European Committee on Antimicrobial Susceptibility Testing

Breakpoint tables for interpretation of MICs and zone diameters

Version 8.0, valid from 2018-01-01

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Version 8.0, valid from 2018-01-01

Notes

1. The EUCAST clinical breakpoint tables contain clinical MIC breakpoints (determined or revised during 2002-2017) and their inhibition zone diameter correlates. The EUCAST breakpoint table version 8.0 includes corrected typographical errors, clarifications, breakpoints for new agents and/or 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.

3. Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.

4. Antimicrobial agent 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. The document is released as an Excel® file suitable for viewing on screen and as an Acrobat® pdf file suitable for printing. To utilize all functions in the Excel® file, use Microsoft™ original programs only. The Excel® file enables users to alter the list of agents to suit the local range of agents tested. The content of single cells cannot be changed. Hide lines by right-clicking on the line number and choose "hide". Hide columns by right-clicking on the column letter and choose "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 organism or group 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 Tables v. 8.0, valid from 2018-01-01

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium:
Inoculum:
Incubation:
Reading:
Quality control:

EUCAST methodology and quality control for MIC determination

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

EUCAST methodology and quality control for disk diffusion

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

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

Antimicrobial agent	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Antimicrobial agent A	1[1]	1[1]	X	20[A]	20[A]	**1.** Notes that are general comments and/or relating to MIC breakpoints.
Antimicrobial agent B, *S. aureus*	2[2]	4	Y	26	23	**2.** New comment
Antimicrobial agent C	IE	IE		IE	IE	~~Removed comment~~
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

Screening breakpoint to differentiate between isolates without and with resistance mechanisms

Not Applicable

In Preparation

No breakpoints. Susceptibility testing is not recommended

MIC breakpoints in blue are linked to MIC distributions

Zone diameter breakpoints in blue are linked to zone diameter distributions

Antimicrobial agents in blue are linked to EUCAST rationale documents

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

European Committee on Antimicrobial Susceptibility Testing

Breakpoint tables for interpretation of MICs and zone diameters

Version 8.0, valid from 2018-01-01

Version 8.0, 2018-01-01	**Changes (cells containing a change, a deletion or an addition) from v. 7.1 are marked yellow. Changed comments are underlined. Removed comments are shown in strikethrough font style.**
General	• Recommendations for MIC determination added. • Reading recommendations for disk diffusion methodology clarified and further information on QC recommendations added. • All dosages moved to the table of dosages. • Mupirocin removed from all tables except for topical agents.
Enterobacteriaceae **(new taxonomy: Enterobacterales)**	**General** • Information on new taxonomy added. **Revised breakpoints** • Ticarcillin (zone diameter) • Ticarcillin-clavulanic acid (zone diameter) • Cefepime (zone diameter) **New comments** • Aminoglycosides comment 2 **Revised comments** • Penicillins comment 5 • Miscellaneous agents comment 1 • Miscellaneous agents comment A
***Pseudomonas* spp.**	**New breakpoints** • Ceftolozane-tazobactam (zone diameter for *P. aeruginosa*) **Revised breakpoints** • Cefepime (zone diameter) **Revised comments** • Penicillins comment 3 • Miscellaneous agents comment 1 • Miscellaneous agents comment 2 • Miscellaneous agents comment A
***Acinetobacter* spp.**	**Revised comments** • Miscellaneous agents comment 1 • Miscellaneous agents comment A
***Staphylococcus* spp.**	**General** • Phenoxymethylpenicillin separated for *S. aureus* and coagulase-negative staphylococci. **Revised breakpoints** • Ceftaroline (MIC and zone diameter). • Ceftaroline breakpoints separated for pneumonia and other indications. **New comments** • Penicillins comment C • Cephalosporins comment 6/E **Revised comments** • Penicillins comment 1/A • Glycopeptides comment 2 removed for teicoplanin and coagulase-negative staphylococci. • Macrolides comment 2 • Miscellaneous agents comment 3

European Committee on Antimicrobial Susceptibility Testing

Breakpoint tables for interpretation of MICs and zone diameters

Version 8.0, valid from 2018-01-01

Version 8.0, 2018-01-01	**Changes (cells containing a change, a deletion or an addition) from v. 7.1 are marked yellow.** **Changed comments are underlined. Removed comments are shown in strikethrough font style.**
***Enterococcus* spp.**	**New comments** • Penicillins comment 2
Streptococcus groups A, B, C and G	**Revised comments** • Macrolides comment 2
Streptococcus pneumoniae	**General** • Recommendations in meningitis added to flow chart for screening for beta-lactam resistance. **Revised comments** • Penicillins comment 2 • Macrolides comment 2
Viridans group streptococci	**Revised comments** • Macrolides comment 1
Haemophilus influenzae	**Revised breakpoints** • Azithromycin (MIC) • Clarithromycin (MIC) • Erythromycin (MIC and zone diameter) • Roxithromycin (MIC) • Telithromycin (MIC) **New comments** • Macrolides comment 1/A
Moraxella catarrhalis	**Revised breakpoints** • Ciprofloxacin (MIC and zone diameter) • Levofloxacin (MIC and zone diameter) • Moxifloxacin (MIC and zone diameter) • Ofloxacin (MIC and zone diameter)
Neisseria gonorrhoeae	**General** • General comment on dosages added to the top of the table. **Removed comments** • Macrolides comment 1
Kingella kingae	**Revised comments** • Penicillins comment 1 • Penicillins comment 3/B
***Aeromonas* spp.**	• New table
Mycobacterium tuberculosis	**Revised comments** • Comment 1
PK-PD breakpoints	**General** • Further information on the use of PK-PD breakpoints added.
Dosages	• New column with information on special situations added. • Several dosages added or revised.

Enterobacteriaceae (new taxonomy: Enterobacterales*)

MIC determination (broth microdilution according to ISO standard 20776-1 except for mecillinam and fosfomycin where agar dilution is used)
Medium: Mueller-Hinton broth
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Escherichia coli* ATCC 25922. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

*** Recent taxonomic studies have narrowed the definition of the family Enterobacteriaceae. Some previous members of this family are now included in other families within the Order Enterobacterales. Breakpoints in this table apply to all members of the Enterobacterales.**

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Benzylpenicillin	-	-		-	-
Ampicillin	8[1]	8	10	14[A,B]	14[B]
Ampicillin-sulbactam	8[1,2]	8[2]	10-10	14[A,B]	14[B]
Amoxicillin	8[1]	8	-	Note[C]	Note[C]
Amoxicillin-clavulanic acid	8[1,3]	8[3]	20-10	19[A,B]	19[B]
Amoxicillin-clavulanic acid (uncomplicated UTI only)	32[1,3]	32[3]	20-10	16[A,B]	16[B]
Piperacillin	8	16	30	20	17
Piperacillin-tazobactam	8[4]	16[4]	30-6	20	17
Ticarcillin	8	16	75	23	20
Ticarcillin-clavulanic acid	8[3]	16[3]	75-10	23	20
Temocillin	Note[5]	Note[5]		Note[5]	Note[5]
Phenoxymethylpenicillin	-	-		-	-
Oxacillin	-	-		-	-
Cloxacillin	-	-		-	-
Dicloxacillin	-	-		-	-
Flucloxacillin	-	-		-	-
Mecillinam (uncomplicated UTI only) *E. coli, Klebsiella* spp. and *P. mirabilis*	8[6]	8[6]	10	15[D]	15[D]

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1/A. Wild type Enterobacteriaceae are categorised as susceptible to aminopenicillins.
Some countries prefer to categorise wild type isolates of *E. coli* and *P. mirabilis* 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. Breakpoints still under consideration.
6. Agar dilution is the reference method for mecillinam MIC determination.

B. Ignore growth that may appear as a thin inner zone on some batches of Mueller-Hinton agars.
C. Susceptibility inferred from ampicillin.
D. Ignore isolated colonies within the inhibition zone for *E. coli.*

Enterobacteriaceae (new taxonomy: Enterobacterales*)

Cephalosporins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor	-	-		-	-	**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.e. the presence or absence of an ESBL does not in itself influence the categorisation of susceptibility. ESBL detection and characterisation are recommended for public health and infection control purposes.
Cefadroxil (uncomplicated UTI only)	16	16	30	12	12	
Cefalexin (uncomplicated UTI only)	16	16	30	14	14	
Cefazolin	-	-		-	-	
Cefepime	1	4	30	27	24	**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.
Cefixime (uncomplicated UTI only)	1	1	5	17	17	**3.** For susceptibility testing purposes, the concentration of avibactam is fixed at 4 mg/L.
Cefotaxime	1	2	5	20	17	**4.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Cefoxitin (screen)[2]	NA	NA	30	19	19	**5.** Breakpoints are based on high dose therapy, see table of dosages ~~(1.5 g x 3)~~.
Cefpodoxime (uncomplicated UTI only)	1	1	10	21	21	
Ceftaroline	0.5	0.5	5	23	23	
Ceftazidime	1	4	10	22	19	
Ceftazidime-avibactam	8[3]	8[3]	10-4	13	13	
Ceftibuten (UTI only)	1	1	30	23	23	
Ceftobiprole	0.25	0.25	5	23	23	
Ceftolozane-tazobactam	1[4]	1[4]	30-10	23	23	
Ceftriaxone	1	2	30	25	22	
Cefuroxime iv[5], *E. coli, Klebsiella* spp. and *P. mirabilis*	8	8	30	19	19	
Cefuroxime oral (uncomplicated UTI only)	8	8	30	19	19	

Carbapenems[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem	1	2	10	24	21	**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.e. the presence or absence of a carbapenemase does not in itself influence the categorisation of susceptibility. Carbapenemase detection and characterisation are recommended for public health and infection control purposes.
Ertapenem	0.5	1	10	25	22	
Imipenem[2]	2	8	10	22	16	
Meropenem	2	8	10	22	16	**2.** Low-level resistance is common in *Morganella* spp., *Proteus* spp. and *Providencia* spp.

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam[1]	1	4	30	26	21	**1.** 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.e. the presence or absence of an ESBL does not in itself influence the categorisation of susceptibility. ESBL detection and characterisation are recommended for public health and infection control purposes.

Enterobacteriaceae (new taxonomy: Enterobacterales*)

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	0.25	0.5	**5**	26	24	**1**. There is clinical evidence for ciprofloxacin to indicate a poor response in systemic infections caused by *Salmonella* spp. with low-level ciprofloxacin resistance (MIC >0.06 mg/L). The available data relate mainly to *Salmonella* Typhi but there are also case reports of poor response with other *Salmonella* species.
Ciprofloxacin, *Salmonella* spp.[1]	0.06	0.06		Note[A]	Note[A]	
Pefloxacin (screen), *Salmonella* spp.[1]	NA	NA	**5**	24[B]	24[B]	
Levofloxacin	0.5	1	**5**	23	19	**A**. Tests with a ciprofloxacin 5 µg disk will not reliably detect low-level resistance in *Salmonella* spp. To screen for ciprofloxacin resistance in *Salmonella* spp., use the pefloxacin 5 µg disk. **See Note B.**
Moxifloxacin	0.25	0.25	**5**	22	22	**B.** Susceptibility of *Salmonella* spp. to ciprofloxacin can be inferred from pefloxacin disk diffusion susceptibility.
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (uncomplicated UTI only)	0.5	1	**10**	22	19	
Ofloxacin	0.25	0.5	**5**	24	22	

Aminoglycosides[1,2]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	8	16	**30**	18	15	**1.** Aminoglycoside breakpoints are based on once-daily administration of high dose therapy aminoglycoside dosages, see table of dosages. Most often aminoglycosides are given in combination with beta-lactam agents.
Gentamicin	2	4	**10**	17	14	**2.** Breakpoints do not apply to *Plesiomonas shigelloides* since aminoglycosides have low intrinsic activity against this species.
Netilmicin	2	4	**10**	15	12	
Tobramycin	2	4	**10**	17	14	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R>		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin	-	-		-	-	
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin[1]	-	-		-	-	**1.** Azithromycin has been used in the treatment of infections with *Salmonella* Typhi (MIC ≤16 mg/L for wild type isolates) and *Shigella* spp.
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

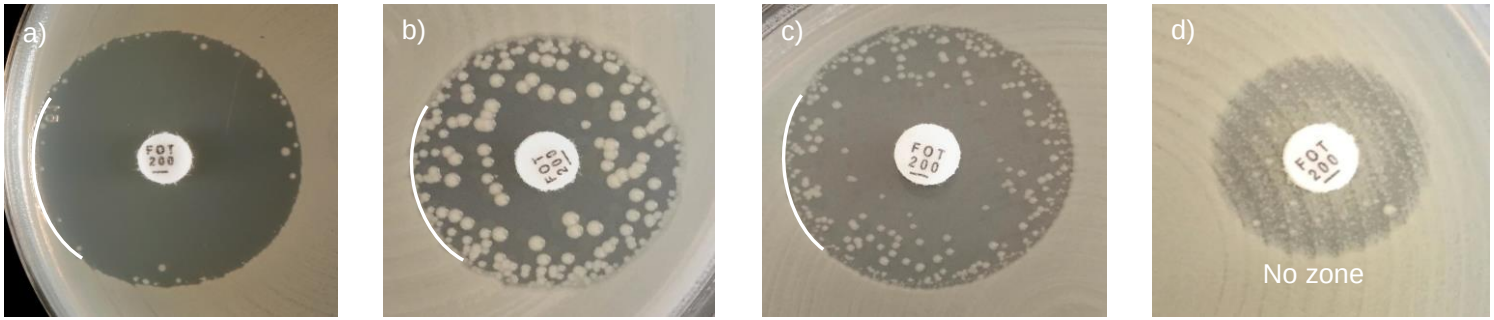
Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	-	-		-	-	**1.** Tigecycline has poor activity against *Morganella*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

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid	-	-		-	-	
Tedizolid	-	-		-	-	

Enterobacteriaceae (new taxonomy: Enterobacterales*)

EUCAST Clinical Breakpoint Tables v. 8.0, valid from 2018-01-01

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Chloramphenicol	8	8	**30**	17	17	**1.** Colistin MIC determination should be performed with broth microdilution. Quality control must be performed with both a susceptible QC strain (*E. coli* ATCC 25922 or *P. aeruginosa* ATCC 27853) and the colistin resistant *E. coli* NCTC 13846 (*mcr-1* positive).
Colistin[1]	2	2		Note[A]	Note[A]	**2.** Agar dilution is the reference method for fosfomycin. MICs must be determined in the presence of glucose-6-phosphate (25 mg/L in the medium). Follow the manufacturers' instructions for commercial systems.
Daptomycin	-	-		-	-	**3.** Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Fosfomycin iv	32[2]	32[2]	**200**[B]	24[C,D]	24[C,D]	
Fosfomycin oral (uncomplicated UTI only)	32[2]	32[2]	**200**[B]	24[C,D]	24[C,D]	**A.** Use an MIC method (broth microdilution only).
Fusidic acid	-	-		-	-	**B.** Fosfomycin 200 µg disks must contain 50 µg glucose-6-phosphate.
Metronidazole	-	-		-	-	**C.** Zone diameter breakpoints apply to *E. coli* only. For other Enterobacteriaceae, use an MIC method.
Nitrofurantoin (uncomplicated UTI only), *E. coli*	64	64	**100**	11	11	**D.** Ignore isolated colonies within the inhibition zone (see pictures below).
Nitroxoline (uncomplicated UTI only), *E. coli*	16	16	**30**	15	15	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	2	4	**5**	18	15	
Trimethoprim-sulfamethoxazole[3]	2	4	**1.25-23.75**	14	11	



Examples of inhibition zones for *Escherichia coli* with fosfomycin.
a-c) Ignore all colonies and read the outer zone edge.
d) Record as no inhibition zone.

