

# European Committee on Antimicrobial Susceptibility Testing

## Breakpoint tables for interpretation of MICs and zone diameters

Version 5.0, valid from 2015-01-01

### This document should be cited as

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# European Committee on Antimicrobial Susceptibility Testing

## Breakpoint tables for interpretation of MICs and zone diameters

Version 5.0, valid from 2015-01-01

### Notes

1. The EUCAST tables of clinical breakpoints contain clinical MIC breakpoints (determined or revised during 2002-2014) and their inhibition zone diameter correlates. The EUCAST breakpoint table version 5.0 includes corrected typographical errors, clarifications, breakpoints for new organisms, revised MIC breakpoints and revised and new zone diameter breakpoints. Changes are best seen on screen or on a colour printout since cells containing a change are yellow. New or revised comments are underlined. Removed comments are shown in strikethrough font style.

2. PK/PD (Non-species-related) breakpoints are listed separately on the last page.

3. Numbered footnotes relate to MIC breakpoints. Lettered footnotes relate to zone diameter breakpoints.

4. Antimicrobial names in blue are linked to EUCAST rationale documents. MIC and zone diameter breakpoints in blue are linked to EUCAST MIC and zone diameter distributions, respectively.

5. One version of the document is released as an unprotected Excel file to enable users to alter the list of agents to suit the range of agents tested locally. The content of single cells cannot be changed. Hide lines by right-clicking on the line number and choosing "hide". Hide columns by right-clicking on the column letter and choosing "hide".

6. A zone diameter breakpoint of "S ≥ 50 mm" is an arbitrary "off scale" zone diameter breakpoint corresponding to MIC breakpoint situations where wild type isolates are categorised as intermediate (*i.e.* no fully susceptible isolates exist).

7. In order to simplify the EUCAST tables, the intermediate category is not listed. It is interpreted as values between the S and the R breakpoints. For example, for MIC breakpoints listed as S ≤ 1 mg/L and R > 8 mg/L, the intermediate category is 2-8 (technically >1-8) mg/L, and for zone diameter breakpoints listed as S ≥ 22 mm and R < 18 mm, the intermediate category is 18-21 mm.

8. For *Stenotrophomonas maltophilia* with trimethoprim-sulfamethoxazole, *Staphylococcus aureus* with benzylpenicillin and enterococci with vancomycin, it is crucial to follow specific reading instructions for correct interpretation of the disk diffusion test. For these, pictures with reading examples are included at the end of the corresponding breakpoint table. For general and other specific reading instructions, please refer to the EUCAST Reading Guide.

9. For cefuroxime and fosfomycin there are breakpoints for intravenous and oral administration.

10. By international convention MIC dilution series are based on twofold dilutions up and down from 1 mg/L. At dilutions below 0.25 mg/L, this leads to concentrations with multiple decimal places. To avoid having to use these in tables and documents, EUCAST has decided to use the following format (in bold): 0.125→**0.125**, 0.0625→**0.06**, 0.03125→**0.03**, 0.015625→**0.016**, 0.0078125→**0.008**, 0.00390625→**0.004** and 0.001953125→**0.002** mg/L.

"-" indicates that susceptibility testing is not recommended as the species is a poor target for therapy with the agent. Isolates may be reported as R without prior testing.

"IE" indicates that there is insufficient evidence that the species in question is a good target for therapy with the agent. An MIC with a comment but without an accompanying S, I or R categorisation may be reported.

NA = Not Applicable

IP = In Preparation

# Guidance on reading EUCAST Breakpoint Tables

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

The intermediate category is not listed but is interpreted as the values between the S and the R breakpoints. If the S and R breakpoints are the same value there is no intermediate category.

Agent A: No intermediate category  
 Agent B: Intermediate category: 4 mg/L, 23-25 mm  
 Agent G: Intermediate category: 1-2 mg/L, 24-29 mm

Disk diffusion (EUCAST standardised disk diffusion method)  
 Medium:  
 Inoculum:  
 Incubation:  
 Reading:  
 Quality control:

EUCAST method for antimicrobial susceptibility testing by disk diffusion and recommendations for quality control

Breakpoints with a species name apply only to that particular species (in this example *S. aureus*)

Antimicrobial agent	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Antimicrobial agent A	1 <sup>1</sup>	1 <sup>1</sup>	X	20 <sup>A</sup>	20 <sup>A</sup>	1. Comment on MIC breakpoints
Antimicrobial agent B, <i>S. aureus</i>	2 <sup>2</sup>	4	Y	26	23	2. New comment Removed comment
Antimicrobial agent C	IE	IE		IE	IE	
Antimicrobial agent D	-	-		-	-	A. Comment on disk diffusion
Antimicrobial agent E	IP	IP		IP	IP	
Antimicrobial agent F (screen)	NA	NA	Y	25	25	
Antimicrobial agent G	0.5	2	Z	30	24	

Changes from previous version highlighted in yellow

No breakpoints. Susceptibility testing is not recommended

Zone diameter breakpoints in blue are linked to zone diameter distributions

Not Applicable

In Preparation

MIC breakpoints in blue are linked to MIC distributions

Insufficient evidence that the organism or group is a good target for therapy with the agent

Screening breakpoint to differentiate between isolates without and with resistance mechanisms

Antimicrobial names in blue are linked to EUCAST rational documents

# European Committee on Antimicrobial Susceptibility Testing

## Breakpoint tables for interpretation of MICs and zone diameters

Version 5.0, valid from 2015-01-01

<b>Version 5.0, 2015-01-01</b>	<b>Changes (cells containing a change, a deletion or an addition) from v 4.0 are marked yellow. Changed comments are underlined. Removed comments are shown in strikethrough font style.</b>
<b>All tables</b>	<ul style="list-style-type: none"> <li>New format for comments. New or revised comments are underlined. Removed comments are shown in strikethrough font style.</li> <li>For MIC values below 0.5 mg/L, the following format is used: 0.25, 0.125, 0.06, 0.03, 0.016, 0.008, 0.004 and 0.002 mg/L.</li> <li>Amoxicillin-clavulanate is changed to amoxicillin-clavulanic acid.</li> <li>Information on testing conditions is added for telavancin, tigecycline, daptomycin and fosfomicin.</li> <li>Ceftobiprole added.</li> <li>Links to rationale documents added for ceftaroline, fosfomicin iv and fosfomicin oral.</li> <li>ECOFF expression changed (WT ≤ removed).</li> </ul>
<b>Notes</b>	<ul style="list-style-type: none"> <li>Note 10 on format for MIC values updated.</li> </ul>
<b>Enterobacteriaceae</b>	<ul style="list-style-type: none"> <li>Revised breakpoints: Amikacin zone diameter breakpoints.</li> <li>Revised comments: Aztreonam (typo error corrected) and tigecycline comment 1.</li> </ul>
<b><i>Pseudomonas</i> spp.</b>	<ul style="list-style-type: none"> <li>Revised comments: Aztreonam (comment removed) and fosfomicin.</li> </ul>
<b><i>Stenotrophomonas maltophilia</i></b>	<ul style="list-style-type: none"> <li>Clarification regarding reading instructions.</li> <li>New comment: Trimethoprim-sulfamethoxazole comment 2.</li> <li>Improved pictures with reading examples.</li> </ul>
<b><i>Staphylococcus</i> spp.</b>	<ul style="list-style-type: none"> <li>Clarification regarding reading instructions.</li> <li>Revised breakpoints: Telavancin (new breakpoints valid for testing with polysorbate-80).</li> <li>New/revised comments: Cephalosporins comments 1/A, 3, 4 and 6, amikacin (criteria for kanamycin added) and telavancin comment 3.</li> <li>Improved pictures with reading examples.</li> </ul>
<b><i>Enterococcus</i> spp.</b>	<ul style="list-style-type: none"> <li>New/revised comments: Ampicillin-sulbactam (missing in previous versions) and aminoglycosides comment 2/A (clarification).</li> <li>Comment 2/B added to trimethoprim-sulfamethoxazole.</li> <li>Improved pictures with reading examples and glycopeptides corrected to vancomycin in methodology section.</li> </ul>
<b>Streptococcus groups A, B, C and G</b>	<ul style="list-style-type: none"> <li>Revised comments: Clindamycin comment 2 (reporting of inducible clindamycin resistance).</li> </ul>
<b><i>Streptococcus pneumoniae</i></b>	<ul style="list-style-type: none"> <li>New comments: Comment 3 for ampicillin, amoxicillin and amoxicillin-clavulanic acid.</li> <li>Revised comments: Clindamycin comment 2 (reporting of inducible clindamycin resistance).</li> <li>Ceftobiprole added to supplementary table.</li> </ul>
<b>Viridans group streptococci</b>	<ul style="list-style-type: none"> <li>Revised comments: Aminoglycosides comment 2 (clarification) and clindamycin comment 1 (reporting of inducible clindamycin resistance).</li> </ul>
<b><i>Haemophilus influenzae</i></b>	<ul style="list-style-type: none"> <li><i>Haemophilus influenzae</i> ATCC 49766 added as quality control strain.</li> </ul>
<b><i>Moraxella catarrhalis</i></b>	<ul style="list-style-type: none"> <li>Revised breakpoints: Ceftaroline (changed from dash to IE).</li> <li><i>Haemophilus influenzae</i> ATCC 49766 added as quality control strain.</li> </ul>
<b><i>Neisseria gonorrhoeae</i></b>	<ul style="list-style-type: none"> <li>Revised breakpoints: Cefpodoxime and ceftibuten (both changed from IE to dash).</li> </ul>
<b><i>Neisseria meningitidis</i></b>	<ul style="list-style-type: none"> <li>Revised breakpoints: Cefoxitin (missing in previous versions) and ciprofloxacin.</li> </ul>
<b>Gram-positive anaerobes</b>	<ul style="list-style-type: none"> <li>General information added.</li> <li>Revised breakpoints: Cefoxitin (missing in previous versions).</li> <li>Comment 1 on penicillins removed from ampicillin-sulbactam, amoxicillin-clavulanic acid, piperacillin-tazobactam and ticarcillin-clavulanic acid (correction from previous versions).</li> </ul>
<b><i>Clostridium difficile</i></b>	<ul style="list-style-type: none"> <li>New breakpoints: Fidaxomicin.</li> <li>New comment: Fidaxomicin.</li> </ul>
<b>Gram-negative anaerobes</b>	<ul style="list-style-type: none"> <li>General information added.</li> <li>Revised breakpoints: Cefoxitin (missing in previous versions).</li> </ul>
<b><i>Pasteurella multocida</i></b>	<ul style="list-style-type: none"> <li><i>Haemophilus influenzae</i> ATCC 49766 added as quality control strain.</li> <li>New comment: Amoxicillin-clavulanic acid (missing in previous versions).</li> </ul>
<b><i>Mycobacterium tuberculosis</i></b>	<ul style="list-style-type: none"> <li>New table.</li> </ul>
<b>PK/PD (Non-species related) breakpoints</b>	<ul style="list-style-type: none"> <li>Clarification regarding the use of the PK/PD breakpoints.</li> <li>Terminology updated: S/I breakpoint changed to S breakpoint and I/R breakpoint to R breakpoint.</li> <li>Revised breakpoints: Aminoglycosides (changed to IE)</li> <li>Revised comments: Aminoglycosides (comments removed).</li> </ul>

# Enterobacteriaceae

# EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar  
**Inoculum:** McFarland 0.5  
**Incubation:** Air, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light.  
**Quality control:** *Escherichia coli* ATCC 25922

Penicillins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Benzylpenicillin</b>	-	-		-	-	<b>Notes</b> Numbers for comments on MIC breakpoints Letters for comments on disk diffusion  1/A. Wild type Enterobacteriaceae are categorised as susceptible to aminopenicillins. Some countries prefer to categorise wild type isolates of <i>E. coli</i> and <i>P. mirabilis</i> as intermediate. When this is the case, use the MIC breakpoint S ≤ 0.5 mg/L and the corresponding zone diameter breakpoint S ≥ 50 mm. 2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 3. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L. 4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L. 5/D. Mecillinam (pivmecillinam) breakpoints relate to <i>E. coli</i> , <i>Klebsiella</i> spp. and <i>P. mirabilis</i> only.  B. Ignore growth that may appear as a thin inner zone on some batches of Mueller-Hinton agars. C. Susceptibility inferred from ampicillin. E. Ignore isolated colonies within the inhibition zone for <i>E. coli</i> .
<b>Ampicillin</b>	8 <sup>1</sup>	8	10	14 <sup>A,B</sup>	14 <sup>B</sup>	
<b>Ampicillin-sulbactam</b>	8 <sup>1,2</sup>	8 <sup>2</sup>	10-10	14 <sup>A,B</sup>	14 <sup>B</sup>	
<b>Amoxicillin</b>	8 <sup>1</sup>	8	-	Note <sup>C</sup>	Note <sup>C</sup>	
<b>Amoxicillin-clavulanic acid</b>	8 <sup>1,3</sup>	8 <sup>3</sup>	20-10	19 <sup>A,B</sup>	19 <sup>B</sup>	
<b>Amoxicillin-clavulanic acid (uncomplicated UTI only)</b>	32 <sup>1,3</sup>	32 <sup>3</sup>	20-10	16 <sup>A,B</sup>	16 <sup>B</sup>	
<b>Piperacillin</b>	8	16	30	20	17	
<b>Piperacillin-tazobactam</b>	8 <sup>4</sup>	16 <sup>4</sup>	30-6	20	17	
<b>Ticarcillin</b>	8	16	75	23	23	
<b>Ticarcillin-clavulanic acid</b>	8 <sup>3</sup>	16 <sup>3</sup>	75-10	23	23	
<b>Phenoxymethylpenicillin</b>	-	-		-	-	
<b>Oxacillin</b>	-	-		-	-	
<b>Cloxacillin</b>	-	-		-	-	
<b>Dicloxacillin</b>	-	-		-	-	
<b>Flucloxacillin</b>	-	-		-	-	
<b>Mecillinam (uncomplicated UTI only)</b>	8 <sup>5</sup>	8 <sup>5</sup>	10	15 <sup>D,E</sup>	15 <sup>D,E</sup>	

