



# Microgen<sup>®</sup> STREP-ID

An identification system for Streptococci and Enterococci from Clinical, Veterinary, Food and Environmental sources

## Instructions for Use

REF

MID-62

20

CE

IVD



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# MICROGEN STREP-ID

## Quick Reference

|                             |  |
|-----------------------------|--|
| <b>CONFIRMATION</b>         | <p>Perform: Gram stain (Gram positive cocci in pairs or chains), Catalase (catalase negative) and note haemolysis on a blood plate for <math>\alpha</math> or <math>\beta</math>-haemolysis.</p> <p>Record haemolytic reactions on the report form provided.</p>   |
| <b>INOCULUM</b>             | <p>Prepare a 2.0 MacFarland suspension in suspending medium.</p>   |
| <b>INOCULATION</b>          | <p>Add 3-4 drops (100<math>\mu</math>l) of the inoculum, prepared in the suspending medium, per well of the MID 62 microwell test strip. Add 3 drops of the Hippurate solution to the tube provided and inoculate with a loopful of cultured organism. Seal the tube with the cap provided and incubate.</p>                             |
| <b>OVERLAY WITH OIL</b>     | <p>Well 12 – Arginine</p>  |
| <b>INCUBATION TIME</b>      | <p>18 - 24 hours</p>   |
| <b>TEMPERATURE</b>          | <p>35 - 37°C</p>   |
| <b>INITIAL READINGS</b>     | <p>Read all tests and record colour changes</p>  |
| <b>ADDITION OF REAGENTS</b> | <p>Well 8: VP - Add 1 drop of VPI Reagent followed by 1 drop of VPII Reagent and read after 15 - 30 minutes.</p> <p>Well 11: PYR – Add 1 drop of PYR reagent and read after 5 -10 minutes</p> <p>Hippurate Test – Carefully add 3 drops of Ninhydrin Reagent, do not mix. Incubate at room temperature for 10 – 15 minutes and read.</p> |
| <b>FINAL READING</b>        | <p>Record results on report form provided, calculate Octal Code and interpret using MID Software</p>   |

**Note: A black circle around the top of a well indicates a well requiring the addition of mineral oil prior to incubation.**

**A green circle around the top of a well indicates a well requiring addition of reagents after incubation.**

## INTENDED USE

The Microgen Strep-ID system employs 12 standardised biochemical substrates in a microwell test strip and three additional tests to identify members of the genus *Streptococcus*, *Enterococcus* and related species of importance to medical, veterinary, food and environmental laboratories. The kit is intended for in vitro diagnostic use only.

## PRINCIPLE OF THE TEST

The Microgen Strep-ID system comprises 15 biochemical tests of which 12 are performed in the standardised 12 microwell test strip, a hippurate test (provided) and 2 based on observations of the colonial morphology of isolates on blood agar medium. All of these tests have been selected on the basis of extensive computer analysis (1) of published databases for the identification of the genus *Streptococcus* (2, 3, 4). The dehydrated substrates in each well a suspension of the organism in the suspending medium provided. 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 (MID-60) to identify the test organism.

| CONT       | KIT PRESENTATION |                               |                |
|------------|------------------|-------------------------------|----------------|
| BROTH      | MID-62b          | STREP-ID Suspending Broth     | 20 x 3ml       |
| TEST STRIP | MID-62c          | STREP-ID Microwell Test Strip | 20 Test strips |
| HIPPURATE  | MID-62d          | Hippurate                     | 2.8ml          |

Microwell test strips containing 12 biochemical substrates for identification of *Streptococcus* and *Enterococcus* organisms - see data tables

Holding frame for microwell test strips  
Tubes with caps for Hippurate test (24)  
Result forms  
Instructions for Use

### Additional Requirements:

- 1) Microgen Identification System Software (MID-60) - Provides identification based on probability, % probability and likelihood with an analysis of the quality of separation. Full definition of these terms is provided with the software Help manual.  
MID-60 software (V 1.1.16.19 onwards) which does not contain the *Streptococcus* database may be updated to include the Strep-ID data, from the Microgen Bioproducts website ([www.microgenbioproducts.com](http://www.microgenbioproducts.com))
- 2) Sterile physiological saline
- 3) Mineral Oil
- 4) VP I + VP II Reagents
- 5) PYR Reagent (5)
- 6) Ninhydrin Reagent (6)
- 7) Sterile pipettes, swabs and bacteriological loops
- 8) Gram stain reagents
- 9) Hydrogen Peroxide
- 10) Incubator, not fan-assisted (35 - 37°C)
- 11) Bunsen burner.