Pseudomonas spp.

MIC determination (broth microdilution according to ISO standard 20776-1 except for fosfomycin where agar dilution is used)
Medium: Mueller-Hinton broth
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Pseudomonas aeruginosa* ATCC 27853. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Benzylpenicillin	-	-		-	-
Ampicillin	-	-		-	-
Ampicillin-sulbactam	-	-		-	-
Amoxicillin	-	-		-	-
Amoxicillin-clavulanic acid	-	-		-	-
Piperacillin[1]	16	16	30	18	18
Piperacillin-tazobactam[1]	16[2]	16[2]	30-6	18	18
Ticarcillin[3]	16	16	75	18	18
Ticarcillin-clavulanic acid[3]	16[4]	16[4]	75-10	18	18
Temocillin	-	-		-	-
Phenoxymethylpenicillin	-	-		-	-
Oxacillin	-	-		-	-
Cloxacillin	-	-		-	-
Dicloxacillin	-	-		-	-
Flucloxacillin	-	-		-	-
Mecillinam (uncomplicated UTI only)	-	-		-	-

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. Breakpoints are based on high dose therapy, see table of dosages ~~(4 g x 4, with or without tazobactam)~~.
2. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
3. Breakpoints are based on high dose therapy, see table of dosages.
4. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor	-	-		-	-	**1.** Breakpoints are based on high dose therapy, see table of dosages (~~2 g x 3~~).
Cefadroxil	-	-		-	-	**2**. Breakpoints are based on high dose therapy, see table of dosages (~~2 g x 3~~).
Cefalexin	-	-		-	-	**3.** For susceptibility testing purposes, the concentration of avibactam is fixed at 4 mg/L.
Cefazolin	-	-		-	-	**4.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Cefepime[1]	8	8	**30**	21	21	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime[2]	8	8	**10**	17	17	
Ceftazidime-avibactam, *P. aeruginosa*	8[3]	8[3]	**10-4**	17	17	
Ceftibuten	-	-		-	-	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam, *P. aeruginosa*	4[4]	4[4]	**30-10**	24	24	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem[1]	1	2	**10**	25	22	**1.** Breakpoints are based on high dose therapy, see table of dosages (~~1 g administered over 4 h x 3~~).
Ertapenem	-	-		-	-	**2.** Breakpoints are based on high dose therapy, see table of dosages (~~1 g x 4~~).
Imipenem[2]	4	8	**10**	20	17	
Meropenem	2	8	**10**	24	18	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	1	16	**30**	50	16	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin[1]	0.5	0.5	5	26	26	**1.** Breakpoints are based on high dose therapy, see table of dosages ~~(0.75 g x 2 oral or 0.4 g x 3 iv)~~.
Levofloxacin[2]	1	1	5	22	22	**2.** Breakpoints are based on high dose therapy, see table of dosages ~~(0.5 g x 2 oral or 0.5 g x 2 iv)~~.
Moxifloxacin	-	-		-	-	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-		-	-	
Ofloxacin	-	-		-	-	

Aminoglycosides[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	8	16	30	18	15	**1.** Aminoglycoside breakpoints are based on once-daily administration of high dose therapy aminoglycoside dosages, see table of 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 and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin	-	-		-	-	
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	-	-		-	-	
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	-	-		-	-	
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline	-	-		-	-	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid	-	-		-	-	
Tedizolid	-	-		-	-	

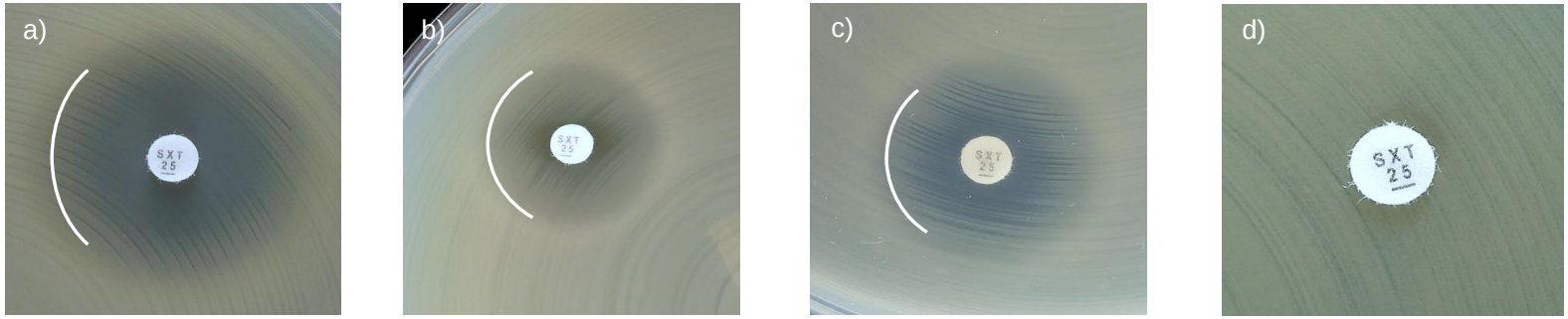
Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Chloramphenicol	-	-		-	-	**1.** Colistin MIC determination should be performed with broth microdilution. Quality control must be performed with both a susceptible QC strain (*E. coli* ATCC 25922 or *P. aeruginosa* ATCC 27853) and the colistin resistant *E. coli* NCTC 13846 (*mcr-1* positive). **2.** Agar dilution is the reference method for fosfomycin. MICs must be determined in the presence of glucose-6-phosphate (25 mg/L in the medium). Follow the manufacturers' instructions for commercial systems. Infections caused by wild type isolates (ECOFF: MIC 128 mg/L; corresponding zone diameter 12 mm using the disk potency and reading instructions for *E. coli*) have been treated with fosfomycin in combination with other agents. **A.** Use an MIC method (broth microdilution only).
Colistin[1]	2	2		Note[A]	Note[A]	
Daptomycin	-	-		-	-	
Fosfomycin iv[2]	-	-		-	-	
Fosfomycin oral[2]	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole	-	-		-	-	

Trimethoprim-sulfamethoxazole is the only agent for which EUCAST breakpoints are currently available. For further information, see guidance document on www.eucast.org.

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: For trimethoprim-sulfamethoxazole, the MIC should be read at the lowest concentration that inhibits approximately 80% of growth as compared with the growth control well.
Quality control: *Escherichia coli* ATCC 25922

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 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 <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Trimethoprim-sulfamethoxazole[1,2]	4	4	**1.25-23.75**	16[A]	16[A]	**1.** Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration. **2.** Breakpoints are based on high dose therapy, see table of dosages. ~~at least 0.24 g trimethoprim and 1.2 g sulfamethoxazole administered together twice daily~~. **A.** Isolates showing any sign of inhibition zone ≥ 16 mm should be reported susceptible and growth within the inhibition zone should be ignored. The density of growth within the zone may vary from a fine haze to substantial growth (**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.

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Pseudomonas aeruginosa* ATCC 27853. For agents not covered by this strain, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin	-	-		-	-	**1.** Susceptibility testing of *Acinetobacter* spp. to penicillins is unreliable. In most instances, *Acinetobacter* spp. are resistant to penicillins.
Ampicillin	-	-		-	-	
Ampicillin-sulbactam	IE	IE		IE	IE	
Amoxicillin	-	-		-	-	
Amoxicillin-clavulanic acid	-	-		-	-	
Piperacillin	IE	IE		IE	IE	
Piperacillin-tazobactam	IE	IE		IE	IE	
Ticarcillin	IE	IE		IE	IE	
Ticarcillin-clavulanic acid	IE	IE		IE	IE	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	-	-		-	-	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	-	-		-	-	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	-	-		-	-	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem[1]	1	2	10	24	21	**1.** Breakpoints are based on high dose therapy, see table of dosages ~~(1 g administered over 4 h x 3)~~.
Ertapenem	-	-		-	-	**2.** Breakpoints are based on high dose therapy, see table of dosages ~~(1 g x 4)~~.
Imipenem[2]	2	8	10	23	17	
Meropenem	2	8	10	21	15	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	-	-		-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin[1]	1	1	5	21	21	**1**. Breakpoints are based on high dose therapy, see table of dosages ~~(0.75 g x 2 oral or 0.4 g x 3 iv)~~.
Levofloxacin	0.5	1	5	23	20	
Moxifloxacin	-	-		-	-	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-		-	-	
Ofloxacin	-	-		-	-	

Aminoglycosides[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	8	16	30	19	17	**1.** Aminoglycoside breakpoints are based on once-daily administration of high dose therapy aminoglycoside dosages, see table of 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 and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin	-	-		-	-	
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	-	-		-	-	
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	-	-		-	-	
Minocycline	IE	IE		IE	IE	
Tetracycline	-	-		-	-	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid	-	-		-	-	
Tedizolid	-	-		-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Chloramphenicol	-	-		-	-	**1.** Colistin MIC determination should be performed with broth microdilution. Quality control must be performed with both a susceptible QC strain (*E. coli* ATCC 25922 or *P. aeruginosa* ATCC 27853) and the colistin resistant *E. coli* NCTC 13846 (*mcr-1* positive). **2.** Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration. **A.** Use an MIC method (broth microdilution only).
Colistin[1]	2	2		Note[A]	Note[A]	
Daptomycin	-	-		-	-	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole[2]	2	4	1.25-23.75	14	11	

MIC determination (broth microdilution according to ISO standard 20776-1 except for fosfomycin where agar dilution is used)
Medium: Mueller-Hinton broth
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Staphylococcus aureus* ATCC 29213. For agents not covered by this strain, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Benzylpenicillin, *S. aureus*	0.125[1]	0.125[1]	**1 unit**	26[A,B]	26[A,B]
Benzylpenicillin, *S. lugdunensis*	0.125[1]	0.125[1]	**1 unit**	26[A]	26[A]
Benzylpenicillin, Coagulase-negative staphylococci	-[1,2]	-[1,2]		Note[A,C]	Note[A,C]
Ampicillin, *S. saprophyticus*	Note[1,3]	Note[1,3]	**2**	18[A,D]	18[A,D]
Ampicillin-sulbactam	Note[1,3]	Note[1,3]		Note[A,D]	Note[A,D]
Amoxicillin	Note[1,3]	Note[1,3]		Note[A,D]	Note[A,D]
Amoxicillin-clavulanic acid	Note[1,3]	Note[1,3]		Note[A,D]	Note[A,D]
Piperacillin	Note[1,3]	Note[1,3]		Note[A,D]	Note[A,D]
Piperacillin-tazobactam	Note[1,3]	Note[1,3]		Note[A,D]	Note[A,D]
Ticarcillin	Note[1]	Note[1]		Note[A]	Note[A]
Ticarcillin-clavulanic acid	Note[1]	Note[1]		Note[A]	Note[A]
Temocillin	-	-		-	-
Phenoxymethylpenicillin, *S. aureus*	Note[1]	Note[1]		Note[A]	Note[A]
Phenoxymethylpenicillin, Coagulase-negative staphylococci	-[1,2]	-[1,2]		Note[A,]	Note[A,]
Oxacillin[4]	Note[1,4]	Note[1,4]		Note[A,C]	Note[A, C]
Cloxacillin	Note[1]	Note[1]		Note[A]	Note[A]
Dicloxacillin	Note[1]	Note[1]		Note[A]	Note[A]
Flucloxacillin	Note[1]	Note[1]		Note[A]	Note[A]
Mecillinam (uncomplicated UTI only)	-	-		-	-

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1/A. Most staphylococci are penicillinase producers, which make them resistant to benzylpenicillin, phenoxymethylpenicillin, ampicillin, amoxicillin, piperacillin and ticarcillin. When staphylococci test as susceptible to benzylpenicillin and cefoxitin they can be reported as susceptible to the above agents. However, the efficacy of oral formulations, particularly phenoxymethylpenicillin, is uncertain. Isolates that test as resistant to benzylpenicillin but susceptible to cefoxitin are susceptible to β-lactamase inhibitor combinations, the isoxazolylpenicillins (oxacillin, cloxacillin, dicloxacillin and flucloxacillin), nafcillin and many cephalosporins. With the exception of ceftaroline and ceftobiprole, cefoxitin-resistant isolates are resistant to all beta-lactam agents.
2/C. No currently available method can reliably detect penicillinase production in coagulase-negative staphylococci.
3/D. Ampicillin susceptible *S. saprophyticus* are *mecA*-negative and susceptible to ampicillin, amoxicillin and piperacillin (without or with a beta-lactamase inhibitor).
4. *S. aureus, S. lugdunensis* and *S. saprophyticus* with oxacillin MIC values >2 mg/L are mostly methicillin resistant due to the presence of the *mecA* or *mecC* gene. The corresponding oxacillin MIC for coagulase-negative staphylococci other than *S. saprophyticus* and *S. lugdunensis* is >0.25 mg/L.

