

Breakpoints Eliminated From CLSI Document M100 Since 2010

Antimicrobial Agent	Disk Content	Interpretive Categories and Zone Diameter Breakpoints, Nearest Whole mm				Interpretive Categories and MIC Breakpoints, µg/mL				M100 Edition in Which Breakpoints Were Last Included/Comments	Rationale
		S	I	R		S	I	R			
Enterobacteriales											
Cephalothin (surrogate test for uncomplicated UTI)	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32	M100-S25	Cefazolin is a more reliable surrogate than cephalothin for predicting results for oral cephalosporins that might be used for treatment of uncomplicated UTIs.		
Nalidixic acid	30 µg	≥ 19	14-18	≤ 13	≤ 16	-	≥ 32	M100S, 26th ed. Deleted for <i>Salmonella</i> spp. only	Nalidixic acid does not perform reliably in predicting susceptibility to fluoroquinolones that might be used for treatment of <i>Salmonella</i> infections. It has been shown to produce both false-resistant and false-susceptible results. ^{1,2}		
Piperacillin	100 µg	≥ 21	18-20	≤ 17	-	-	-	M100-Ed31	Disk diffusion breakpoints deleted because disk correlates for revised MIC breakpoints were reassessed.		
Ticarcillin	75 µg	≥ 20	15-19	≤ 14	≤ 16	32-64	≥ 128	M100-S25	This agent is no longer available.		
<i>Pseudomonas aeruginosa</i>											
Cefoperazone	75 µg	≥ 21	16-20	≤ 15	≤ 16	32	≥ 64	M100-S20	These agents are no longer available or have limited indications for <i>P. aeruginosa</i> .		
Cefotaxime	30 µg	≥ 23	15-22	≤ 14	≤ 8	16-32	≥ 64	M100-S20			
Ceftizoxime	30 µg	≥ 20	15-19	≤ 14	≤ 8	16-32	≥ 64	M100-S20			
Ceftriaxone	30 µg	≥ 21	14-20	≤ 13	≤ 8	16-32	≥ 64	M100-S20			
Gentamicin	10 µg	≥ 15	13-14 ^a	≤ 12	≤ 4	8 ^a	≥ 16	M100-Ed32			
Moxalactam	30 µg	≥ 23	15-22	≤ 14	≤ 8	16-32	≥ 64	M100-S20			
Ticarcillin	75 µg	≥ 24	16-23	≤ 15	≤ 16	32-64	≥ 128	M100-S25			
<i>Acinetobacter</i> spp.											
Doxycycline	30 µg	≥ 13	10-12	≤ 9	≤ 4	8	≥ 16	M100-Ed34	MIC and disk diffusion breakpoints were removed based on data showing that two CLSI reference AST methods, BMD and AD, do not correlate.		
Mezlocillin	75 µg	≥ 21	18-20	≤ 17	≤ 16	32-64	≥ 128	M100-S25	This agent is no longer available.		
Tetracycline	30 µg	≥ 15	12-14	≤ 11	≤ 4	8	≥ 16	M100 Ed-34	MIC and disk diffusion breakpoints were removed based on data showing that two CLSI reference AST methods, BMD and AD, do not correlate.		
Ticarcillin	75 µg	≥ 20	15-19	≤ 14	≤ 16	32-64	≥ 128	M100-S25	This agent is no longer available.		
<i>Burkholderia cepacia</i> Complex											
Ceftazidime	30 µg	≥ 21	18-20	≤ 17	≤ 8	16	≥ 32	M100-Ed33 (disk diffusion)	MIC and disk diffusion breakpoints were removed based on data showing that two CLSI reference AST methods, BMD and AD, do not correlate.		
Chloramphenicol	-	-	-	-	≤ 8	16	≥ 32	M100-Ed34 (MIC)			
Levofloxacin	-	-	-	-	≤ 2	4	≥ 8				
Meropenem	10 µg	≥ 20	16-19	≤ 15	≤ 4	8	≥ 16				
Minocycline	30 µg	≥ 19	15-18	≤ 14	≤ 4	8	≥ 16				
Ticarcillin-clavulanate	-	-	-	-	≤ 16/2	32/2-64/2	≥ 128/2				
Trimethoprim-sulfamethoxazole	1.25/23.75 µg	≥ 16	11-15	≤ 10	≤ 2/38	-	≥ 4/76				
<i>Stenotrophomonas maltophilia</i>											
Ceftazidime	-	-	-	-	≤ 8	16	≥ 32	M100-Ed33	MIC breakpoints were removed due to limited PK/PD studies and other data used when the breakpoint was established.		