Items 3, 4, 5 and 6 can be purchased from Microgen Bioproducts Ltd.

## WARNINGS AND PRECAUTIONS

### Safety:

1. The reagents supplied in this kit are for *in vitro* diagnostic use only
2. Appropriate precautions should be taken when handling or disposing of potential pathogens. 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 neutralised before treatment.
3. Care should be taken when handling additional reagents as they may contain corrosive or irritant materials. Refer to the individual reagent bottles for further information.

### Procedural:

1. The Microgen Strep-ID system should be used according to the kit instructions.
2. The microwell test strips must **not** be incubated in a CO<sub>2</sub> incubator
3. Incorrect incubation, inadequate filling of wells, or inadequate inoculum density may give false results.

## STORAGE AND SHELF LIFE

Microgen Strep-ID microwell test strips are stable in unopened foil pouches at 2 - 8°C until the expiry date on the label. Opened 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.

Hippurate is stable at 2 - 8°C until the expiry date on the label.

## SPECIMENS

A pure 18 - 24 hour culture of the bacterial isolate to be identified must always be used.

## PROCEDURE - INOCULATION AND INCUBATION

1. Carry out a Gram stain (Gram positive cocci in pairs or chains), catalase test (catalase negative).
2. Note any haemolysis produced on a blood plate ( $\alpha$  or  $\beta$ -haemolysis) and record the observed reactions on the report form provided.
3. To prepare the inoculum for the microwell test strip(s), if possible remove sufficient identical, isolated colonies from the primary isolation medium and emulsify in the suspending medium supplied in the kit to produce a suspension equivalent to 2.0 MacFarland. Mix thoroughly. If insufficient colonies are available, subculture a single isolated colony onto a suitable non-selective differential medium (Blood agar is recommended). Incubate the plate aerobically at 35 - 37°C for 18 - 24 hours. After incubation, remove sufficient growth using either a sterile bacteriological loop or swab and emulsify in the suspending medium provided so as to produce a 2.0 MacFarland suspension.
4. Add 3 drops of Hippurate solution to an empty tube, then take a small sweep of bacteria using a sterile bacteriological loop and emulsify in the Hippurate solution in the tube, cap the tube and incubate for 18-24 hours at 35 - 37°C.
5. Carefully peel back the adhesive tape(s) sealing the microwell test strip(s), but do not remove completely. **Do NOT discard the adhesive tape(s) as they will be required later.**
6. Using a sterile pasteur pipette, add 3 - 4 drops (approximately 100 $\mu$ L) of the bacterial suspension to each well of the microwell test strip(s).
7. As a purity check, transfer 1 drop of the bacterial suspension on to a purity plate using a non-selective differential medium (Blood agar is recommended). Incubate the plate aerobically at 35 - 37°C for 18 - 24 hours.
8. After inoculation, overlay well 12 with 3-4 drops of mineral oil. This well is highlighted with a black circle around the well to allow easy identification of the correct well.
9. Seal the top of the microwell test strip(s) with the adhesive tape(s) removed earlier and incubate aerobically at 35 - 37°C. The microwell test strip(s) are read after 18-24 hours incubation.


## PROCEDURE - READING AND ADDITION OF REAGENTS

1. Remove the adhesive tape(s) 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 micro-wells:
  - a) Perform the VP test on well 8 by adding 1 drop of VP I followed by 1 drop of VP II to the well and read after 15 - 30 minutes. The development of a light pink to dark red colour indicates that VP reaction is positive. A clear background indicates a negative VP reaction.
  - b) Add 1 drop of PYR reagent to well 11 and read after 5 - 10 minutes. Formation of pale pink to a very deep red colour indicates a positive result.
  - c) Carefully add 3 drops of Ninhydrin reagent to the Hippurate test. Do not mix the reagent into the test, the reagent should overlay the inoculum. Incubate at room temperature for 10 - 15 minutes and read. The development of a purple colour in the upper reagent layer indicates a positive Hippurate reaction. A clear colour in the upper reagent level indicates a negative reaction.
3. Record these additional results on the forms provided.