## Enterobacteriaceae

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	-	-	-	-	-	<p>1. The cephalosporin breakpoints for Enterobacteriaceae will detect all clinically important resistance mechanisms (including ESBL and plasmid mediated AmpC). Some isolates that produce beta-lactamases are susceptible or intermediate to 3rd or 4th generation cephalosporins with these breakpoints and should be reported as tested, <i>i.e.</i> the presence or absence of an ESBL does not in itself influence the categorisation of susceptibility. In many areas, ESBL detection and characterisation is recommended or mandatory for infection control purposes.</p> <p>2. The cefoxitin ECOFF (8 mg/L) has a high sensitivity but poor specificity for identification of AmpC-producing Enterobacteriaceae as this agent is also affected by permeability alterations and some carbapenemases. Classical non-AmpC producers are wild type, whereas plasmid AmpC producers or chromosomal AmpC hyperproducers are non-wild type.</p> <p>3/A. The breakpoint relates to a dosage of 1.5 g x 3 and to <i>E. coli</i>, <i>Klebsiella</i> spp. and <i>P. mirabilis</i> only.</p>
Cefadroxil (uncomplicated UTI only)	16	16	30	12	12	
Cefalexin (uncomplicated UTI only)	16	16	30	14	14	
Cefazolin	-	-	-	-	-	
Cefepime	1	4	30	24	21	
Cefixime (uncomplicated UTI only)	1	1	5	17	17	
Cefotaxime	1	2	5	20	17	
Cefoxitin (screen) <sup>2</sup>	NA	NA	30	19	19	
Cefpodoxime (uncomplicated UTI only)	1	1	10	21	21	
Ceftaroline	0.5	0.5	5	23	23	
Ceftazidime	1	4	10	22	19	
Ceftibuten (UTI only)	1	1	30	23	23	
Ceftobiprole	0.25	0.25	IP	IP	IP	
Ceftriaxone	1	2	30	23	20	
Cefuroxime iv	8 <sup>3</sup>	8	30	18 <sup>A</sup>	18	
Cefuroxime oral (uncomplicated UTI only)	8	8	30	18	18	

Carbapenems <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	1	2	10	24	21	<p>1. The carbapenem breakpoints for Enterobacteriaceae will detect all clinically important resistance mechanisms (including the majority of carbapenemases). Some isolates that produce carbapenemase are categorised as susceptible with these breakpoints and should be reported as tested, <i>i.e.</i> the presence or absence of a carbapenemase does not in itself influence the categorisation of susceptibility. In many areas, carbapenemase detection and characterisation is recommended or mandatory for infection control purposes.</p> <p>2. Low-level resistance is common in <i>Morganella</i> spp., <i>Proteus</i> spp. and <i>Providencia</i> spp.</p>
Ertapenem	0.5	1	10	25	22	
Imipenem <sup>2</sup>	2	8	10	22	16	
Meropenem	2	8	10	22	16	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam <sup>1</sup>	1	4	30	24	21	<p>1. <u>The aztreonam breakpoints for Enterobacteriaceae will detect clinically important resistance mechanisms (including ESBL). Some isolates that produce beta-lactamases are susceptible or intermediate to aztreonam with these breakpoints and should be reported as tested, <i>i.e.</i> the presence or absence of an ESBL does not in itself influence the categorisation of susceptibility. In many areas, ESBL detection and characterisation is recommended or mandatory for infection control purposes.</u></p>

## Enterobacteriaceae

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Ciprofloxacin</a>	0.5	1	5	22	19	<p>1. There is clinical evidence for ciprofloxacin to indicate a poor response in systemic infections caused by <i>Salmonella</i> spp. with low-level ciprofloxacin resistance (MIC &gt;0.06 mg/L). The available data relate mainly to <i>Salmonella</i> Typhi but there are also case reports of poor response with other <i>Salmonella</i> species.</p> <p>A. Tests with a ciprofloxacin 5 µg disk will not reliably detect low-level resistance in <i>Salmonella</i> spp. To screen for ciprofloxacin resistance in <i>Salmonella</i> spp., use the pefloxacin 5 µg disk. <b>See Note B.</b></p> <p>B. Susceptibility of <i>Salmonella</i> spp. to ciprofloxacin can be inferred from pefloxacin disk diffusion susceptibility.</p>
<a href="#">Ciprofloxacin</a> , <i>Salmonella</i> spp. <sup>1</sup>	0.06	0.06		Note <sup>A</sup>	Note <sup>A</sup>	
<a href="#">Pefloxacin (screen)</a> , <i>Salmonella</i> spp. <sup>1</sup>	NA	NA	5	24 <sup>B</sup>	24 <sup>B</sup>	
<a href="#">Levofloxacin</a>	1	2	5	22	19	
<a href="#">Moxifloxacin</a>	0.5	1	5	20	17	
<a href="#">Nalidixic acid (screen)</a>	NA	NA		NA	NA	
<a href="#">Norfloxacin</a>	0.5	1	10	22	19	
<a href="#">Ofloxacin</a>	0.5	1	5	22	19	

Aminoglycosides <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Amikacin</a>	8	16	30	18	15	<p>1. Aminoglycoside breakpoints are based on once-daily administration of high aminoglycoside dosages. Most often aminoglycosides are given in combination with beta-lactam agents.</p>
<a href="#">Gentamicin</a>	2	4	10	17	14	
<a href="#">Netilmicin</a>	2	4	10	15	12	
<a href="#">Tobramycin</a>	2	4	10	17	14	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Teicoplanin</a>	-	-		-	-	
<a href="#">Telavancin</a>	-	-		-	-	
<a href="#">Vancomycin</a>	-	-		-	-	

## Enterobacteriaceae

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin <sup>1</sup>	-	-		-	-	1. Azithromycin has been used in the treatment of infections with <i>Salmonella</i> Typhi (MIC ≤16 mg/L for wild type isolates) and <i>Shigella</i> spp.
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	1. Tigecycline has poor activity against <i>Morganella</i> spp., <i>Proteus</i> spp. and <i>Providencia</i> spp. 2. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	A. Zone diameter breakpoints validated for <i>E. coli</i> only. For other Enterobacteriaceae, use an MIC method.
Tigecycline <sup>1</sup>	1 <sup>2</sup>	2 <sup>2</sup>	15	18 <sup>A</sup>	15 <sup>A</sup>	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	8	8	30	17	17	1. For fosfomycin MIC determination, the medium must be supplemented with glucose-6-phosphate to a final concentration of 25 mg/L. 2/B. Breakpoints apply to <i>E. coli</i> only. 3. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration. A. Use an MIC method.
Colistin	2	2		Note <sup>A</sup>	Note <sup>A</sup>	
Daptomycin	-	-		-	-	
Fosfomycin iv <sup>1</sup>	32	32		IP	IP	
Fosfomycin oral <sup>1</sup> (uncomplicated UTI only)	32	32		IP	IP	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	64 <sup>2</sup>	64 <sup>2</sup>	100	11 <sup>B</sup>	11 <sup>B</sup>	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	2	4	5	18	15	
Trimethoprim-sulfamethoxazole <sup>3</sup>	2	4	1.25-23.75	16	13	



*Pseudomonas* spp.

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion (EUCAST standardised disk diffusion method)  
**Medium:** Mueller-Hinton agar  
**Inoculum:** McFarland 0.5  
**Incubation:** Air, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light.  
**Quality control:** *Pseudomonas aeruginosa* ATCC 27853

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<a href="#">Benzylpenicillin</a>	-	-		-	-	1. Breakpoints are based on high dose therapy (with or without tazobactam, 4 g x 4). 2. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L. 3. Breakpoints are based on high dose therapy (with or without clavulanic acid, 3 g x 4). 4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
<a href="#">Ampicillin</a>	-	-		-	-	
<a href="#">Ampicillin-sulbactam</a>	-	-		-	-	
<a href="#">Amoxicillin</a>	-	-		-	-	
<a href="#">Amoxicillin-clavulanic acid</a>	-	-		-	-	
<a href="#">Piperacillin</a> <sup>1</sup>	16	16	30	18	18	
<a href="#">Piperacillin-tazobactam</a> <sup>1</sup>	16 <sup>2</sup>	16 <sup>2</sup>	30-6	18	18	
<a href="#">Ticarcillin</a> <sup>3</sup>	16	16	75	18	18	
<a href="#">Ticarcillin-clavulanic acid</a> <sup>3</sup>	16 <sup>4</sup>	16 <sup>4</sup>	75-10	18	18	
<a href="#">Phenoxymethylpenicillin</a>	-	-		-	-	
<a href="#">Oxacillin</a>	-	-		-	-	
<a href="#">Cloxacillin</a>	-	-		-	-	
<a href="#">Dicloxacillin</a>	-	-		-	-	
<a href="#">Flucloxacillin</a>	-	-		-	-	
<a href="#">Mecillinam (uncomplicated UTI only)</a>	-	-		-	-	

***Pseudomonas* spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	1. Breakpoints relate to high dose therapy.
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	8 <sup>1</sup>	8	30	19	19	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	8 <sup>1</sup>	8	10	16	16	
Ceftibuten	-	-		-	-	
Ceftobiprole	IE	IE		IE	IE	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	1 <sup>1</sup>	2	10	25	22	1. Breakpoints relate to high dose therapy.
Ertapenem	-	-		-	-	
Imipenem	4 <sup>1</sup>	8	10	20	17	
Meropenem	2	8	10	24	18	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	1	16	30	50	16	The resistant breakpoint relates to high dose therapy. The susceptible breakpoint is set to ensure that wild type isolates are reported intermediate.

***Pseudomonas* spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.5	1	5	25	22	
Levofloxacin	1	2	5	20	17	
Moxifloxacin	-	-	-	-	-	
Nalidixic acid (screen)	NA	NA	-	NA	NA	
Norfloxacin	-	-	-	-	-	
Ofloxacin	-	-	-	-	-	

Aminoglycosides <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Amikacin	8	16	30	18	15	1. Aminoglycoside breakpoints are based on once-daily administration of high aminoglycoside dosages. Most often aminoglycosides are given in combination with beta-lactam agents.
Gentamicin	4	4	10	15	15	
Netilmicin	4	4	10	12	12	
Tobramycin	4	4	10	16	16	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Teicoplanin	-	-	-	-	-	
Telavancin	-	-	-	-	-	
Vancomycin	-	-	-	-	-	

***Pseudomonas* spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	-	-		-	-	
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline	-	-		-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	1. Infections caused by wild type isolates (ECOFF 128 mg/L) have been treated with combinations of fosfomycin and other agents.
Colistin	4	4		Note <sup>A</sup>	Note <sup>A</sup>	A. Use an MIC method.
Daptomycin	-	-		-	-	
Fosfomycin iv <sup>1</sup>	-	-		-	-	
Fosfomycin oral <sup>1</sup>	-	-		-	-	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole	-	-		-	-	

## Stenotrophomonas maltophilia

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Trimethoprim-sulfamethoxazole is the only agent for which EUCAST breakpoints are currently available. For further information, see guidance document on [www.eucast.org](http://www.eucast.org).

Disk diffusion (EUCAST standardised disk diffusion method)

Medium: Mueller-Hinton agar

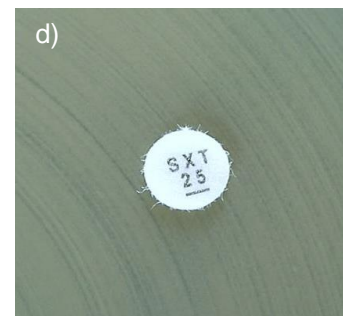
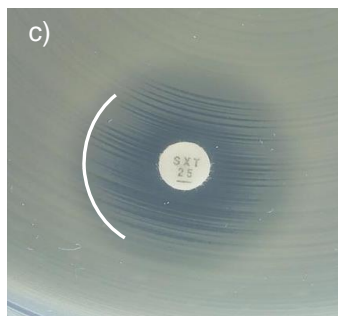
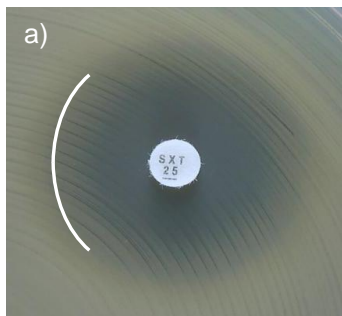
Inoculum: McFarland 0.5

Incubation: Air, 35±1°C, 18±2h

Reading: Read zone edges from the back of the plate against a dark background illuminated with reflected light (see below for specific instructions).

Quality control: *Escherichia coli* ATCC 25922

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Trimethoprim-sulfamethoxazole <sup>1</sup>	4 <sup>2</sup>	4 <sup>2</sup>	1.25-23.75	16 <sup>A</sup>	16 <sup>A</sup>	1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration. 2. Breakpoints are based on high dose therapy. A. Ignore haze or fine growth within the inhibition zone (see pictures below).



Examples of inhibition zones for *Stenotrophomonas maltophilia* with trimethoprim-sulfamethoxazole.

a-c) An outer zone can be seen. Report susceptible if the zone diameter ≥ 16 mm.

d) Growth up to the disk **and** no sign of inhibition zone. Report resistant.

