subsp. rhinoscleromatis
Klebsiella terrigena / Raoultella terrigena
Kluyvera ascorbata
Kluyvera cryocrescens
Kluyvera georgiana
Kluyvera intermedia
Leclercia adecarboxylata
Leminorella grimontii
Leminorella richardii

Moellerella wisconsensis
Morganella morganii
Morganella morganii ss morganii
Morganella morganii biogp 1
Morganella morganii ss Sibonii 1 / Morganella morganii subsp. sibonii
Obesumbacterium proteus biogp 2
Pragia fontium
Pantoea dispersa
Pantoea agglomerans
Photorhabdus luminescens (25C)
Photorhabdus asymbiotica
Proteus mirabilis
Proteus vulgaris
Proteus penneri
Proteus myxofaciens
Providencia rettgeri
Providencia stuartii
Providencia alcalifaciens
Providencia rustigianii
Providencia heimbachae
Rahnella aquatilis
Salmonella enterica Group I
Salmonella serotype Typhi
Salmonella Cholerae-suis / Salmonella enterica subsp. enterica serovar Choleraesuis
Salmonella Paratyphi A / Salmonella enterica subsp. enterica serovar Paratyphi A
Salmonella gallinarum / Salmonella enterica subsp. enterica serovar Gallinarum
Salmonella pullorum / Salmonella enterica subsp. enterica serovar Pullorum
Salmonella Group II
Salmonella Group IIIa
Salmonella Group IIIb
Salmonella Group IV
Salmonella bongori (Group V)
Salmonella Group VI
Serratia marcescens
Serratia marcescens biogp 1
Serratia liquefaciens
Serratia rubidaea
Serratia odorifera biogp 1
Serratia odorifera biogp 2
Serratia plymuthica
Serratia ficaria
Serratia entomophila
Serratia fonticola
Tatumella ptyseos
Trabulsiella guamensis
Xenorhabdus nematophilis (25°C) / Xenorhabdus nematophila (25°C)
Xanthomonas (Stenotrophomonas) maltophilia / Stenotrophomonas maltophilia
Yersinia enterocolitica
Yersinia frederiksenii
Yersinia intermedia
Yersinia kristensenii
Yersinia rohdei
Yersinia aldovae
Yersinia bercovieri
Yersinia mollaretii
Yersinia pestis
Yersinia pseudotuberculosis
Yersinia ruckeri
Yokenella regensburgei
Enteric Gp59
Enteric Gp60
Enteric Gp63
Enteric Gp64
Enteric Gp68
Enteric Gp69

17.2.2 OXIDASE POSITIVE NON-FASTIDIOUS GRAM-NEGATIVE BACILLI

Pseudomonas aeruginosa
Pseudomonas fluorescens 25°C
Pseudomonas fluorescens 37°C
Burkholderia cepacia
Pseudomonas putida
Pseudomonas stutzeri
Pseudomonas diminuta
Burkholderia pseudomallei
Shewanella putrefaciens
Alcaligenes faecalis type 11
Alcaligenes faecalis
Alcaligenes xylosoxidans ss xylos / Achromobacter xylosoxidans
Flavobacterium meningosepticum / Elizabethkingia meningoseptica
Flavobacterium odoratum / Myroides odoratus
Flavobacterium breve / Empedobacter brevis
Flavobacterium oindologenes / Chryseobacterium indologenes
Vibrio fluvialis
Vibrio furnissii
Vibrio mimicus
Vibrio vulnificus
Vibrio hollisae / Grimontia hollisae
Vibrio cholerae
Vibrio parahaemolyticus
Vibrio alginolyticus
Vibrio cincinnatiensis
Vibrio damsela / Photobacterium damselae
Vibrio carchariae
Moraxella spp.
Plesiomonas shigelloides
Aeromonas hydrophila
Aeromonas veronii bio sobria
Aeromonas veronii bio veronii
Aeromonas caviae
Weeksella virosa
Weeksella zoohelcum / Bergeyella zoohelcum
Pasteurella multocida
Pasteurella haemolytica / Mannheimia haemolytica
Actinobacillus spp.