## IDENTIFICATION

On the Microgen Strep-ID 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 (MID-60), 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 separation. Full definitions of these terms and an explanation of their usefulness in interpretation are provided with the software Help manual.

### Example of Report Form:

| MICROGEN STREP-ID         |          |     |                                     |          |     |  |          |     |     |          |    |  |          |     |     |
|---------------------------|----------|-----|-------------------------------------|----------|-----|--|----------|-----|-----|----------|----|--|----------|-----|-----|
| REPORT FORM               |          |     |                                     |          |     |  |          |     |     |          |    |  |          |     |     |
| Lab. No.<br><b>B7365</b>  |          |     | Specimen Type: <b>Brain Abscess</b> |          |     |  |          |     |     |          |    |  |          |     |     |
|                           |          |     | Date: <b>2/1/07</b>                 |          |     |  |          |     |     |          |    |  |          |     |     |
| Strep-ID                  |          |     |                                     |          |     |  |          |     |     |          |    |  |          |     |     |
| Well Number               | HIP      | AHE | BHE                                 | MEL      | SOR | INU  | LAC      | ARA | RIB | ESC      | VP | PHS  | βGA      | PYR | ARG |
| Reaction                  | -        | +   | -                                   | -        | -   | -  | +        | -   | -   | -        | -  | -  | +        | -   | -   |
| 24 hours                  | -        | +   | -                                   | -        | -   | -  | +        | -   | -   | -        | -  | -  | +        | -   | -   |
| Reaction Index            | 4        | 2   | 1                                   | 4        | 2   | 1  | 4        | 2   | 1   | 4        | 2  | 1  | 4        | 2   | 1   |
| Sum of Positive Reactions | <b>2</b> |     |                                     | <b>0</b> |     |  | <b>4</b> |     |     | <b>0</b> |    |  | <b>4</b> |     |     |
| Profile No: <b>20404</b>  |          |     |                                     |          |     | Final Identification: <b>S. mitis biovar 1</b> |          |     |     |          |    |  |          |     |     |

### Important:

The Microgen Strep-ID microwell test strips + external tests will generate a 5 digit Octal Code.

## LIMITATIONS OF USE

1. Results should be interpreted by the clinician in the context of all available clinical and laboratory information.
2. The Microgen Strep-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 Strep-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. The recording  $\alpha$  or  $\beta$ -haemolysis must be performed on all isolates prior to inoculation into the Microgen Strep-ID microwell test strip. A 5 digit Octal Code is required to interpret the results using the Microgen Identification System Software.
9. *S. pneumoniae* and some other  $\alpha$ -Haemolytic species (*S. mitis* and *S. sanguinis*) may not always be clearly separated using the substrates included in the Microgen Strep-ID. It is recommended that an Optochin Sensitivity and/or Bile Solubility test be performed to clarify the identification of these two species:
  1. Optochin Sensitivity
    1. Subculture a single colony onto a 5% blood agar plate.
    2. Spread the inoculum over the surface of the plate.
    3. Place a 5 $\mu$ g optochin disc onto the inoculated surface of the agar plate.
    4. Incubate at 35 - 37°C in a 5% CO<sub>2</sub> atmosphere for 18 – 24 hours.
    5. Sensitive: Growth inhibited around disc (14mm or greater with 6mm disc) – *S. pneumoniae*. Resistant: Growth not inhibited around disc or growth up to and around disc – *S. mitis* or *S. sanguinis*.
  2. Bile Solubility
    1. Subculture a single colony onto a 5% blood agar plate in such a way as to ensure well isolated colonies.
    2. Place a loopful or drop of 2% deoxycholate (pH 7.0) directly onto a single well-isolated colony.
    3. Incubate the plate at 35 - 37°C, aerobically for 30 minutes. (Do not invert the plate)
    4. Bile Soluble: Colony disintegrates (disappears) under the drop leaving an area of haemolysis where the colony had been – *S. pneumoniae*. Bile insoluble: colony remains intact and visible – *S. mitis* or *S. sanguinis*.
10. Some species belonging to the same group may be poorly separated e.g. *S. intermedius* and *S. anginosus* belong to the Anginosus group. The Microgen Identification System Software indicates where species belong to the same group.

