

# Breakpoints

**Table 1. Interpretive Categories Used for Susceptibility Testing of *Salmonella* and *E. coli*<sup>1</sup>**

Antimicrobial Class	Antimicrobial Agent	Susceptible Breakpoints (µg/ml)	Intermediate Breakpoints (µg/ml)	Resistant Breakpoints (µg/ml)
Aminoglycosides	Gentamicin	≤ 4	8	≥ 16
	Streptomycin before 2014	≤ 32	N/A	≥ 64
	Streptomycin beginning in 2014	≤ 16	N/A	≥ 32
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin–Clavulanic Acid	≤ 8 / 4	16 / 8	≥ 32 / 16
Carbapenem	Meropenem	≤ 1	2	≥ 4
Cephems	Cefoxitin	≤ 8	16	≥ 32
	Ceftriaxone	≤ 1	2	≥ 4
Folate Pathway Inhibitors	Sulfamethoxazole/Sulfisoxazole <sup>2</sup>	≤ 256	N/A	≥ 512
	Trimethoprim–Sulfamethoxazole	≤ 2 / 38	N/A	≥ 4 / 76
Macrolides	Azithromycin	≤ 16	N/A	≥ 32
Penicillins	Ampicillin	≤ 8	16	≥ 32
Phenicol	Chloramphenicol	≤ 8	16	≥ 32
Quinolones	Ciprofloxacin <sup>3</sup>	≤ 0.06	≥0.12	≥0.12
	Nalidixic acid	≤ 16	N/A	≥ 32
Tetracyclines	Tetracycline	≤ 4	8	≥ 16

<sup>1</sup> Breakpoints were adopted from CLSI (Clinical and Laboratory Standards Institute) M100-S29 document, except for streptomycin and azithromycin, which has no CLSI breakpoints.

<sup>2</sup> Sulfamethoxazole was tested from 1996 through 2003 and was replaced by sulfisoxazole in 2004.

<sup>3</sup> In 2012, the Clinical and Laboratory Standards Institute (CLSI)'s M100-S27 expanded the Minimum Inhibitory Concentration (MIC) range that defines the intermediate susceptibility category for ciprofloxacin. We now use decreased susceptibility to ciprofloxacin (DSC, MIC ≥ 0.12 µg/ml) as a marker for emerging fluoroquinolone resistance (CLSI, 2017).

**Table 2. Interpretive Categories Used for Susceptibility Testing of *Campylobacter*<sup>4</sup>**

Antimicrobial Class	Antimicrobial Agent	<i>C. jejuni</i> Susceptible Breakpoints (µg/ml)	<i>C. jejuni</i> Resistant Breakpoints (µg/ml)	<i>C. coli</i> Susceptible Breakpoints (µg/ml)	<i>C. coli</i> Resistant Breakpoints (µg/ml)
<b>Aminoglycosides</b>	Gentamicin	≤ 2	≥ 4	≤ 2	≥ 4
<b>Ketolides</b>	Telithromycin	≤ 4	≥ 8	≤ 4	≥ 8
<b>Lincosamides</b>	Clindamycin	≤ 0.5	≥ 1	≤ 1	≥ 2
<b>Macrolides</b>	Azithromycin	≤ 0.25	≥ 0.5	≤ 0.5	≥ 1
	Erythromycin	≤ 4	≥ 8	≤ 8	≥ 16
<b>Phenicol</b>	Chloramphenicol	≤ 16	≥ 32	≤ 16	≥ 32
	Florfenicol	≤ 4	≥ 8	≤ 4	≥ 8
<b>Quinolones</b>	Ciprofloxacin	≤ 0.5	≥ 1	≤ 0.5	≥ 1
	Nalidixic acid	≤ 16	≥ 32	≤ 16	≥ 32
<b>Tetracyclines</b>	Doxycycline	≤ 0.5	≥ 1	≤ 1	≥ 2
	Tetracycline	≤ 1	≥ 2	≤ 2	≥ 4

<sup>4</sup> Breakpoints were adopted from epidemiological cut off values

**Table 3. Interpretive Categories Used for Susceptibility Testing of *Enterococcus*<sup>5</sup>**

Antimicrobial Class	Antimicrobial Agent	Susceptible Breakpoints (µg/ml)	Intermediate Breakpoints (µg/ml)	Resistant Breakpoints (µg/ml)
Aminoglycosides	Gentamicin	≤ 500	N/A	>500
	Kanamycin <sup>6</sup>	≤ 512	N/A	≥ 1024
	Streptomycin	≤ 512	N/A	≥ 1024
Glycopeptides	Vancomycin	≤ 4	8–16	≥ 32
Glycylcyclines	Tigecycline <sup>6,7</sup>	≤ 0.25	N/A	N/A
Lincosamides	Lincomycin <sup>6</sup>	≤ 2	4	≥ 8
Lipopeptides	Daptomycin <sup>8</sup>	≤ 4	N/A	N/A
Macrolides	Erythromycin	≤ 0.5	1– 4	≥ 8
	Tylosin <sup>6</sup>	≤ 8	16	≥ 32
Nitrofurans	Nitrofurantoin	≤ 32	64	≥ 128
Oxazolidinones	Linezolid	≤ 2	4	≥ 8
Penicillins	Penicillin	≤ 8	N/A	≥ 16
Phenicol	Chloramphenicol	≤ 8	16	≥ 32
Quinolone	Ciprofloxacin	≤ 1	2	≥ 4
Streptogramins	Quinupristin/Dalfopristin	≤ 1	2	≥ 4
Tetracyclines	Tetracycline	≤ 4	8	≥ 16

<sup>5</sup> Breakpoints were adopted from CLSI (Clinical and Laboratory Standards Institute) M100-S26 document, where available.

<sup>6</sup> No CLSI interpretive categories for this bacterium/antimicrobial combination currently available.

<sup>7</sup> Only a susceptible breakpoint (≤0.25 µg/ml) has been established. Isolates with an MIC ≥0.5 µg/ml are reported as resistant.

<sup>8</sup> Only a susceptible breakpoint (≤4 µg/ml) has been established for *E. faecalis*. Isolates with an MIC ≥8 µg/ml are reported as resistant. There are no established CLSI breakpoints for *E. faecium* and *E. hirae*.