***Acinetobacter* spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar  
**Inoculum:** McFarland 0.5  
**Incubation:** Air, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light.  
**Quality control:** *Pseudomonas aeruginosa* ATCC 27853

Penicillins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<a href="#">Benzylpenicillin</a>	-	-		-	-	1. Susceptibility testing of <i>Acinetobacter</i> spp. to penicillins is unreliable. In most instances <i>Acinetobacter</i> spp. are resistant to penicillins.
<a href="#">Ampicillin</a>	-	-		-	-	
<a href="#">Ampicillin-sulbactam</a>	IE	IE		IE	IE	
<a href="#">Amoxicillin</a>	-	-		-	-	
<a href="#">Amoxicillin-clavulanic acid</a>	-	-		-	-	
<a href="#">Piperacillin</a>	IE	IE		IE	IE	
<a href="#">Piperacillin-tazobactam</a>	IE	IE		IE	IE	
<a href="#">Ticarcillin</a>	IE	IE		IE	IE	
<a href="#">Ticarcillin-clavulanic acid</a>	IE	IE		IE	IE	
<a href="#">Phenoxymethylpenicillin</a>	-	-		-	-	
<a href="#">Oxacillin</a>	-	-		-	-	
<a href="#">Cloxacillin</a>	-	-		-	-	
<a href="#">Dicloxacillin</a>	-	-		-	-	
<a href="#">Flucloxacillin</a>	-	-		-	-	
<a href="#">Mecillinam (uncomplicated UTI only)</a>	-	-		-	-	

**Acinetobacter spp.**

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	-	-		-	-	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	-	-		-	-	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	1 <sup>1</sup>	2	10	23	20	1. Breakpoints relate to high dose therapy.
Ertapenem	-	-		-	-	
Imipenem	2 <sup>1</sup>	8	10	23	17	
Meropenem	2	8	10	21	15	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

**Acinetobacter spp.**

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	1	1	5	21	21	
Levofloxacin	1	2	5	21	18	
Moxifloxacin	-	-		-	-	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin	-	-		-	-	
Ofloxacin	-	-		-	-	

Aminoglycosides <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Amikacin	8	16	30	18	15	1. Aminoglycoside breakpoints are based on once-daily administration of high aminoglycoside dosages. Most often aminoglycosides are given in combination with beta-lactam agents.
Gentamicin	4	4	10	17	17	
Netilmicin	4	4	10	16	16	
Tobramycin	4	4	10	17	17	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	



**Acinetobacter spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	-	-		-	-	
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	
Minocycline	IE	IE		IE	IE	
Tetracycline	-	-		-	-	
Tigecycline	IE	IE		IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	2	2		Note <sup>A</sup>	Note <sup>A</sup>	A. Use an MIC method.
Daptomycin	-	-		-	-	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole <sup>1</sup>	2	4	1.25-23.75	16	13	

**Staphylococcus spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar  
**Inoculum:** McFarland 0.5  
**Incubation:** Air, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light (except for benzylpenicillin and linezolid, see below).  
**Quality control:** *Staphylococcus aureus* ATCC 29213

Penicillins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Benzylpenicillin</b> , <i>S. aureus</i>	0.125 <sup>1</sup>	0.125 <sup>1,2</sup>	1 unit	26 <sup>A,B</sup>	26 <sup>A,B</sup>	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p><b>1/A.</b> Most staphylococci are penicillinase producers, which are resistant to benzylpenicillin, phenoxymethylpenicillin, ampicillin, amoxicillin, piperacillin and ticarcillin. Isolates negative for penicillinase and susceptible to methicillin can be reported susceptible to these agents. Isolates positive for penicillinase and methicillin susceptible are susceptible to beta-lactamase inhibitor combinations and isoxazolylicins (oxacillin, cloxacillin, dicloxacillin and flucloxacillin). Methicillin resistant isolates are, with few exceptions, resistant to all beta-lactam agents.</p> <p><b>2.</b> <i>S. aureus</i> and <i>S. lugdunensis</i> with oxacillin MIC values &gt;2 mg/L are mostly methicillin resistant due to the presence of the <i>mecA</i> gene. The corresponding oxacillin MIC for coagulase-negative staphylococci is &gt;0.25 mg/L.</p> <p><b>3/C.</b> No currently available method can reliably detect penicillinase production in coagulase-negative staphylococci.</p> <p><b>4/D.</b> Ampicillin susceptible <i>S. saprophyticus</i> are <i>mecA</i>-negative and susceptible to ampicillin, amoxicillin and piperacillin (without or with a beta-lactamase inhibitor).</p> <p><b>B.</b> For <i>S. aureus</i>, disk diffusion is more reliable than MIC determination for detection of penicillinase producers, provided the zone diameter is measured AND the zone edge closely inspected (see pictures below). If the zone diameter is &lt;26 mm, then report resistant. If the zone diameter is ≥26 mm AND the zone edge is sharp, then report resistant. If not sharp, then report susceptible and if uncertain, then report resistant. Chromogenic cephalosporin-based beta-lactamase tests do not reliably detect staphylococcal penicillinase.</p>
<b>Benzylpenicillin</b> , <i>S. lugdunensis</i>	0.125 <sup>1</sup>	0.125 <sup>1,2</sup>	1 unit	26 <sup>A</sup>	26 <sup>A</sup>	
<b>Benzylpenicillin</b> , Coagulase-negative staphylococci	- <sup>3</sup>	- <sup>3</sup>		Note <sup>C</sup>	Note <sup>C</sup>	
<b>Ampicillin</b> , <i>S. saprophyticus</i>	Note <sup>1</sup>	Note <sup>1</sup>	2	18 <sup>A,B</sup>	18 <sup>A,B</sup>	
<b>Ampicillin-sulbactam</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,D</sup>	Note <sup>A,D</sup>	
<b>Amoxicillin</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,D</sup>	Note <sup>A,D</sup>	
<b>Amoxicillin-clavulanic acid</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,D</sup>	Note <sup>A,D</sup>	
<b>Piperacillin</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,D</sup>	Note <sup>A,D</sup>	
<b>Piperacillin-tazobactam</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,D</sup>	Note <sup>A,D</sup>	
<b>Ticarcillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Ticarcillin-clavulanic acid</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Phenoxymethylpenicillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Oxacillin</b> <sup>2</sup>	Note <sup>1,2</sup>	Note <sup>1,2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Cloxacillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Dicloxacillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Flucloxacillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Mecillinam (uncomplicated UTI only)</b>	-	-		-	-	

## Staphylococcus spp.

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor <sup>2</sup>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	<p><b>1/A.</b> Susceptibility of staphylococci to cephalosporins is inferred from the cefoxitin susceptibility except for ceftazidime, cefixime and ceftibuten, which do not have breakpoints and should not be used for staphylococcal infections. Some methicillin-resistant <i>S. aureus</i> are susceptible to ceftaroline and ceftobiprole. <b>see Notes 5/B and 6.</b></p> <p><b>2.</b> High-dose therapy is required for treatment of staphylococcal infections.</p> <p><b>3.</b> <i>S. aureus</i> and <i>S. lugdunensis</i> with cefoxitin MIC values &gt;4 mg/L and <i>S. saprophyticus</i> with cefoxitin MIC values &gt;8 mg/L are methicillin resistant, mostly due to the presence of the <i>mecA</i> gene. Disk diffusion reliably predicts methicillin resistance.</p> <p><b>4.</b> For staphylococci other than <i>S. aureus</i>, <i>S. lugdunensis</i> and <i>S. saprophyticus</i> the cefoxitin MIC is a poorer predictor of methicillin resistance than the disk diffusion test.</p> <p><b>5/B.</b> Methicillin-susceptible isolates can be reported susceptible to ceftaroline without further testing.</p> <p><b>6.</b> Methicillin-susceptible isolates can be reported susceptible to ceftobiprole without further testing.</p>
Cefadroxil	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefalexin	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefazolin	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefepime	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefixime	-	-		-	-	
Cefotaxime	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefoxitin (screen), <i>S. aureus</i> , <i>S. lugdunensis</i> and <i>S. saprophyticus</i>	Note <sup>3</sup>	Note <sup>3</sup>	30	22 <sup>A</sup>	22 <sup>A</sup>	
Cefoxitin (screen), Coagulase-negative staphylococci other	Note <sup>4</sup>	Note <sup>4</sup>	30	25 <sup>A</sup>	25 <sup>A</sup>	
Cefoxitin (screen), <i>S. pseudintermedius</i>	Note <sup>4</sup>	Note <sup>4</sup>	30	35 <sup>A</sup>	35 <sup>A</sup>	
Cefpodoxime	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Ceftaroline, <i>S. aureus</i>	1 <sup>5</sup>	1 <sup>5</sup>	5	20 <sup>B</sup>	20 <sup>B</sup>	
Ceftazidime	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole, <i>S. aureus</i>	2 <sup>6</sup>	2 <sup>6</sup>	IP	IP	IP	
Ceftriaxone	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefuroxime iv	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefuroxime oral	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	

Carbapenems <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	<p><b>1/A.</b> Susceptibility of staphylococci to carbapenems is inferred from the cefoxitin susceptibility.</p>
Ertapenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Imipenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Meropenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	

## Staphylococcus spp.

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Fluoroquinolones <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin <sup>2</sup>	1	1	5	20 <sup>A</sup>	20 <sup>A</sup>	1. For breakpoints for other fluoroquinolones (e.g. pefloxacin and enoxacin), refer to breakpoints set by national breakpoint committees. 2. Breakpoints relate to high dose therapy. A. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. <b>See Note B.</b> B. Isolates categorised as susceptible to norfloxacin can be reported susceptible to ciprofloxacin, levofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.
Levofloxacin	1	2	5	22 <sup>A</sup>	19 <sup>A</sup>	
Moxifloxacin	0.5	1	5	24 <sup>A</sup>	21 <sup>A</sup>	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	10	17 <sup>B</sup>	Note <sup>B</sup>	
Ofloxacin <sup>2</sup>	1	1	5	20 <sup>A</sup>	20 <sup>A</sup>	

Aminoglycosides <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Amikacin <sup>2</sup> , <i>S. aureus</i>	8	16	30	18	16	1. Aminoglycoside breakpoints are based on once-daily administration of high aminoglycoside dosages. Most often aminoglycosides are given in combination with beta-lactam agents. 2. Resistance to amikacin is most reliably determined by testing with kanamycin (MIC >8 mg/L). Screening zone diameter breakpoints are under development.
Amikacin <sup>2</sup> , Coagulase-negative staphylococci	8	16	30	22	19	
Gentamicin, <i>S. aureus</i>	1	1	10	18	18	
Gentamicin, Coagulase-negative staphylococci	1	1	10	22	22	
Netilmicin, <i>S. aureus</i>	1	1	10	18	18	
Netilmicin, Coagulase-negative staphylococci	1	1	10	22	22	
Tobramycin, <i>S. aureus</i>	1	1	10	18	18	
Tobramycin, Coagulase-negative staphylococci	1	1	10	22	22	

**Staphylococcus spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Glycopeptides <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Teicoplanin</b> , <i>S. aureus</i>	2	2		Note <sup>A</sup>	Note <sup>A</sup>	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p>1. Glycopeptide MICs are method dependent and should be determined by broth microdilution (reference ISO 20776). <i>S. aureus</i> with vancomycin MIC values of 2 mg/L are on the border of the wild type MIC distribution and there may be an impaired clinical response. The resistant breakpoint has been reduced to 2 mg/L to avoid reporting "GISA" isolates intermediate as serious infections with "GISA" isolates are not treatable with increased doses of vancomycin or teicoplanin.</p> <p>2. For telavancin MIC determination, the medium must be supplemented with polysorbate-80 to a final concentration of 0.002%.</p> <p>3. MRSA isolates susceptible to vancomycin can be reported susceptible to telavancin.</p> <p>A. Disk diffusion is unreliable and cannot distinguish between wild type isolates and those with non-<i>vanA</i>-mediated glycopeptide resistance.</p>
<b>Teicoplanin</b> , Coagulase-negative staphylococci	4	4		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Telavancin</b> , MRSA	0.125 <sup>2,3</sup>	0.125 <sup>2,3</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Vancomycin</b> , <i>S. aureus</i>	2	2		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Vancomycin</b> , Coagulase-negative staphylococci	4	4		Note <sup>A</sup>	Note <sup>A</sup>	

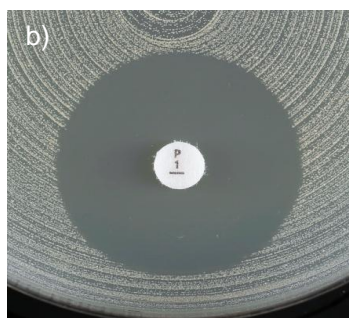
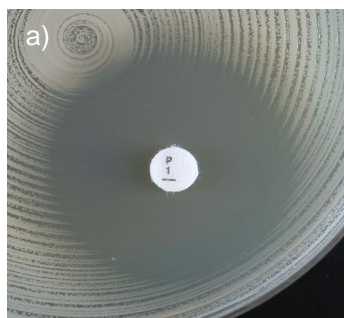
Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Azithromycin</b>	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p>1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.</p> <p>2. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant and consider adding this comment to the report: "Clindamycin may still be used for short-term therapy of less serious skin and soft tissue infections as constitutive resistance is unlikely to develop during such therapy".</p> <p>B. Place the erythromycin and clindamycin disks 12-20 mm apart (edge to edge) and look for antagonism (the D phenomenon).</p> <p>C. Isolates non-susceptible by disk diffusion should be confirmed by MIC testing.</p>
<b>Clarithromycin</b>	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Erythromycin</b>	1 <sup>1</sup>	2 <sup>1</sup>	15	21 <sup>A</sup>	18 <sup>A</sup>	
<b>Roxithromycin</b>	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Telithromycin</b>	IE	IE		IE	IE	
<b>Clindamycin</b> <sup>2</sup>	0.25	0.5	2	22 <sup>B</sup>	19 <sup>B</sup>	
<b>Quinupristin-dalfopristin</b>	1	2	15	21	18 <sup>C</sup>	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Doxycycline</b>	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p>1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.</p> <p>2. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.</p> <p>3. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p>
<b>Minocycline</b>	0.5 <sup>1</sup>	1 <sup>1</sup>	30	23 <sup>A</sup>	20 <sup>A</sup>	
<b>Tetracycline</b>	1 <sup>1</sup>	2 <sup>1</sup>	30	22 <sup>A</sup>	19 <sup>A</sup>	
<b>Tigecycline</b>	0.5 <sup>2,3</sup>	0.5 <sup>2</sup>	15	18	18	

## Staphylococcus spp.

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Chloramphenicol	8	8	30	18	18	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p>1. For daptomycin MIC determination, the medium must be supplemented with Ca<sup>2+</sup> to a final concentration of 50 mg/L.</p> <p>2. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p> <p>3. For fosfomycin MIC determination the medium must be supplemented with of glucose-6-phosphate to a final concentration of 25 mg/L.</p> <p>4/C. Breakpoints relate to nasal decolonisation of <i>S. aureus</i>. Intermediate isolates are associated with short term suppression (useful preoperatively) but, unlike susceptible isolates, long term eradication rates are low.</p> <p>5/D. Breakpoints apply to <i>S. saprophyticus</i> only.</p> <p>6. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.</p> <p>A. Use an MIC method. B. Examine zone edges with transmitted light (plate held up to light).</p>
Colistin	-	-		-	-	
Daptomycin	1 <sup>1,2</sup>	1 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Fosfomycin iv	32 <sup>3</sup>	32 <sup>3</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Fosfomycin oral	-	-		-	-	
Fusidic acid	1	1	10	24	24	
Linezolid	4	4	10	19 <sup>B</sup>	19 <sup>B</sup>	
Metronidazole	-	-		-	-	
Mupirocin	1 <sup>4</sup>	256 <sup>4</sup>	200	30 <sup>C</sup>	18 <sup>C</sup>	
Nitrofurantoin (uncomplicated UTI only)	64 <sup>5</sup>	64 <sup>5</sup>	100	13 <sup>D</sup>	13 <sup>D</sup>	
Rifampicin	0.06	0.5	5	26	23	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	2	4	5	17	14	
Trimethoprim-sulfamethoxazole <sup>6</sup>	2	4	1.25-23.75	17	14	



### Examples of inhibition zones for *Staphylococcus aureus* with benzylpenicillin.

a) Fuzzy zone edge and zone diameter ≥ 26 mm. Report susceptible.

b) Sharp zone edge and zone diameter ≥ 26 mm. Report resistant.