## QUALITY CONTROL

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

*Streptococcus salivarius* ATCC 13419

*Streptococcus mutans* NCTC 10449/ ATCC 25175

*Streptococcus mitis* biovar 1 ATCC 6249

*Enterococcus gallinarum* ATCC 49573

|  | H<br>I<br>P | A<br>H<br>E | B<br>H<br>E | M<br>E<br>L | S<br>O<br>R | I<br>N<br>U | L<br>A<br>C | A<br>R<br>A | R<br>I<br>B | E<br>S<br>C | V<br>P | P<br>H<br>S | B<br>G<br>A | P<br>Y<br>R | A<br>R<br>G |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------|-------------|-------------|-------------|-------------|
| <i>S. salivarius</i> ATCC 13419          | -           | +           | -           | -           | -           | +           | +           | -           | -           | +           | +      | -           | -           | -           | -           |
| <i>S. mutans</i> NCTC 10449 / ATCC 25175 | -           | +           | -           | +           | +           | +           | +           | -           | -           | +           | +      | -           | +           | -           | -           |
| <i>S. mitis</i> biovar 1 ATCC 6249       | -           | +           | -           | +           | -           | -           | +           | -           | -           | -           | -      | +           | +           | -           | -           |
| <i>E. gallinarum</i> ATCC 49573          | +           | -           | -           | +           | -           | +           | +           | +           | +           | +           | +      | -           | +           | +           | +           |

## DATABASE

Microgen Strep-ID is based on standard biochemical testing methods. The data provided for interpretation of reaction profiles is based on established literature sources (2,3,4,5).

## PERFORMANCE CHARACTERISTICS

Microgen Strep-ID (MID-62) has been evaluated in comparison with an established commercially available product for identification of cultured bacterial isolates.

|  | Number Tested | MID-62 | Competitor |
|--|---------------|--------|------------|
| <i>E. avium</i>                            | 1             | 1      | 1          |
| <i>E. durans</i>                           | 2             | 2      | 1          |
| <i>E. faecalis</i>                         | 10            | 10     | 10         |
| <i>E. faecium</i>                          | 5             | 5      | 5          |
| <i>E. gallinarum</i>                       | 1             | 1      | 0          |
| <i>E. hirae</i>                            | 1             | 1      | 0          |
| <i>G. haemolysans</i>                      | 1             | 1      | 1          |
| <i>S. acidominimus</i>                     | 1             | 1      | 0          |
| <i>S. agalactiae</i>                       | 5             | 5      | 5          |
| <i>S. anginosus</i>                        | 3             | 3      | 2          |
| <i>S. bovis</i>                            | 1             | 1      | 1          |
| <i>S. constellatus</i>                     | 3             | 2      | 3          |
| <i>S. dysgalactiae</i> ssp. <i>equi</i>    | 1             | 1      | 1          |
| <i>S. equi</i> subsp. <i>equi</i>          | 2             | 2      | 2          |
| <i>S. equi</i> subsp. <i>zooepidemicus</i> | 1             | 1      | 1          |
| <i>S. gordonii</i>                         | 1             | 1      | 0          |
| <i>S. intermedius</i>                      | 1             | 1      | 0          |
| <i>S. mitis</i>                            | 9             | 9      | 5          |
| <i>S. mutans</i>                           | 4             | 3      | 4          |
| <i>S. parasanguinis</i>                    | 1             | 1      | 0          |
| <i>S. pneumoniae</i>                       | 5             | 4      | 2          |
| <i>S. pyogenes</i>                         | 3             | 3      | 3          |
| <i>S. salivarius</i>                       | 4             | 4      | 3          |
| <i>S. sanguinis</i>                        | 2             | 0      | 2          |
| <i>S. uberis</i>                           | 1             | 1      | 1          |
| <i>S. vestibularis</i>                     | 1             | 1      | 0          |
| TOTAL                                      | 70            | 65     | 53         |

A total of 70 organisms, comprising cultures from recognized culture collections and clinical isolates were examined. Microgen Strep-ID correctly identified 65 (93%). The competitor product identified 53 (76%) of the isolates tested.

## REPRODUCIBILITY

**Intra-batch:** A panel of bacterial cultures was tested using one batch of Microgen Strep-ID, on three occasions using a different operator on each occasion. Test results obtained by the three operators correlated very closely giving an overall intra-batch reproducibility of 99%.

**Inter-batch:** Three batches of Microgen Strep-ID were tested using a panel of five bacterial cultures. This gave an overall inter-batch reproducibility of >99%.

