Table 4A-1. Disk Diffusion QC Ranges for Nonfastidious Organisms and Antimicrobial Agents Excluding β-Lactam Combination Agents[a]

Antimicrobial Agent	Disk Content	Disk Diffusion QC Ranges, mm		
		Escherichia coli ATCC®[b] 25922	*Pseudomonas aeruginosa* ATCC® 27853	*Staphylococcus aureus* ATCC® 25923
Amikacin	30 µg	19-26	20-26	20-26
Ampicillin	10 µg	15-22	–	27-35
Azithromycin	15 µg	–	–	21-26
Azlocillin	75 µg	–	24-30	–
Aztreonam	30 µg	28-36	23-29	–
Carbenicillin	100 µg	23-29	18-24	–
Cefaclor	30 µg	23-27	–	27-31
Cefamandole	30 µg	26-32	–	26-34
Cefazolin	30 µg	21-27	–	29-35
Cefdinir	5 µg	24-28	–	25-32
Cefditoren	5 µg	22-28	–	20-28
Cefepime	30 µg	31-37	25-31	23-29
Cefetamet	10 µg	24-29	–	–
Cefiderocol	30 µg	25-31	22-31	–
Cefixime	5 µg	20-26	–	–
Cefmetazole	30 µg	26-32	–	25-34
Cefonicid	30 µg	25-29	–	22-28
Cefoperazone	75 µg	28-34	23-29	24-33
Cefotaxime	30 µg	29-35	18-22	25-31
Cefotetan	30 µg	28-34	–	17-23
Cefoxitin[c]	30 µg	23-29	–	23-29
Cefpodoxime	10 µg	23-28	–	19-25
Cefprozil	30 µg	21-27	–	27-33
Ceftaroline	30 µg	26-34	–	26-35
Ceftazidime	30 µg	25-32	22-29	16-20

Table 4A-1. (Continued)

Antimicrobial Agent	Disk Content	Disk Diffusion QC Ranges, mm		
		Escherichia coli ATCC®[b] 25922	*Pseudomonas aeruginosa* ATCC® 27853	*Staphylococcus aureus* ATCC® 25923
Ceftibuten	30 µg	27-35	–	–
Ceftizoxime	30 µg	30-36	12-17	27-35
Ceftobiprole	5 µg	25-31	–	20-27
Ceftriaxone	30 µg	29-35	17-23	22-28
Cefuroxime	30 µg	20-26	–	27-35
Cephalothin	30 µg	15-21	–	29-37
Chloramphenicol	30 µg	21-27	–	19-26
Cinoxacin	100 µg	26-32	–	–
Ciprofloxacin	5 µg	29-38	25-33	22-30
Clarithromycin	15 µg	–	–	26-32
Clinafloxacin	5 µg	31-40	27-35	28-37
Clindamycin[d]	2 µg	–	–	24-30
Colistin	10 µg	11-17	11-17	–
Contezolid	**5 µg**	**–**	**–**	**17-23**
Delafloxacin[e]	5 µg	28-35	23-29	32-40
Dirithromycin	15 µg	–	–	18-26
Doripenem	10 µg	27-35	28-35	33-42
Doxycycline	30 µg	18-24	–	23-29
Enoxacin	10 µg	28-36	22-28	22-28
Eravacycline	20 µg	17-24	–	19-26
Ertapenem	10 µg	29-36	13-21	24-31
Erythromycin[d]	15 µg	–	–	22-30
Faropenem	5 µg	20-26	–	27-34
Fleroxacin	5 µg	28-34	12-20	21-27
Fosfomycin[f]	200 µg	22-30	–	25-33
Fusidic acid	10 µg	–	–	24-32
Garenoxacin	5 µg	28-35	19-25	30-36

Table 4A-1
Nonfastidious Disk Diffusion QC Excluding β-Lactam Combination Agents
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Table 4A-1. (Continued)