B. For *S. aureus*, 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**). Examine the zone edge with transmitted light (plate held up to light). If the zone diameter is <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.
C. For screening for methicillin resistance in *S. pseudintermedius*, **see Note C on cephalosporins.**

Cephalosporins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor[2]	Note[1]	Note[1]		Note[A]	Note[A]	**1/A.** Susceptibility of staphylococci to cephalosporins is inferred from the cefoxitin susceptibility except for cefixime, ceftazidime, ceftazidime-avibactam, ceftibuten and ceftolozane-tazobactam, which do not have breakpoints and should not be used for staphylococcal infections. Some methicillin-resistant *S. aureus* are susceptible to ceftaroline and ceftobiprole**, see Notes 5/D and 7/F.**
Cefadroxil	Note[1]	Note[1]		Note[A]	Note[A]	**2.** For dosing, see table of dosages.
Cefalexin	Note[1]	Note[1]		Note[A]	Note[A]	**3.** *S. aureus* and *S. lugdunensis* with cefoxitin MIC values >4 mg/L and *S. saprophyticus* with cefoxitin MIC values >8 mg/L are methicillin resistant, mostly due to the presence of the *mecA* or *mecC* gene. Disk diffusion reliably predicts methicillin resistance.
Cefazolin	Note[1]	Note[1]		Note[A]	Note[A]	**4.** For staphylococci other than *S. aureus, S. lugdunensis* and *S. saprophyticus* , the cefoxitin MIC is a poorer predictor of methicillin resistance than the disk diffusion test.
Cefepime	Note[1]	Note[1]		Note[A]	Note[A]	**5/D.** Methicillin-susceptible isolates can be reported susceptible to ceftaroline without further testing.
Cefixime	-	-		-	-	**6/E.** Resistant isolates are rare.
Cefotaxime	Note[1]	Note[1]		Note[A]	Note[A]	**7/F.** Methicillin-susceptible isolates can be reported susceptible to ceftobiprole without further testing.
Cefoxitin (screen), *S. aureus* and coagulase-negative staphylococci other than *S. epidermidis*	Note[3,4]	Note[3,4]	**30**	22[A,B]	22[A,B]	
Cefoxitin (screen), *S. epidermidis*	Note[4]	Note[4]	**30**	25[A,B]	25[A,B]	
Cefoxitin (screen), *S. pseudintermedius*	NA	NA		Note[C]	Note[C]	
Cefpodoxime	Note[1]	Note[1]		Note[A]	Note[A]	**B.** If coagulase-negative staphylococci are not identified to species level, use zone diameter breakpoints S≥25, R<25 mm.
Ceftaroline, *S. aureus* **(indications other than pneumonia)**	1[5]	2[5,6]	**5**	20[D]	17[D,E]	**C.** Cefoxitin screen for methicillin resistance in *S. pseudintermedius* is less predictive of the presence of *mecA* than in other staphylococci. Use the oxacillin 1 µg disk with zone diameter breakpoints S≥20, R<20 mm to screen for methicillin resistance.
Ceftaroline, *S. aureus* **(pneumonia)**	1[5]	1[5]	**5**	20[D]	20[D]	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole, *S. aureus*	2[7]	2[7]	**5**	17[F]	17[F]	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	Note[1]	Note[1]		Note[A]	Note[A]	
Cefuroxime iv	Note[1]	Note[1]		Note[A]	Note[A]	
Cefuroxime oral	Note[1]	Note[1]		Note[A]	Note[A]	

Carbapenems[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem	Note[1]	Note[1]		Note[A]	Note[A]	1/A. Susceptibility of staphylococci to carbapenems is inferred from the cefoxitin susceptibility.
Ertapenem	Note[1]	Note[1]		Note[A]	Note[A]	
Imipenem	Note[1]	Note[1]		Note[A]	Note[A]	
Meropenem	Note[1]	Note[1]		Note[A]	Note[A]	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	-	-		-	-	

Fluoroquinolones[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Ciprofloxacin[2], *S. aureus*	1	1	**5**	21[A]	21[A]	**1.** For breakpoints for other fluoroquinolones (*e.g.* pefloxacin and enoxacin), refer to breakpoints set by national breakpoint committees.
Ciprofloxacin[2], Coagulase-negative staphylococci	1	1	**5**	24[A]	24[A]	
Levofloxacin, *S. aureus*	1	1	**5**	22[A]	22[A]	**2.** Breakpoints are based on high dose therapy, see table of dosages ~~(oral dose of 0.75 g x 2, iv dose of 0.4 g x 3)~~.
Levofloxacin, Coagulase-negative staphylococci	1	1	**5**	24[A]	24[A]	**3.** Breakpoints are based on high dose therapy, see table of dosages ~~(0.4 g x 2)~~.
Moxifloxacin, *S. aureus*	0.25	0.25	**5**	25[A]	25[A]	**A.** The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. **See Note B.**
Moxifloxacin, Coagulase-negative staphylococci	0.25	0.25	**5**	28[A]	28[A]	**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.
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	**10**	17[B]	Note[B]	
Ofloxacin[3], *S. aureus*	1	1	**5**	20[A]	20[A]	
Ofloxacin[3], Coagulase-negative staphylococci	1	1	**5**	24[A]	24[A]	

Aminoglycosides[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Amikacin[2], *S. aureus*	8	16	**30**	18	16	**1.** Aminoglycoside breakpoints are based on once-daily administration.
Amikacin[2], Coagulase-negative staphylococci	8	16	**30**	22	19	**2.** Resistance to amikacin is most reliably determined by testing with kanamycin (MIC >8 mg/L). The corresponding zone diameter for the kanamycin 30 µg disk is R<18 mm for *S. aureus* and R<22 mm for coagulase-negative staphylococci.
Gentamicin, *S. aureus*	1	1	**10**	18	18	
Gentamicin, Coagulase-negative staphylococci	1	1	**10**	22	22	
Netilmicin, *S. aureus*	1	1	**10**	18	18	
Netilmicin, Coagulase-negative staphylococci	1	1	**10**	22	22	
Tobramycin, *S. aureus*	1	1	**10**	18	18	
Tobramycin, Coagulase-negative staphylococci	1	1	**10**	22	22	

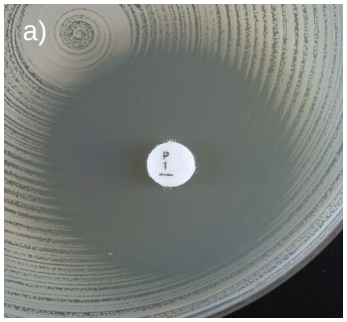
Glycopeptides and lipoglycopeptides[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin[2]	0.125[3,4]	0.125[3]		Note[A]	Note[A]	**1.** Glycopeptide MICs are method dependent and should be determined by broth microdilution (ISO standard 20776-1). *S. aureus* with vancomycin MIC values of 2 mg/L are on the border of the wild type 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.
Oritavancin, *S. aureus*[2]	0.125[3,4]	0.125[3]		Note[A]	Note[A]	
Teicoplanin, *S. aureus*[2]	2	2		Note[A]	Note[A]	
Teicoplanin, Coagulase-negative staphylococci	4	4		Note[A]	Note[A]	
Telavancin, MRSA[2]	0.125[3,5]	0.125[3]		Note[A]	Note[A]	**2**. Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Vancomycin, *S. aureus*[2]	2	2		Note[A]	Note[A]	**3.** MICs must be determined in the presence of polysorbate-80 (0.002% in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems.
Vancomycin, Coagulase-negative staphylococci[2]	4	4		Note[A]	Note[A]	**4.** *S. aureus* isolates susceptible to vancomycin can be reported susceptible to dalbavancin and oritavancin.
						5. MRSA isolates susceptible to vancomycin can be reported susceptible to telavancin.
						A. Disk diffusion is unreliable and cannot distinguish between wild type isolates and those with non-*vanA* -mediated glycopeptide resistance.

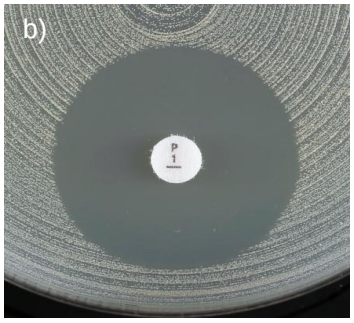
Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	1[1]	2[1]		Note[A]	Note[A]	**1/A.** Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.
Clarithromycin	1[1]	2[1]		Note[A]	Note[A]	**2.** Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as tested according to the clinical breakpoints. 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".
Erythromycin	1[1]	2[1]	**15**	21[A]	18[A]	
Roxithromycin	1[1]	2[1]		Note[A]	Note[A]	
Telithromycin	IE	IE		IE	IE	
						B. Place the erythromycin and clindamycin disks 12-20 mm apart (edge to edge) and look for antagonism (the D phenomenon) to detect inducible clindamycin resistance.
Clindamycin[2]	0.25	0.5	**2**	22[B]	19[B]	**C.** Isolates non-susceptible by disk diffusion should be confirmed by MIC testing.
Quinupristin-dalfopristin	1	2	**15**	21	18[C]	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	1[1]	2[1]		Note[A]	Note[A]	**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[1]	1[1]	**30**	23[A]	20[A]	
Tetracycline	1[1]	2[1]	**30**	22[A]	19[A]	**2.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Tigecycline[2]	0.5[3]	0.5[3]	**15**	18	18	**3.** For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid	4	4	10	21[A]	21[A]	**1.** Isolates susceptible to linezolid can be reported susceptible to tedizolid.
Tedizolid	0.5[1]	0.5		Note[B]	Note[B]	**A.** Examine zone edges with transmitted light (plate held up to light). **B.** Isolates susceptible to linezolid can be reported susceptible to tedizolid. For isolates resistant to linezolid, perform an MIC test.

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Chloramphenicol	8	8	30	18	18	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Colistin	-	-		-	-	**2.** Daptomycin MICs must be determined in the presence of Ca^{2+} (50 mg/L in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturers' instructions for commercial systems.
Daptomycin[1]	1[2]	1[2]		Note[A]	Note[A]	**3.** Agar dilution is the reference method for fosfomycin. MICs must be determined in the presence of glucose-6-phosphate (25 mg/L in the medium). Follow the manufacturers' instructions for commercial systems.
Fosfomycin iv	32[3]	32[3]		Note[A]	Note[A]	**4.** Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Fosfomycin oral	-	-		-	-	**A.** Use an MIC method.
Fusidic acid	1	1	10	24	24	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only), *S. saprophyticus*	64	64	100	13	13	
Nitroxoline (uncomplicated UTI only), *S. saprophyticus*	IE	IE		IE	IE	
Rifampicin	0.06	0.5	5	26	23	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	2	4	5	17	14	
Trimethoprim-sulfamethoxazole[4]	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.

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

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Enterococcus faecalis* ATCC 29212. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 18±2h (for glycopeptides 24h)
Reading: Unless otherwise stated, 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. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Benzylpenicillin	-	-		-	-
Ampicillin	4	8[2]	2	10	8[2]
Ampicillin-sulbactam[3]	4[4]	8[4]		Note[A]	Note[A]
Amoxicillin[3]	4	8		Note[A]	Note[A]
Amoxicillin-clavulanic acid[3]	4[5]	8[5]		Note[A]	Note[A]
Piperacillin[3]	Note[3]	Note[3]		Note[A]	Note[A]
Piperacillin-tazobactam[3]	Note[3]	Note[3]		Note[A]	Note[A]
Ticarcillin	-	-		-	-
Ticarcillin-clavulanic acid	-	-		-	-
Temocillin	-	-		-	-
Phenoxymethylpenicillin	-	-		-	-
Oxacillin	-	-		-	-
Cloxacillin	-	-		-	-
Dicloxacillin	-	-		-	-
Flucloxacillin	-	-		-	-
Mecillinam (uncomplicated UTI only)	-	-		-	-

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. *E. faecium* resistant to penicillins can be considered resistant to all other beta-lactam agents including carbapenems.
2. Ampicillin resistance in *E. faecalis* is rare and should be confirmed with an MIC test.
3/A. Susceptibility to ampicillin, amoxicillin and piperacillin with and without beta-lactamase inhibitor can be inferred from ampicillin.
4. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.
5. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor	-	-		-	-	
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	-	-		-	-	
Cefixime	-	-		-	-	
Cefotaxime	-	-		-	-	
Cefoxitin	-	-		-	-	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	-	-		-	-	
Cefuroxime iv	-	-		-	-	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem	-	-		-	-	
Ertapenem	-	-		-	-	
Imipenem	4	8	10	21	18	
Meropenem	-	-		-	-	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	-	-		-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin (uncomplicated UTI only)	4	4	5	15[A]	15[A]	**A.** The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. **See Note B.**
Levofloxacin (uncomplicated UTI only)	4	4	5	15[A]	15[A]	**B.** Susceptibility of ciprofloxacin and levofloxacin can be inferred from the norfloxacin susceptibility.
Moxifloxacin	-	-		-	-	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	10	12[B]	12[B]	
Ofloxacin	-	-		-	-	

Aminoglycosides[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	Note[2]	Note[2]		Note[A]	Note[A]	**1**. 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 aminoglycoside resistance. All testing is therefore to distinguish between intrinsic and high-level acquired resistance.
Gentamicin (test for high-level aminoglycoside resistance)	Note[2]	Note[2]	30	Note[A]	Note[A]	**2/A.** Gentamicin can be used to screen for high-level aminoglycoside resistance (HLAR). **Negative test:** 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. **Positive test:** 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.
Netilmicin	Note[2]	Note[2]		Note[A]	Note[A]	**3/B.** Isolates with high-level gentamicin resistance may not be high-level resistant to streptomycin. **Negative test:** Isolates with streptomycin MIC ≤512 mg/L or a zone diameter ≥14 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. **Positive test:** Isolates with streptomycin MIC >512 mg/L or a zone diameter <14 mm. The isolate is high-level resistant to streptomycin. There will be no synergy with penicillins or glycopeptides.
Streptomycin (test for high-level streptomycin resistance)	Note[3]	Note[3]	300	Note[B]	Note[B]	
Tobramycin	Note[2]	Note[2]		Note[A]	Note[A]	

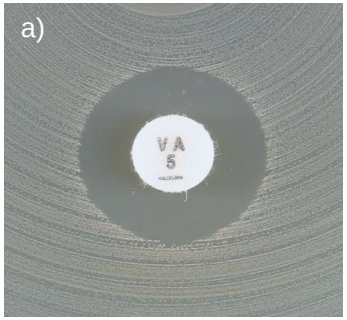
Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin	IE	IE		IE	IE	**A.** Vancomycin susceptible enterococci exhibit sharp zone edges and do not exhibit colonies in the inhibition zone. Examine zone edges with transmitted light (plate held up to light). If the zone edge is fuzzy, colonies grow within the zone or if you are uncertain, then perform confirmatory testing with PCR or report resistant (**see pictures below**) even if the zone diameter is ≥ 12 mm. Isolates must not be reported susceptible before 24 h incubation.
Oritavancin	IE	IE		IE	IE	
Teicoplanin	2	2	30	16	16	
Telavancin	IE	IE		IE	IE	
Vancomycin	4	4	5	12[A]	12[A]	

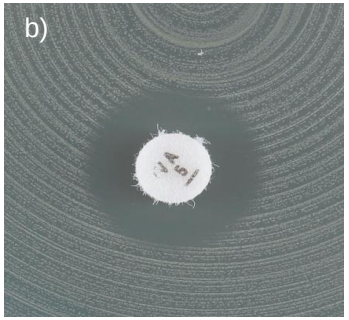
Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	-	-		-	-	
Clarithromycin	-	-		-	-	
Erythromycin	-	-		-	-	
Roxithromycin	-	-		-	-	
Telithromycin	-	-		-	-	
				-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin, *E. faecium*	1	4	**15**	22	20	

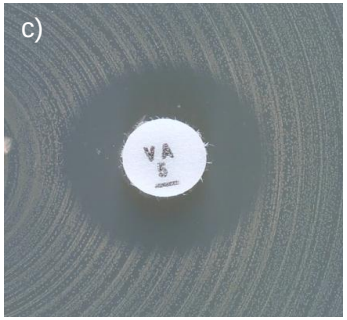
Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	-	-		-	-	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. **2** For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline[1]	0.25[2]	0.5[2]	**15**	18	15	

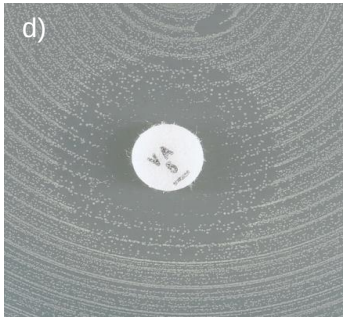
Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid	4	4	**10**	19	19	
Tedizolid	IE	IE		IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Chloramphenicol	-	-		-	-	**1.** For more information, see http://www.eucast.org/guidance_documents/.
Colistin	-	-		-	-	**2/A.** The activity of trimethoprim and trimethoprim-sulfamethoxazole is uncertain against enterococci, hence the wild type population is categorised as intermediate.
Daptomycin[1]	IE	IE		IE	IE	**3.** Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only), *E. faecalis*	64	64	100	15	15	
Nitroxoline (uncomplicated UTI only)	IE	IE		IE	IE	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	0.03[2]	1	5	50[A]	21	
Trimethoprim-sulfamethoxazole[3]	0.03[2]	1	1.25-23.75	50[A]	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. Perform confirmatory testing with PCR or report resistant even if the zone diameter ≥ 12 mm.