## REFERENCES

1. Lapage S.P, Bascombe S, Willcox W.R and Curtis M.A. (1973) Identification of Bacteria by Computer: General Aspects and Perspectives J.Gen. Microbiol. **77**: 273 -290
2. Murray P.R. (Ed) (2007) Manual of Clinical Microbiology 9<sup>th</sup> Edition. American Society for Microbiology, Washington, DC
3. Flackham R. (2002) What Happened to Streptococci: Overview of Taxonomic and Nomenclature Changes. Clin. Microbiol. Reviews. **15**: 613 – 630
4. Bascomb S. and M. Manafi (1998) Use of Enzyme Tests in Characterization and Identification of Aerobic and Facultatively Anaerobic Gram – Positive Cocci. Clin. Microbiol. Reviews. **11**: 318 – 340
5. Ellner P.D., Williams D.A., Hosmer M.E. and A. Cohenford. (1985) Preliminary evaluation of a rapid colorimetric method for the presumptive identification of group A streptococci and enterococci. J. Clin. Microbiol. **22**: 880 – 881
6. Hwang M, and G.M. Ederer (1975) Rapid hippurate hydrolysis method for presumptive identification group B streptococci. J. Clin.Microbiol **1**: 114 - 115



## SUBSTRATE REFERENCE TABLE

| Well | Reaction               | Description   | Positive                | Negative         |
|------|------------------------|---|-------------------------|------------------|
| 1    | Melibiose              | Sugar Fermentation – Phenol red changes from red to yellow as a result of acid produced from the carbohydrate fermentation.   | Yellow – Yellow/ Orange | Red/ Deep Orange |
| 2    | Sorbitol               |   |                         |                  |
| 3    | Inulin                 |   |                         |                  |
| 4    | Lactose                |   |                         |                  |
| 5    | Arabitol               |   |                         |                  |
| 6    | Ribose                 |   |                         |                  |
| 7    | Esculin                | Hydrolysis of Esculin to glucose and esculetin which produces a black compound in the presence of Ferric ions.  | Black                   | Brown            |
| 8    | Voges Proskauer (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.  | Pale Pink/ Red          | Clear            |
| 9    | Alkaline Phosphatase   | Hydrolysis of p-nitrophenyl phosphate by alkaline phosphatase results in the production of yellow p-nitrophenol.  | Yellow                  | Colourless       |
| 10   | $\beta$ -Galactosidase | Hydrolysis – p-nitrophenyl- $\beta$ -D-galactopyranoside by $\beta$ -galactosidase results in the production of yellow ortho-nitrophenol.   | Yellow                  | Colourless       |
| 11   | PYR                    | Hydrolysis of L-pyrrolidonyl- $\alpha$ -naphthylamide by the enzyme pyrrolidonyl arylamidase.   | Pale Pink/ Red          | Colourless       |
| 12   | Arginine               | Arginine is converted to ornithine, ammonia and CO <sub>2</sub> 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 Blue        | Yellow           |
| 13   | Hippurate              | Hippurate is hydrolysed to the amino acid Glycine which is detected using the Ninhydrin reagent.  | Purple                  | Clear            |
| 14   | $\alpha$ -Haemolysis   | Visual recording of haemolysis on blood agar  | (1)                     |                  |
| 15   | $\beta$ -Haemolysis    | Visual recording of haemolysis on blood agar  | (2)                     |                  |

- (1).  $\alpha$ -Haemolysis - Presents as a zone of partial haemolysis of red blood cells on blood agar medium. This is characterised by the development of a green discolouration of the medium immediately surrounding colonies.
- (2).  $\beta$ -Haemolysis – Presents as a zone of complete haemolysis of red blood cells on blood agar medium. This is characterised by the development of a complete clearing of the medium immediately surrounding colonies.

## Species Identified using Microgen Strep-ID

### ***Enterococcus* spp.**

*E. avium*  
*E. casseliflavus*  
*E. cecorum*  
*E. dispar*  
*E. durans*  
*E. faecalis*  
*E. faecium*  
*E. gallinarum*  
*E. hirae*  
*E. mundtii*  
*E. raffinosus*