Antimicrobial Agent	Disk Content	Disk Diffusion QC Ranges, mm		
		Escherichia coli ATCC®[b] 25922	*Pseudomonas aeruginosa* ATCC® 27853	*Staphylococcus aureus* ATCC® 25923
Gatifloxacin	5 µg	30-37	20-28	27-33
Gemifloxacin	5 µg	29-36	19-25	27-33
Gentamicin[g]	10 µg	19-26	17-23	19-27
Gepotidacin	10 µg	18-26	–	23-29
Grepafloxacin	5 µg	28-36	20-27	26-31
Iclaprim	5 µg	14-22	–	25-33
Imipenem[h]	10 µg	26-32	20-28	–
Kanamycin	30 µg	17-25	–	19-26
Lefamulin	20 µg	–	–	26-32
Levofloxacin	5 µg	29-37	19-26	25-30
Levonadifloxacin	10 µg	27-33[e]	17-23[e]	32-39[e]
Linezolid	30 µg	–	–	24-30
Lomefloxacin	10 µg	27-33	22-28	23-29
Loracarbef	30 µg	23-29	–	23-31
Mecillinam	10 µg	24-30	–	–
Meropenem	10 µg	28-35	27-33	29-37
Minocycline	30 µg	20-26	–	25-30
Moxalactam	30 µg	28-35	17-25	18-24
Moxifloxacin	5 µg	28-35	17-25	28-35
Nafcillin	1 µg	–	–	16-22
Nafithromycin	15 µg	–	–	25-31[e]
Nalidixic acid	30 µg	22-28	–	–
Netilmicin	30 µg	22-30	17-23	22-31
Nitrofurantoin	300 µg	20-25	–	18-22
Norfloxacin	10 µg	28-35	22-29	17-28
Ofloxacin	5 µg	29-33	17-21	24-28
Omadacycline	30 µg	22-28	–	22-30

Table 4A-1. (Continued)

Antimicrobial Agent	Disk Content	Disk Diffusion QC Ranges, mm		
		Escherichia coli ATCC®[b] 25922	*Pseudomonas aeruginosa* ATCC® 27853	*Staphylococcus aureus* ATCC® 25923
Oxacillin	1 µg	–	–	18-24
Pefloxacin	5 µg	25-33	–	–
Penicillin	10 units	–	–	26-37
Piperacillin	100 µg	24-30	25-33	–
Plazomicin	30 µg	21-27	15-21	19-25
Polymyxin B	300 units	13-19	14-18	–
Quinupristin-dalfopristin	15 µg	–	–	21-28
Razupenem	10 µg	21-26	–	–[i]
Rifampin	5 µg	8-10	–	26-34
Solithromycin	15 µg	–	–	22-30
Sparfloxacin	5 µg	30-38	21-29	27-33
Streptomycin[g]	10 µg	12-20	–	14-22
Sulfisoxazole[j,k]	250 µg or 300 µg	15-23	–	24-34
Sulopenem	2 µg	24-30[e]	–	–
Tebipenem[h]	10 µg	30-37	20-26	–
Tedizolid[l]	2 µg	–	–	19-25
Teicoplanin	30 µg	–	–	15-21
Telithromycin	15 µg	–	–	24-30
Tetracycline	30 µg	18-25	–	24-30
Ticarcillin	75 µg	24-30	21-27	–
Tigecycline	15 µg	20-27	9-13	20-25
Tobramycin	10 µg	18-26	20-26	19-29
Trimethoprim[j]	5 µg	21-28	–	19-26
Trimethoprim-sulfamethoxazole[j]	1.25/23.75 µg	23-29	–	24-32
Trospectomycin	30 µg	10-16	–	15-20
Trovafloxacin	10 µg	29-36	21-27	29-35

Table 4A-1
Nonfastidious Disk Diffusion QC Excluding β-Lactam Combination Agents
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Table 4A-1. (Continued)

Antimicrobial Agent	Disk Content	Disk Diffusion QC Ranges, mm		
		Escherichia coli ATCC®[b] 25922	*Pseudomonas aeruginosa* ATCC® 27853	*Staphylococcus aureus* ATCC® 25923
Ulifloxacin (prulifloxacin)[m]	5 µg	32-38	27-33	20-26
Vancomycin	30 µg	–	–	17-21
Zosurabalpin[n]	**5 µg**	**–**	**–**	**–**

Abbreviations: AST, antimicrobial susceptibility testing; ATCC®, American Type Culture Collection; ICR, inducible clindamycin resistance; IQCP, individualized quality control plan; MHA, Mueller-Hinton agar; **NCTC, National Collection of Type Cultures;** QC, quality control.