Streptococcus groups A, B, C and G

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Streptococcus pneumoniae* ATCC 49619. For agents not covered by this strain, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin[2]	0.25	0.25	**1 unit**	18	18	**1/A**. 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.
Ampicillin	Note[1]	Note[1]		Note[A]	Note[A]	**2.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Ampicillin-sulbactam[3]	Note[1]	Note[1]		Note[A]	Note[A]	**3.** Streptococcus groups A, B, C and G do not produce beta-lactamase. The addition of a beta-lactamase inhibitor does not add clinical benefit.
Amoxicillin	Note[1]	Note[1]		Note[A]	Note[A]	
Amoxicillin-clavulanic acid[3]	Note[1]	Note[1]		Note[A]	Note[A]	
Piperacillin	Note[1]	Note[1]		Note[A]	Note[A]	
Piperacillin-tazobactam[3]	Note[1]	Note[1]		Note[A]	Note[A]	
Ticarcillin	-	-		-	-	
Ticarcillin-clavulanic acid	-	-		-	-	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin Streptococcus groups A, C and G	Note[1]	Note[1]		Note[A]	Note[A]	
Oxacillin Streptococcus groups A, C and G	NA	NA		NA	NA	
Cloxacillin Streptococcus groups A, C and G	Note[1]	Note[1]		Note[A]	Note[A]	
Dicloxacillin Streptococcus groups A, C and G	Note[1]	Note[1]		Note[A]	Note[A]	
Flucloxacillin Streptococcus groups A, C and G	Note[1]	Note[1]		Note[A]	Note[A]	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Cephalosporins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor	Note[1]	Note[1]		Note[A]	Note[A]	**1/A**. The susceptibility of streptococcus groups A, B, C and G to cephalosporins is inferred from the benzylpenicillin susceptibility.
Cefadroxil	Note[1]	Note[1]		Note[A]	Note[A]	
Cefalexin	Note[1]	Note[1]		Note[A]	Note[A]	
Cefazolin	Note[1]	Note[1]		Note[A]	Note[A]	
Cefepime	Note[1]	Note[1]		Note[A]	Note[A]	
Cefixime	-	-		-	-	
Cefotaxime	Note[1]	Note[1]		Note[A]	Note[A]	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	Note[1]	Note[1]		Note[A]	Note[A]	
Ceftaroline	Note[1]	Note[1]		Note[A]	Note[A]	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	Note[1]	Note[1]		Note[A]	Note[A]	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam	IE	IE		IE	IE	
Ceftriaxone	Note[1]	Note[1]		Note[A]	Note[A]	
Cefuroxime iv	Note[1]	Note[1]		Note[A]	Note[A]	
Cefuroxime oral	Note[1]	Note[1]		Note[A]	Note[A]	

Carbapenems[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem	Note[1]	Note[1]		Note[A]	Note[A]	**1/A**. The susceptibility of streptococcus groups A, B, C and G to carbapenems is inferred from the benzylpenicillin susceptibility.
Ertapenem	Note[1]	Note[1]		Note[A]	Note[A]	
Imipenem	Note[1]	Note[1]		Note[A]	Note[A]	
Meropenem	Note[1]	Note[1]		Note[A]	Note[A]	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	-	-		-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	-	-		-	-	**A.** The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. **See Note B.**
Levofloxacin	2	2	5	17[A]	17[A]	**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.
Moxifloxacin	0.5	0.5	5	19[A]	19[A]	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	10	12[B]	Note[B]	
Ofloxacin	-	-		-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	-	-		-	-	
Gentamicin	-	-		-	-	
Netilmicin	-	-		-	-	
Tobramycin	-	-		-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin[1]	0.125[2,3]	0.125[2]		Note[A]	Note[A]	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Oritavancin[1]	0.25[2,3]	0.25[2]		Note[A]	Note[A]	**2.** MICs must be determined in the presence of polysorbate-80 (0.002% in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems.
Teicoplanin[1]	2	2	30	15	15	**3.** Isolates susceptible to vancomycin can be reported susceptible to dalbavancin and oritavancin.
Telavancin	IE	IE		IE	IE	
Vancomycin[1]	2	2	5	13	13	**A.** Disk diffusion criteria have not been defined and an MIC method should be used.

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	0.25[1]	0.5[1]		Note[A]	Note[A]	**1/A.** Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.
Clarithromycin	0.25[1]	0.5[1]		Note[A]	Note[A]	**2.** Inducible clindamycin resistance can be detected by antagonism of clindamycin activity by a macrolide agent. If not detected, then report as tested according to the clinical breakpoints. 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". The clinical importance of inducible clindamycin resistance in combination treatment of severe *S. pyogenes* infections is not known.
Erythromycin	0.25[1]	0.5[1]	**15**	21[A]	18[A]	
Roxithromycin	0.5[1]	1[1]		Note[A]	Note[A]	
Telithromycin	0.25	0.5	**15**	20	17	
						B. Place the erythromycin and clindamycin disks 12-16 mm apart (edge to edge) and look for antagonism (the D phenomenon) to detect inducible clindamycin resistance.
Clindamycin[2]	0.5	0.5	**2**	17[B]	17[B]	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	1[1]	2[1]		Note[A]	Note[A]	**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[1]	1[1]	**30**	23[A]	20[A]	**2.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Tetracycline	1[1]	2[1]	**30**	23[A]	20[A]	**3.** For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Tigecycline[2]	0.25[3]	0.5[3]	**15**	19	16	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid[1]	2	4	**10**	19	16	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Tedizolid[1]	0.5[2]	0.5		Note[A]	Note[A]	**2.** Isolates susceptible to linezolid can be reported susceptible to tedizolid.
						A. Isolates susceptible to linezolid can be reported susceptible to tedizolid. For isolates resistant to linezolid, perform an MIC test.

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Chloramphenicol	8	8	**30**	19	19	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Colistin	-	-		-	-	
Daptomycin[1]	1[2]	1[2]		Note[A]	Note[A]	**2.** Daptomycin MICs must be determined in the presence of Ca^{2+} (50 mg/L in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems.
Fosfomycin iv	-	-		-	-	**3**. Trimethoprim-sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Fosfomycin oral	-	-		-	-	
Fusidic acid	IE	IE		IE	IE	**A.** Use an MIC method.
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only), *S. agalactiae* (group B streptococci)	64	64	**100**	15	15	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	0.06	0.5	**5**	21	15	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only), *S. agalactiae* (group B streptococci)	2	2	**5**	IP	IP	
Trimethoprim-sulfamethoxazole[3]	1	2	**1.25-23.75**	18	15	

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Streptococcus pneumoniae* ATCC 49619. For agents not covered by this strain, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Benzylpenicillin (indications other than meningitis)[2]	0.06[1]	2[1]		Note[A]	Note[A]
Benzylpenicillin (meningitis)	0.06[1]	0.06[1]		Note[A]	Note[A]
Ampicillin	0.5[1,3]	2[1,3]		Note[A,B]	Note[A,B]
Ampicillin-sulbactam	Note[1,4]	Note[1,4]		Note[A,B]	Note[A,B]
Amoxicillin	Note[1,3,4]	Note[1,3,4]		Note[A,B]	Note[A,B]
Amoxicillin-clavulanic acid	Note[1,3,4]	Note[1,3,4]		Note[A,B]	Note[A,B]
Piperacillin	Note[1,4]	Note[1,4]		Note[A,B]	Note[A,B]
Piperacillin-tazobactam	Note[1,4]	Note[1,4]		Note[A,B]	Note[A,B]
Ticarcillin	-	-		-	-
Ticarcillin-clavulanic acid	-	-		-	-
Temocillin	-	-		-	-
Phenoxymethylpenicillin	Note[1]	Note[1]		Note[A]	Note[A]
Oxacillin (screen)	NA	NA	1	20[C]	Note[C]
Cloxacillin	-	-		-	-
Dicloxacillin	-	-		-	-
Flucloxacillin	-	-		-	-
Mecillinam (uncomplicated UTI only)	-	-		-	-

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. Breakpoints for penicillins other than benzylpenicillin relate only to non-meningitis isolates.
Isolates fully susceptible to benzylpenicillin (MIC ≤0.06 mg/L and/or susceptible by **oxacillin disk screen, see note C**) can be reported susceptible to beta-lactam agents for which clinical breakpoints are listed (including those with "Note").
2. For breakpoints and dosing in pneumonia, see table of dosages.
3. For isolates categorised as intermediate to ampicillin avoid oral treatment with ampicillin, amoxicillin or amoxicillin-clavulanic acid.
4/B. Susceptibility inferred from the MIC of ampicillin.

A. Screen for beta-lactam resistance with the oxacillin 1 µg disk, **see Note C**.
C. For interpretation of the oxacillin disk screen, see flow chart below. For oxacillin non-susceptible isolates, always determine the MIC of benzylpenicillin.

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor	0.03	0.5	30	50	28	**A.** Screen for beta-lactam resistance with the oxacillin 1 µg disk. **See Note C on penicillins and flow chart below.**
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	1	2		Note[A]	Note[A]	
Cefixime	-	-		-	-	
Cefotaxime	0.5	2		Note[A]	Note[A]	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	0.25	0.5		Note[A]	Note[A]	
Ceftaroline	0.25	0.25		Note[A]	Note[A]	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	0.5	0.5		Note[A]	Note[A]	
Ceftolozane-tazobactam	-	-		-	-	
Ceftriaxone	0.5	2		Note[A]	Note[A]	
Cefuroxime iv	0.5	1		Note[A]	Note[A]	
Cefuroxime oral	0.25	0.5		Note[A]	Note[A]	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem[1]	1	1		Note[A]	Note[A]	**1.** Not for meningitis (meropenem is the only carbapenem used for meningitis).
Ertapenem[1]	0.5	0.5		Note[A]	Note[A]	**2.** Meropenem is the only carbapenem used for meningitis.
Imipenem[1]	2	2		Note[A]	Note[A]	
Meropenem[1] (indications other than meningitis)	2	2		Note[A]	Note[A]	**A.** Screen for beta-lactam resistance with the oxacillin 1 µg disk. **See Note C on penicillins and flow chart below.**
Meropenem[2] (meningitis)	0.25	1		Note[A,B]	Note[A,B]	**B.** For use in meningitis determine the meropenem MIC.

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	-	-		-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	-	-		-	-	**1.** Breakpoints are based on high dose therapy, see table of dosages ~~(0.5 g x 2)~~.
Levofloxacin[1]	2	2	5	16[A]	16[A]	**A.** The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance. **See Note B.**
Moxifloxacin	0.5	0.5	5	22[A]	22[A]	**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.
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (screen)	NA	NA	10	11[B]	Note[B]	
Ofloxacin	-	-		-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	-	-		-	-	
Gentamicin	-	-		-	-	
Netilmicin	-	-		-	-	
Tobramycin	-	-		-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin	IE	IE		IE	IE	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Oritavancin	IE	IE		IE	IE	
Teicoplanin[1]	2	2	30	17	17	
Telavancin	IE	IE		IE	IE	
Vancomycin[1]	2	2	5	16	16	

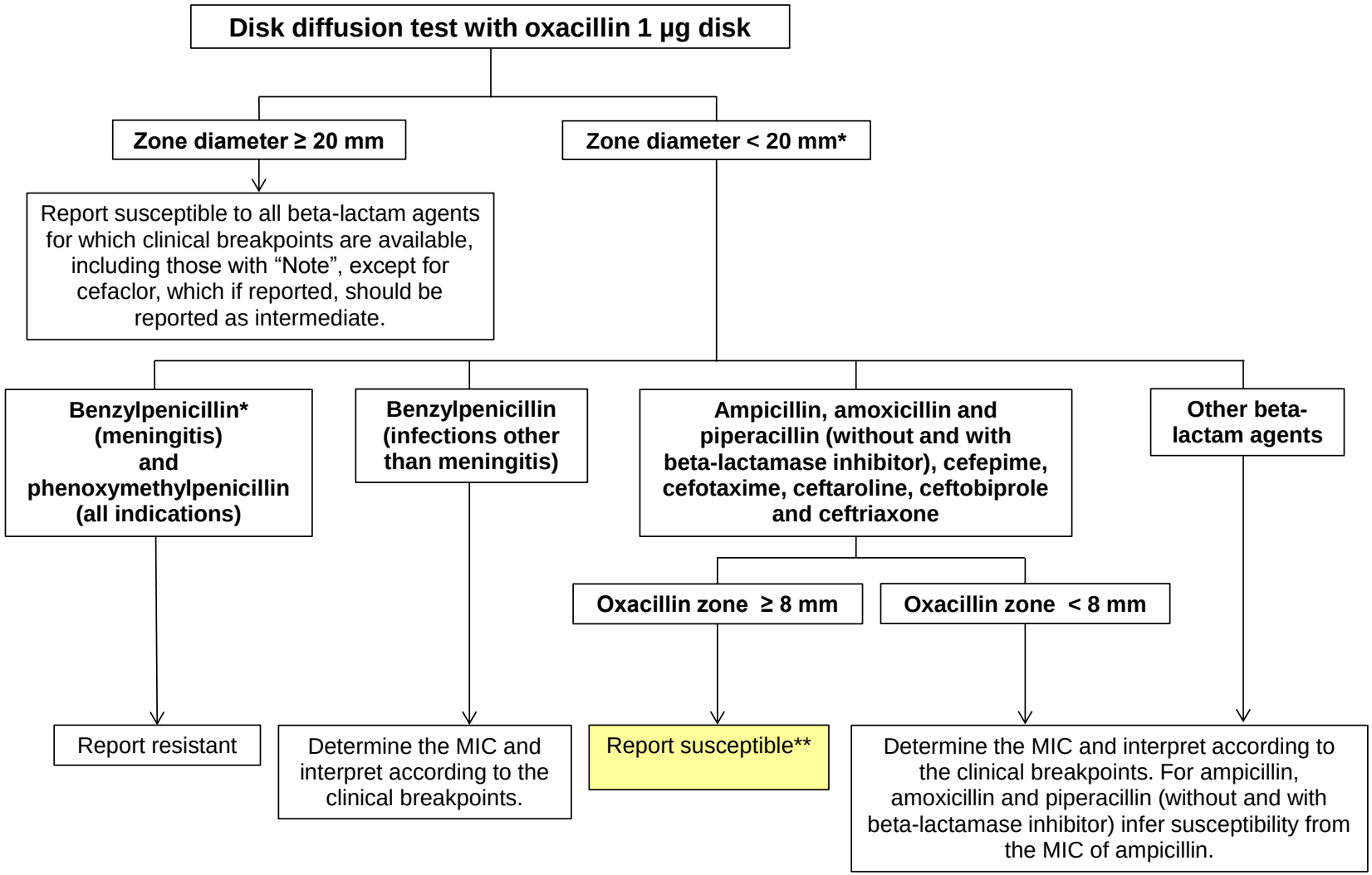
Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Azithromycin	0.25[1]	0.5[1]		Note[A]	Note[A]	**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 tested according to the clinical breakpoints. 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) to detect inducible clindamycin resistance.
Clarithromycin	0.25[1]	0.5[1]		Note[A]	Note[A]	
Erythromycin	0.25[1]	0.5[1]	**15**	22[A]	19[A]	
Roxithromycin	0.5[1]	1[1]		Note[A]	Note[A]	
Telithromycin	0.25	0.5	**15**	23	20	
Clindamycin[2]	0.5	0.5	**2**	19[B]	19[B]	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	1[1]	2[1]		Note[A]	Note[A]	**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[1]	1[1]	**30**	24[A]	21[A]	
Tetracycline	1[1]	2[1]	**30**	25[A]	22[A]	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	2	4	**10**	22	19	
Tedizolid	IE	IE		IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	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	-	-		-	-	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	0.06	0.5	**5**	22	17	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole[1]	1	2	**1.25-23.75**	18	15	

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



*Always determine the MIC of benzylpenicillin. Do not delay reporting resistance in meningitis.