**Enterococcus spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

In endocarditis, refer to national or international endocarditis guidelines for breakpoints for *Enterococcus* spp.

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar  
**Inoculum:** McFarland 0.5  
**Incubation:** Air, 35±1°C, 18±2h (for glycopeptides 24 h)  
**Reading:** Read zone edges as the point showing no growth viewed from the back of the plate against a dark background illuminated with reflected light (except for vancomycin, see below).  
**Quality control:** *Enterococcus faecalis* ATCC 29212

Penicillins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Benzylpenicillin</b>	-	-		-	-	1. <i>E. faecium</i> resistant to penicillins can be considered resistant to all other beta-lactam agents including carbapenems. 2/A. Susceptibility to ampicillin, amoxicillin and piperacillin with and without beta-lactamase inhibitor can be inferred from ampicillin. 3. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
<b>Ampicillin</b>	4	8	2	10	8	
<b>Ampicillin-sulbactam<sup>2</sup></b>	4 <sup>3</sup>	8 <sup>3</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Amoxicillin<sup>2</sup></b>	4	8		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Amoxicillin-clavulanic acid<sup>2</sup></b>	4 <sup>4</sup>	8 <sup>4</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Piperacillin<sup>2</sup></b>	Note <sup>2</sup>	Note <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Piperacillin-tazobactam<sup>2</sup></b>	Note <sup>2</sup>	Note <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Ticarcillin</b>	-	-		-	-	
<b>Ticarcillin-clavulanic acid</b>	-	-		-	-	
<b>Phenoxymethylpenicillin</b>	-	-		-	-	
<b>Oxacillin</b>	-	-		-	-	
<b>Cloxacillin</b>	-	-		-	-	
<b>Dicloxacillin</b>	-	-		-	-	
<b>Flucloxacillin</b>	-	-		-	-	
<b>Mecillinam (uncomplicated UTI only)</b>	-	-		-	-	

**Enterococcus spp.**

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	-	-		-	-	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	-	-		-	-	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	-	-		-	-	
Ertapenem	-	-		-	-	
Imipenem	4	8	10	21	18	
Meropenem	-	-		-	-	



**Enterococcus spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin (uncomplicated UTI only)	4	4	5	IP <sup>A</sup>	IP <sup>A</sup>	<b>A.</b> The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. <b>See Note B.</b> <b>B.</b> Susceptibility of ciprofloxacin and levofloxacin can be inferred from the norfloxacin susceptibility.
Levofloxacin (uncomplicated UTI only)	4	4	5	IP <sup>A</sup>	IP <sup>A</sup>	
Moxifloxacin	-	-		-	-	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	10	12 <sup>B</sup>	12 <sup>B</sup>	
Ofloxacin	-	-		-	-	

Aminoglycosides <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Amikacin	Note <sup>2</sup>	Note <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	<b>1.</b> Enterococci are intrinsically resistant to aminoglycosides and aminoglycoside monotherapy is ineffective. There is likely to be synergy between aminoglycosides and penicillins or glycopeptides against enterococci without acquired high-level resistance. All testing is therefore to distinguish between intrinsic and high-level acquired resistance. <b>2/A.</b> Gentamicin can be used to screen for high-level aminoglycoside resistance (HLAR). <b>Negative test:</b> Isolates with gentamicin MIC ≤128 mg/L or a zone diameter ≥8 mm. The isolate is wild type for gentamicin and low-level intrinsic resistant. For other aminoglycosides, this may not be the case. Synergy with penicillins or glycopeptides can be expected if the isolate is susceptible to the penicillin or glycopeptide. <b>Positive test:</b> Isolates with gentamicin MIC >128 mg/L or a zone diameter <8 mm. The isolate is high-level resistant to gentamicin and other aminoglycosides, except streptomycin which must be tested separately if required (see note 3/B). There will be no synergy with penicillins or glycopeptides. <b>3/B.</b> Isolates with high-level gentamicin resistance may not be high-level resistant to streptomycin. <b>Negative test:</b> Isolates with streptomycin MIC ≤512 mg/L or a zone diameter ≥19 mm. The isolate is wild type for streptomycin and low-level intrinsic resistant. Synergy with penicillins or glycopeptides can be expected if the isolate is susceptible to the penicillin or glycopeptide. <b>Positive test:</b> Isolates with streptomycin MIC >512 mg/L or a zone diameter <19 mm. The isolate is high-level resistant to streptomycin. There will be no synergy with penicillins or glycopeptides.
Gentamicin	Note <sup>2</sup>	Note <sup>2</sup>	30	Note <sup>A</sup>	Note <sup>A</sup>	
Netilmicin	Note <sup>2</sup>	Note <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Streptomycin	Note <sup>3</sup>	Note <sup>3</sup>	300	Note <sup>B</sup>	Note <sup>B</sup>	
Tobramycin	Note <sup>2</sup>	Note <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	

**Enterococcus spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Teicoplanin	2	2	30	16	16	A. Vancomycin susceptible enterococci exhibit sharp zone edges. Examine zone edges with transmitted light (plate held up to light) and suspect resistance when the vancomycin zone edge is fuzzy or colonies grow within the inhibition zone (see pictures below). Isolates must not be reported susceptible before 24 h incubation.
Telavancin	IE	IE		IE	IE	
Vancomycin	4	4	5	12 <sup>A</sup>	12 <sup>A</sup>	

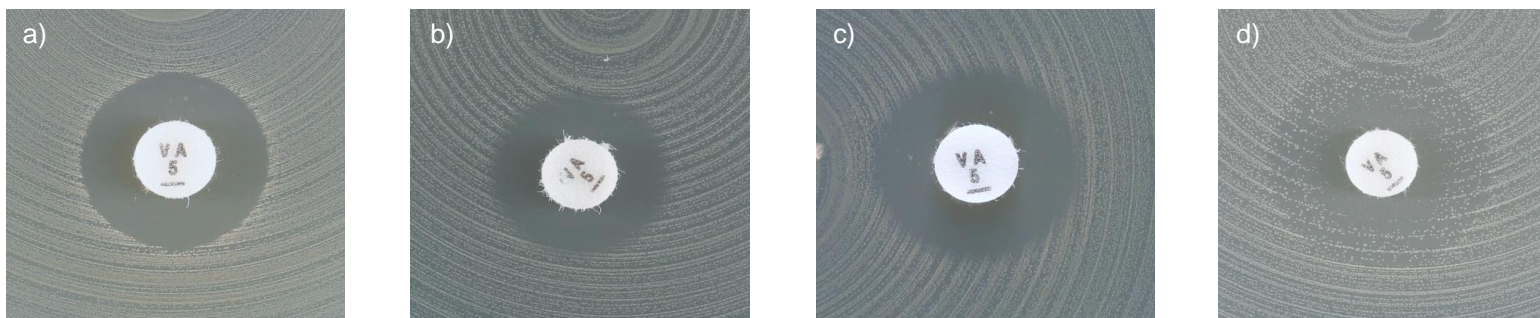
Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	-	-		-	-	1/A. Quinupristin-dalfopristin breakpoints apply to <i>E. faecium</i> only.
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	1 <sup>1</sup>	4 <sup>1</sup>	15	22 <sup>A</sup>	20 <sup>A</sup>	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	1. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use. 2. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline	0.25 <sup>1,2</sup>	0.5 <sup>1</sup>	15	18	15	

**Enterococcus spp.**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	1/A. Nitrofurantoin breakpoints apply to <i>E. faecalis</i> only. 2/B. The activity of trimethoprim and trimethoprim-sulfamethoxazole is uncertain against enterococci, hence the wild type population is categorised as intermediate. 3. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin	IE	IE		IE	IE	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Linezolid	4	4	10	19	19	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	64 <sup>1</sup>	64 <sup>1</sup>	100	15 <sup>A</sup>	15 <sup>A</sup>	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	0.03 <sup>2</sup>	1	5	50 <sup>B</sup>	21	
Trimethoprim-sulfamethoxazole <sup>3</sup>	0.03 <sup>2</sup>	1	1.25-23.75	50 <sup>B</sup>	21	



**Examples of inhibition zones for *Enterococcus* spp. with vancomycin.**

- a) Sharp zone edge **and** zone diameter ≥ 12 mm. Report susceptible.
- b-d) Fuzzy zone edge or colonies within zone. Report resistant even if the zone diameter ≥ 12 mm.

## Streptococcus groups A, B, C and G

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)  
**Inoculum:** McFarland 0.5  
**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Streptococcus pneumoniae* ATCC 49619

Penicillins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Benzylpenicillin</b>	0.25 <sup>2</sup>	0.25	1 unit	18	18	<b>Notes</b> Numbers for comments on MIC breakpoints Letters for comments on disk diffusion <b>1/A.</b> The susceptibility of streptococcus groups A, B, C and G to penicillins is inferred from the benzylpenicillin susceptibility with the exception of phenoxymethylpenicillin and isoxazolylpenicillins for streptococcus group B. <b>2.</b> Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant. <b>3.</b> Streptococcus groups A, B, C and G do not produce beta-lactamase. The addition of a beta-lactamase inhibitor does not add clinical benefit. <b>4/B.</b> The breakpoints apply to streptococcus groups A, C and G only.
<b>Ampicillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Ampicillin-sulbactam<sup>3</sup></b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Amoxicillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Amoxicillin-clavulanic acid<sup>3</sup></b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Piperacillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Piperacillin-tazobactam<sup>3</sup></b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Ticarcillin</b>	-	-		-	-	
<b>Ticarcillin-clavulanic acid</b>	-	-		-	-	
<b>Phenoxymethylpenicillin</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Oxacillin</b>	NA	NA		NA	NA	
<b>Cloxacillin</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Dicloxacillin</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Flucloxacillin</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Mecillinam (uncomplicated UTI only)</b>	-	-		-	-	

## Streptococcus groups A, B, C and G

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. The susceptibility of streptococcus groups A, B, C and G to cephalosporins is inferred from the benzylpenicillin susceptibility.
Cefadroxil	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefalexin	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefazolin	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefepime	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefixime	-	-		-	-	
Cefotaxime	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Ceftaroline	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Ceftazidime	-	-		-	-	
Ceftibuten	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Ceftobiprole	IE	IE		IE	IE	
Ceftriaxone	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefuroxime iv	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Cefuroxime oral	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	

Carbapenems <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. The susceptibility of streptococcus groups A, B, C and G to carbapenems is inferred from the benzylpenicillin susceptibility.
Ertapenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Imipenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Meropenem	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

## Streptococcus groups A, B, C and G

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	-	-	-	-	-	<p>A. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. <b>See Note B.</b></p> <p>B. Isolates categorised as susceptible to norfloxacin can be reported susceptible to levofloxacin and moxifloxacin. Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.</p>
Levofloxacin	1	2	5	18 <sup>A</sup>	15 <sup>A</sup>	
Moxifloxacin	0.5	1	5	18 <sup>A</sup>	15 <sup>A</sup>	
Nalidixic acid (screen)	NA	NA	-	NA	NA	
Norfloxacin (screen)	NA	NA	10	12 <sup>B</sup>	Note <sup>B</sup>	
Ofloxacin	-	-	-	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Amikacin	-	-	-	-	-	
Gentamicin	-	-	-	-	-	
Netilmicin	-	-	-	-	-	
Tobramycin	-	-	-	-	-	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Teicoplanin	2 <sup>1</sup>	2	30	15 <sup>A</sup>	15 <sup>A</sup>	<p>1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p> <p>A. Zone diameter breakpoints are based on wild type distributions as there are currently no resistant isolates.</p>
Telavancin	IE	IE	-	IE	IE	
Vancomycin	2 <sup>1</sup>	2	5	13 <sup>A</sup>	13 <sup>A</sup>	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>	-	Note <sup>A</sup>	Note <sup>A</sup>	<p>1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.</p> <p>2. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant and consider adding this comment to the report: "Clindamycin may still be used for short-term therapy of less serious skin and soft tissue infections as constitutive resistance is unlikely to develop during such therapy".</p> <p>B. Place the erythromycin and clindamycin disks 12-16 mm apart (edge to edge) and look for antagonism (the D phenomenon).</p>
Clarithromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>	-	Note <sup>A</sup>	Note <sup>A</sup>	
Erythromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>	15	21 <sup>A</sup>	18 <sup>A</sup>	
Roxithromycin	0.5 <sup>1</sup>	1 <sup>1</sup>	-	Note <sup>A</sup>	Note <sup>A</sup>	
Telithromycin	0.25	0.5	15	20	17	
Clindamycin <sup>2</sup>	0.5	0.5	2	17 <sup>B</sup>	17 <sup>B</sup>	
Quinupristin-dalfopristin	-	-	-	-	-	