18 COMMONLY ENCOUNTERED GRAM-NEGATIVE DATA TABLE

COMMONLY ENCOUNTERED GRAM NEGATIVE DATA TABLE

	LYS	ORN	H2S	GLU	MAN	XYL	ONP	IND	UR	VP	CIT	TDA
Acinetobacter baumannii	60	8	0.1	99.9	0.1	97	0.1	0.1	9	0.1	99.9	0.1
Acinetobacter lwoffii	40	0.1	0.1	6	0.1	0.1	0.1	0.1	3	0.1	0.1	0.1
Acinetobacter haemolyticus	40	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3	0.1	9	0.1
Citrobacter freundii	0.1	0.1	78	99.9	99.9	89	89	33	44	0.1	78	0.1
Citrobacter diversus / koseri	0.1	99	0.1	99.9	99	99.9	99	99	75	0.1	99	0.1
Edwardsiella tarda	99.9	99.9	99.9	99.9	0.1	0.1	0.1	99	0.1	0.1	1	0.1
Enterobacter aerogenes	98	98	0.1	99.9	99.9	99.9	99.9	0.1	2	98	95	0.1
Enterobacter cloacae	0.1	96	0.1	99.9	99.9	99	99	0.1	65	99.9	99.9	0.1
Pantoea agglomerans	0.1	0.1	0.1	99.9	99.9	93	90	20	20	70	50	20
Enterobacter gergoviae	90	99.9	0.1	99.9	99	99	97	0.1	93	99.9	99	0.1
Enterobacter sakazakii	0.1	91	0.1	99.9	99.9	99.9	99.9	11	1	99.9	99	50
Escherichia coli	85	85	1	99.9	98	95	95	99.9	1	0.1	1	0.1
Escherichia coli - inactive	40	20	1	99.9	93	70	45	80	1	0.1	1	0.1
Shigella Serogroups A,B&C	0.1	1	0.1	99.9	93	2	2	50	0.1	0.1	0.1	0.1
Shigella sonnei (Group D)	0.1	98	0.1	99.9	99	2	90	0.1	0.1	0.1	0.1	0.1
Hafnia alvei	99.9	98	0.1	99.9	99	98	90	0.1	4	85	10	0.1
Klebsiella pneumoniae	98	0.1	0.1	99.9	99	99	99	0.1	95	98	98	0.1
Klebsiella oxytoca	99	0.1	0.1	99.9	99	99.9	99.9	99	90	95	95	1
Klebsiella ozaenae	40	3	0.1	99.9	99.9	95	80	0.1	10	0.1	30	0.1
Klebsiella rhinoscleromatis	0.1	0.1	0.1	99.9	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1
Morganella morganii	24	97	0.1	99.9	0.1	0.1	0.1	99	98	0.1	0.1	95
Proteus mirabilis	0.1	99	98	99.9	0.1	98	0.1	2	98	50	65	98
Proteus vulgaris	0.1	0.1	95	99.9	0.1	95	1	98	95	0.1	15	99
Providencia rettgeri	0.1	0.1	0.1	99.9	99.9	10	5	99	98	0.1	95	98
Providencia stuartii	0.1	0.1	0.1	99.9	10	7	10	98	30	0.1	93	95
Providencia alcalifaciens	0.1	1	0.1	99.9	2	1	1	99	0.1	0.1	98	98
Salmonella species	98	97	95	99.9	99.9	97	2	1	1	0.1	95	0.1
Salmonella Typhi	98	0.1	97	99.9	99.9	82	0.1	0.1	0.1	0.1	0.1	0.1
Salmonella Choleraesuis	95	99.9	50	99.9	98	98	0.1	0.1	0.1	0.1	25	0.1
Salmonella Paratyphi A	0.1	95	10	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Salmonella Gallinarum	90	1	99.9	99.9	99.9	70	0.1	0.1	0.1	0.1	0.1	0.1
Salmonella Pullorum	99.9	95	90	99.9	99.9	90	0.1	0.1	0.1	0.1	0.1	0.1
Salmonella Arizonae	99	99	99	99.9	99.9	99.9	92	2	0.1	0.1	98	0.1
Serratia marcescens	99	99	0.1	99.9	99	7	95	1	15	98	98	0.1
Serratia liquefaciens	95	95	0.1	99.9	99.9	99.9	93	1	3	93	90	0.1
Serratia rubidaea	55	0.1	0.1	99.9	99.9	99	99.9	0.1	2	99.9	95	0.1
Yersinia enterocolitica	0.1	95	0.1	99.9	98	70	95	50	90	2	0.1	0.1