** In meningitis confirm by determining the MIC for the agent considered for clinical use.

Viridans group streptococci

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

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Streptococcus pneumoniae* ATCC 49619. For agents not covered by this strain, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

This group of bacteria includes many species, which can be grouped as follows:
***S. anginosus* group:** *S. anginosus, S. constellatus, S. intermedius*
***S. mitis* group:** *S. australis, S. cristatus, S. infantis, S. mitis, S. oligofermentans, S. oralis,S. peroris, S. pseudopneumoniae, S. sinensis*
***S. sanguinis* group:** *S. sanguinis, S. parasanguinis, S. gordonii*
***S. bovis* group:** *S. equinus, S. gallolyticus (S. bovis), S. infantarius*
***S. salivarius* group:** *S. salivarius, S. vestibularis, S. thermophilus*
***S. mutans* group:** *S. mutans, S. sobrinus*

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin	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.
Benzylpenicillin (screen)	NA	NA	1 unit	18[A]	Note[A]	
Ampicillin	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.
Ampicillin-sulbactam	Note[1]	Note[1]		Note[A,B]	Note[A,B]	
Amoxicillin	0.5	2		Note[A,B]	Note[A,B]	
Amoxicillin-clavulanic acid	Note[1]	Note[1]		Note[A,B]	Note[A,B]	
Piperacillin	Note[1]	Note[1]		Note[A,B]	Note[A,B]	
Piperacillin-tazobactam	Note[1]	Note[1]		Note[A,B]	Note[A,B]	
Ticarcillin	IE	IE		IE	IE	
Ticarcillin-clavulanic acid	IE	IE		IE	IE	
Temocillin	-	-		-	-	
Phenoxymethylpenicillin	IE	IE		IE	IE	
Oxacillin	-	-		-	-	
Cloxacillin	-	-		-	-	
Dicloxacillin	-	-		-	-	
Flucloxacillin	-	-		-	-	
Mecillinam (uncomplicated UTI only)	-	-		-	-	

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Cefaclor	-	-		-	-	**A**. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. **See Note A on penicillins.**
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	0.5	0.5	**30**	IP	IP	
Cefepime	0.5	0.5	**30**	25[A]	25[A]	
Cefixime	-	-		-	-	
Cefotaxime	0.5	0.5	**5**	23[A]	23[A]	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	-	-		-	-	
Ceftaroline	-	-		-	-	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	-	-		-	-	
Ceftobiprole	-	-		-	-	
Ceftolozane-tazobactam, *S. anginosus* group	IE	IE		IE	IE	
Ceftriaxone	0.5	0.5	**30**	27[A]	27[A]	
Cefuroxime iv	0.5	0.5	**30**	26[A]	26[A]	
Cefuroxime oral	-	-		-	-	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doripenem	1	1		Note[A]	Note[A]	**A**. Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance in viridans group streptococci. **See Note A on penicillins.**
Ertapenem	0.5	0.5		Note[A]	Note[A]	
Imipenem	2	2		Note[A]	Note[A]	
Meropenem	2	2		Note[A]	Note[A]	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Aztreonam	-	-		-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	-	-		-	-	
Levofloxacin	IE	IE		IE	IE	
Moxifloxacin	IE	IE		IE	IE	
Nalidixic acid (screen)	NA	NA		NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-		-	-	
Ofloxacin	-	-		-	-	

Aminoglycosides[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	Note[2]	Note[2]		-	-	**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 aminoglycoside resistance. All testing is therefore to distinguish between intrinsic and high-level acquired resistance. **2.** Gentamicin can be used to screen for high-level aminoglycoside resistance (HLAR). **Negative test:** 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. **Positive test:** Isolates with gentamicin MIC >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.
Gentamicin	Note[2]	Note[2]		-	-	
Netilmicin	Note[2]	Note[2]		-	-	
Tobramycin	Note[2]	Note[2]		-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin, *S. anginosus* group[1]	0.125[2,3]	0.125[2]		Note[A]	Note[A]	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory. **2.** MICs must be determined in the presence of polysorbate-80 (0.002% in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturer's instructions for commercial systems. **3.** Isolates susceptible to vancomycin can be reported susceptible to dalbavancin and oritavancin. **A.** Disk diffusion criteria have not been defined and an MIC method should be used.
Oritavancin, *S. anginosus* group[1]	0.25[2,3]	0.25[2]		Note[A]	Note[A]	
Teicoplanin[1]	2	2	**30**	16	16	
Telavancin	IE	IE		IE	IE	
Vancomycin[1]	2	2	**5**	15	15	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	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 tested according to the clinical breakpoints. 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) to detect inducible clindamycin resistance.
Clarithromycin	IE	IE		IE	IE	
Erythromycin	IE	IE	**15**	IE	IE	
Roxithromycin	IE	IE		IE	IE	
Telithromycin	IE	IE		IE	IE	
Clindamycin[1]	0.5	0.5	**2**	19[A]	19[A]	
Quinupristin-dalfopristin	IE	IE		IE	IE	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	-	-		-	-	
Minocycline	-	-		-	-	
Tetracycline	-	-		-	-	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	-	-		-	-	**A.** Perform an MIC test.
Tedizolid, *S. anginosus* group	0.25	0.25		Note[A]	Note[A]	

Viridans group streptococci

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Chloramphenicol	-	-		-	-	
Colistin	-	-		-	-	
Daptomycin	-	-		-	-	
Fosfomycin iv	-	-		-	-	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole	-	-		-	-	

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* MIC breakpoints can be applied to *H. parainfluenzae.*

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Haemophilus influenzae* ATCC 49766. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Benzylpenicillin	IE	IE		IE	IE
Benzylpenicillin (screen)	NA	NA	1 unit	12[A]	Note[A]
Ampicillin[1,2]	1	1	2	16[A]	16[A]
Ampicillin-sulbactam[1]	1[3,4]	1[3,4]	10-10	Note[A,B]	Note[A,B]
Amoxicillin[1,2]	2	2		Note[A,C]	Note[A,C]
Amoxicillin-clavulanic acid[1]	2[5]	2[5]	2-1	15[A]	15[A]
Piperacillin[1,2]	Note[6]	Note[6]		Note[A,D]	Note[A,D]
Piperacillin-tazobactam[1]	Note[4]	Note[4]		Note[A,B]	Note[A,B]
Ticarcillin	IE	IE		IE	IE
Ticarcillin-clavulanic acid	IE	IE		IE	IE
Temocillin	IE	IE		IE	IE
Phenoxymethylpenicillin	IE	IE		IE	IE
Oxacillin	-	-		-	-
Cloxacillin	-	-		-	-
Dicloxacillin	-	-		-	-
Flucloxacillin	-	-		-	-
Mecillinam (uncomplicated UTI only)	-	-		-	-

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. Breakpoints are based on intravenous administration.
2. Beta-lactamase positive isolates can be reported resistant to ampicillin, amoxicillin and piperacillin without inhibitors. Tests based on a chromogenic cephalosporin can be used to detect the beta-lactamase.
3. For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.
4/B. Susceptibility can be inferred from amoxicillin-clavulanic acid.
5. For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
6/D. Susceptibility inferred from ampicillin or amoxicillin.

A. Benzylpenicillin 1 unit can be used to screen for, but not to distinguish between, beta-lactamase producing isolates and isolates with PBP mutations. **For interpretation of the benzylpenicillin disk screen, see flow chart below.**
C. Susceptibility can be inferred from ampicillin.

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefaclor	-	-		-	-	**A.** Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance. **See Note A on penicillins and flow chart below.**
Cefadroxil	-	-		-	-	
Cefalexin	-	-		-	-	
Cefazolin	-	-		-	-	
Cefepime	0.25	0.25	30	28[A]	28[A]	
Cefixime	0.125	0.125	5	26[A]	26[A]	
Cefotaxime	0.125	0.125	5	27[A]	27[A]	
Cefoxitin	NA	NA		NA	NA	
Cefpodoxime	0.25	0.5	10	26[A]	23[A]	
Ceftaroline	0.03	0.03		Note[A]	Note[A]	
Ceftazidime	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	1	1	30	25[A]	25[A]	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam	IE	IE		IE	IE	
Ceftriaxone	0.125	0.125	30	31[A]	31[A]	
Cefuroxime iv	1	2	30	26[A]	25[A]	
Cefuroxime oral	0.125	1	30	50	26	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem[1]	1	1	10	20[A]	20[A]	**1.** Not for meningitis (meropenem is the only carbapenem used for meningitis).
Ertapenem[1]	0.5	0.5	10	20[A]	20[A]	**2.** Meropenem is the only carbapenem used for meningitis.
Imipenem[1]	2	2	10	20[A]	20[A]	
Meropenem[1] (indications other than meningitis)	2	2	10	20[A]	20[A]	**A.** Benzylpenicillin 1 unit can be used to screen for beta-lactam resistance. **See Note A on penicillins and flow chart below.**
Meropenem[2] (meningitis)	0.25	1		Note[B]	Note[B]	**B.** For use in meningitis determine the meropenem MIC value.

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	IE	IE		IE	IE	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	0.06	0.06	5	30[A]	30[A]	**A.** The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. **See Note B.**
Levofloxacin	0.06	0.06	5	30[A]	30[A]	**B.** Isolates categorised as susceptible to nalidixic acid can be reported susceptible to ciprofloxacin, levofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.
Moxifloxacin	0.125	0.125	5	28[A]	28[A]	
Nalidixic acid (screen)	NA	NA	30	23[B]	Note[B]	
Norfloxacin (uncomplicated UTI only)	-	-		-	-	
Ofloxacin	0.06	0.06	5	30[A]	30[A]	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	IE	IE		IE	IE	
Gentamicin	IE	IE		IE	IE	
Netilmicin	IE	IE		IE	IE	
Tobramycin	IE	IE		IE	IE	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin	-	-		-	-	
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

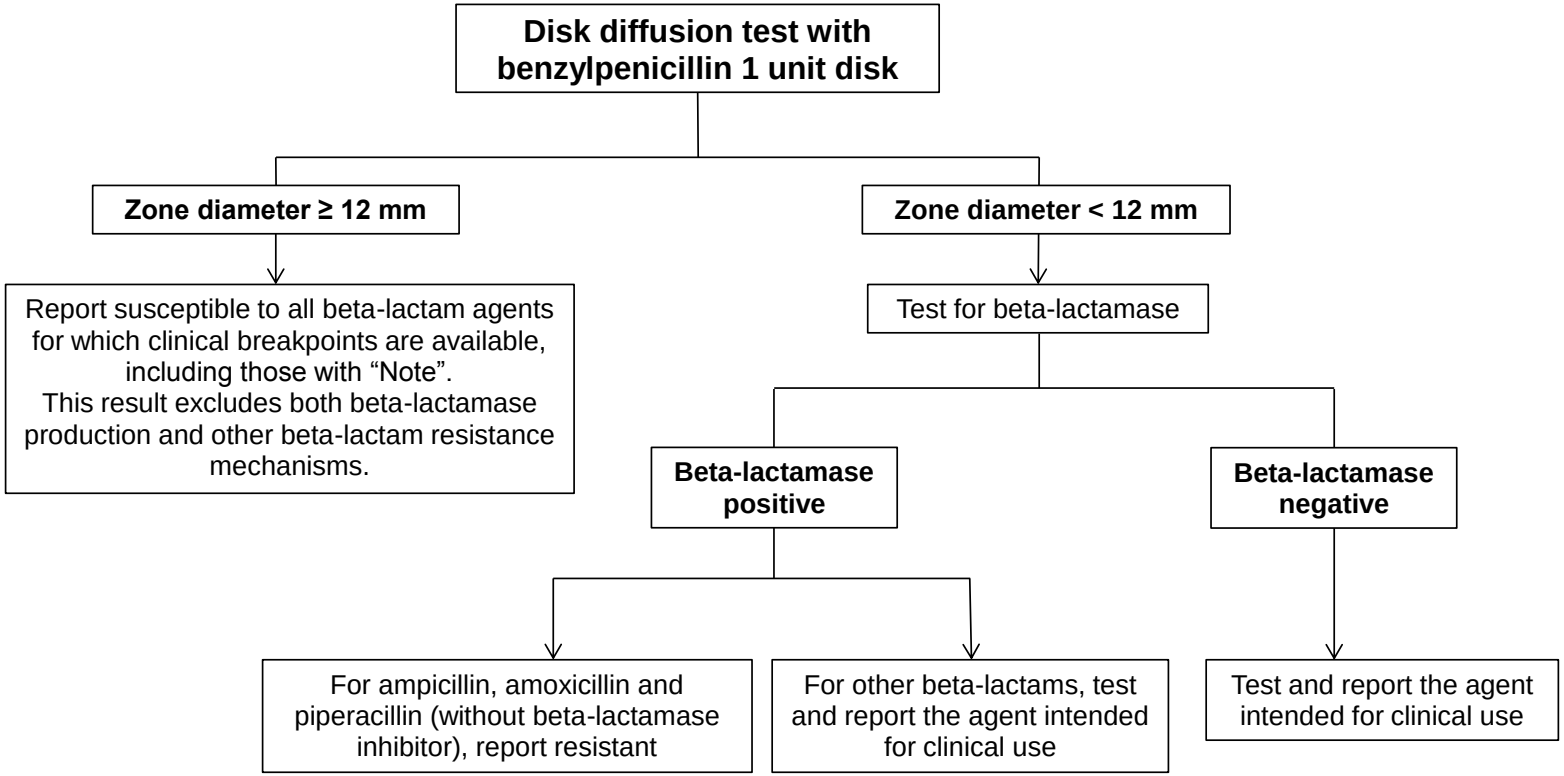
Macrolides[1], lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	Note[1]	Note[1]		Note[A]	Note[A]	**1/A.** Clinical evidence for the efficacy of macrolides in *H. influenzae* respiratory infections is conflicting due to high spontaneous cure rates. Should there be a need to test any macrolide against this species, the epidemiological cut-offs (ECOFFs) should be used to detect strains with acquired resistance. The ECOFFs for each agent are: azithromycin 4 mg/L, clarithromycin 32 mg/L, erythromycin 16 mg/L and telithromycin 8 mg/L. There are insufficient data available to establish an ECOFF for roxithromycin.
Clarithromycin	Note[1]	Note[1]		Note[A]	Note[A]	
Erythromycin	Note[1]	Note[1]		Note[A]	Note[A]	
Roxithromycin	Note[1]	Note[1]		Note[A]	Note[A]	
Telithromycin	Note[1]	Note[1]		Note[A]	Note[A]	
	-	-		-	-	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Doxycycline	1[1]	2[1]		Note[A]	Note[A]	**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[1]	2[1]	**30**	24[A]	21[A]	
Tetracycline	1[1]	2[1]	**30**	25[A]	22[A]	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	S ≤	R >		S ≥	R <	
Linezolid	-	-		-	-	
Tedizolid	-	-		-	-	

Miscellaneous agents	MIC breakpoint (mg/L)			Zone diameter breakpoint (mm)		Notes Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
	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	-	-		-	-	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin (for prophylaxis only)	1	1	**5**	18	18	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole[1]	0.5	1	**1.25-23.75**	23	20	

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



MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Haemophilus influenzae* ATCC 49766. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)	
	S ≤	R >		S ≥	R <
Benzylpenicillin	-	-		-	-
Ampicillin	-[1]	-[1]		-	-
Ampicillin-sulbactam	1[2,3]	1[2,3]		Note[A]	Note[A]
Amoxicillin	-[1]	-[1]		-	-
Amoxicillin-clavulanic acid	1[4]	1[4]	2-1	19	19
Piperacillin	-[1]	-[1]		-	-
Piperacillin-tazobactam	Note[3]	Note[3]		Note[A]	Note[A]
Ticarcillin	IE	IE		IE	IE
Ticarcillin-clavulanic acid	IE	IE		IE	IE
Temocillin	IE	IE		IE	IE
Phenoxymethylpenicillin	-	-		-	-
Oxacillin	-	-		-	-
Cloxacillin	-	-		-	-
Dicloxacillin	-	-		-	-
Flucloxacillin	-	-		-	-
Mecillinam (uncomplicated UTI only)	-	-		-	-

Notes
Numbered notes relate to general comments and/or MIC breakpoints.
Lettered notes relate to the disk diffusion method.