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		S	I	R	S	I	R					
Other Non-Enterobacteriales												
Carbenicillin	N/A	-	-	-	≤ 16	32	≥ 64	M100-S25			These agents are no longer available.	
Mezlocillin	N/A	-	-	-	≤ 16	32-64	≥ 128					
Ticarcillin	N/A	-	-	-	≤ 16	32-64	≥ 128					
Staphylococcus spp.												
Oxacillin	1 µg	≥ 13	11-12	≤ 10	-	-	-	-	M100-S22	Oxacillin disk diffusion performance is inferior to that of cefoxitin for detection of <i>mecA</i> -mediated oxacillin resistance.		
<i>S. aureus</i> / <i>S. lugdunensis</i>												
Amoxicillin-clavulanate	20/10 µg	≥ 20	-	≤ 19	≤ 4/2	-	≥ 8/4	-	≥ 8/4	There are limited data available to demonstrate the predictive value of testing these β-lactam agents against staphylococci. Consequently, susceptibility results for antistaphylococcal β-lactams other than penicillin and oxacillin (cefoxitin) are best determined by deducing results from testing penicillin and oxacillin (cefoxitin). An exception is for ceftaroline, which must be tested if ceftaroline results are requested. ³		
Ampicillin-sulbactam	10/10 µg	≥ 15	12-14	≤ 11	≤ 8/4	16/8	≥ 32/16					
Piperacillin-tazobactam	100/10 µg	≥ 18	-	≤ 17	≤ 8/4	-	≥ 16/4					
Ticarcillin-clavulanate	75/10 µg	≥ 23	-	≤ 22	≤ 8/2	-	≥ 16/2					
Cefaclor	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Cefamandole	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Cefazolin	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Cefepime	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Cefdinir	5 µg	≥ 20	17-19	≤ 16	≤ 1	2	≥ 4					
Cefmetazole	30 µg	≥ 16	13-15	≤ 12	≤ 16	32	≥ 64					
Cefonicid	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Cefoperazone	75 µg	≥ 21	16-20	≤ 15	≤ 16	32	≥ 64					
Cefotaxime	30 µg	≥ 23	15-22	≤ 14	≤ 8	16-32	≥ 64					
Cefotetan	30 µg	≥ 16	13-15	≤ 12	≤ 16	32	≥ 64					
Cefpodoxime	10 µg	≥ 21	18-20	≤ 17	≤ 2	4	≥ 8					
Cefprozil	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Ceftazidime	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Ceftizoxime	30 µg	≥ 20	15-19	≤ 14	≤ 8	16-32	≥ 64					
Ceftriaxone	30 µg	≥ 21	14-20	≤ 13	≤ 8	16-32	≥ 64					
Cefuroxime (oral)	30 µg	≥ 23	15-22	≤ 14	≤ 4	8-16	≥ 32					
Cefuroxime (parenteral)	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Cephalothin	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Loracarbef	30 µg	≥ 18	15-17	≤ 14	≤ 8	16	≥ 32					
Moxalactam	30 µg	≥ 23	15-22	≤ 14	≤ 8	16-32	≥ 64					
Doripenem	10 µg	≥ 30	-	-	≤ 0.5	-	-					
Ertapenem	10 µg	≥ 19	16-18	≤ 15	≤ 2	4	≥ 8					
Imipenem	10 µg	≥ 16	14-15	≤ 13	≤ 4	8	≥ 16					
Meropenem	10 µg	≥ 16	14-15	≤ 13	≤ 4	8	≥ 16					