19 EXTENDED OXIDASE NEGATIVE DATA TABLE

	LYS	ORN	H2S	GLU	MAN	XYL	ONP	IND	UR	VP	CIT	TDA	GEL	MAL	INO	SOR	RHA	SUC	LAC	ARA	ADO	RAF	SAL	ARG
Acinetobacter baumannii	60	8	0.1	99.9	0.1	97	0.1	0.1	9	0.1	99.9	0.1	0.1	98	0.1	0.1	0.1	0.1	0.1	87	0.1	0.1	0.1	0.1
Acinetobacter lwoffii	40	0.1	0.1	6	0.1	0.1	0.1	0.1	3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	6
Acinetobacter haemolyticus	40	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3	0.1	9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	6
Averyella dalhousiensis	99.9	85	0.1	99.9	99.9	99.9	99.9	0.1	70	0.1	85	0.1	0.1	85	0.1	99.9	99.9	0.1	30	99.9	0.1	0.1	99.9	0.1
Budvicia aquatica	0.1	0.1	80	99.9	60	93	93	0.1	33	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	67	80	0.1	0.1	0.1	0.1
Buttiauxella agrestis	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	99.9	0.1	0.1	60	0.1	0.1	99.9	0.1	99.9	99.9	0.1	99.9	99.9	0.1
Buttiauxella brennerae	0.1	33	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	33	0.1	67	99.9	67	99.9	99.9	0.1
Buttiauxella ferragutiae	99.9	80	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1
Buttiauxella gaviniae	0.1	0.1	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	20	0.1	0.1	99.9	0.1	0.1	99.9	0.1	60	99.9	99.9	0.1	99.9	20
Buttiauxella izardi	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	99.9	0.1	99.9	99.9	0.1	33	99.9	0.1
Buttiauxella noackiae	0.1	0.1	0.1	99.9	99.9	99.9	99.9	33	0.1	0.1	33	99.9	0.1	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1	0.1	99.9	67
Butiauxella wamboldiae	0.1	0.1	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	33	99.9	0.1	99.9	67	0.1	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1
Cedecea davisae	0.1	95	0.1	99.9	99.9	99.9	90	0.1	0.1	50	95	0.1	0.1	91	0.1	0.1	0.1	99.9	19	0.1	0.1	10	99	50
Cedecea lapagei	0.1	0.1	0.1	99.9	99.9	0.1	99	0.1	0.1	80	99	0.1	0.1	99	0.1	0.1	0.1	0.1	60	0.1	0.1	0.1	99.9	80
Cedecea neteri	0.1	0.1	0.1	99.9	99.9	99.9	99.9	0.1	0.1	50	99.9	0.1	0.1	99.9	0.1	99.9	0.1	99.9	35	0.1	0.1	0.1	99.9	99.9
Cedecea sp 3	0.1	0.1	0.1	99.9	99.9	99.9	99.9	0.1	0.1	50	99.9	0.1	0.1	0.1	0.1	0.1	0.1	50	0.1	0.1	0.1	99.9	99.9	99.9
Cedecea sp 5	0.1	50	0.1	99.9	99.9	99.9	99.9	0.1	0.1	50	99.9	0.1	0.1	0.1	0.1	99.9	0.1	99.9	0.1	0.1	0.1	99.9	99.9	50
Citrobacter freundii	0.1	0.1	78	99.9	99.9	89	89	33	44	0.1	78	0.1	0.1	11	0.1	99.9	99.9	89	78	99.9	0.1	44	0.1	67
Citrobacter diversus / koseri	0.1	99	0.1	99.9	99	99.9	99	99	75	0.1	99	0.1	0.1	95	0.1	99	99	40	50	99	99	0.1	15	80
Citrobacter amalonaticus	0.1	95	5	99.9	99.9	99	97	99.9	85	0.1	95	0.1	0.1	1	0.1	99	99.9	9	35	99	0.1	5	30	85
Citrobacter farmeri	0.1	99.9	0.1	99.9	99.9	99.9	99.9	99.9	59	0.1	10	0.1	0.1	0.1	0.1	98	99.9	99.9	15	99.9	0.1	99.9	9	85
Citrobacter youngae	0.1	5	65	99.9	99.9	99.9	90	15	80	0.1	75	0.1	0.1	5	5	99.9	99.9	20	25	99.9	0.1	10	10	50
Citrobacter braakii	0.1	93	80	99.9	99.9	99.9	80	33	67	0.1	87	0.1	0.1	0.1	0.1	99.9	99.9	7	80	99.9	0.1	7	0.1	67
Citrobacter werkmanii	0.1	0.1	99.9	99.9	99.9	99.9	99.9	0.1	99.9	0.1	99.9	0.1	0.1	99.9	0.1	99.9	99.9	0.1	17	99.9	0.1	0.1	0.1	99.9
Citrobacter sedlakii	0.1	99.9	0.1	99.9	99.9	99.9	99.9	83	99.9	0.1	83	0.1	0.1	99.9	0.1	99.9	99.9	0.1	99.9	99.9	0.1	0.1	17	99.9
Citrobacter rodentium	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	99.9	0.1	0.1	0.1	0.1	99.9	0.1	99.9	99.9	0.1	99.9	99.9	0.1	0.1	0.1	0.1
Citrobacter gillenii	0.1	0.1	67	99.9	99.9	99.9	67	0.1	0.1	0.1	33	0.1	0.1	99.9	0.1	99.9	99.9	33	67	99.9	0.1	0.1	0.1	33
Citrobacter Group 137	0.1	99.9	0.1	99.9	99.9	99.9	99.9	99.9	70	0.1	0.1	0.1	0.1	0.1	0.1	99.9	99.9	99.9	99.9	99.9	0.1	99.9	99.9	20
Edwardsiella tarda	99.9	99.9	99.9	99.9	0.1	0.1	0.1	99	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	9	0.1	0.1	0.1	0.1
Edwardsiella tarda biogp 1	99.9	99.9	0.1	99.9	99.9	0.1	0.1	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	99.9	0.1	0.1	0.1	0.1