## Streptococcus groups A, B, C and G

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Doxycycline</b>	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p>1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.</p> <p>2. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.</p> <p>3. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p>
<b>Minocycline</b>	0.5 <sup>1</sup>	1 <sup>1</sup>	30	23 <sup>A</sup>	20 <sup>A</sup>	
<b>Tetracycline</b>	1 <sup>1</sup>	2 <sup>1</sup>	30	23 <sup>A</sup>	20 <sup>A</sup>	
<b>Tigecycline</b>	0.25 <sup>2,3</sup>	0.5 <sup>2</sup>	15	19	16	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Chloramphenicol</b>	8	8	30	19	19	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p>1. For daptomycin MIC determination, the medium must be supplemented with Ca<sup>2+</sup> to a final concentration of 50 mg/L.</p> <p>2. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p> <p>3/B. Nitrofurantoin breakpoints apply to <i>S. agalactiae</i> (group B streptococci) only.</p> <p>4. Trimethoprim breakpoints apply to <i>S. agalactiae</i> (group B streptococci) only.</p> <p>5. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.</p> <p>A. Use an MIC method.</p>
<b>Colistin</b>	-	-		-	-	
<b>Daptomycin</b>	1 <sup>1,2</sup>	1 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Fosfomycin iv</b>	-	-		-	-	
<b>Fosfomycin oral</b>	-	-		-	-	
<b>Fusidic acid</b>	IE	IE		IE	IE	
<b>Linezolid</b>	2	4	10	19	16	
<b>Metronidazole</b>	-	-		-	-	
<b>Mupirocin</b>	-	-		-	-	
<b>Nitrofurantoin (uncomplicated UTI only)</b>	64 <sup>3</sup>	64 <sup>3</sup>	100	15 <sup>B</sup>	15 <sup>B</sup>	
<b>Rifampicin</b>	0.06	0.5	5	21	15	
<b>Spectinomycin</b>	-	-		-	-	
<b>Trimethoprim (uncomplicated UTI only)</b>	2 <sup>4</sup>	2 <sup>4</sup>	5	IP	IP	
<b>Trimethoprim-sulfamethoxazole<sup>5</sup></b>	1	2	1.25-23.75	18	15	

*Streptococcus pneumoniae*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)  
**Inoculum:** McFarland 0.5 from blood agar or McFarland 1.0 from chocolate agar  
**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Streptococcus pneumoniae* ATCC 49619

Penicillins <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Benzylpenicillin</b> (infections other than meningitis)	0.06 <sup>1,2</sup>	2 <sup>1,2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	<p>1. Breakpoints for penicillins other than benzylpenicillin relate only to non-meningitis isolates.</p> <p>Isolates fully susceptible to benzylpenicillin (MIC ≤0.06 mg/L and/or susceptible by <b>oxacillin disk screen</b>, see note C) can be reported susceptible to beta-lactam agents for which clinical breakpoints are listed (including those with "Note").</p> <p>2. <b>In pneumonia</b>, when a dose of 1.2 g x 4 is used, isolates with <b>MIC ≤0.5 mg/L</b> should be regarded as susceptible.</p> <p><b>In pneumonia</b>, when a dose of 2.4 g x 4 or 1.2 g x 6 is used, isolates with <b>MIC ≤1 mg/L</b> should be regarded as susceptible.</p> <p><b>In pneumonia</b>, when a dose of 2.4 g x 6 is used, isolates with <b>MIC ≤2 mg/L</b> should be regarded as susceptible.</p> <p>3. For isolates categorised as intermediate to ampicillin avoid oral treatment with ampicillin, amoxicillin or amoxicillin-clavulanic acid.</p> <p>4/B. Susceptibility inferred from the MIC of ampicillin.</p> <p>A. Screen for beta-lactam resistance with the oxacillin 1 µg disk, see Note C.</p> <p>C. For interpretation of the oxacillin disk screen, see supplementary table below.</p> <p>For oxacillin non-susceptible isolates, always determine the MIC of benzylpenicillin.</p>
<b>Benzylpenicillin</b> (meningitis)	0.06 <sup>1</sup>	0.06 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Ampicillin</b>	0.5 <sup>1,3</sup>	2 <sup>1,3</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Ampicillin-sulbactam</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Amoxicillin</b>	Note <sup>1,3,4</sup>	Note <sup>1,3,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Amoxicillin-clavulanic acid</b>	Note <sup>1,3,4</sup>	Note <sup>1,3,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Piperacillin</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Piperacillin-tazobactam</b>	Note <sup>1,4</sup>	Note <sup>1,4</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Ticarcillin</b>	-	-		-	-	
<b>Ticarcillin-clavulanic acid</b>	-	-		-	-	
<b>Phenoxymethylpenicillin</b>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Oxacillin</b> (screen)	NA	NA	1	20 <sup>C</sup>	Note <sup>C</sup>	
<b>Cloxacillin</b>	-	-		-	-	
<b>Dicloxacillin</b>	-	-		-	-	
<b>Flucloxacillin</b>	-	-		-	-	
<b>Mecillinam</b> (uncomplicated UTI only)	-	-		-	-	



***Streptococcus pneumoniae***

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	0.03	0.5	30	50	28	1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.  A. Screen for beta-lactam resistance with the oxacillin 1 µg disk. <b>See supplementary table below.</b>
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	1 <sup>1</sup>	2		Note <sup>A</sup>	Note <sup>A</sup>	
Cefixime	-	-		-	-	
Cefotaxime	0.5 <sup>1</sup>	2		Note <sup>A</sup>	Note <sup>A</sup>	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	0.25	0.5		Note <sup>A</sup>	Note <sup>A</sup>	
Ceftaroline	0.25	0.25		Note <sup>A</sup>	Note <sup>A</sup>	
Ceftazidime	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	0.5	0.5		Note <sup>A</sup>	Note <sup>A</sup>	
Ceftriaxone	0.5 <sup>1</sup>	2		Note <sup>A</sup>	Note <sup>A</sup>	
Cefuroxime iv	0.5	1		Note <sup>A</sup>	Note <sup>A</sup>	
Cefuroxime oral	0.25	0.5		Note <sup>A</sup>	Note <sup>A</sup>	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem <sup>1</sup>	1 <sup>2</sup>	1		Note <sup>A</sup>	Note <sup>A</sup>	1. Not for meningitis (meropenem is the only carbapenem used for meningitis). 2. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant. 3. Meropenem is the only carbapenem used for meningitis.  A. Screen for beta-lactam resistance with the oxacillin 1 µg disk. <b>See supplementary table below.</b> B. For use in meningitis determine the meropenem MIC.
Ertapenem <sup>1</sup>	0.5 <sup>2</sup>	0.5		Note <sup>A</sup>	Note <sup>A</sup>	
Imipenem <sup>1</sup>	2 <sup>2</sup>	2		Note <sup>A</sup>	Note <sup>A</sup>	
Meropenem <sup>3</sup> (infections other than meningitis)	2	2		Note <sup>A</sup>	Note <sup>A</sup>	
Meropenem <sup>3</sup> (meningitis)	0.25	1		Note <sup>A,B</sup>	Note <sup>A,B</sup>	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

## Streptococcus pneumoniae

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Ciprofloxacin</a> <sup>1</sup>	0.125	2	5	50 <sup>A</sup>	16 <sup>A</sup>	1. Wild type <i>S. pneumoniae</i> are not considered susceptible to ciprofloxacin and are therefore categorised as intermediate. 2. The breakpoints for levofloxacin relate to high dose therapy. 3. Wild type <i>S. pneumoniae</i> are not considered susceptible to ofloxacin and are therefore categorised as intermediate.  A. The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. <b>See Note B.</b> B. Isolates categorised as susceptible to norfloxacin can be reported susceptible to levofloxacin and moxifloxacin and intermediate to ciprofloxacin and ofloxacin. Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.
<a href="#">Levofloxacin</a> <sup>2</sup>	2	2	5	17 <sup>A</sup>	17 <sup>A</sup>	
<a href="#">Moxifloxacin</a>	0.5	0.5	5	22 <sup>A</sup>	22 <sup>A</sup>	
<a href="#">Nalidixic acid</a> (screen)	NA	NA		NA	NA	
<a href="#">Norfloxacin</a> (screen)	NA	NA	10	12 <sup>B</sup>	Note <sup>B</sup>	
<a href="#">Ofloxacin</a> <sup>3</sup>	0.125	4	5	50 <sup>A</sup>	13 <sup>A</sup>	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Amikacin</a>	-	-		-	-	
<a href="#">Gentamicin</a>	-	-		-	-	
<a href="#">Netilmicin</a>	-	-		-	-	
<a href="#">Tobramycin</a>	-	-		-	-	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Teicoplanin</a>	2 <sup>1</sup>	2	30	17 <sup>A</sup>	17 <sup>A</sup>	1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.  A. Zone diameter breakpoints are based on wild type distributions as there are currently no resistant isolates.
<a href="#">Telavancin</a>	IE	IE		IE	IE	
<a href="#">Vancomycin</a>	2 <sup>1</sup>	2	5	16 <sup>A</sup>	16 <sup>A</sup>	

***Streptococcus pneumoniae***

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin. 2. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant.  B. Place the erythromycin and clindamycin disks 12-16 mm apart (edge to edge) and look for antagonism (the D phenomenon).
Clarithromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Erythromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>	15	22 <sup>A</sup>	19 <sup>A</sup>	
Roxithromycin	0.5 <sup>1</sup>	1 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Telithromycin	0.25	0.5	15	23	20	
Clindamycin <sup>2</sup>	0.5	0.5	2	19 <sup>B</sup>	19 <sup>B</sup>	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.
Minocycline	0.5 <sup>1</sup>	1 <sup>1</sup>	30	24 <sup>A</sup>	21 <sup>A</sup>	
Tetracycline	1 <sup>1</sup>	2 <sup>1</sup>	30	25 <sup>A</sup>	22 <sup>A</sup>	
Tigecycline	IE	IE		IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	8	8	30	21	21	1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin	IE	IE		IE	IE	
Fosfomycin iv	IE	IE		IE	IE	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Linezolid	2	4	10	22	19	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Rifampicin	0.06	0.5	5	22	17	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole <sup>1</sup>	1	2	1.25-23.75	18	15	

***Streptococcus pneumoniae***

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

**Screening for beta-lactam resistance in *S. pneumoniae***  
**Supplementary table**

Oxacillin 1 µg disk Zone diameter	Antimicrobial agent	Further testing and/or interpretation
≥ 20 mm	All beta-lactam agents for which clinical breakpoints are listed (including those with "Note")	Report susceptible irrespective of clinical indication, except for cefaclor, which if reported, should be reported as intermediate.
< 20 mm*	Benzylicillin (meningitis) and phenoxymethylpenicillin (all indications)	Report resistant.
	Benzylicillin (for infections other than meningitis)	Determine the MIC and interpret according to the clinical breakpoints.
	Ampicillin, amoxicillin and piperacillin (without and with beta-lactamase inhibitor), cefepime, cefotaxime, ceftaroline, ceftobiprole and ceftriaxone	<b>Oxacillin zone diameter ≥ 8 mm:</b> Report susceptible. In meningitis confirm by determining the MIC for the agent considered for clinical use.
	Other beta-lactam agents	<b>Oxacillin zone diameter &lt; 8 mm:</b> Determine the MIC of the beta-lactam agent intended for clinical use but for ampicillin, amoxicillin and piperacillin (without and with beta-lactamase inhibitor) infer susceptibility from the MIC of ampicillin. Determine the MIC of the agent considered for clinical use and interpret according to the clinical breakpoints.

\*Oxacillin 1 µg < 20 mm: Always determine the MIC of benzylicillin but do not delay reporting as recommended above.

## Viridans group streptococci

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

In endocarditis, refer to national or international endocarditis guidelines for breakpoints for viridans group streptococci.

### Disk diffusion (EUCAST standardised disk diffusion method)

**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)

**Inoculum:** McFarland 0.5

**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h

**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.

**Quality control:** *Streptococcus pneumoniae* ATCC 49619

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Benzylpenicillin</a>	0.25	2	1 unit	18	12	1/B. For isolates susceptible to benzylpenicillin, susceptibility can be inferred from benzylpenicillin or ampicillin. For isolates resistant to benzylpenicillin, susceptibility is inferred from ampicillin.
<a href="#">Benzylpenicillin (screen)</a>	NA	NA	1 unit	18 <sup>A</sup>	Note <sup>A</sup>	
<a href="#">Ampicillin</a>	0.5	2	2	21	15	A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. Isolates categorised as susceptible can be reported susceptible to beta-lactam agents for which clinical breakpoints are listed (including those with "Note"). Isolates categorised as non-susceptible should be tested for susceptibility to individual agents.
<a href="#">Ampicillin-sulbactam</a>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<a href="#">Amoxicillin</a>	0.5	2		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<a href="#">Amoxicillin-clavulanic acid</a>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<a href="#">Piperacillin</a>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<a href="#">Piperacillin-tazobactam</a>	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<a href="#">Ticarcillin</a>	IE	IE		IE	IE	
<a href="#">Ticarcillin-clavulanic acid</a>	IE	IE		IE	IE	
<a href="#">Phenoxymethylpenicillin</a>	IE	IE		IE	IE	
<a href="#">Oxacillin</a>	-	-		-	-	
<a href="#">Cloxacillin</a>	-	-		-	-	
<a href="#">Dicloxacillin</a>	-	-		-	-	
<a href="#">Flucloxacillin</a>	-	-		-	-	
<a href="#">Mecillinam (uncomplicated UTI only)</a>	-	-		-	-	

## Viridans group streptococci

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. <b>See Note A on penicillins.</b>
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	0.5	0.5	30	IP	IP	
Cefepime	0.5	0.5	30	25 <sup>A</sup>	25 <sup>A</sup>	
Cefixime	-	-		-	-	
Cefotaxime	0.5	0.5	5	23 <sup>A</sup>	23 <sup>A</sup>	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftriaxone	0.5	0.5	30	27 <sup>A</sup>	27 <sup>A</sup>	
Cefuroxime iv	0.5	0.5	30	26 <sup>A</sup>	26 <sup>A</sup>	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	1 <sup>1</sup>	1		Note <sup>A</sup>	Note <sup>A</sup>	1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.  A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. <b>See Note A on penicillins.</b>
Ertapenem	0.5 <sup>1</sup>	0.5		Note <sup>A</sup>	Note <sup>A</sup>	
Imipenem	2 <sup>1</sup>	2		Note <sup>A</sup>	Note <sup>A</sup>	
Meropenem	2 <sup>1</sup>	2		Note <sup>A</sup>	Note <sup>A</sup>	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