1. Most *M. catarrhalis* produce beta-lactamase, although beta-lactamase production is slow and may give weak results with *in vitro* 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.

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
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	-	-		-	-	
Ceftazidime-avibactam	-	-		-	-	
Ceftibuten	IE	IE		IE	IE	
Ceftobiprole	IE	IE		IE	IE	
Ceftolozane-tazobactam	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
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doripenem[1]	1	1	10	30	30	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Ertapenem[1]	0.5	0.5	10	29	29	
Imipenem[1]	2	2	10	29	29	
Meropenem[1]	2	2	10	33	33	

Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	IE	IE		IE	IE	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	0.125	0.125	5	31[A]	31[A]	**A.** The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. **See Note B.**
Levofloxacin	0.125	0.125	5	29[A]	29[A]	**B.** Isolates categorised as susceptible to nalidixic acid can be reported susceptible to ciprofloxacin, levofloxacin, moxifloxacin and ofloxacin. Isolates categorised as non-susceptible may have fluoroquinolone resistance and should be tested against the appropriate agent.
Moxifloxacin	0.25	0.25	5	26[A]	26[A]	
Nalidixic acid (screen)	NA	NA	30	23[B]	Note[B]	
Norfloxacin (uncomplicated UTI only)	-	-		-	-	
Ofloxacin	0.25	0.25	5	28[A]	28[A]	

Aminoglycosides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Amikacin	IE	IE		IE	IE	
Gentamicin	IE	IE		IE	IE	
Netilmicin	IE	IE		IE	IE	
Tobramycin	IE	IE		IE	IE	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Dalbavancin	-	-		-	-	
Oritavancin	-	-		-	-	
Teicoplanin	-	-		-	-	
Telavancin	-	-		-	-	
Vancomycin	-	-		-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	0.25[1]	0.5[1]		Note[A]	Note[A]	**1/A.** Erythromycin can be used to determine susceptibility to azithromycin, clarithromycin and roxithromycin.
Clarithromycin	0.25[1]	0.5[1]		Note[A]	Note[A]	
Erythromycin	0.25	0.5	15	23[A]	20[A]	
Roxithromycin	0.5[1]	1[1]		Note[A]	Note[A]	
Telithromycin	0.25	0.5	15	23	20	
Clindamycin	-	-		-	-	
Quinupristin-dalfopristin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	1[1]	2[1]		Note[A]	Note[A]	**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[1]	2[1]	30	25[A]	22[A]	
Tetracycline	1[1]	2[1]	30	28[A]	25[A]	
Tigecycline	IE	IE		IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid	-	-		-	-	
Tedizolid	-	-		-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Chloramphenicol	2[1]	2[1]	30	30[A]	30[A]	**1/A**. Breakpoints relate to topical use only.
Colistin	-	-		-	-	**2.** Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Daptomycin	-	-		-	-	
Fosfomycin iv	IE	IE		IE	IE	
Fosfomycin oral	-	-		-	-	
Fusidic acid	-	-		-	-	
Metronidazole	-	-		-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-		-	-	
Nitroxoline (uncomplicated UTI only)	-	-		-	-	
Rifampicin	-	-		-	-	
Spectinomycin	-	-		-	-	
Trimethoprim (uncomplicated UTI only)	-	-		-	-	
Trimethoprim-sulfamethoxazole[2]	0.5	1	1.25-23.75	18	15	

For comments on dosages related to breakpoints, see the table of dosages.

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. Laboratories with few isolates are encouraged to refer these to a reference laboratory for testing.

Penicillins[1]	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Benzylpenicillin	0.06[1]	1	**1.** Always test for beta-lactamase. If positive, report resistant to benzylpenicillin, ampicillin and amoxicillin. Tests based on a chromogenic cephalosporin can be used to detect the beta-lactamase. The susceptibility of beta-lactamase negative isolates to ampicillin and amoxicillin can be inferred from benzylpenicillin.
Ampicillin[1]	Note[1]	Note[1]	
Ampicillin-sulbactam	IE	IE	
Amoxicillin[1]	Note[1]	Note[1]	
Amoxicillin-clavulanic acid	Note[1]	Note[1]	
Piperacillin	-	-	
Piperacillin-tazobactam	-	-	
Ticarcillin	-	-	
Ticarcillin-clavulanic acid	-	-	
Temocillin	IE	IE	
Phenoxymethylpenicillin	-	-	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	0.125	0.125	
Cefotaxime	0.125	0.125	
Cefoxitin	-	-	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	-	-	
Ceftriaxone	0.125	0.125	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	IE	IE	
Ertapenem	IE	IE	
Imipenem	IE	IE	
Meropenem	IE	IE	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	IE	IE	

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Ciprofloxacin	0.03	0.06	
Levofloxacin	IE	IE	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	0.125	0.25	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Dalbavancin	-	-	
Oritavancin	-	-	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin	0.25	0.5	~~1.~~ Breakpoints are based on a 2 g single dose in monotherapy.
Clarithromycin	-	-	
Erythromycin	-	-	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	-	-	
Quinupristin-dalfopristin	-	-	

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	IE	IE	
Minocycline	IE	IE	
Tetracycline	0.5	1	
Tigecycline	IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Chloramphenicol	-	-	
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Metronidazole	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	64	64	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

Neisseria meningitidis

EUCAST Clinical Breakpoint Tables v. 8.0, valid from 2018-01-01

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 Numbered notes relate to general comments and/or 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	-	-	
Temocillin	-	-	
Phenoxymethylpenicillin	-	-	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime[1]	0.125	0.125	
Cefoxitin	-	-	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	-	-	
Ceftriaxone[1]	0.125	0.125	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	IE	IE	**1.** Non-susceptible isolates are rare or not yet reported. The identification and antimicrobial susceptibility test result on any such isolate must be confirmed and the isolate sent to a reference laboratory.
Ertapenem	-	-	
Imipenem	-	-	
Meropenem[1] (meningitis)	0.25	0.25	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Ciprofloxacin	0.03[1]	0.03[1]	**1.** Breakpoints apply only to use in the prophylaxis of meningococcal disease.
Levofloxacin	IE	IE	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	IE	IE	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Dalbavancin	-	-	
Oritavancin	-	-	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	-	-	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	-	-	
Quinupristin-dalfopristin	-	-	

Tetracyclines	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	-	-	**1.** Tetracycline can be used to predict susceptibility to minocycline for prophylaxis against *N. meningitidis* infections.
Minocycline	1[1]	2[1]	
Tetracycline	1[1]	2[1]	
Tigecycline	IE	IE	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or 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	-	-	
Metronidazole	-	-	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin[1]	0.25	0.25	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

Gram-positive anaerobes

except *Clostridium difficile*

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, Lactobacillu* s and anaerobic Gram-positive cocci.
Anaerobes are most frequently defined by no growth on culture plates incubated in a CO_2 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_2 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.
For all these species, susceptibility testing should be performed in anaerobic environment.

Penicillins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Benzylpenicillin[1]	0.25	0.5	**1.** Susceptibility to ampicillin, amoxicillin, piperacillin and ticarcillin can be inferred from susceptibility to benzylpenicillin.
Ampicillin[1]	4	8	**2.** For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.
Ampicillin-sulbactam	4[2]	8[2]	**3.** For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
Amoxicillin[1]	4	8	**4.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Amoxicillin-clavulanic acid	4[3]	8[3]	
Piperacillin[1]	8	16	
Piperacillin-tazobactam	8[4]	16[4]	
Ticarcillin[1]	8	16	
Ticarcillin-clavulanic acid	8[3]	16[3]	
Temocillin	-	-	
Phenoxymethylpenicillin	IE	IE	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Gram-positive anaerobes

except *Clostridium difficile*

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime	-	-	
Cefoxitin	IE	IE	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	IE	IE	
Ceftriaxone	-	-	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	1	1	
Ertapenem	1	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	-	-	

Gram-positive anaerobes

except *Clostridium difficile*

Fluoroquinolones	MIC breakpoint (mg/L)		Notes
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Ciprofloxacin	-	-	
Levofloxacin	-	-	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Notes
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Dalbavancin	IE	IE	
Oritavancin	IE	IE	
Teicoplanin	IE	IE	
Telavancin	IE	IE	
Vancomycin	2	2	

Gram-positive anaerobes

except *Clostridium difficile*

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	IE	IE	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	4	4	
Quinupristin-dalfopristin	-	-	

Tetracyclines[1]	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	Note[1]	Note[1]	**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[1]	Note[1]	
Tetracycline	Note[1]	Note[1]	
Tigecycline	Note[1]	Note[1]	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Gram-positive anaerobes

except *Clostridium difficile*

EUCAST Clinical Breakpoint Tables v. 8.0, valid from 2018-01-01

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Chloramphenicol	8	8	
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Metronidazole	4	4	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

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 Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Moxifloxacin	-[1]	-[1]	**1.** Not used clinically. May be tested for epidemiological purposes only (ECOFF 4 mg/L).

Glycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Vancomycin	2[1]	2[1]	**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 Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Tigecycline	-[1,2]	-[1,2]	**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 Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Daptomycin	-[1,2]	-[1,2]	**1.** Daptomycin MICs must be determined in the presence of Ca^{2+} (50 mg/L in the medium for broth dilution methods; agar dilution methods have not been validated). Follow the manufacturers' instructions for commercial systems. **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	-[3]	-[3]	
Fidaxomicin	IE[4]	IE[4]	
Metronidazole	2[5]	2[5]	
Rifampicin	-[6]	-[6]	

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_2 enriched atmosphere. For all these species, susceptibility testing should be performed in anaerobic environment.

Penicillins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Benzylpenicillin[1]	0.25	0.5	**1.** Susceptibility to ampicillin, amoxicillin, piperacillin and ticarcillin can be inferred from susceptibility to benzylpenicillin. **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.
Ampicillin[1]	0.5	2	
Ampicillin-sulbactam	4[2]	8[2]	
Amoxicillin[1]	0.5	2	
Amoxicillin-clavulanic acid	4[3]	8[3]	
Piperacillin[1]	16	16	
Piperacillin-tazobactam	8[4]	16[4]	
Ticarcillin[1]	16	16	
Ticarcillin-clavulanic acid	8[3]	16[3]	
Temocillin	-	-	
Phenoxymethylpenicillin	IE	IE	
Oxacillin	-	-	
Cloxacillin	-	-	
Dicloxacillin	-	-	
Flucloxacillin	-	-	
Mecillinam (uncomplicated UTI only)	-	-	

Cephalosporins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Cefaclor	-	-	
Cefadroxil	-	-	
Cefalexin	-	-	
Cefazolin	-	-	
Cefepime	-	-	
Cefixime	-	-	
Cefotaxime	-	-	
Cefoxitin	IE	IE	
Cefpodoxime	-	-	
Ceftaroline	-	-	
Ceftazidime	-	-	
Ceftazidime-avibactam	-	-	
Ceftibuten	-	-	
Ceftobiprole	-	-	
Ceftolozane-tazobactam	IE	IE	
Ceftriaxone	-	-	
Cefuroxime iv	-	-	
Cefuroxime oral	-	-	

Carbapenems	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doripenem	1	1	
Ertapenem	1	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Aztreonam	-	-	

Fluoroquinolones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Ciprofloxacin	-	-	
Levofloxacin	-	-	
Moxifloxacin	IE	IE	
Nalidixic acid (screen)	NA	NA	
Norfloxacin (uncomplicated UTI only)	-	-	
Ofloxacin	-	-	

Aminoglycosides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Amikacin	-	-	
Gentamicin	-	-	
Netilmicin	-	-	
Tobramycin	-	-	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Dalbavancin	-	-	
Oritavancin	-	-	
Teicoplanin	-	-	
Telavancin	-	-	
Vancomycin	-	-	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Azithromycin	-	-	
Clarithromycin	-	-	
Erythromycin	IE	IE	
Roxithromycin	-	-	
Telithromycin	-	-	
Clindamycin	4	4	
Quinupristin-dalfopristin	-	-	

Tetracyclines[1]	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Doxycycline	Note[1]	Note[1]	**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[1]	Note[1]	
Tetracycline	Note[1]	Note[1]	
Tigecycline	Note[1]	Note[1]	

Oxazolidinones	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Linezolid	-	-	
Tedizolid	-	-	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Chloramphenicol	8	8	
Colistin	-	-	
Daptomycin	-	-	
Fosfomycin iv	-	-	
Fosfomycin oral	-	-	
Fusidic acid	-	-	
Metronidazole	4	4	
Nitrofurantoin (uncomplicated UTI only)	-	-	
Nitroxoline (uncomplicated UTI only)	-	-	
Rifampicin	-	-	
Spectinomycin	-	-	
Trimethoprim (uncomplicated UTI only)	-	-	
Trimethoprim-sulfamethoxazole	-	-	

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
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Amoxicillin	0.125[1]	0.125[1]	**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
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Levofloxacin	1[1]	1[1]	**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
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Clarithromycin	0.25[1]	0.5[1]	**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
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Tetracycline	1[1]	1[1]	**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
	S ≤	R >	Numbered notes relate to general comments and/or MIC breakpoints.
Metronidazole	8[1]	8[1]	**1.** The breakpoints are based on epidemiological cut-off values (ECOFFs), which distinguish wild-type isolates from those with reduced susceptibility.
Rifampicin	1[1]	1[1]	

Listeria monocytogenes

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Streptococcus pneumoniae* ATCC 49619. For agents not covered by this strain, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
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
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Meropenem	0.25	0.25	10	26	26	

Macrolides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Erythromycin	1	1	15	25	25	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Trimethoprim-sulfamethoxazole[1]	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

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Haemophilus influenzae* ATCC 49766. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor combinations, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain and for control of the inhibitor component of beta-lactam inhibitor-combination disks, see EUCAST QC Tables.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
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		Note[A]	Note[A]	**A.** Infer susceptibility from benzylpenicillin susceptibility.
Amoxicillin	1	1		Note[A]	Note[A]	
Amoxicillin-clavulanic acid	1[1]	1[1]	2-1	15	15	

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefotaxime	0.03	0.03	5	26	26	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	0.06	0.06	5	27[A]	27[A]	**A.** The nalidixic acid disk diffusion test can be used to screen for fluoroquinolone resistance. **See Note B.**
Levofloxacin	0.06	0.06	5	27[A]	27[A]	**B.** 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.
Nalidixic acid (screen)	NA	NA	30	23[B]	Note[B]	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	1	1		Note[A]	Note[A]	**A.** Susceptibility inferred from tetracycline screen test.
Tetracycline (screen)	NA	NA	**30**	24[A]	24[A]	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Trimethoprim-sulfamethoxazole[1]	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.