Edwardsiella hoshinae	99.9	95	0.1	99.9	99.9	0.1	0.1	50	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	0.1	99.9	0.1	13	0.1	0.1	50	0.1
Edwardsiella ictaluri	99.9	65	0.1	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Enterobacter aerogenes	98	98	0.1	99.9	99.9	99.9	99.9	0.1	2	98	95	0.1	0.1	95	95	99.9	99	99.9	95	99.9	98	96	99.9	0.1
Enterobacter cloacae	0.1	96	0.1	99.9	99.9	99	99	0.1	65	99.9	99.9	0.1	0.1	75	15	95	92	97	93	99.9	25	97	75	97
Pantoea agglomerans	0.1	0.1	0.1	99.9	99.9	93	90	20	20	70	50	20	2	65	15	30	85	75	40	95	7	30	65	0.1
Enterobacter gergoviae	90	99.9	0.1	99.9	99	99	97	0.1	93	99.9	99	0.1	0.1	96	0.1	0.1	99	98	55	99	0.1	97	99	0.1
Enterobacter sakazakii	0.1	91	0.1	99.9	99.9	99.9	99.9	11	1	99.9	99	50	0.1	18	75	0.1	99.9	99.9	99	99.9	0.1	99	99	99
Enterobacter taylorae (cancerogenus)	0.1	99	0.1	99.9	99.9	99.9	99.9	0.1	1	99.9	99.9	0.1	0.1	99.9	0.1	1	99.9	0.1	10	99.9	0.1	0.1	92	94
Enterobacter amnigenus biogp 1	0.1	55	0.1	99.9	99.9	99.9	91	0.1	0.1	99.9	70	0.1	0.1	91	0.1	9	99.9	99.9	70	99.9	0.1	99.9	91	9
Enterobacter amnigenus biogp 2	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	99.9	99.9	0.1	0.1	99.9	0.1	99.9	99.9	0.1	35	99.9	0.1	0.1	99.9	35
Enterobacter asburiae	0.1	95	0.1	99.9	99.9	97	99.9	0.1	60	2	99.9	0.1	0.1	3	0.1	99.9	5	99.9	75	99.9	0.1	70	99.9	21
Enterobacter hormaechei	0.1	91	0.1	99.9	99.9	96	95	0.1	87	99.9	96	4	0.1	99.9	0.1	0.1	99.9	99.9	9	99.9	0.1	0.1	44	78
Enterobacter cancerogenus	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	99.9	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1	0.1	99.9	99.9
Enterobacter dissolvens	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	99.9	99.9	99.9	0.1	0.1	99.9	0.1	99.9	99.9	99.9	0.1	99.9	0.1	99.9	99.9	99.9
Enterobacter nimipressuralis	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	99.9	0.1	0.1	0.1	99.9	0.1	99.9	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1
Enterobacter pyrinus	99.9	99.9	0.1	99.9	99	0.1	99.9	0.1	86	86	0.1	0.1	0.1	86	99.9	0.1	99.9	99.9	14	99.9	0.1	0.1	99.9	0.1
Escherichia coli	85	85	1	99.9	98	95	95	99.9	1	0.1	1	0.1	0.1	0.1	1	94	80	50	95	99	5	50	40	17
Escherichia coli - inactive	40	20	1	99.9	93	70	45	80	1	0.1	1	0.1	0.1	0.1	1	75	65	15	25	85	3	15	10	3
Escherichia fergusonii	95	99.9	0.1	99.9	98	96	83	98	0.1	0.1	17	0.1	0.1	35	0.1	0.1	92	0.1	0.1	98	98	0.1	65	5
Escherichia hermannii	6	99.9	0.1	99.9	99.9	99.9	98	99	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	97	45	45	99.9	0.1	40	40	0.1
Escherichia vulneris	85	0.1	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	85	0.1	1	93	8	15	99.9	0.1	99	30	30
Escherichia blattae	99.9	99.9	0.1	99.9	0.1	99.9	0.1	0.1	0.1	0.1	50	0.1	0.1	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1	0.1	0.1	0.1
Shigella Serogroups A,B&C	0.1	1	0.1	99.9	93	2	2	50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	30	5	0.1	0.1	60	0.1	50	0.1	5
Shigella sonnei (Group D)	0.1	98	0.1	99.9	99	2	90	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2	75	1	2	95	0.1	3	0.1	2
Ewingella americana	0.1	0.1	0.1	99.9	99.9	13	85	0.1	0.1	95	95	0.1	0.1	0.1	0.1	0.1	23	0.1	70	0.1	0.1	0.1	80	0.1
Hafnia alvei	99.9	98	0.1	99.9	99	98	90	0.1	4	85	10	0.1	0.1	50	0.1	0.1	97	10	5	95	0.1	2	13	6
Hafnia alvei biogp 1	99.9	45	0.1	99.9	55	0.1	30	0.1	0.1	70	0.1	0.1	0.1	45	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	55	0.1
Klebsiella pneumoniae	98	0.1	0.1	99.9	99	99	99	0.1	95	98	98	0.1	0.1	93	95	99	99	99	98	99	90	99	99	0.1
Klebsiella oxytoca	99	0.1	0.1	99.9	99	99.9	99.9	99	90	95	95	1	0.1	98	98	99	99.9	99.9	99.9	98	99	99.9	99.9	0.1
Klebsiella ornithinolytica	99.9	99.9	0.1	99.9	99.9	99.9	99.9	99.9	99.9	70	99.9	0.1	0.1	99.9	95	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	0.1
Klebsiella ozaenae	40	3	0.1	99.9	99.9	95	80	0.1	10	0.1	30	0.1	0.1	3	55	65	55	20	30	98	97	90	97	6
Klebsiella rhinoscleromatis	0.1	0.1	0.1	99.9	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	95	95	99.9	96	75	0.1	99.9	99.9	90	98	0.1