## Viridans group streptococci

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	-	-		-	-	
Levofloxacin	-	-		-	-	
Moxifloxacin	-	-		-	-	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin	-	-		-	-	
Ofloxacin	-	-		-	-	

Aminoglycosides <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Amikacin	Note <sup>2</sup>	Note <sup>2</sup>		-	-	<p>1. Viridans group streptococci are intrinsically resistant to aminoglycosides and aminoglycoside monotherapy is ineffective. There is likely to be synergy between aminoglycosides and penicillins or glycopeptides against streptococci without acquired high-level resistance. All testing is therefore to distinguish between intrinsic and high-level acquired resistance.</p> <p>2. Gentamicin can be used to screen for high-level aminoglycoside resistance (HLAR).</p> <p><b>Negative test:</b> Isolates with gentamicin MIC ≤128 mg/L. The isolate is wild type for gentamicin and low-level intrinsic resistant. For other aminoglycosides, this may not be the case. Synergy with penicillins or glycopeptides can be expected if the isolate is susceptible to the penicillin or glycopeptide.</p> <p><b>Positive test:</b> Isolates with gentamicin MIC &gt;128 mg/L. The isolate is high-level resistant to gentamicin and other aminoglycosides except streptomycin. There will be no synergy with penicillins or glycopeptides.</p>
Gentamicin	Note <sup>2</sup>	Note <sup>2</sup>		-	-	
Netilmicin	Note <sup>2</sup>	Note <sup>2</sup>		-	-	
Tobramycin	Note <sup>2</sup>	Note <sup>2</sup>		-	-	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Teicoplanin	2 <sup>1</sup>	2	30	16 <sup>A</sup>	16 <sup>A</sup>	<p>1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p> <p>A. Zone diameter breakpoints are based on wild type distributions as there are currently no resistant isolates.</p>
Telavancin	IE	IE		IE	IE	
Vancomycin	2 <sup>1</sup>	2	5	15 <sup>A</sup>	15 <sup>A</sup>	

## Viridans group streptococci

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	IE	IE		IE	IE	1. Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as susceptible. If detected, then report as resistant.  A. Place the erythromycin and clindamycin disks 12-16 mm apart (edge to edge) and look for antagonism (the D phenomenon).
Clarithromycin	IE	IE		IE	IE	
Erythromycin	IE	IE	15	IE	IE	
Roxithromycin	IE	IE		IE	IE	
Telithromycin	IE	IE		IE	IE	
Clindamycin <sup>1</sup>	0.5	0.5	2	19 <sup>A</sup>	19 <sup>A</sup>	
Quinupristin-dalfopristin	IE	IE		IE	IE	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline	IE	IE		IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	
Colistin	-	-		-	-	
Daptomycin	-	-		-	-	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole	-	-		-	-	



## Haemophilus influenzae

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

EUCAST breakpoints have been defined for *H. influenzae* only. Clinical data for other *Haemophilus* species are scarce. MIC distributions for *H. parainfluenzae* are similar to those for *H. influenzae*. In the absence of specific breakpoints the *H. influenzae* breakpoints can be applied to *H. parainfluenzae*.

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)  
**Inoculum:** McFarland 0.5  
**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Haemophilus influenzae* ATCC 49766 or *Haemophilus influenzae* NCTC 8468

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<b>Benzympenicillin</b>	IE	IE		IE	IE	<p>1. Breakpoints are based on intravenous administration. For penicillins without inhibitors, breakpoints apply to beta-lactamase negative isolates only. For penicillins without inhibitors, beta-lactamase positive isolates should be reported resistant.</p> <p>2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.</p> <p>3/B. Susceptibility can be inferred from amoxicillin-clavulanic acid.</p> <p>4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.</p> <p>5/D. Susceptibility inferred from ampicillin or amoxicillin.</p> <p>A. Benzylpenicillin 1 unit can be used to screen for, but not to distinguish between, beta-lactamase producing isolates and isolates with PBP mutations. <b>For interpretation of the benzylpenicillin disk screen, see supplementary table below.</b></p> <p>C. Susceptibility inferred from ampicillin.</p>
<b>Benzympenicillin (screen)</b>	NA	NA	1 unit	12 <sup>A</sup>	Note <sup>A</sup>	
<b>Ampicillin</b>	1 <sup>1</sup>	1 <sup>1</sup>	2	16 <sup>A</sup>	16 <sup>A</sup>	
<b>Ampicillin-sulbactam</b>	1 <sup>1,2,3</sup>	1 <sup>1,2,3</sup>	10-10	Note <sup>A,B</sup>	Note <sup>A,B</sup>	
<b>Amoxicillin</b>	2 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A,C</sup>	Note <sup>A,C</sup>	
<b>Amoxicillin-clavulanic acid</b>	2 <sup>1,4</sup>	2 <sup>1,4</sup>	2-1	15 <sup>A</sup>	15 <sup>A</sup>	
<b>Piperacillin</b>	Note <sup>1,5</sup>	Note <sup>1,5</sup>		Note <sup>A,D</sup>	Note <sup>A,D</sup>	
<b>Piperacillin-tazobactam</b>	Note <sup>1,3</sup>	Note <sup>1,3</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<b>Ticarcillin</b>	IE	IE		IE	IE	
<b>Ticarcillin-clavulanic acid</b>	IE	IE		IE	IE	
<b>Phenoxymethylpenicillin</b>	IE	IE		IE	IE	
<b>Oxacillin</b>	-	-		-	-	
<b>Cloxacillin</b>	-	-		-	-	
<b>Dicloxacillin</b>	-	-		-	-	
<b>Flucloxacillin</b>	-	-		-	-	
<b>Mecillinam (uncomplicated UTI only)</b>	-	-		-	-	

## Haemophilus influenzae

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	<p>1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p> <p>A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance. <b>See supplementary table below.</b></p>
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	0.25 <sup>1</sup>	0.25	30	27 <sup>A</sup>	27 <sup>A</sup>	
Cefixime	0.125 <sup>1</sup>	0.125	5	25 <sup>A</sup>	25 <sup>A</sup>	
Cefotaxime	0.125 <sup>1</sup>	0.125	5	26 <sup>A</sup>	26 <sup>A</sup>	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	0.25 <sup>1</sup>	0.5	10	26 <sup>A</sup>	23 <sup>A</sup>	
Ceftaroline	0.03	0.03		IP	IP	
Ceftazidime	-	-		-	-	
Ceftibuten	1 <sup>1</sup>	1	30	25 <sup>A</sup>	25 <sup>A</sup>	
Ceftobiprole	IE	IE		IE	IE	
Ceftriaxone	0.125 <sup>1</sup>	0.125	30	30 <sup>A</sup>	30 <sup>A</sup>	
Cefuroxime iv	1	2	30	26 <sup>A</sup>	25 <sup>A</sup>	
Cefuroxime oral	0.125	1	30	50	26	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem <sup>1</sup>	1 <sup>2</sup>	1	10	20 <sup>A</sup>	20 <sup>A</sup>	<p>1. Not for meningitis (meropenem is the only carbapenem used for meningitis).</p> <p>2. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p> <p>3. Meropenem is the only carbapenem used for meningitis.</p> <p>A. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance. <b>See supplementary table below.</b> B. For use in meningitis determine the meropenem MIC value.</p>
Ertapenem <sup>1</sup>	0.5 <sup>2</sup>	0.5	10	20 <sup>A</sup>	20 <sup>A</sup>	
Imipenem <sup>1</sup>	2 <sup>2</sup>	2	10	20 <sup>A</sup>	20 <sup>A</sup>	
Meropenem <sup>3</sup> (infections other than meningitis)	2 <sup>2</sup>	2	10	20 <sup>A</sup>	20 <sup>A</sup>	
Meropenem <sup>3</sup> (meningitis)	0.25	1		Note <sup>B</sup>	Note <sup>B</sup>	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	IE	IE		IE	IE	

## Haemophilus influenzae

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones <sup>1</sup>	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.5 <sup>2</sup>	0.5	5	26 <sup>A</sup>	26 <sup>A</sup>	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p> <p>1. Low-level fluoroquinolone resistance (ciprofloxacin MICs of 0.125-0.5 mg/L) may occur but there is no evidence that this resistance is of clinical importance in respiratory tract infections with <i>H. influenzae</i>.</p> <p>2. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.</p> <p>A. The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. <b>See Note B.</b></p> <p>B. Isolates categorised as susceptible to nalidixic acid can be reported susceptible to levofloxacin, ciprofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.</p>
Levofloxacin	1 <sup>2</sup>	1	5	26 <sup>A</sup>	26 <sup>A</sup>	
Moxifloxacin	0.5 <sup>2</sup>	0.5	5	25 <sup>A</sup>	25 <sup>A</sup>	
Nalidixic acid (screen)	NA	NA	30	23 <sup>B</sup>	Note <sup>B</sup>	
Norfloxacin	-	-	-	-	-	
Ofloxacin	0.5 <sup>2</sup>	0.5	5	23 <sup>A</sup>	23 <sup>A</sup>	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Amikacin	IE	IE		IE	IE	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p>
Gentamicin	IE	IE		IE	IE	
Netilmicin	IE	IE		IE	IE	
Tobramycin	IE	IE		IE	IE	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
Teicoplanin	-	-		-	-	<p>Numbers for comments on MIC breakpoints Letters for comments on disk diffusion</p>
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

## Haemophilus influenzae

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Macrolides <sup>1</sup> , lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	0.125 <sup>2</sup>	4 <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1. Correlation between macrolide MICs and clinical outcome is weak for <i>H. influenzae</i> . Therefore, breakpoints for macrolides and related antibiotics have been set to categorise wild type <i>H. influenzae</i> as intermediate. 2/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.
Clarithromycin	1 <sup>2</sup>	32 <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Erythromycin	0.5	16	15	50	10	
Roxithromycin	1 <sup>2</sup>	16 <sup>2</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Telithromycin	0.125	8	15	50	12	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.
Minocycline	1 <sup>1</sup>	2 <sup>1</sup>	30	24 <sup>A</sup>	21 <sup>A</sup>	
Tetracycline	1 <sup>1</sup>	2 <sup>1</sup>	30	25 <sup>A</sup>	22 <sup>A</sup>	
Tigecycline	IE	IE		IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	2	2	30	28	28	1. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin	-	-		-	-	
Fosfomycin iv	IE	IE		IE	IE	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Rifampicin (for prophylaxis only)	1	1	5	18	18	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole <sup>1</sup>	0.5	1	1.25-23.75	23	20	

***Haemophilus influenzae***

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

**Screening for beta-lactam resistance in *H. influenzae***  
Supplementary table

<b>Benzylopicillin 1 unit disk Zone diameter</b>	<b>Beta-lactamase</b>	<b>Further testing and/or interpretation</b>
≥ 12 mm	Do not test	Report susceptible to all beta-lactam agents for which clinical breakpoints are listed (including those with "Note"), and cefuroxime oral, which if reported, should be reported intermediate.
< 12 mm	Beta-lactamase negative	A resistance mechanism other than beta-lactamase production is present. As the effect on individual beta-lactam agents differs, test susceptibility to the beta-lactam agent intended for clinical use.
	Beta-lactamase positive	For ampicillin, amoxicillin and piperacillin, report resistant. For other beta-lactam agents, test susceptibility to the beta-lactam agent intended for clinical use as another resistance mechanism cannot be excluded by the screen test.

**Moraxella catarrhalis**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)  
**Inoculum:** McFarland 0.5  
**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Haemophilus influenzae* ATCC 49766 or *Haemophilus influenzae* NCTC 8468

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	
<a href="#">Benzylpenicillin</a>	-	-		-	-	1. Most <i>M. catarrhalis</i> produce beta-lactamase, although beta-lactamase production is slow and may give weak results with <i>in vitro</i> tests. Beta-lactamase producers should be reported resistant to penicillins and aminopenicillins without inhibitors. 2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L. 3/A. Susceptibility can be inferred from amoxicillin-clavulanic acid. 4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
<a href="#">Ampicillin</a>	1	1		-	-	
<a href="#">Ampicillin-sulbactam</a>	1 <sup>2,3</sup>	1 <sup>2,3</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<a href="#">Amoxicillin</a>	1	1		-	-	
<a href="#">Amoxicillin-clavulanic acid</a>	1 <sup>4</sup>	1 <sup>4</sup>	2-1	19	19	
<a href="#">Piperacillin</a>	1	1		-	-	
<a href="#">Piperacillin-tazobactam</a>	Note <sup>3</sup>	Note <sup>3</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
<a href="#">Ticarcillin</a>	IE	IE		IE	IE	
<a href="#">Ticarcillin-clavulanic acid</a>	IE	IE		IE	IE	
<a href="#">Phenoxymethylpenicillin</a>	-	-		-	-	
<a href="#">Oxacillin</a>	-	-		-	-	
<a href="#">Cloxacillin</a>	-	-		-	-	
<a href="#">Dicloxacillin</a>	-	-		-	-	
<a href="#">Flucloxacillin</a>	-	-		-	-	
<a href="#">Mecillinam (uncomplicated UTI only)</a>	-	-		-	-	

**Moraxella catarrhalis**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	4	4	30	20	20	
Cefixime	0.5	1	5	21	18	
Cefotaxime	1	2	5	20	17	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	IP	IP	10	IP	IP	
Ceftaroline	IE	IE		IE	IE	
Ceftazidime	-	-		-	-	
Ceftibuten	IE	IE		IE	IE	
Ceftobiprole	IE	IE		IE	IE	
Ceftriaxone	1	2	30	24	21	
Cefuroxime iv	4	8	30	21	18	
Cefuroxime oral	0.125	4	30	50	21	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doripenem	1 <sup>1</sup>	1	10	30	30	1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.
Ertapenem	0.5 <sup>1</sup>	0.5	10	29	29	
Imipenem	2 <sup>1</sup>	2	10	29	29	
Meropenem	2 <sup>1</sup>	2	10	33	33	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Aztreonam	IE	IE		IE	IE	

