MIC Test Strip Technical Sheet ***Haemophilus influenzae***

Specimen

Blood, CSF, sterile site (joint fluid, eye) and respiratory (sputum, tracheal aspirate, middle ear, nasopharynx)

Medium	Haemophilus Test Medium, Ref. 10080 or Mueller Hinton Fastidious Agar (Horse blood 5% + 20 mg/L β-NAD), Ref. 10132
Inoculum	Suspension in broth to 0.5 McFarland (Ref. 80400) (if mucoid: 1 McFarland, Ref. 80401)
Incubation	35 ± 2 °C / 5% CO_2 / 20-24 hours
Evaluating the results	Bactericidal drugs: interpret the M.I.C. at complete inhibition of all growth including microcolonies, hazes and isolated colonies.Bacteriostatic drugs: interpret the M.I.C. at 80% inhibition when trailing is seen.

		Quality Control (M.I.C. µg/mL)		**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Example of ANTIBIOGRAM** 140 mm petri dish
		***H. influenzae* ATCC® 49247**	***H. influenzae* ATCC® 49766**	**S**	**I**	**R**	**S**	**R**	
AMP	AMPICILLIN	2-8	-	≤1	2	≥4	≤1	>1	
AUG	AMOXICILLIN/CLAVULANIC ACID 2/1 [1]	2-16	-	≤4	-	≥8			✓ or AMP
AMC	AMOXICILLIN/CLAVULANIC ACID 2µg/mL [1]	-	-				≤2	>2	
AZM	AZITHROMYCIN (Ambient)	1-4	-	≤4	-	-	≤0.12	>4	
AZM	AZITHROMYCIN (CO_2) [2]	4-16	-	≤8	-	-			
CTX	CEFOTAXIME	0.12-0.5	-	≤2	-	-	≤0.12	>0.12	✓ or CRO
CRO	CEFTRIAXONE	0.06-0.25	-	≤2	-	-	≤0.12	>0.12	
CXM	CEFUROXIME	-	0.25-1	≤4	8	≥16	≤1	>2	
CXM	CEFUROXIME oral	-	0.25-1				≤0.12	>1	
C	CHLORAMPHENICOL	0.25-1	-	≤2	4	≥8	≤2	>2	✓ or CXM or LEV
CLR	CLARITHROMYCIN (Ambient)	4-16	-	≤8	16	≥32	≤1	>32	
CLR	CLARITHROMYCIN (CO_2) [2]	8-32	-	≤16	32	≥64			
LEV	LEVOFLOXACIN	0.008-0.03	-	≤2	-	-	≤1	>1	
MRP	MEROPENEM	-	0.03-0.12	≤0.5	-	-			✓
MRP	MEROPENEM (infections other than meningitis)	-	-				≤2	>2	
MRP	MEROPENEM (meningitis)	-	-				≤0.25	>1	
TE	TETRACYCLINE	4-32	-	≤2	4	≥8	≤1	>2	✓ or AZM or CLR
SXT	TRIMETHOPRIM/SULFAMETHOXAZOLE 1/19 [1]	0.03-0.25	-	≤0.5	1-2	≥4	≤0.5	>1	✓

Notes

1. Value on the M.I.C. scale refers to the first component of the combination.
2. CLSI broth microdilution uses ambient incubation while agar based methods use CO_2 incubation that causes a pH decrease and may affect activity of macrolides. Quality control ranges and interpretive criteria for M.I.C. test are adjusted for CO_2 incubation.

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0, January 2013.

MIC Test Strip, Patent No. 1395483

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MIC Test Strip Technical Sheet **Enterococci**

Specimen

Blood, wounds and sterile sites (tissues, peritoneal fluid), urines (urosepsis)

	Enterococci (general)	**HLAR (High level Aminoglycoside Resistance)**	**VRE (Vancomycin Resistant Enterococci)**
Medium	Mueller Hinton II Agar (Ref. 10031)	Mueller Hinton II Agar (Ref. 10031) **MIC Test Strip range:** Gentamicin and Streptomycin 0.064-1024 µg/ mL	Brain Heart Infusion Agar (Ref. 10060)
Inoculum	Suspension in physiological solution to 0.5 McFarland turbidity (Ref. 80400)	Suspension in physiological solution to 0.5-1 McFarland (heavier inoculum preferable) (1 McFarland Ref. 80401)	Suspension in broth to 2 McFarland. Dispense 0.1 mL per 90 mm agar plate and streak evenly.
Incubation	35 °C, ambient, 16-20 hours; interpret vancomycin at 24 hours.	35 °C, ambient, 24 hours (interpret streptomycin at 48 hours).	35 °C, ambient, 24-48 hours; interpret at 48 hours.
Evaluating the results	Bactericidal drugs: interpret at complete inhibition of all growth including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret at 80% inhibition when trailing is seen.	Read at complete inhibition including microcolonies, hazes and isolated colonies.	Look for hazes, microcolonies and isolated colonies. Use a magnifying glass, oblique light and/or tilt the plate to look for all growth.