Klebsiella terrigena	99.9	20	0.1	99.9	99.9	99.9	99.9	0.1	0.1	99.9	40	0.1	0.1	99.9	80	99.9	99.9	99.9	99.9	99.9	99.9	99.9	0.1
Kluyvera ascorbata	97	99.9	0.1	99.9	99.9	99	99.9	92	0.1	0.1	96	0.1	0.1	96	0.1	40	99.9	98	98	99.9	0.1	98	99.9	0.1
Kluyvera cryocrescens	23	99.9	0.1	99.9	95	91	99.9	90	0.1	0.1	80	0.1	0.1	86	0.1	45	99.9	81	95	99.9	0.1	99.9	99.9	0.1
Kluyvera georgiana	99.9	99.9	0.1	99.9	99.9	99.9	99.9	99.9	0.1	0.1	99.9	0.1	0.1	50	0.1	0.1	83	99.9	83	99.9	0.1	99.9	99.9	0.1
Kluyvera intermedia	0.1	89	0.1	99.9	99.9	99.9	99.9	0.1	0.1	99.9	65	0.1	0.1	99.9	0.1	99.9	99.9	65	99.9	99.9	0.1	99.9	99.9	0.1
Leclercia adecarboxylata	0.1	0.1	0.1	99.9	99.9	99.9	99.9	99.9	48	0.1	0.1	0.1	0.1	93	0.1	0.1	99.9	66	93	99.9	93	66	99.9	0.1
Leminorella grimontii	0.1	0.1	99.9	99.9	0.1	83	0.1	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1
Leminorella richardii	0.1	0.1	99.9	99.9	0.1	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1
Moellerella wisconsensis	0.1	0.1	0.1	99.9	60	0.1	90	0.1	0.1	0.1	80	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	99.9	0.1	99.9	99.9	0.1
Morganella morganii	24	97	0.1	99.9	0.1	0.1	0.1	99	98	0.1	0.1	95	0.1	4	0.1	0.1	0.1	1	1	0.1	0.1	0.1	0.1	0.1
Morganella morganii ss morganii	1	95	20	99.9	0.1	0.1	10	95	95	0.1	0.1	95	0.1	1	0.1	0.1	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1
Morganella morganii biogp 1	99.9	80	15	99.9	0.1	0.1	20	99.9	99.9	0.1	0.1	99.9	0.1	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Morganella morganii ss Sibonii 1	29	64	7	99.9	0.1	0.1	0.1	50	99.9	0.1	0.1	93	0.1	0.1	0.1	0.1	0.1	7	0.1	0.1	0.1	0.1	0.1	0.1
Obesumbacterium proteus biogp 2	99.9	99.9	0.1	99.9	0.1	15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	15	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Pragia fontium	0.1	0.1	89	99.9	0.1	0.1	0.1	0.1	0.1	0.1	89	22	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	78	0.1
Pantoea dispersa	0.1	0.1	0.1	99.9	99.9	99.9	91	0.1	0.1	64	99.9	9	0.1	9	0.1	0.1	91	1	0.1	99.9	0.1	0.1	0.1	0.1
Photorhabdus luminescens (25C)	0.1	0.1	0.1	99.9	0.1	0.1	0.1	50	25	0.1	50	0.1	50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Photorhabdus asymbiotica	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1	60	0.1	20	0.1	80	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Proteus mirabilis	0.1	99	98	99.9	0.1	98	0.1	2	98	50	65	98	90	2	0.1	0.1	1	15	2	0.1	0.1	1	0.1	0.1
Proteus vulgaris	0.1	0.1	95	99.9	0.1	95	1	98	95	0.1	15	99	91	0.1	0.1	0.1	5	97	2	0.1	0.1	1	50	0.1
Proteus penneri	0.1	0.1	30	99.9	0.1	99.9	1	0.1	99.9	0.1	0.1	99	50	0.1	0.1	0.1	0.1	99.9	1	0.1	0.1	1	0.1	0.1
Proteus myxofaciens	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1	99.9	99.9	50	99.9	99.9	0.1	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1	0.1	0.1
Providencia rettgeri	0.1	0.1	0.1	99.9	99.9	10	5	99	98	0.1	95	98	0.1	0.1	90	1	70	15	5	0.1	99.9	5	50	0.1
Providencia stuartii	0.1	0.1	0.1	99.9	10	7	10	98	30	0.1	93	95	0.1	0.1	95	1	0.1	50	2	1	5	7	2	0.1