**Moraxella catarrhalis**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.5	0.5	5	23 <sup>A</sup>	23 <sup>A</sup>	<p><b>A.</b> The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. <b>See Note B.</b></p> <p><b>B.</b> Isolates categorised as susceptible to nalidixic acid can be reported susceptible to levofloxacin, ciprofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.</p>
Levofloxacin	1	1	5	23 <sup>A</sup>	23 <sup>A</sup>	
Moxifloxacin	0.5	0.5	5	23 <sup>A</sup>	23 <sup>A</sup>	
Nalidixic acid (screen)	NA	NA	30	23 <sup>B</sup>	Note <sup>B</sup>	
Norfloxacin	-	-	-	-	-	
Ofloxacin	0.5	0.5	5	25 <sup>A</sup>	25 <sup>A</sup>	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Amikacin	IE	IE		IE	IE	
Gentamicin	IE	IE		IE	IE	
Netilmicin	IE	IE		IE	IE	
Tobramycin	IE	IE		IE	IE	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	



**Moraxella catarrhalis**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.
Clarithromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Erythromycin	0.25	0.5	15	23 <sup>A</sup>	20 <sup>A</sup>	
Roxithromycin	0.5 <sup>1</sup>	1 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Telithromycin	0.25	0.5	15	23	20	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	1 <sup>1</sup>	2 <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. Isolates susceptible to tetracycline are also susceptible to doxycycline and minocycline, but some resistant to tetracycline may be susceptible to minocycline and/or doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.
Minocycline	1 <sup>1</sup>	2 <sup>1</sup>	30	25 <sup>A</sup>	22 <sup>A</sup>	
Tetracycline	1 <sup>1</sup>	2 <sup>1</sup>	30	28 <sup>A</sup>	25 <sup>A</sup>	
Tigecycline	IE	IE		IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Chloramphenicol	2 <sup>1</sup>	2 <sup>1</sup>	30	30 <sup>A</sup>	30 <sup>A</sup>	1/A. Breakpoints relate to topical use of chloramphenicol. 2. Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Colistin	-	-		-	-	
Daptomycin	-	-		-	-	
Fosfomycin iv	IE	IE		IE	IE	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Linezolid	-	-		-	-	
Metronidazole	-	-		-	-	
Mupirocin	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole <sup>2</sup>	0.5	1	1.25-23.75	18	15	

*Neisseria gonorrhoeae*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion criteria for antimicrobial susceptibility testing of *Neisseria gonorrhoeae* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

Penicillins <sup>1</sup>	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
<a href="#">Benzylpenicillin</a>	0.06	1	1. Always test for beta-lactamase. If positive, report resistant to benzylpenicillin, ampicillin and amoxicillin. The susceptibility of beta-lactamase negative isolates to ampicillin and amoxicillin can be inferred from benzylpenicillin.
<a href="#">Ampicillin</a> <sup>1</sup>	Note <sup>1</sup>	Note <sup>1</sup>	
Ampicillin-sulbactam	IE	IE	
<a href="#">Amoxicillin</a> <sup>1</sup>	Note <sup>1</sup>	Note <sup>1</sup>	
Amoxicillin-clavulanic acid	Note <sup>1</sup>	Note <sup>1</sup>	
Piperacillin	-	-	
<a href="#">Piperacillin-tazobactam</a>	-	-	
Ticarcillin	-	-	
Ticarcillin-clavulanic acid	-	-	
<a href="#">Phenoxymethylpenicillin</a>	-	-	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
<a href="#">Mecillinam</a> (uncomplicated UTI only)	-	-	

*Neisseria gonorrhoeae*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	0.125	0.125	
Cefotaxime	0.125	0.125	
Cefoxitin	-	-	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftriaxone	0.125	0.125	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Doripenem	IE	IE	
Ertapenem	IE	IE	
Imipenem	IE	IE	
Meropenem	IE	IE	

Monobactams	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Aztreonam	IE	IE	

**Neisseria gonorrhoeae**

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Ciprofloxacin	0.03	0.06	
Levofloxacin	IE	IE	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin	IE	IE	
Ofloxacin	0.125	0.25	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	

*Neisseria gonorrhoeae*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Azithromycin	0.25	0.5	
Clarithromycin	-	-	
Erythromycin	-	-	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	-	-	
Quinupristin-dalfopristin	-	-	

Tetracyclines <sup>1</sup>	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Doxycycline	IE	IE	1. Isolates susceptible to tetracycline are also susceptible to minocycline, but some isolates resistant to tetracycline may be susceptible to minocycline.
Minocycline	IE	IE	
Tetracycline	0.5	1	
Tigecycline	IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Chloramphenicol	-	-	
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Linezolid	-	-	
Metronidazole	-	-	
Mupirocin	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	64	64	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

*Neisseria meningitidis*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion criteria for antimicrobial susceptibility testing of *Neisseria meningitidis* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

Penicillins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Benzylpenicillin	0.06	0.25	
Ampicillin	0.125	1	
Ampicillin-sulbactam	IE	IE	
Amoxicillin	0.125	1	
Amoxicillin-clavulanic acid	-	-	
Piperacillin	-	-	
Piperacillin-tazobactam	-	-	
Ticarcillin	-	-	
Ticarcillin-clavulanic acid	-	-	
Phenoxymethylpenicillin	-	-	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

*Neisseria meningitidis*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Cefaclor	-	-	1. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime	0.125 <sup>1</sup>	0.125	
Cefoxitin	-	-	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftriaxone	0.125 <sup>1</sup>	0.125	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Doripenem	IE	IE	1. Breakpoints relate to meningitis only. 2. Isolates with MIC values above the susceptible breakpoint are very rare or not yet reported. The identification and antimicrobial susceptibility tests on any such isolate must be repeated and if the result is confirmed the isolate sent to a reference laboratory. Until there is evidence regarding clinical response for confirmed isolates with MIC values above the current resistant breakpoint they should be reported resistant.
Ertapenem	-	-	
Imipenem	-	-	
Meropenem <sup>1</sup>	0.25 <sup>2</sup>	0.25	

Monobactams	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Aztreonam	-	-	

**Neisseria meningitidis**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Ciprofloxacin	0.03 <sup>1</sup>	0.03 <sup>1</sup>	1. Breakpoints apply only to use in the prophylaxis of meningococcal disease.
Levofloxacin	IE	IE	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin	-	-	
Ofloxacin	IE	IE	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	



***Neisseria meningitidis***

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	-	-	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	-	-	
Quinupristin-dalfopristin	-	-	

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Doxycycline	-	-	1. Tetracycline can be used to predict susceptibility to minocycline for prophylaxis against <i>N. meningitidis</i> infections.
Minocycline <sup>1</sup>	1	2	
Tetracycline	1	2	
Tigecycline	IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Chloramphenicol	2	4	1. For prophylaxis of meningitis only (refer to national guidelines).
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Linezolid	-	-	
Metronidazole	-	-	
Mupirocin	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Rifampicin <sup>1</sup>	0.25	0.25	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

## Gram-positive anaerobes

except *Clostridium difficile*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion criteria for antimicrobial susceptibility testing of anaerobes have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

This group of bacteria includes many genera. The most frequently isolated Gram-positive anaerobes are: *Clostridium*, *Actinomyces*, *Propionibacterium*, *Bifidobacterium*, *Eggerthella*, *Eubacterium*, *Lactobacillus* and anaerobic gram-positive cocci.

Anaerobes are most frequently defined by no growth on culture plates incubated in a CO<sub>2</sub> enriched atmosphere, but many Gram-positive, non-spore forming rods such as *Actinomyces* spp, many *P. acnes* and some *Bifidobacterium* spp. can grow on incubation in CO<sub>2</sub> and may be tolerant enough to grow poorly in air, but are still considered as anaerobic bacteria. Several species of *Clostridium*, including *C. carnis*, *C. histolyticum* and *C. tertium*, can grow but not sporulate in air.

Penicillins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
<a href="#">Benzylpenicillin<sup>1</sup></a>	0.25	0.5	<ol style="list-style-type: none"> <li>1. Susceptibility to ampicillin, amoxicillin, piperacillin and ticarcillin can be inferred from susceptibility to benzylpenicillin.</li> <li>2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.</li> <li>3. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.</li> <li>4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.</li> </ol>
<a href="#">Ampicillin<sup>1</sup></a>	4	8	
<a href="#">Ampicillin-sulbactam</a>	4 <sup>2</sup>	8 <sup>2</sup>	
<a href="#">Amoxicillin<sup>1</sup></a>	4	8	
<a href="#">Amoxicillin-clavulanic acid</a>	4 <sup>3</sup>	8 <sup>3</sup>	
<a href="#">Piperacillin<sup>1</sup></a>	8	16	
<a href="#">Piperacillin-tazobactam</a>	8 <sup>4</sup>	16 <sup>4</sup>	
<a href="#">Ticarcillin<sup>1</sup></a>	8	16	
<a href="#">Ticarcillin-clavulanic acid</a>	8 <sup>3</sup>	16 <sup>3</sup>	
<a href="#">Phenoxymethylpenicillin</a>	IE	IE	
<a href="#">Oxacillin</a>	-	-	
<a href="#">Cloxacillin</a>	-	-	
<a href="#">Dicloxacillin</a>	-	-	
<a href="#">Flucloxacillin</a>	-	-	
<a href="#">Mecillinam (uncomplicated UTI only)</a>	-	-	

**Gram-positive anaerobes**  
except *Clostridium difficile*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime	-	-	
Cefoxitin	IE	IE	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftriaxone	-	-	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Doripenem	1	1	
Ertapenem	1	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Aztreonam	-	-	

**Gram-positive anaerobes**  
except *Clostridium difficile*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Ciprofloxacin	-	-	
Levofloxacin	-	-	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin	-	-	
Ofloxacin	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Teicoplanin	IE	IE	
Telavancin	IE	IE	
Vancomycin	2	2	

**Gram-positive anaerobes**  
except *Clostridium difficile*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	IE	IE	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	4	4	
Quinupristin-dalfopristin	-	-	

Tetracyclines <sup>1</sup>	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Doxycycline	Note <sup>1</sup>	Note <sup>1</sup>	1. For anaerobic bacteria there is clinical evidence of activity in mixed intra-abdominal infections, but no correlation between MIC values, PK/PD data and clinical outcome. Therefore no breakpoints for susceptibility testing are given.
Minocycline	Note <sup>1</sup>	Note <sup>1</sup>	
Tetracycline	Note <sup>1</sup>	Note <sup>1</sup>	
Tigecycline	Note <sup>1</sup>	Note <sup>1</sup>	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Chloramphenicol	8	8	
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Linezolid	-	-	
Metronidazole	4	4	
Mupirocin	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

*Clostridium difficile*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion criteria for antimicrobial susceptibility testing of *Clostridium difficile* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Moxifloxacin	<sub>-1</sub>	<sub>-1</sub>	1. Not used clinically. May be tested for epidemiological purposes only (ECOFF 4 mg/L).

Glycopeptides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Vancomycin	<sub>2</sub> <sup>1</sup>	<sub>2</sub> <sup>1</sup>	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Tigecycline	<sub>-1,2</sub>	<sub>-1,2</sub>	1. For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use. 2. Not used clinically. May be tested for epidemiological purposes only (ECOFF 0.25 mg/L).

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Daptomycin	<sub>-1,2</sub>	<sub>-1,2</sub>	1. For daptomycin MIC determination, the medium must be supplemented with Ca <sup>2+</sup> to a final concentration of 50 mg/L. 2. Not used clinically. May be tested for epidemiological purposes only (ECOFF 4 mg/L). 3. Not used clinically. May be tested for epidemiological purposes only (ECOFF 2 mg/L). 4. Fidaxomicin breakpoints and ECOFF have not been set because the available data show major variation in MIC distribution between studies. 5. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility. 6. Not used clinically. May be tested for epidemiological purposes only (ECOFF 0.004 mg/L).
Fusidic acid	<sub>-3</sub>	<sub>-3</sub>	
Fidaxomicin	1E <sup>4</sup>	1E <sup>4</sup>	
Metronidazole	<sub>2</sub> <sup>5</sup>	<sub>2</sub> <sup>5</sup>	
Rifampicin	<sub>-6</sub>	<sub>-6</sub>	

## Gram-negative anaerobes

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion criteria for antimicrobial susceptibility testing of anaerobes have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

This group of bacteria includes many genera. The most frequently isolated Gram-negative anaerobes are *Bacteroides*, *Prevotella*, *Porphyromonas*, *Fusobacterium*, *Bilophila* and *Mobiluncus*.  
Anaerobes are most frequently defined by no growth on culture plates incubated in a CO<sub>2</sub> enriched atmosphere.