### ***Gemella* spp.**

*G. haemolysans*

### ***Streptococcus* spp.**

*S. acidominimus*  
*S. agalactiae*  
*S. anginosus/intermedius*  
*S. bovis*  
*S. canis*  
*S. constellatus*  
*S. dysgalactiae* subsp. *dysgalactiae*  
*S. dysgalactiae* subsp. *equisimilis*  
*S. equi* subsp. *equi*  
*S. equi* subsp. *zooepidemicus*  
*S. equinus*  
*S. gordonii* biovar 1  
*S. gordonii* biovar 2  
*S. gordonii* biovar 3  
*S. intermedius/anginosus*  
*S. iniae*  
*S. mitis* biovar 1  
*S. mitis* biovar 2

*S. mutans*  
*S. oralis*  
*S. parasanguinis*  
*S. pneumoniae*  
*S. porcinus*  
*S. pyogenes*  
*S. salivarius*  
*S. sanguinis* biovar 1  
*S. sanguinis* biovar 2  
*S. sanguinis* biovar 3  
*S. sanguinis* biovar 4  
*S. suis*  
*S. uberis*  
*S. vestibularis*





















# Streptococcus Data Table

|   | HIP | AHE | BHE  | MEL  | SOR  | INU  | LAC  | ARA | RIB | ESC  | VP   | PHS  | BGA  | PYR  | ARG  |
|---|-----|-----|------|------|------|------|------|-----|-----|------|------|------|------|------|------|
| <i>Enterococcus avium</i>                           | 45  | 90  | 1    | 30   | 99.9 | 0.1  | 99.9 | 85  | 99  | 99.9 | 60   | 0.1  | 85   | 92   | 0.1  |
| <i>Enterococcus casseliflavus</i>                   | 0.1 | 50  | 0.1  | 99.9 | 13   | 90   | 99.9 | 99  | 99  | 99   | 95   | 0.1  | 99   | 99   | 58   |
| <i>Enterococcus cecorum</i>                         | 0.1 | 90  | 5    | 99.9 | 0.1  | 99.9 | 99.9 | 0.1 | 99  | 99.9 | 99.9 | 99.9 | 75   | 24   | 0.1  |
| <i>Enterococcus dispar</i>                          | 60  | 22  | 0.1  | 99.9 | 0.1  | 0.1  | 99.9 | 0.1 | 99  | 99.9 | 99.9 | 0.1  | 99.9 | 99.9 | 99.9 |
| <i>Enterococcus durans</i>                          | 45  | 64  | 20   | 20   | 0.1  | 0.1  | 95   | 5   | 99  | 99.9 | 97   | 0.1  | 82   | 99.9 | 99.9 |
| <i>Enterococcus faecalis</i>                        | 90  | 12  | 24   | 0.1  | 95   | 0.1  | 95   | 0.1 | 99  | 99.9 | 99.9 | 5    | 24   | 99.9 | 99.9 |
| <i>Enterococcus faecium</i>                         | 80  | 60  | 0.1  | 95   | 8    | 2    | 98   | 95  | 99  | 99.9 | 92   | 0.1  | 50   | 99.9 | 90   |
| <i>Enterococcus gallinarum</i>                      | 91  | 50  | 0.1  | 99.9 | 20   | 82   | 99.9 | 99  | 99  | 99.9 | 96   | 0.1  | 55   | 96   | 70   |
| <i>Enterococcus hirae</i>                           | 70  | 0.1 | 0.1  | 98   | 0.1  | 0.1  | 99.9 | 0.1 | 99  | 99.9 | 90   | 0.1  | 80   | 99.9 | 92   |
| <i>Enterococcus mundtii</i>                         | 0.1 | 0.1 | 0.1  | 99.9 | 80   | 15   | 99.9 | 99  | 99  | 99.9 | 99.9 | 0.1  | 99.9 | 99.9 | 91   |
| <i>Enterococcus raffinosus</i>                      | 35  | 25  | 0.1  | 99.9 | 99.9 | 0.1  | 99.9 | 99  | 99  | 99.9 | 65   | 0.1  | 0.1  | 99   | 0.1  |
| <i>Gamella haemolysans</i>                          | 0.1 | 0.1 | 1    | 0.1  | 5    | 0.1  | 0.1  | 0.1 | 0.1 | 0.1  | 50   | 60   | 0.1  | 81   | 0.1  |