Providencia alcalifaciens	0.1	1	0.1	99.9	2	1	1	99	0.1	0.1	98	98	0.1	0.1	1	1	0.1	15	0.1	1	98	1	1	0.1
Providencia rustigianii	0.1	0.1	0.1	99.9	0.1	0.1	0.1	98	0.1	0.1	15	99.9	0.1	0.1	0.1	0.1	0.1	35	0.1	0.1	0.1	0.1	0.1	0.1
Providencia heimbachae	0.1	0.1	0.1	99.9	0.1	8	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	46	0.1	99.9	0.1	0.1	0.1	92	0.1	0.1	0.1
Rahnella aquatilis	0.1	0.1	0.1	99.9	99.9	94	99.9	0.1	0.1	99.9	94	95	0.1	99.9	0.1	94	94	99.9	99.9	99.9	0.1	94	99.9	0.1
Salmonella enterica (Group I)	98	97	95	99.9	99.9	97	2	1	1	0.1	95	0.1	0.1	0.1	35	95	95	1	1	99	0.1	2	0.1	70
Salmonella serotype *Typhi*	98	0.1	97	99.9	99.9	82	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99	0.1	0.1	1	2	0.1	0.1	0.1	3
Salmonella serotype *Choleraesuis*	95	99.9	50	99.9	98	98	0.1	0.1	0.1	0.1	25	0.1	0.1	0.1	0.1	90	99.9	0.1	0.1	0.1	0.1	1	0.1	55
Salmonella serotype *Paratyphi A*	0.1	95	10	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	95	99.9	0.1	0.1	99.9	0.1	0.1	0.1	15
Salmonella serotype *Gallinarum*	90	1	99.9	99.9	99.9	70	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	10	0.1	0.1	80	0.1	10	0.1	10
Salmonella serotype *Pullorum*	99.9	95	90	99.9	99.9	90	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	10	99.9	0.1	0.1	99.9	0.1	1	0.1	10
Salmonella Group II	99.9	99.9	99.9	99.9	99.9	99.9	15	2	0.1	0.1	99.9	0.1	2	95	5	99.9	99.9	1	1	99.9	0.1	0.1	5	90
Salmonella Group IIIa	99	99	99	99.9	99.9	99.9	99.9	1	0.1	0.1	99	0.1	0.1	95	0.1	99	99	1	15	99	0.1	1	0.1	70
Salmonella Group IIIb	99	99	99	99.9	99.9	99.9	92	2	0.1	0.1	98	0.1	0.1	95	0.1	99	99	5	85	99	0.1	1	0.1	70
Salmonella Group IV	99.9	99.9	99.9	99.9	98	99.9	0.1	0.1	2	0.1	98	0.1	0.1	0.1	0.1	99.9	98	0.1	0.1	99.9	5	0.1	60	70
Salmonella bongori (Group V)	99.9	99.9	99.9	99.9	99.9	99.9	94	0.1	0.1	0.1	94	0.1	0.1	0.1	0.1	99.9	88	0.1	0.1	94	0.1	0.1	0.1	94
Salmonella Group VI	99.9	99.9	99.9	99.9	99.9	99.9	44	0.1	0.1	0.1	89	0.1	0.1	0.1	0.1	0.1	99.9	0.1	22	99.9	0.1	0.1	0.1	67
Serratia marcescens	99	99	0.1	99.9	99	7	95	1	15	98	98	0.1	90	3	75	99	0.1	99	2	0.1	40	2	95	0.1
Serratia marcescens biogp 1	55	65	0.1	99.9	96	0.1	75	0.1	0.1	60	30	0.1	30	0.1	30	92	0.1	99.9	4	0.1	30	0.1	92	4
Serratia liquefaciens	95	95	0.1	99.9	99.9	99.9	93	1	3	93	90	0.1	90	2	60	95	15	98	10	98	5	85	97	0.1
Serratia rubidaea	55	0.1	0.1	99.9	99.9	99	99.9	0.1	2	99.9	95	0.1	90	94	20	1	1	99	99.9	99.9	99	99	99	0.1
Serratia odorifera biogp 1	99.9	99.9	0.1	99.9	99.9	99.9	99.9	60	5	50	99.9	0.1	95	0.1	99.9	99.9	95	99.9	70	99.9	50	99.9	98	0.1
Serratia odorifera biogp 2	94	0.1	0.1	99.9	97	99.9	99.9	50	0.1	99.9	97	0.1	94	0.1	99.9	99.9	94	0.1	97	99.9	55	7	45	0.1
Serratia plymuthica	0.1	0.1	0.1	99.9	99.9	94	70	0.1	0.1	80	75	0.1	60	0.1	50	65	0.1	99.9	80	99.9	0.1	94	94	0.1
Serratia ficaria	0.1	0.1	0.1	99.9	99.9	99.9	99.9	0.1	0.1	75	99.9	0.1	99.9	0.1	55	99.9	35	99.9	15	99.9	0.1	70	99.9	0.1