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: 5x10^5 CFU/mL
Incubation: Microaerobic environment, 41±1ºC, 24h. Isolates with insufficient growth after 24h incubation are reincubated immediately and MICs read after a total of 40-48h incubation.
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Staphylococcus aureus* ATCC 29213 (standard conditions for staphylococci)

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 overnight or at 35°C, with the lid removed, for 15 min).
Inoculum: McFarland 0.5
Incubation: Microaerobic environment, 41±1ºC, 24h. Isolates with insufficient growth after 24h incubation are reincubated immediately and inhibition zones read after a total of 40-48h incubation.
Reading: Unless otherwise stated, 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
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	0.5	0.5	**5**	26	26	

Macrolides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	Note[1]	Note[1]		Note[A]	Note[A]	**1/A.** Erythromycin can be used to determine susceptibility to azithromycin and clarithromycin.
Clarithromycin	Note[1]	Note[1]		Note[A]	Note[A]	
Erythromycin, *C. jejuni*	4[1]	4[1]	**15**	20[A]	20[A]	
Erythromycin, *C. coli*	8[1]	8[1]	**15**	24[A]	24[A]	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	Note[1]	Note[1]		Note[A]	Note[A]	**1/A.** Tetracycline can be used to determine susceptibility to doxycycline.
Tetracycline	2[1]	2[1]	**30**	30[A]	30[A]	

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and MICs read after a total of 40-44h incubation.
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Streptococcus pneumoniae* ATCC 49619. For agents not covered by this strain, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-44h incubation.
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin	0.125	0.125	1 unit	29	29	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
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
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Gentamicin	1	1	10	23	23	

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Vancomycin	2	2	5	17	17	

Lincosamides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Clindamycin	0.5	0.5	2	20	20	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Tetracycline	2	2	30	24	24	

Oxazolidinones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Linezolid	2	2	10	25	25	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Rifampicin	0.06	0.5	5	30	25	

MIC determination (broth microdilution according to ISO standard 20776-1)[1]
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and MICs read after a total of 40-44h incubation.
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Streptococcus pneumoniae* ATCC 49619. For agents not covered by this strain, see EUCAST QC Tables.
[1] For fluoroquinolones, agar dilution may produce clearer endpoints.

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_2, 35±1ºC, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-44h incubation.
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin	0.125	0.125	1 unit	21	21	**1/A.** Infer susceptibility from ampicillin susceptibility.
Ampicillin	0.25	0.25	2	26	26	
Amoxicillin	Note[1]	Note[1]		Note[A]	Note[A]	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Meropenem	0.25	0.25	10	31	31	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin (uncomplicated UTI only)	2	2	5	21[A]	21[A]	**1.** Susceptibility can be inferred from ciprofloxacin susceptibility.
Levofloxacin (uncomplicated UTI only)	2[1]	2[1]	5	Note[B]	Note[B]	**A.** Susceptibility can be inferred from norfloxacin susceptibility. **See Note C.**
Norfloxacin (screen)	NA	NA	10	17[C]	17[C]	**B.** Susceptibility can be inferred from ciprofloxacin or norfloxacin susceptibility. **See Note C.** **C.** The norfloxacin disk diffusion test can be used to screen for fluoroquinolone resistance.

Glycopeptides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Vancomycin	1	1	5	16	16	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Nitrofurantoin (uncomplicated UTI only)	16	16	100	16	16	
Rifampicin	0.125	0.125	5	25	25	

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth + 5% lysed horse blood and 20 mg/L β-NAD (MH-F broth)
Inoculum: $5x10^5$ CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-44h incubation.
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Haemophilus influenzae* ATCC 49766. For agents not covered by this strain, see EUCAST QC Tables.

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_2, 35±1ºC, 18±2h. Isolates with insufficient growth after 16-20h incubation are reincubated immediately and inhibition zones read after a total of 40-44h incubation.
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Penicillins[1]	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Benzylpenicillin	0.03	0.03	**1 unit**	25	25	**1.** Beta-lactamase positive isolates can be reported resistant to benzylpenicillin and to ampicillin and amoxicillin without inhibitors. Tests based on a chromogenic cephalosporin can be used to detect the beta-lactamase. Beta-lactam resistance mechanisms other than beta-lactamase production have not yet been described for *K. kingae* . **2.** Susceptibility can be inferred from benzylpenicillin susceptibility. **3/B.** The intrinsic activity of clavulanic acid in *K. kingae* is such that the organism is inhibited by 2 mg/L clavulanic acid. Therefore no breakpoints for amoxicillin-clavulanic acid can be given. **A.** Infer susceptibility from benzylpenicillin susceptibility.
Ampicillin	0.06[2]	0.06[2]		Note[A]	Note[A]	
Amoxicillin	0.125[2]	0.125[2]		Note[A]	Note[A]	
Amoxicillin-clavulanic acid	Note[3]	Note[3]		Note[B]	Note[B]	

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefotaxime	0.125	0.125	**5**	27	27	
Ceftriaxone	0.06	0.06	**30**	30	30	
Cefuroxime iv	0.5	0.5	**30**	29	29	

Carbapenems	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Meropenem	0.03	0.03	**10**	30	30	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	0.06	0.06	**5**	28	28	
Levofloxacin	0.125	0.125	**5**	28	28	

Macrolides and lincosamides	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Azithromycin	0.25[1]	0.25[1]		Note[A]	Note[A]	**1.** Susceptibility can be inferred from erythromycin susceptibility.
Clarithromycin	0.5[1]	0.5[1]		Note[A]	Note[A]	**A.** Infer susceptibility from erythromycin susceptibility.
Erythromycin	0.5	0.5	**15**	20	20	
Clindamycin	-	-		-	-	

Tetracyclines	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Doxycycline	0.5[1]	0.5[1]		Note[A]	Note[A]	**1/A.** Isolates susceptible to tetracycline are also susceptible to doxycycline, but some resistant to tetracycline may be susceptible to doxycycline. An MIC method should be used to test doxycycline susceptibility of tetracycline resistant isolates if required.
Tetracycline	0.5	0.5	**30**	28	28	

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Rifampicin	0.5	0.5	**5**	20	20	**1.** Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration.
Trimethoprim-sulfamethoxazole[1]	0.25	0.25	**1.25-23.75**	28	28	

Aeromonas spp.

MIC determination (broth microdilution according to ISO standard 20776-1)
Medium: Mueller-Hinton broth
Inoculum: 5x10^5 CFU/mL
Incubation: Sealed panels, air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, read MICs at the lowest concentration of the agent that completely inhibits visible growth.
Quality control: *Pseudomonas aeruginosa* ATCC 27853. For agents not covered by this strain, see EUCAST QC Tables.

Disk diffusion (EUCAST standardised disk diffusion method)
Medium: Mueller-Hinton agar
Inoculum: McFarland 0.5
Incubation: Air, 35±1ºC, 18±2h
Reading: Unless otherwise stated, 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. For agents not covered by this strain, see EUCAST QC Tables.

Cephalosporins	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Cefepime	1	4	30	27	24	
Ceftazidime	1	4	10	24	21	

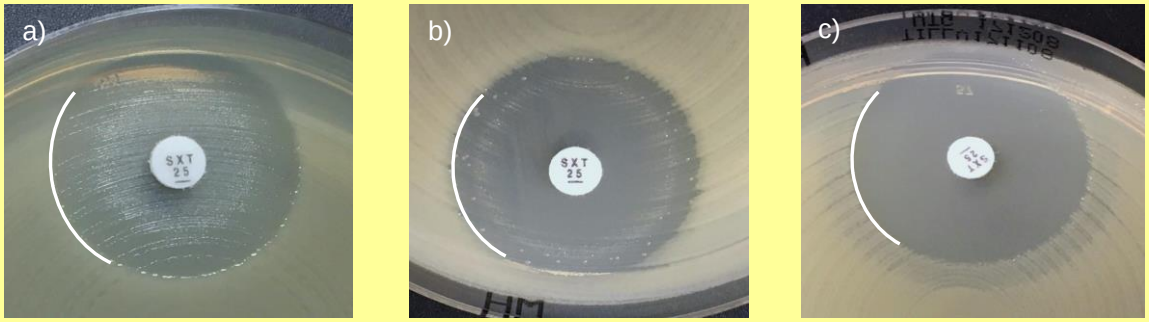
Monobactams	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Aztreonam	1	4	30	29	26	

Fluoroquinolones	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Ciprofloxacin	0.25	0.5	5	27	24	
Levofloxacin	0.5	1	5	27	24	

Aeromonas spp.

EUCAST Clinical Breakpoint Tables v. 8.0, valid from 2018-01-01

Miscellaneous agents	MIC breakpoint (mg/L)		Disk content (µg)	Zone diameter breakpoint (mm)		Notes
	S ≤	R >		S ≥	R <	Numbered notes relate to general comments and/or MIC breakpoints. Lettered notes relate to the disk diffusion method.
Trimethoprim-sulfamethoxazole[1]	2	4	**1.25-23.75**	19[A]	16[A]	**1.** Trimethoprim:sulfamethoxazole in the ratio 1:19. Breakpoints are expressed as the trimethoprim concentration. **A.** Read the obvious zone edge and disregard haze or growth within the inhibition zone (**see pictures below**).



Examples of inhibition zones for *Aeromonas* spp. with trimethoprim-sulfamethoxazole.
a-c) Read the obvious zone edge and disregard haze or growth within the inhibition zone.

Mycobacterium tuberculosis

EUCAST Clinical Breakpoint Tables v. 8.0, valid from 2018-01-01

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 Numbered notes relate to general comments and/or MIC breakpoints.
	S ≤	R >	
Delamanid	0.06	0.06	**1.** Breakpoints apply only to tests performed on Middlebrook 7H11/7H10 medium. Comparability of tests performed by other media has not been established.
Bedaquiline	0.25[1]	0.25[1]	

ECOFFs and systemic clinical breakpoints for antimicrobial agents that are used topically

In the absence of clinical data on outcome related to MIC of infecting organisms EUCAST does not find it possible to reach a consensus that resolves the conflicting opinions on these two alternative proposals (**for details see guidance document on www.eucast.org**):

1. Use ECOFFs for all agents when used topically.
2. Use clinical breakpoints when available and ECOFFs when there are no clinical breakpoints.

For information, the table presents systemic clinical breakpoints and ECOFFs for agents that are used both systemically and topically, and ECOFFs for agents that are used topically only (note that the mupirocin breakpoints are the exception).

Organisms		Gentamicin[3]	Ciprofloxacin[3]	Levofloxacin[3]	Ofloxacin[3]	Chloramphenicol[3]	Colistin[3] (for polymyxin B)	Fusidic acid[3]	Neomycin (framycetin)	Bacitracin	Mupirocin	Retapamulin
Enterobacteriaceae	**ECOFF**[1,2]	2	0.125	0.25	0.5	16	2	-	8	-	-	-
	Systemic clinical breakpoint[1]	2/4	0.25/0.5	0.5/1	0.25/0.5	8/8	2/2	-	-	-	-	-
P. aeruginosa	**ECOFF**[1]	8	0.5	2	2	-	4	-	ND	-	-	-
	Systemic clinical breakpoint[1]	4/4	0.5/0.5	1/1	-	-	2/2	-	-	-	-	-
***Acinetobacter* spp.**	**ECOFF**[1,2]	4	1	0.5	1	-	2	-	ND	-	-	-
	Systemic clinical breakpoint[1]	4/4	1/1	0.5/1	-	-	2/2	-	-	-	-	-
S. aureus	**ECOFF**[1]	2	1	1	1	16	-	0.5	1	ND	1[4]	0.5
	Systemic clinical breakpoint[1]	1/1	1/1	1/1	1/1	8/8	-	1/1	-	-	-	-
S. pneumoniae	**ECOFF**[1]	-	2	2	4	8	-	32	ND	ND	-	-
	Systemic clinical breakpoint[1]	-	-	2/2	-	8/8	-	-	-	-	-	-
Streptococcus A, B, C and G	**ECOFF**[1,2]	-	2	2	4	8	-	32	ND	ND	0.5	0.125
	Systemic clinical breakpoint[1]	-	-	2/2	-	8/8	-	IE	-	-	-	-
H. influenzae	**ECOFF**[1]	4	0.06	0.06	0.125	1	-	ND	ND	-	-	-
	Systemic clinical breakpoint[1]	IE	0.06/0.06	0.06/0.06	0.06/0.06	2/2	-	-	-	-	-	-
***Moraxella* spp.**	**ECOFF**[1,2]	0.25	0.125	0.125	0.25	2	-	ND	ND	-	-	-
	Systemic clinical breakpoint[1]	IE	0.5/0.5	1/1	0.5/0.5	2/2	-	-	-	-	-	-

Notes

[1] ECOFFs and systemic clinical breakpoints in mg/L.

[2] This ECOFF is representative of ECOFFs for the most relevant species.

[3] Agents also available for systemic use.

[4] Breakpoints for nasal decontamination S≤1, R>256 mg/L (S≥30, R<18 mm for the mupirocin 200 µg disks). Intermediate isolates are associated with short term suppression (useful preoperatively) but, unlike susceptible isolates, long term eradication rates are low.

ND = No ECOFF defined on EUCAST MIC distribution website.

PK-PD (Non-species related) breakpoints

EUCAST Clinical Breakpoint Tables v. 8.0, valid from 2018-01-01

These breakpoints are used only when there are no species-specific breakpoints or other recommendations (a dash or a note) in the species-specific tables.
If the MIC is greater than the PK-PD resistant breakpoint, advise against use of the agent.
If the MIC is less than or equal to the PK-PD susceptible breakpoint, suggest that the agent can be used with caution. The MIC may also be reported although this is not essential. Include a note that the guidance is based on PK-PD breakpoints only, and include the dosage on which PK-PD breakpoint is based.
More information is available in the guidance document "Antimicrobial susceptibility tests on groups of organisms or agents for which there are no EUCAST breakpoints".