| <i>Streptococcus acidominimus</i>                   | 80  | 40  | 0.1  | 0.1  | 0.1  | 0.1  | 99.9 | 0.1 | 0.1 | 0.1  | 0.1  | 0.1  | 99.9 | 8    | 40   |
| <i>Streptococcus agalactiae</i>                     | 99  | 0.1 | 98   | 20   | 7    | 0.1  | 70   | 0.1 | 99  | 0.1  | 75   | 99.9 | 5    | 0.1  | 99.9 |
| <i>Streptococcus anginosus/ intermedius</i>         | 0.1 | 40  | 0.1  | 12   | 0.1  | 0.1  | 85   | 0.1 | 0.1 | 99.9 | 80   | 90   | 30   | 0.1  | 99.9 |
| <i>Streptococcus bovis</i>                          | 0.1 | 32  | 0.1  | 99.9 | 10   | 50   | 99.9 | 30  | 99  | 90   | 85   | 0.1  | 16   | 0.1  | 0.1  |
| <i>Streptococcus canis</i>                          | 0.1 | 0.1 | 99.9 | 0.1  | 0.1  | 0.1  | 97   | 0.1 | 99  | 99   | 0.1  | 99   | 90   | 0.1  | 99   |
| <i>Streptococcus constellatus</i>                   | 0.1 | 0.1 | 80   | 18   | 0.1  | 0.1  | 52   | 0.1 | 0.1 | 99.9 | 99.9 | 99   | 70   | 0.1  | 99   |
| <i>Streptococcus dysgalactiae ssp. dysgalactiae</i> | 0.1 | 60  | 2    | 0.1  | 70   | 0.1  | 80   | 0.1 | 99  | 0.1  | 0.1  | 99   | 0.1  | 0.1  | 99   |
| <i>Streptococcus dysgalactiae ssp. equisimilis</i>  | 15  | 0.1 | 95   | 0.1  | 0.1  | 0.1  | 99.9 | 0.1 | 98  | 0.1  | 0.1  | 99   | 99   | 0.1  | 99   |
| <i>Streptococcus equi subsp. equi</i>               | 0.1 | 0.1 | 99   | 0.1  | 0.1  | 0.1  | 0.1  | 0.1 | 0.1 | 88   | 0.1  | 99   | 0.1  | 0.1  | 99   |
| <i>Streptococcus equi subsp. zooepidemicus</i>      | 0.1 | 0.1 | 97   | 0.1  | 99   | 0.1  | 99.9 | 0.1 | 99  | 80   | 0.1  | 99   | 20   | 0.1  | 99   |
| <i>Streptococcus equinus</i>                        | 0.1 | 58  | 0.1  | 10   | 0.1  | 15   | 5    | 0.1 | 50  | 99.9 | 28   | 0.1  | 0.1  | 0.1  | 0.1  |
| <i>Streptococcus gordonii biovar 1</i>              | 0.1 | 99  | 0.1  | 99.9 | 0.1  | 99.9 | 99.9 | 0.1 | 0.1 | 99.9 | 0.1  | 99.9 | 99.9 | 0.1  | 99.9 |
| <i>Streptococcus gordonii biovar 2</i>              | 0.1 | 99  | 0.1  | 0.1  | 0.1  | 75   | 99.9 | 0.1 | 0.1 | 99.9 | 0.1  | 99.9 | 65   | 0.1  | 99.9 |
| <i>Streptococcus gordonii biovar 3</i>              | 0.1 | 99  | 0.1  | 0.1  | 0.1  | 99.9 | 99.9 | 0.1 | 0.1 | 99.9 | 0.1  | 99.9 | 45   | 0.1  | 99.9 |
| <i>Streptococcus iniae</i>                          | 0.1 | 0.1 | 99.9 | 5    | 0.1  | 0.1  | 5    | 0.1 | 99  | 93   | 0.1  | 98   | 26   | 99   | 50   |
| <i>Streptococcus intermedius/ anginosus</i>         | 0.1 | 50  | 45   | 9    | 0.1  | 0.1  | 96   | 0.1 | 6   | 99.9 | 99.9 | 99.9 | 99.9 | 0.1  | 99.9 |
| <i>Streptococcus mitis biovar 1</i>                 | 0.1 | 89  | 0.1  | 42   | 0.1  | 0.1  | 99.9 | 0.1 | 5   | 0.1  | 0.1  | 35   | 60   | 0.1  | 2    |
| <i>Streptococcus mitis biovar 2</i>                 | 0.1 | 85  | 0.1  | 99.9 | 38   | 0.1  | 99.9 | 0.1 | 7   | 0.1  | 0.1  | 60   | 80   | 0.1  | 85   |