Serratia entomophila	0.1	0.1	0.1	99.9	99.9	40	99.9	0.1	0.1	99.9	99.9	0.1	99.9	0.1	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1	99.9	0.1
Serratia fonticola	99.9	97	0.1	99.9	99.9	85	99.9	0.1	13	9	91	0.1	0.1	88	30	99.9	76	21	97	99.9	99.9	99.9	99.9	0.1
Tatumella ptyseos	0.1	0.1	0.1	99.9	0.1	9	0.1	0.1	0.1	5	2	90	0.1	0.1	0.1	0.1	0.1	98	0.1	0.1	0.1	11	55	0.1
Trabulsiella guamensis	99.9	99.9	99.9	99.9	99.9	99.9	99.9	40	0.1	0.1	88	0.1	0.1	0.1	0.1	99.9	99.9	0.1	0.1	99.9	0.1	0.1	13	50
Xenorhabdus nematophilus (25°C)	0.1	0.1	0.1	80	0.1	0.1	0.1	40	0.1	0.1	0.1	0.1	80	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Xanthomonas (Stenotrophomonas) maltophi	94	0.1	0.1	3	0.1	0.1	35	0.1	0.1	0.1	98	0.1	89	81	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	1
Yersinia enterocolitica	0.1	95	0.1	99.9	98	70	95	50	90	2	0.1	0.1	0.1	0.1	30	99	1	95	5	98	0.1	5	20	0.1
Yersinia frederiksenii	0.1	95	0.1	99.9	99.9	99.9	99.9	99.9	70	0.1	15	0.1	0.1	0.1	20	99.9	99	99.9	40	99.9	0.1	30	92	0.1
Yersinia intermedia	0.1	99.9	0.1	99.9	99.9	99.9	90	99.9	80	5	5	0.1	0.1	5	15	99.9	99.9	99.9	35	99.9	0.1	45	99.9	0.1
Yersinia kristensenii	0.1	92	0.1	99.9	99.9	85	70	30	77	0.1	0.1	0.1	0.1	0.1	15	99.9	0.1	0.1	8	77	0.1	0.1	15	0.1
Yersinia rohdei	0.1	25	0.1	99.9	99.9	38	50	0.1	62	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	99.9	0.1	99.9	0.1	62	0.1	0.1
Yersinia aldovae	0.1	40	0.1	99.9	80	40	0.1	0.1	60	0.1	0.1	0.1	0.1	0.1	0.1	60	0.1	20	0.1	60	0.1	0.1	0.1	0.1
Yersinia bercovieri	0.1	80	0.1	99.9	99.9	99.9	80	0.1	60	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	99.9	20	99.9	0.1	0.1	20	0.1
Yersinia mollaretii	0.1	80	0.1	99.9	99.9	60	20	0.1	20	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	99.9	40	99.9	0.1	0.1	20	0.1
Yersinia pestis	0.1	0.1	0.1	99.9	97	90	50	0.1	5	0.1	0.1	0.1	0.1	0.1	0.1	50	1	0.1	0.1	99.9	0.1	0.1	70	0.1
Yersinia pseudotuberculosis	0.1	0.1	0.1	99.9	99.9	99.9	70	0.1	95	0.1	0.1	0.1	0.1	0.1	0.1	0.1	70	0.1	0.1	50	0.1	15	25	0.1
"Yersinia" ruckeri	50	99.9	0.1	99.9	99.9	0.1	50	0.1	0.1	10	0.1	0.1	30	0.1	0.1	50	0.1	0.1	0.1	5	0.1	5	0.1	5
Yokenella regensburgei	99.9	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	92	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	99.9	0.1	25	8	8
Enteric Gp59	0.1	0.1	0.1	99.9	99.9	99.9	99.9	10	0.1	0.1	99.9	30	0.1	90	0.1	0.1	99.9	0.1	80	99.9	0.1	0.1	99.9	60
Enteric Gp60	0.1	99.9	0.1	99.9	50	0.1	99.9	0.1	50	0.1	0.1	0.1	0.1	99.9	0.1	0.1	75	0.1	0.1	25	0.1	0.1	0.1	0.1
Enteric Gp63	99.9	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	99.9	0.1	0.1	99.9	0.1	0.1	99.9	0.1
Enteric Gp64	0.1	0.1	0.1	99.9	99.9	99.9	99.9	0.1	0.1	0.1	50	0.1	0.1	99.9	0.1	0.1	99.9	0.1	99.9	99.9	99.9	0.1	99.9	50
Enteric Gp68	0.1	0.1	0.1	99.9	99.9	0.1	0.1	0.1	0.1	50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	99.9	0.1	0.1	0.1	0.1	50	0.1
Enteric Gp69	0.1	99.9	0.1	99.9	99.9	99.9	99.9	0.1	0.1	99.9	99.9	0.1	0.1	99.9	0.1	99.9	99.9	25	99.9	99.9	0.1	99.9	99.9	99.9