Penicillins	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Benzylpenicillin	0.25	2	**1.** For susceptibility testing purposes, the concentration of sulbactam is fixed at 4 mg/L.
Ampicillin	2	8	**2.** For susceptibility testing purposes, the concentration of clavulanic acid is fixed at 2 mg/L.
Ampicillin-sulbactam	2[1]	8[1]	**3.** For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Amoxicillin	2	8	
Amoxicillin-clavulanic acid	2[2]	8[2]	
Piperacillin	4	16	
Piperacillin-tazobactam	4[3]	16[3]	
Ticarcillin	8	16	
Ticarcillin-clavulanic acid	8[2]	16[2]	
Temocillin	IE	IE	
Phenoxymethylpenicillin	IE	IE	
Oxacillin	IE	IE	
Cloxacillin	IE	IE	
Dicloxacillin	IE	IE	
Flucloxacillin	IE	IE	
Mecillinam	IE	IE	

Cephalosporins	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Cefaclor	IE	IE	**1**. Based on PK-PD target for Gram-negative organisms. **2.** For susceptibility testing purposes, the concentration of avibactam is fixed at 4 mg/L. **3**. Breakpoints are based on ceftolozane data. **4**. For susceptibility testing purposes, the concentration of tazobactam is fixed at 4 mg/L.
Cefadroxil	IE	IE	
Cefalexin	IE	IE	
Cefazolin	1	2	
Cefepime	4	8	
Cefixime	IE	IE	
Cefotaxime	1	2	
Cefoxitin	IE	IE	
Cefpodoxime	IE	IE	
Ceftaroline	0.5[1]	0.5[1]	
Ceftazidime	4	8	
Ceftazidime-avibactam	8[2]	8[2]	
Ceftibuten	IE	IE	
Ceftobiprole	4	4	
Ceftolozane-tazobactam	4[3,4]	4[3,4]	
Ceftriaxone	1	2	
Cefuroxime iv	4	8	
Cefuroxime oral	IE	IE	

Carbapenems	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Doripenem	1	2	
Ertapenem	0.5	1	
Imipenem	2	8	
Meropenem	2	8	

Monobactams	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Aztreonam	4	8	

Fluoroquinolones	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Ciprofloxacin	0.25	0.5	
Levofloxacin	0.5	1	
Moxifloxacin	0.25	0.25	
Nalidixic acid (screen)	IE	IE	
Norfloxacin	IE	IE	
Ofloxacin	0.25	0.5	

Aminoglycosides	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Amikacin	IE	IE	
Gentamicin	IE	IE	
Netilmicin	IE	IE	
Tobramycin	IE	IE	

Glycopeptides and lipoglycopeptides	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Dalbavancin	0.25[1]	0.25[1]	**1.** For broth microdilution MIC determination, the medium must be supplemented with polysorbate-80 to a final concentration of 0.002%.
Oritavancin	0.125[1,2]	0.125[1,2]	**2.** PK-PD breakpoints are based on *S. aureus* . For *S. pyogenes* there is uncertainty regarding the PK-PD target. For broth microdilution MIC determination, the medium must be supplemented with polysorbate-80 to a final concentration of 0.002%.
Teicoplanin	IE	IE	
Telavancin	IE	IE	
Vancomycin	IE	IE	

Macrolides, lincosamides and streptogramins	MIC breakpoint (mg/L)		Notes
	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)		Notes
	S ≤	R >	
Doxycycline	IE	IE	**1.** For tigecycline broth microdilution MIC determination, the medium must be prepared fresh on the day of use.
Minocycline	IE	IE	
Tetracycline	IE	IE	
Tigecycline	0.25[1]	0.5[1]	

Oxazolidinones	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Linezolid	2	4	
Tedizolid	IE	IE	

Miscellaneous agents	MIC breakpoint (mg/L)		Notes
	S ≤	R >	
Chloramphenicol	IE	IE	
Colistin	IE	IE	
Daptomycin	IE	IE	
Fosfomycin iv	IE	IE	
Fosfomycin oral	IE	IE	
Fusidic acid	IE	IE	
Metronidazole	IE	IE	
Nitrofurantoin	IE	IE	
Nitroxoline	IE	IE	
Rifampicin	IE	IE	
Spectinomycin	IE	IE	
Trimethoprim	IE	IE	
Trimethoprim-sulfamethoxazole	IE	IE	

Dosages

EUCAST breakpoints are based on the following dosages (see section 8 in Rationale Documents).

Penicillins	Standard dose	High dose	Special situations
Benzylpenicillin	0.6 g x 4 iv	1.2 g x 4-6 iv	**Meningitis:** For a dose of 2.4 g x 6 iv, isolates with MIC≤0.06 mg/L are susceptible. **Pneumonia caused by *S. pneumoniae:* breakpoints are related to dosage:** For a dose of 1.2 g x 4 iv, isolates with MIC ≤0.5 mg/L are susceptible. For a dose of 2.4 g x 4 iv or 1.2 g x 6 iv, isolates with MIC ≤1 mg/L are susceptible. For a dose of 2.4 g x 6 iv, isolates with MIC ≤2 mg/L are susceptible.
Ampicillin	1 g x 3-4 iv depending on species and/or infection type	2 g x 3-4 iv depending on species and/or infection type	**Meningitis:** 2 g x 6 iv
Ampicillin-sulbactam	3 g x 3 iv	3 g x 4 iv	
Amoxicillin	0.5 g x 3 iv Oral dosage under discussion	2 g x 6 iv Oral dosage under discussion	**Meningitis:** 2 g x 6 iv
Amoxicillin-clavulanic acid	(1 g amoxicillin + 0.2 g clavulanic acid) x 3 iv Oral dosage under discussion	(2 g amoxicillin + 0.2 g clavulanic acid) x 3 iv Oral dosage under discussion	
Piperacillin	4 g x 3 iv	4 g x 4 iv	***Pseudomonas* spp.:** High dose only
Piperacillin-tazobactam	(4 g piperacillin + 0.5 g tazobactam) x 3 iv	(4 g piperacillin + 0.5 g tazobactam) x 4 iv	***Pseudomonas* spp.:** High dose only
Ticarcillin	3 g x 4 iv	3 g x 6 iv	***Pseudomonas* spp.:** High dose only
Ticarcillin-clavulanic acid	(3 g ticarcillin + 0.1 g clavulanic acid) x 4 iv	(3 g ticarcillin + 0.1 g clavulanic acid) x 6 iv	***Pseudomonas* spp.:** High dose only
Phenoxymethylpenicillin	0.5-2 g x 3-4 oral depending on species and/or infection type	None	
Oxacillin	Clinical breakpoints not available	Clinical breakpoints not available	
Cloxacillin	0.5 g x 4 oral or 1 g x 4 iv	1 g x 4 oral or 2 g x 6 iv	
Dicloxacillin	0.5-1 g x 4 oral or 1 g x 4 iv	2 g x 4 oral or 2 g x 6 iv	
Flucloxacillin	1 g x 3 oral or 2 g x 4 iv	1 g x 4 oral or 2 g x 6 iv	
Mecillinam	0.2 g x 3 oral	0.4 g x 3 oral	

Cephalosporins	Standard dose	High dose	Special situations
Cefaclor	0.25-1 g x 3 oral depending on species and/or infection type	None	***Staphylococcus* spp.:** Minimum dose 0.5 g x 3
Cefadroxil	0.5-1 g x 2 oral depending on species and/or infection type	None	
Cefalexin	0.25-1 g x 2-3 oral depending on species and/or infection type	None	
Cefazolin	1-2 g x 3 iv depending on species and/or infection type	None	
Cefepime	2 g x 2 iv	2 g x 3 iv	***Pseudomonas* spp.:** High dose only
Cefixime	0.2-0.4 g x 2 oral	None	**Gonorrhoea:** 0.4 g oral as a single dose
Cefotaxime	1 g x 3 iv	2 g x 3 iv	**Meningitis:** 2 g x 4 iv **Gonorrhoea:** 0.5 g im as a single dose
Cefpodoxime	0.1-0.2 g x 2 oral depending on species and/or infection type	None	
Ceftaroline	0.6 g x 2 iv over 1 hour	0.6 g x 3 iv over 2 hours	***S. aureus* in complicated skin and skin structure infections:** There is some PK-PD evidence to suggest that isolates with MICs of 4 mg/L could be treated with high dose.
Ceftazidime	1 g x 3 iv	2 g x 3 iv	***Pseudomonas* spp.:** High dose only
Ceftazidime-avibactam	(2 g ceftazidime + 0.5 g avibactam) x 3 over 2 hours	None	
Ceftibuten	0.4 g x 1 oral	None	
Ceftobiprole	0.5 g x 3 iv over 2 hours	None	
Ceftolozane-tazobactam	(1 g ceftolozane + 0.5 g tazobactam) x 3 iv over 1 hour	Under evaluation	
Ceftriaxone	1 g x 1 iv	2 g x 1 iv	**Meningitis:** 4 g x 1 iv **Gonorrhoea:** 0.5 g im as a single dose
Cefuroxime iv	0.75 g x 3 iv	1.5 g x 3 iv	***E. coli*, *Klebsiella* spp., *P. mirabilis*:** High dose only
Cefuroxime oral	0.25-0.5 g x 2 oral depending on species and/or infection type	None	

Carbapenems	Standard dose	High dose	Special situations
Doripenem	0.5 g x 3 iv over 1 hour	1 g x 3 iv over 4 hours	***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp.:** High dose only
Ertapenem	1 g x 1 iv over 30 minutes	None	
Imipenem	0.5 g x 4 iv over 30 minutes	1 g x 4 iv over 30 minutes	***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp.:** High dose only
Meropenem	1 g x 3 iv over 30 minutes	2 g x 3 iv over 30 minutes	**Meningitis:** 2 g x 3 iv over 30 minutes

Monobactams	Standard dose	High dose	Special situations
Aztreonam	1 g x 3 iv	2 g x 4 iv	***Pseudomonas* spp.:** High dose only

Fluoroquinolones	Standard dose	High dose	Special situations
Ciprofloxacin	0.5 g x 2 oral or 0.4 g x 2 iv	0.75 g x 2 oral or 0.4 g x 3 iv	***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp.:** High dose only ***Staphylococcus* spp.:** High dose only **Gonorrhoea:** 0.5 g oral as a single dose
Levofloxacin	0.5 g x 1 oral or 0.5 g x 1 iv	0.5 g x 2 oral or 0.5 g x 2 iv	***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp**.: High dose only. ***S. pneumoniae*:** High dose only
Moxifloxacin	0.4 g x 1 oral or 0.4 g x 1 iv	None	
Norfloxacin	0.4 g x 2 oral	None	
Ofloxacin	0.2 g x 2 oral or 0.2 g x 2 iv	0.4 g x 2 oral or 0.4 g x 2 iv	***Staphylococcus* spp.:** High dose only

Aminoglycosides	Standard dose	High dose	Special situations
Amikacin	20 mg/kg x 1 iv	30 mg/kg x 1 iv	**Enterobacteriaceae:** High dose only ***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp.:** High dose only
Gentamicin	5 mg/kg x 1 iv	7 mg/kg x 1 iv	**Enterobacteriaceae:** High dose only ***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp.:** High dose only
Netilmicin	5 mg/kg x 1 iv	7 mg/kg x 1 iv	**Enterobacteriaceae:** High dose only ***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp.:** High dose only
Tobramycin	5 mg/kg x 1 iv	7 mg/kg x 1 iv	**Enterobacteriaceae:** High dose only ***Pseudomonas* spp.:** High dose only ***Acinetobacter* spp.:** High dose only

Glycopeptides and lipoglycopeptides	Standard dose	High dose	Special situations
Dalbavancin	1 g x 1 iv over 30 minutes on day 1 If needed, 0.5 g x 1 iv over 30 minutes on day 8	None	
Oritavancin	1.2 g x 1 (single dose) iv over 3 hours	None	
Teicoplanin	0.4 g x 1 iv	0.8 g x 1 iv or 0.4 g x 2 iv	
Telavancin	10 mg/kg x 1 iv over 1 hour	None	
Vancomycin	0.5 g x 4 iv or 1 g x 2 iv or 2 g x 1 by continuous infusion	None	

Macrolides, lincosamides and streptogramins	Standard dose	High dose	Special situations
Azithromycin	0.5 g x 1 oral or 0.5 g x 1 iv	None	**Gonorrhoea:** 2 g oral as a single dose
Clarithromycin	0.25 g x 2 oral	0.5 g x 2 oral	
Erythromycin	0.5 g x 2-4 oral or 0.5 g x 2-4 iv	1 g x 4 oral or 1 g x 4 iv	
Roxithromycin	0.15 g x 2 oral	None	
Telithromycin	0.8 g x 1 oral	None	
Clindamycin	0.3 g x 2 oral or 0.6 g x 3 iv	0.3 g x 4 oral or 1.2 g x 2 iv	
Quinupristin-dalfopristin	7.5 mg/kg x 2 iv	7.5 mg/kg x 3 iv	

Tetracyclines	Standard dose	High dose	Special situations
Doxycycline	0.1 g x 1 oral	0.2 g x 1 oral	
Minocycline	0.1 g x 2 oral	None	
Tetracycline	0.25 g x 4 oral	0.5 g x 4 oral	
Tigecycline	0.1 g loading dose followed by 50 mg x 2 iv	None	

Oxazolidinones	Standard dose	High dose	Special situations
Linezolid	0.6 g x 2 oral or 0.6 g x 2 iv	None	
Tedizolid	0.2 g x 1 oral	None	

Miscellaneous agents	Standard dose	High dose	Special situations
Chloramphenicol	1 g x 4 oral or 1 g x 4 iv	2 g x 4 oral or 2 g x 4 iv	
Colistin	2 MU x 3 iv with a loading dose of 9 MU	None	
Daptomycin	0.25 g x 1 iv	0.5 g x 1 iv	
Fosfomycin iv	4 g x 3 iv	8 g x 3 iv	
Fosfomycin oral	3 g x 1 oral as a single dose	None	
Fusidic acid	0.5 g x 2 oral or 0.5 g x 2 iv	0.5 g x 3 oral or 0.5 g x 3 iv	
Metronidazole	0.4 g x 3 oral or 0.4 g x 3 iv	0.5 g x 3 oral or 0.5 g x 3 iv	
Nitrofurantoin	50 mg x 3 oral	0.1 g x 4 oral	
Nitroxoline	0.25 g x 3 oral	None	
Rifampicin	0.6 g x 1 oral or 0.6 g x 1 iv	0.6 g x 2 oral or 0.6 g x 2 iv	
Spectinomycin	2 g x 1 im	None	**Gonorrhoea:** 2 g im as a single dose
Trimethoprim	0.16 g x 2 oral	None	
Trimethoprim-sulfamethoxazole	(0.16 g trimethoprim + 0.8 g sulfa) x 2 oral or (0.16 g trimethoprim + 0.8 g sulfa) x 2 iv	(0.24 g trimethoprim + 1.2 g sulfa) x 2 oral or (0.24 g trimethoprim + 1.2 g sulfa) x 2 iv	***Stenotrophomonas maltophilia*** **:** High dose only