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<i>Staphylococcus</i> spp. (continued)											
Amikacin	30 µg	≥ 17	15-16	≤ 14	≤ 16	32	≥ 64		M100, 27th ed.	According to current guidelines, if an aminoglycoside is warranted, only gentamicin in combination with another active drug should be used for treatment of methicillin-resistant staphylococcal infections; none of these other aminoglycosides should be considered.	
Kanamycin	30 µg	≥ 18	14-17	≤ 13	≤ 16	32	≥ 64				
Netilmicin	30 µg	≥ 15	13-14	≤ 12	≤ 8	16	≥ 32				
Tobramycin	10 µg	≥ 15	13-14	≤ 12	≤ 4	8	≥ 16				
Telithromycin	15 µg	≥ 22	19-21	≤ 18	≤ 1	2	≥ 4		M100, 28th ed.	This agent is no longer available.	
<i>Haemophilus influenzae</i> and <i>Haemophilus parainfluenzae</i>											
Amoxicillin-clavulanate	20/10 µg	≥ 20	-	≤ 19	-	-	-		M100-Ed31	These breakpoints do not correlate with revised MIC breakpoints.	
Telithromycin	15 µg	≥ 15	12-14	≤ 11	≤ 4	8	≥ 16		M100, 28th ed.	This agent is no longer available.	
<i>Neisseria gonorrhoeae</i>											
Cefuroxime	30 µg	≥ 31	26-30	≤ 25	≤ 1	2	≥ 4		M100, 28th ed.	These agents currently have no role in the management of gonococcal infections. They are not on the list of recommended treatments, in contemporary treatment guidelines for uncomplicated infections, or for special situations.	
Cefmetazole	30 µg	≥ 33	28-32	≤ 27	≤ 2	4	≥ 8				
Ceftazidime	30 µg	≥ 31	-	-	≤ 0.5	-	-				
Cefetamet	10 µg	≥ 29	-	-	≤ 0.5	-	-				
Enoxacin	10 µg	≥ 36	32-35	≤ 31	≤ 0.5	1	≥ 2				
Floxacin	5 µg	≥ 35	29-34	≤ 28	≤ 0.25	0.5	≥ 1				
Lomefloxacin	10 µg	≥ 38	27-37	≤ 26	≤ 0.12	0.25-1	≥ 2				
Ofloxacin	5 µg	≥ 31	25-30	≤ 24	≤ 0.25	0.5-1	≥ 2				
<i>Streptococcus pneumoniae</i>											
Telithromycin	15 µg	≥ 19	16-18	≤ 15	≤ 1	2	≥ 4		M100, 28th ed.	This agent is no longer available.	
<i>Neisseria meningitidis</i>											
Sulfisoxazole	N/A	-	-	-	≤ 2	4	≥ 8		M100-Ed34	This agent is no longer available.	
Anaerobes											
Mezlocillin	N/A	-	-	-	≤ 32	64	≥ 128		M100-525	These agents are no longer available.	
Ticarcillin	N/A	-	-	-	≤ 32	64	≥ 128				
Piperacillin	N/A	-	-	-	≤ 32	64	≥ 128		M100, 30th ed.	This agent is no longer available.	

Abbreviations: AD, agar dilution; AST, antimicrobial susceptibility testing; BMD, broth microdilution; I, intermediate; MIC, minimal inhibitory concentration; N/A, not applicable; PK/PD, pharmacokinetics/pharmacodynamics; R, resistant; S, susceptible; UTI, urinary tract infection.
 Symbol: ^, designation for agents that have the potential to concentrate in the urine.

References

- 1 Deak E, Skov R, Hindler JA, Humphries RM. Evaluation of surrogate disk tests for detection of ciprofloxacin and levofloxacin resistance in clinical isolates of *Salmonella enterica*. *J Clin Microbiol*. 2015;53(11):3405-3410. doi:10.1128/JCM.01393-15
- 2 Skov R, Matuschek E, Sjölund-Karlsson M, et al. Development of a pefloxacin disk diffusion method for detection of fluoroquinolone-resistant *Salmonella enterica*. *J Clin Microbiol*. 2015;53(11):3411-3417. doi: 10.1128/JCM.01287-15
- 3 Dien Bard J, Hindler JA, Gold HS, Limbago B. Rationale for eliminating *Staphylococcus* breakpoints for β-lactam agents other than penicillin, oxacillin or ceftaxitin, and ceftaroline. *Clin Infect Dis*. 2014;58(9):1287-1296. doi:10.1093/cid/ciu043