20 OXIDASE POSITIVE DATA TABLE

ORGANISM	OXI	MOT	NIT	LYS	ORN	H2S	GLU	MAN	XYL	ONP	IND	UR	VP	CIT	TDA	GEL	MAL	INO	SOR	RHA	SUC	LAC	ARA	ADO	RAF	SAL	ARG
Pseudomonas aeruginosa	100	93	85	89	3	0	85	40	81	0	0	56	0	95	0	64	94	0	0	0	0	0	45	0	0	0	100
Pseudomonas fluorescens 25°C	100	94	55	46	0	0	78	12	74	0	0	7	0	100	0	50	78	2	7	0	44	0	48	0	0	0	48
Pseudomonas fluorescens 37°C	100	94	5	26	0	0	0	7	0	0	0	0	0	63	0	0	41	0	0	0	0	0	7	0	0	0	74
Burkholderia cepacia	91	100	5	98	0	0	94	0	25	76	0	30	0	95	5	87	87	12	0	0	48	84	95	3	0	5	0
Pseudomonas putida	100	100	0	75	0	0	24	0	56	0	0	5	0	95	0	5	53	0	0	0	0	0	1	1	0	0	95
Pseudomonas stutzeri	100	100	81	48	0	0	18	18	9	0	0	17	0	72	0	3	33	0	0	0	0	0	0	0	0	0	14
Pseudomonas diminuta	100	100	10	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0
Burkholderia pseudomallei	100	100	90	12	0	0	95	95	51	0	0	39	0	86	0	75	80	95	80	6	70	70	80	56	6	9	85
Shewanella putrefaciens	100	100	100	80	80	100	0	0	0	0	0	20	0	80	0	80	0	0	0	0	0	0	0	0	0	0	0
Alcaligenes faecalis type 11	91	91	40	26	0	0	0	0	0	0	0	0	0	58	0	0	40	0	0	0	0	0	0	0	0	0	0
Alcaligenes faecalis	100	80	0	36	9	0	0	0	0	0	0	0	0	100	0	0	1	0	0	0	0	0	0	0	0	0	0
Alcaligenes xylosoxidans ss xylos	100	100	100	95	0	0	0	0	0	0	0	0	0	80	0	3	4	0	0	0	0	0	0	0	0	0	0
Flavobacterium meningosepticum	100	5	2	0	0	0	0	0	0	45	100	0	0	27	0	79	0	0	0	0	0	3	5	0	0	0	0
Flavobacterium odoratum	99	3	0	0	0	0	0	0	0	0	0	100	0	60	0	60	0	0	0	0	0	0	0	0	0	0	0
Flavobacterium breve	100	5	1	0	0	0	0	0	0	0	60	2	0	60	0	60	0	0	0	0	0	0	0	0	0	0	0
Flavobacterium oindologenes	100	4	31	0	0	0	0	0	0	0	100	0	0	70	0	100	0	0	0	0	0	0	0	0	0	0	0
Vibrio fluvialis	100	70	96	0	0	0	100	100	0	42	15	0	0	84	0	79	5	0	0	8	100	0	100	0	0	49	98
Vibrio furnissii	100	90	98	0	0	0	100	100	0	35	11	0	0	90	0	80	12	0	0	45	100	0	95	0	5	0	95
Vibrio mimicus	98	100	100	97	92	0	100	80	0	90	94	0	5	90	0	63	0	0	0	0	1	19	1	0	0	0	0
Vibrio vulnificus	99	99	100	98	93	0	100	43	0	75	95	0	0	75	35	79	0	0	0	0	15	86	0	0	0	95	0
Vibrio hollisae	100	0	100	0	0	0	100	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	94	0	0	0	0
Vibrio cholerae	100	97	99	98	98	0	100	98	0	93	88	0	65	96	0	43	2	0	0	0	100	9	0	0	0	5	0
Vibrio parahaemolyticus	100	99	100	93	59	0	80	93	10	20	65	0	0	31	0	55	0	0	0	0	0	0	34	0	28	0	0
Vibrio alginolyticus	100	100	100	90	70	0	50	20	0	10	20	0	70	10	0	30	10	0	0	0	60	0	10	0	10	0	0
Vibrio cincinnatiensis	100	86	100	57	0	0	100	100	43	86	8	0	0	21	0	0	0	100	0	0	100	0	100	0	0	100	0
Vibrio damsela	95	25	100	50	0	0	100	0	0	0	0	0	95	0	0	6	0	0	0	0	5	0	93	0	0	0	95
Vibrio carchariae	100	0	100	100	0	0	50	50	0	0	100	0	50	0	0	0	0	0	0	0	50	0	0	0	0	0	0
Moraxella spp.	100	0	65	50	50	0	0	0	0	0	0	9	0	50	0	19	2	0	0	0	0	0	0	0	0	0	0
Plesiomonas shigelloides	97	85	99	95	50	0	100	0	0	94	100	0	0	0	0	5	0	99	0	0	0	40	0	0	0	20	95
Aeromonas hydrophila	100	100	98	72	1	5	100	96	1	93	99	5	76	26	0	83	1	0	1	9	93	27	62	3	3	65	90
Aeromonas veronii bio sobria	100	100	100	91	2	0	100	100	0	88	96	0	80	77	0	60	4	1	0	0	88	5	11	2	2	2	98
Aeromonas veronii bio veronii	100	100	100	91	87	0	100	100	0	88	96	0	80	77	0	60	4	1	0	0	88	5	11	2	2	83	10
Aeromonas caviae	100	100	100	40	0	1	100	97	2	96	92	0	22	3	0	50	0	0	1	22	100	15	84	0	1	33	84
Weeksella virosa	99	0	0	0	0	0	0	0	0	0	60	0	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0
Weeksella zoohelcum	99	0	0	0	0	0	0	0	0	0	20	85	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Pasteurella multocida	100	0	45	1	78	0	100	90	34	10	90	3	0	0	0	0	1	5	84	1	88	9	3	0	1	1	1
Pasteurella haemolytica	95	0	95	0	0	0	100	90	40	70	0	0	0	0	0	0	0	70	70	0	90	20	5	10	70	0	0
Actinobacillus spp.	90	0	91	0	0	10	33	27	11	78	0	100	0	0	0	0	5	0	5	0	27	27	0	0	33	33	0

Number denotes the percentage of positive strains

21 COLOUR CHART

Colour chart/Farbtafel/Tableau 'de couleurs

Microgen GN A ID

WELL/NAPFCHEN /GODET	1	2	3	4	5	6	7	8	9	10	11	12	7
Reaction	Lysine	Ornithine	H_2S	Glucose	Mannitol	Xylose	O.N.P.G.	Indole	Urease	V.P.	Citrate	T.D.A.	Nitrate
Negative													
Positive													

Microgen GN B ID

WELL/NAPFCHEN /GODET	13	14	15	16	17	18	19	20	21	22	23	24	24
Reaction	Gelatin	Malonate	Inositol	Sorbitol	Rhamnose	Sucrose	Lactose	Arabinose	Adonitol	Raffinose	Salicin	Arginine 24hrs	Arginine 48hrs
Negative													
Positive													

CAUTION: Keep out of direct sunlight. Due to laminate discolouration and paper ageing, the colours on the chart will change.

These colours are provided as general guide to range of test colours.

Legend:

 Appropriate reagents to be added prior to reading.

 Overlaid with sterile mineral oil.

 Not overlaid with oil for Oxidase positive organism.

TECHNICAL SUPPORT SERVICE

For technical assistance and more information please contact Gold Standard Diagnostics Budapest's Customer Service or your local distributor.

Gold Standard Diagnostics Budapest Kft.
Fóti út 56 A ép.
1047 Budapest, Hungary
www.goldstandarddiagnostics.com

LIST OF MODIFICATIONS		
VERSION	DESCRIPTION OF THE CHANGE	ISSUE DATE
1.0	First issue	01 JUN 2023
2.0	® symbol was removed	09 AUG 2023
3.0	17.1 ; 17.2.1 and 17.2.2 Microorganism lists were complemeted with new microorganisms name	06 SEP 2023
4.0	**No product or assay-specific changes** Clarified "Additional materials required" section Adjustment of structuring, formatting in some sections	19 OCT 2023
5.0	**Version approved by AOAC** Added AOAC licence number and logo on the front page Clarified "Additional materials required" section Updated section 7. PRECAUTIONS Added disclaimer on Storage conditions section “Do not freeze”.	09 JAN 2024