Footnotes

a. Refer to Table 4A-2 for QC of β-lactam combination agents.

b. ATCC® is a registered trademark of the American Type Culture Collection. Per ATCC® convention, the trademark symbol is used after "BAA" in each catalog number, in conjunction with the registered ATCC® name.

c. *S. aureus* ATCC® 43300 is *mecA* positive and is a supplemental QC strain for testing cefoxitin (acceptable zone ≤ 21 mm).

d. When disk approximation tests are performed with erythromycin and clindamycin, *S. aureus* ATCC® BAA-977™ (containing inducible *erm*[A]-mediated resistance) and *S. aureus* ATCC® BAA-976™ (containing *msr*[A]-mediated macrolide-only efflux) are recommended as supplemental QC strains (eg, for training, competence assessment, or test evaluation). *S. aureus* ATCC® BAA-977™ should demonstrate ICR (ie, a positive D-zone test), whereas *S. aureus* ATCC® BAA-976™ should not demonstrate ICR. *S. aureus* ATCC® 25923 should be used for routine QC (eg, daily or per IQCP) of erythromycin and clindamycin disks using standard MHA.

e. QC ranges were established using data from only 1 disk manufacturer. Disks from other manufacturers were not available at the time of testing.

f. The 200-µg fosfomycin disk contains 50 µg of glucose-6-phosphate.

g. For control ranges of gentamicin 120-µg and streptomycin 300-µg disks, use *Enterococcus faecalis* ATCC® 29212 (gentamicin: 16-23 mm; streptomycin: 14-20 mm).

h. *Klebsiella pneumoniae* ATCC® 700603 is a supplemental QC strain for testing QC of imipenem (25-33 mm) and tebipenem (26-32 mm).

i. Razupenem tested with *S. aureus* ATCC® 25923 can often produce the double or target zone phenomenon. For accurate QC results, use *S. aureus* ATCC® 29213 (no double zones) with acceptable range 33-39 mm.

j. These agents can be affected by excess levels of thymidine and thymine. See CLSI M02[1] for guidance, should a problem with QC occur.

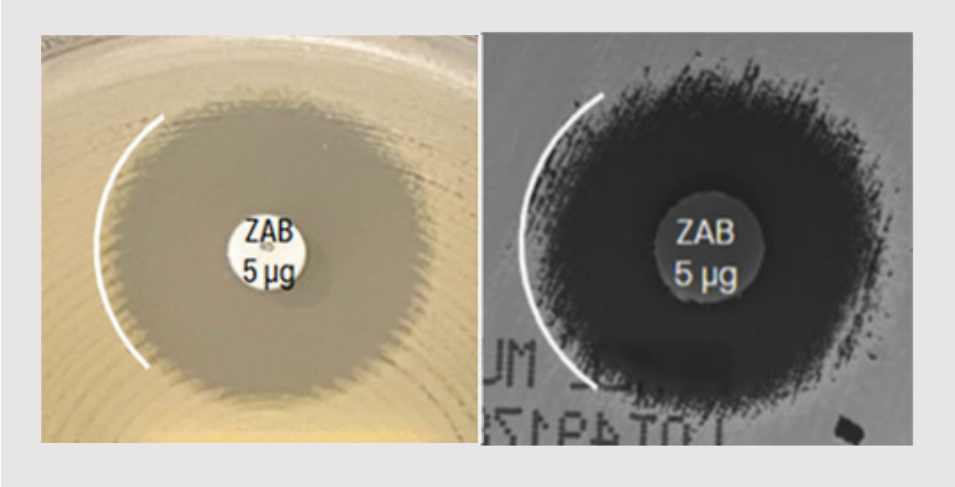
k. Sulfisoxazole can be used to represent any of the currently available sulfonamide preparations.

Table 4A-1. (Continued)

l. *E. faecalis* ATCC® 29212 is a supplemental QC strain for testing QC of tedizolid (14-21 mm) to assist with reading.

m. Ulifloxacin is the active metabolite of the prodrug prulifloxacin. Only ulifloxacin should be used for AST.

n. QC range for *Acinetobacter baumannii* NCTC 13304 with zosurabalpin is 22-28 mm. In contrast to standard recommendations for assessing double zones, the outer zone should be measured to determine the zone diameter (see Figure 1).



Abbreviation: NCTC, National Collection of Type Cultures.

Figure 1. Measuring the Zosurabalpin Outer Zone Diameter for *A. baumannii* NCTC 13304

NOTE: Information in boldface type is new or modified since the previous edition.

Reference for Table 4A-1

1 CLSI. *Performance Standards for Antimicrobial Disk Susceptibility Tests*. 14th ed. CLSI standard M02. Clinical and Laboratory Standards Institute; 2024.