| <i>Streptococcus mutans</i>                         | 0.1 | 40  | 1    | 99.9 | 99.9 | 99.9 | 99.9 | 0.1 | 50  | 99.9 | 90   | 0.1  | 35   | 0.1  | 0.1  |
| <i>Streptococcus oralis</i>                         | 0.1 | 99  | 0.1  | 99.9 | 0.1  | 0.1  | 99.9 | 10  | 90  | 0.1  | 0.1  | 85   | 96   | 0.1  | 0.1  |
| <i>Streptococcus parasanguinis</i>                  | 0.1 | 99  | 0.1  | 45   | 0.1  | 0.1  | 99.9 | 0.1 | 0.1 | 42   | 0.1  | 65   | 45   | 0.1  | 85   |
| <i>Streptococcus pneumoniae</i>                     | 0.1 | 90  | 0.1  | 5    | 0.1  | 60   | 99.9 | 0.1 | 0.1 | 37   | 0.1  | 0.1  | 98   | 25   | 24   |
| <i>Streptococcus porcinus</i>                       | 27  | 0.1 | 95   | 0.1  | 90   | 0.1  | 10   | 0.1 | 99  | 99   | 95   | 98   | 1    | 5    | 90   |
| <i>Streptococcus pyogenes</i>                       | 0.1 | 0.1 | 99.9 | 0.1  | 0.1  | 0.1  | 99.9 | 0.1 | 0.1 | 20   | 0.1  | 99.9 | 0.1  | 99.9 | 99.9 |
| <i>Streptococcus salivarius</i>                     | 0.1 | 40  | 0.1  | 20   | 0.1  | 55   | 45   | 0.1 | 35  | 99.9 | 55   | 35   | 57   | 0.1  | 0.1  |
| <i>Streptococcus sanguinis biovar 1</i>             | 0.1 | 95  | 0.1  | 0.1  | 5    | 80   | 99.9 | 0.1 | 0.1 | 99   | 0.1  | 0.1  | 99.9 | 0.1  | 98   |
| <i>Streptococcus sanguinis biovar 2</i>             | 0.1 | 95  | 0.1  | 0.1  | 1    | 73   | 99.9 | 0.1 | 0.1 | 98   | 0.1  | 0.1  | 50   | 0.1  | 98   |
| <i>Streptococcus sanguinis biovar 3</i>             | 0.1 | 96  | 0.1  | 0.1  | 25   | 78   | 99.9 | 0.1 | 0.1 | 99   | 0.1  | 0.1  | 38   | 0.1  | 98   |
| <i>Streptococcus sanguinis biovar 4</i>             | 0.1 | 95  | 0.1  | 0.1  | 1    | 64   | 99.9 | 0.1 | 0.1 | 92   | 0.1  | 0.1  | 99.9 | 0.1  | 98   |
| <i>Streptococcus suis</i>                           | 0.1 | 99  | 1    | 50   | 0.1  | 99.9 | 99   | 0.1 | 0.1 | 99   | 0.1  | 5    | 50   | 40   | 99   |
| <i>Streptococcus uberis</i>                         | 99  | 50  | 0.1  | 46   | 99.9 | 75   | 50   | 0.1 | 98  | 99.9 | 95   | 40   | 40   | 40   | 50   |
| <i>Streptococcus vestibularis</i>                   | 0.1 | 95  | 0.1  | 0.1  | 0.1  | 0.1  | 99.9 | 0.1 | 0.1 | 80   | 80   | 0.1  | 99.9 | 0.1  | 82   |

## Colour chart/Farbtafel/Tableau 'de couleurs

Microgen™ Strep ID (MID- 62)



Read strips at 18 to 24 hours

| WELL/NAPFCHEN /GODET | 1 to 6   | 7  | 8  | 9 to 10  | 11   | 12   |   |
|----------------------|--|--|--|--|--|--|---|
| Reaction             | Carbohydrate Fermentation  | Esculin  | Voges Proskauer  | PHS, $\beta$ GA  | PYR  | <u>Arginine</u>  | Hippurate   |
| Negative             |   | <br> |   |   |    |   |  |
| Positive             | <br> |   | <br> | <br> | <br> | <br> |  |

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

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

### Legend:

-  Appropriate reagents to be added at 18 to 24 hours, prior to reading.
-  Overlaid with sterile mineral oil.

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