Penicillins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
<a href="#">Benzylpenicillin</a> <sup>1</sup>	0.25	0.5	<ol style="list-style-type: none"> <li>1. Susceptibility to ampicillin, amoxicillin, piperacillin and ticarcillin can be inferred from susceptibility to benzylpenicillin.</li> <li>2. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.</li> <li>3. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.</li> <li>4. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.</li> </ol>
<a href="#">Ampicillin</a> <sup>1</sup>	0.5	2	
<a href="#">Ampicillin-sulbactam</a>	4 <sup>2</sup>	8 <sup>2</sup>	
<a href="#">Amoxicillin</a> <sup>1</sup>	0.5	2	
<a href="#">Amoxicillin-clavulanic acid</a>	4 <sup>3</sup>	8 <sup>3</sup>	
<a href="#">Piperacillin</a> <sup>1</sup>	16	16	
<a href="#">Piperacillin-tazobactam</a>	8 <sup>4</sup>	16 <sup>4</sup>	
<a href="#">Ticarcillin</a> <sup>1</sup>	16	16	
<a href="#">Ticarcillin-clavulanic acid</a>	8 <sup>3</sup>	16 <sup>3</sup>	
<a href="#">Phenoxymethylpenicillin</a>	IE	IE	
<a href="#">Oxacillin</a>	-	-	
<a href="#">Cloxacillin</a>	-	-	
<a href="#">Dicloxacillin</a>	-	-	
<a href="#">Flucloxacillin</a>	-	-	
<a href="#">Mecillinam (uncomplicated UTI only)</a>	-	-	

## Gram-negative anaerobes

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime	-	-	
Cefoxitin	IE	IE	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftriaxone	-	-	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Doripenem	1	1	
Ertapenem	1	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Aztreonam	-	-	



## Gram-negative anaerobes

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Ciprofloxacin	-	-	
Levofloxacin	-	-	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin	-	-	
Oxfloxacin	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	IE	IE	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	4	4	
Quinupristin-dalfopristin	-	-	

## Gram-negative anaerobes

## EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Tetracyclines <sup>1</sup>	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
<a href="#">Doxycycline</a>	Note <sup>1</sup>	Note <sup>1</sup>	1. For anaerobic bacteria there is clinical evidence of activity in mixed intra-abdominal infections, but no correlation between MIC values, PK/PD data and clinical outcome. Therefore no breakpoints for susceptibility testing are given.
<a href="#">Minocycline</a>	Note <sup>1</sup>	Note <sup>1</sup>	
<a href="#">Tetracycline</a>	Note <sup>1</sup>	Note <sup>1</sup>	
<a href="#">Tigecycline</a>	Note <sup>1</sup>	Note <sup>1</sup>	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
<a href="#">Chloramphenicol</a>	8	8	
<a href="#">Colistin</a>	-	-	
<a href="#">Daptomycin</a>	-	-	
<a href="#">Fosfomycin iv</a>	-	-	
<a href="#">Fosfomycin oral</a>	-	-	
<a href="#">Fusidic acid</a>	-	-	
<a href="#">Linezolid</a>	-	-	
<a href="#">Metronidazole</a>	4	4	
<a href="#">Mupirocin</a>	-	-	
<a href="#">Nitrofurantoin (uncomplicated UTI only)</a>	-	-	
<a href="#">Rifampicin</a>	-	-	
<a href="#">Spectinomycin</a>	-	-	
<a href="#">Trimethoprim (uncomplicated UTI only)</a>	-	-	
<a href="#">Trimethoprim-sulfamethoxazole</a>	-	-	

*Helicobacter pylori*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion criteria for antimicrobial susceptibility testing of *Helicobacter pylori* have not yet been defined and an MIC method should be used. If a commercial MIC method is used, follow the manufacturer's instructions.

Penicillins	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Amoxicillin	0.125 <sup>1</sup>	0.125 <sup>1</sup>	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.
Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Levofloxacin	1 <sup>1</sup>	1 <sup>1</sup>	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.
Macrolides	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Clarithromycin	0.25 <sup>1</sup>	0.5 <sup>1</sup>	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.
Tetracyclines	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Tetracycline	1 <sup>1</sup>	1 <sup>1</sup>	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.
Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Metronidazole	8 <sup>1</sup>	8 <sup>1</sup>	1. The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.
Rifampicin	1 <sup>1</sup>	1 <sup>1</sup>	

*Listeria monocytogenes*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Disk diffusion (EUCAST standardised disk diffusion method )  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)  
**Inoculum:** McFarland 0.5  
**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Streptococcus pneumoniae* ATCC 49619

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Benzylpenicillin	1	1	1 unit	13	13	
Ampicillin	1	1	2	16	16	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Meropenem	0.25	0.25	10	26	26	

Macrolides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Erythromycin	1	1	15	25	25	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Trimethoprim-sulfamethoxazole <sup>1</sup>	0.06	0.06	1.25-23.75	29	29	1. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.

*Pasteurella multocida*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)  
**Inoculum:** McFarland 0.5  
**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Haemophilus influenzae* ATCC 49766 or *Haemophilus influenzae* NCTC 8468

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Benzylpenicillin	0.5	0.5	1 unit	17	17	1. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
Ampicillin	1	1	2	17	17	A. Susceptibility inferred from ampicillin.
Amoxicillin	1	1		Note <sup>A</sup>	Note <sup>A</sup>	
Amoxicillin-clavulanic acid	1 <sup>1</sup>	1 <sup>1</sup>	2-1	15	15	

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Cefotaxime	0.03	0.03	5	26	26	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.06	0.06	5	27 <sup>A</sup>	27 <sup>A</sup>	A. The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. Isolates categorised as susceptible to nalidixic acid can be reported susceptible to ciprofloxacin and levofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.
Levofloxacin	0.06	0.06	5	27 <sup>A</sup>	27 <sup>A</sup>	
Nalidixic acid (screen)	NA	NA	30	23 <sup>A</sup>	Note <sup>A</sup>	

***Pasteurella multocida***

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Doxycycline</a>	1	1		Note <sup>A</sup>	Note <sup>A</sup>	A. Susceptibility inferred from tetracycline screen test.
<a href="#">Tetracycline</a> (screen)	NA	NA	30	24 <sup>A</sup>	24 <sup>A</sup>	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
<a href="#">Trimethoprim-sulfamethoxazole</a> <sup>1</sup>	0.25	0.25	1.25-23.75	23	23	1. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F). The MH-F plates should be dried prior to inoculation to reduce swarming (at 20-25°C over night or at 35°C, with the lid removed, for 15 min).  
**Inoculum:** McFarland 0.5  
**Incubation:** Microaerobic environment, 41±1°C, 24h. Isolates with insufficient growth after 24h incubation are reincubated immediately and inhibition zones read after a total of 40-48h incubation.  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Campylobacter jejuni* ATCC 33560

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	0.5	0.5	5	26	26	

Macrolides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Azithromycin	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. Erythromycin can be used to determine susceptibility to azithromycin and clarithromycin.
Clarithromycin	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	
Erythromycin, <i>C. jejuni</i>	4 <sup>1</sup>	4 <sup>1</sup>	15	20 <sup>A</sup>	20 <sup>A</sup>	
Erythromycin, <i>C. coli</i>	8 <sup>1</sup>	8 <sup>1</sup>	15	24 <sup>A</sup>	24 <sup>A</sup>	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Doxycycline	Note <sup>1</sup>	Note <sup>1</sup>		Note <sup>A</sup>	Note <sup>A</sup>	1/A. Tetracycline can be used to determine susceptibility to doxycycline.
Tetracycline	2 <sup>1</sup>	2 <sup>1</sup>	30	30 <sup>A</sup>	30 <sup>A</sup>	

**Corynebacterium spp.**  
except *Corynebacterium diphtheriae*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

**Disk diffusion (EUCAST standardised disk diffusion method)**  
**Medium:** Mueller-Hinton agar + 5% defibrinated horse blood and 20 mg/L β-NAD (MH-F)  
**Inoculum:** McFarland 0.5  
**Incubation:** 5% CO<sub>2</sub>, 35±1°C, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-48h incubation.  
**Reading:** Read zone edges as the point showing no growth viewed from the front of the plate with the lid removed and with reflected light.  
**Quality control:** *Streptococcus pneumoniae* ATCC 49619

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Benzylpenicillin	0.125	0.125	1 unit	29	29	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Ciprofloxacin	1	1	5	25	25	
Moxifloxacin	0.5	0.5	5	25	25	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Gentamicin	1	1	10	23	23	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Vancomycin	2	2	5	17	17	



***Corynebacterium* spp.**  
except *Corynebacterium diphtheriae*

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Lincosamides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Clindamycin	0.5	0.5	2	20	20	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Tetracycline	2	2	30	24	24	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbers for comments on MIC breakpoints Letters for comments on disk diffusion
	S ≤	R >		S ≥	R <	
Linezolid	2	2	10	25	25	
Rifampicin	0.06	0.5	5	30	25	

***Mycobacterium tuberculosis***

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

Listed breakpoints have been set in parallel with marketing authorisation by EMA. Breakpoints for other agents have not yet been established.

Recommended methods for antimicrobial susceptibility testing of mycobacteria are currently under discussion.

	MIC breakpoint (mg/L)		Notes Numbers for comments on MIC breakpoints
	S ≤	R >	
Delamanid	0.06	0.06	
Bedaquiline	0.25	0.25	

## PK/PD (Non-species related) breakpoints

EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01

These breakpoints are only used when there are no species specific breakpoints (a value, a dash or a note) in the species specific tables .

Penicillins	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
<a href="#">Benzylpenicillin</a>	0.25	2	The non-species related S and R breakpoints are based on 600 mg x 4 (2.4 g/day) and 2.4 g x 6 (14.4 g/day) doses, respectively.
<a href="#">Ampicillin</a>	2	8	The non-species related breakpoints are based on doses of at least 0.5 g x 3-4 (1.5-2 g/day).
<a href="#">Ampicillin-sulbactam</a>	2	8	
<a href="#">Amoxicillin</a>	2	8	The non-species related breakpoints are based on doses of at least 0.5 g x 3-4 (1.5-2 g/day).
<a href="#">Amoxicillin-clavulanic acid</a>	2	8	
<a href="#">Piperacillin</a>	4	16	Breakpoints apply to piperacillin-tazobactam dosage of 4 g x 3.
<a href="#">Piperacillin-tazobactam</a>	4	16	
<a href="#">Ticarcillin</a>	8	16	
<a href="#">Ticarcillin-clavulanic acid</a>	8	16	
<a href="#">Phenoxymethylpenicillin</a>	IE	IE	
<a href="#">Oxacillin</a>	IE	IE	
<a href="#">Cloxacillin</a>	IE	IE	
<a href="#">Dicloxacillin</a>	IE	IE	
<a href="#">Flucloxacillin</a>	IE	IE	
<a href="#">Mecillinam</a>	IE	IE	

**PK/PD (Non-species related) breakpoints**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Cephalosporins	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Cefaclor	IE	IE	
Cefadroxil	IE	IE	
Cefalexin	IE	IE	
Cefazolin	1	2	
Cefepime	4	8	Breakpoints apply to a daily intravenous dose of 2 g x 2 and a high dose of at least 2 g x 3.
Cefixime	IE	IE	
Cefotaxime	1	2	Breakpoints apply to a daily intravenous dose of 1 g x 3 and a high dose of at least 2 g x 3.
Cefoxitin	IE	IE	
Cefpodoxime	IE	IE	
Ceftaroline	0.5	0.5	Based on PK/PD target for Gram-negative organisms. Breakpoints apply to ceftaroline 600 mg x 2 daily administered intravenously over 1 hour.
Ceftazidime	4	8	Breakpoints apply to a daily intravenous dose of 1 g x 3 and a high dose of at least 2 g x 3.
Ceftibuten	IE	IE	
Ceftobiprole	4	4	Breakpoints apply to ceftobiprole 500 mg x 3 daily administered intravenously over 2 hours.
Ceftriaxone	1	2	Breakpoints apply to a daily intravenous dose of 1 g x 1 and a high dose of at least 2 g x 1.
Cefuroxime iv	4	8	Breakpoints apply to a daily intravenous dose of 750 mg x 3 and a high dose of at least 1.5 g x 3.
Cefuroxime oral	IE	IE	

Carbapenems	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Doripenem	1	2	Breakpoints apply to doripenem 500 mg x 3 daily administered intravenously over 1 hour as the lowest dose. 1000 mg x 3 daily administered over 4 hours was taken into consideration for severe infections and in setting the R breakpoint.
Ertapenem	0.5	1	Breakpoints apply to ertapenem 1000 mg x 1 daily administered intravenously over 30 minutes as the only dose.
Imipenem	2	8	Breakpoints apply to imipenem 500 mg x 4 daily administered intravenously over 30 minutes as the lowest dose. 1 g x 4 daily was
Meropenem	2	8	Breakpoints apply to meropenem 1000 mg x 3 daily administered intravenously over 30 minutes as the lowest dose. 2 g x 3 daily was taken into consideration for severe infections and in setting the R breakpoint.

Monobactams	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Aztreonam	4	8	

**PK/PD (Non-species related) breakpoints**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Fluoroquinolones	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Ciprofloxacin	0.5	1	Breakpoints apply to an oral dose of 500 mg x 2 (or as low as 250 mg x 2 for uncomplicated urinary tract infections) to 750 mg x 2 and an intravenous dose of 400 mg x 2 to 400 mg x 3.
Levofloxacin	1	2	Breakpoints apply to an oral dose of 500 mg x 1 to 500 mg x 2 and an intravenous dose of 500 mg x 1 to 500 mg x 2.
Moxifloxacin	0.5	1	Breakpoints apply to an oral and intravenous dose of 400 mg x 1.
Nalidixic acid	IE	IE	
Norfloxacin	0.5	1	Breakpoints apply to an oral dose of 400 mg x 2.
Ofloxacin	0.5	1	Breakpoints apply to an oral dose of 200 mg x 2 to 400 mg x 2 and an intravenous dose of 200 mg x 2 to 400 mg x 2.

Aminoglycosides	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Amikacin	IE	IE	
Gentamicin	IE	IE	
Netilmicin	IE	IE	
Tobramycin	IE	IE	

Glycopeptides	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Teicoplanin	IE	IE	
Telavancin	IE	IE	
Vancomycin	IE	IE	

**PK/PD (Non-species related) breakpoints**

**EUCAST Clinical Breakpoint Table v. 5.0, valid from 2015-01-01**

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Azithromycin	IE	IE	
Clarithromycin	IE	IE	
Erythromycin	IE	IE	
Roxithromycin	IE	IE	
Telithromycin	IE	IE	
Clindamycin	IE	IE	
Quinupristin-dalfopristin	IE	IE	

Tetracyclines	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Doxycycline	IE	IE	
Minocycline	IE	IE	
Tetracycline	IE	IE	
Tigecycline	0.25	0.5	Breakpoints apply to a tigecycline intravenous dose of 100 mg followed by 50 mg 12 hourly for complicated skin and skin structure infections and complicated intra-abdominal infections.

Miscellaneous agents	MIC breakpoint (mg/L)		PK/PD (Non-species related) breakpoints are based on the following dosages (See section 8 in Rationale Documents)
	S ≤	R >	
Chloramphenicol	IE	IE	
Colistin	IE	IE	
Daptomycin	IE	IE	
Fosfomycin iv	IE	IE	
Fosfomycin oral	IE	IE	
Fusidic acid	IE	IE	
Linezolid	2	4	Breakpoints apply to a linezolid intravenous and oral dosage of 600 mg x 2.
Metronidazole	IE	IE	
Mupirocin	IE	IE	
Nitrofurantoin	IE	IE	
Rifampicin	IE	IE	
Spectinomycin	IE	IE	
Trimethoprim	IE	IE	
Trimethoprim-sulfamethoxazole	IE	IE	