		Quality Control M.I.C. µg/mL	**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Examples of ANTIBIOGRAM**	
		***E. faecalis* ATCC® 29212**	**S**	**I**	**R**	**S**	**R**	Detection of VRE (BHI) 90 mm petri dish	Other antibiotics and HLAR (Mueller Hinton) Observe: QDA for *E. faecium* only. 140 mm petri dish
AMP	AMPICILLIN	0.5-2	≤8	-	≥16	<4	>8		✓
LEV	LEVOFLOXACIN	0.25-2	≤2	4	≥8				
LNZ	LINEZOLID	1-4	≤2	4	≥8	<4	>4		✓
TEC	TEICOPLANIN	0.25-1	≤8	16	≥32	<2	>2		
TE	TETRACYCLINE	8-32	≤4	8	≥16				✓
VA	VANCOMYCIN	1-4	≤4	8-16	≥32	<4	>4		
	HLAR								
CN	GENTAMICIN	4-16							✓
S	STREPTOMYCIN	64-256							✓
	VRE (BHI)								
TEC	TEICOPLANIN	0.25-1						✓	
VA	VANCOMYCIN	2-6						✓	

Phenotype Interpretation

HLAR	Negative	Positive
GENTAMICIN	≤512	>512
STREPTOMYCIN	≤512	>1024

VRE (BHI)				
Phenotype	**Vancomycin (µg/mL)**		**Teicoplanin (µg/mL)**	**Species**
VanA	≥32 (R)	and	≥16 (I-R)	*E. faecalis* *E. faecium*
VanB	≥8-256 (I-R)	and	≤4 (S)	*E. faecalis* *E. faecium*
VanC1	4-16 (S-I)	and	≤4 (S)	*E. gallinarum*
VanC2	4-16 (S-I)	and	≤4 (S)	*E. casseliflavus* *E. flavescens*
VanD	64 (R)	and	≤4 (S)	*E. faecium*
VanE	16 (I)	and	≤4 (S)	*E. faecalis*

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0, January 2013.

MIC Test Strip, Patent No. 1395483

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MIC Test Strip Technical Sheet **Meningococci**

Specimen

Oro-nasopharynges, blood and CSF.

Medium	Mueller Hinton II Agar (Sheep blood 5%) Ref. (10131)
Inoculum	Suspension in broth to 0.5 McFarland (Ref. 80400) from chocolate agar (inoculum from SBA will contain 50% fewer CFU/mL).
Incubation	35 ± 2 °C/ 5% CO_2 / 20-24 hours
Reading precaution	Bactericidal drugs: interpret the M.I.C. at the point of complete inhibition of growth (microcolonies, hazes and isolated colonies). Bacteriostatic drugs: interpret the M.I.C. of hazy zone edges at 80% inhibition.

		Quality Control (M.I.C. µg/mL)		**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Example of ANTIBIOGRAM**
		***S. pneumoniae* ATCC® 49619**	***E. coli* ATCC® 25922** [1]	**S**	**I**	**R**	**S**	**R**	140 mm petri dish
P	PENICILLIN G	0.25-1		≤0.06	0.12-0.25	≥0.5	≤0.06	>0.25	✓ 0.002-32
CTX	CEFOTAXIME	0.03-0.12		≤0.12			≤0.12	>0.12	
CRO	CEFTRIAXONE	0.03-0.12		≤0.12			≤0.12	>0.12	✓ or CTX
CIP	CIPROFLOXACIN		0.004-0.015	≤0.03	0.06	≥0.12	≤0.03	>0.06	✓ or MRP
C	CHLORAMPHENICOL	2-8		≤2	4	≥8	≤2	>4	
MRP	MEROPENEM	0.06-0.25		≤0.25			≤0.25	>0.25	
RD	RIFAMPICIN	0.015-0.06		≤0.5	1	≥2	≤0.25	>0.25	✓ 0.002-32
SXT	TRIMETHOPRIM/ SULFAMETHOXAZOLE 1/19 [2]	0.12-1		≤0.12	0.25	≥0.5	-	-	✓ or C

Notes:

1. CO_2 incubation.
2. Concentration refers to the first component of the combination.

"-" indicates that susceptibility testing is not recommended as the species is a poor target for therapy with the drug.

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0 , January 2013.

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MIC Test Strip Technical Sheet **Gram Negative Aerobes**

Enterobacteriaceae, *Pseudomonas, Burkholderia, Acinetobacter* and *Stenotrophomonas* spp.

Specimen

Blood, Cerebrospinal Fluid, sterile sites (joint, fluids, tissues), wounds, respiratory (sputum, transtracheal aspirate) and urines.

Procedure

Medium	Mueller Hinton II Agar (ref. 10031).
Inoculum	Suspension in physiological solution to 0.5 McFarland (ref. 80400), mucoid strains: 1 McFarland (ref. 80401)
Incubation	35 ± 2 °C/ ambient / 16-20 hours non-fermenters: in case of low growth at 24 hours, confirm at 48 hours
Evaluating the results	Bactericidal drugs: interpret the M.I.C. at complete growth inhibition including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret the M.I.C. at 80% inhibition when trailing is seen.
ESBL Extended Spectrum β-Lactamases	Materials and procedure as above. Test Intensive Care Unit and critical isolates directly with MIC Test Strip CAZ/CAL and CTX/CTL strips. For other isolates, review aztreonam, cefotaxime, ceftazidime, ceftriaxone susceptibility results and use the interpretation criteria in the latest CLSI M100-S document. Confirm ESBL suspects using both MIC Test Strip CTX/CTL and CAZ/CAL. MIC Test Strip FEP/FEL may be used to test strains with non-determinable (ND) CTX/CTL and CAZ/CAL results.

		Quality Control (M.I.C. µg/mL)			**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)	
		E. coli **ATCC® 25922**	***P. aeruginosa*** **ATCC® 27853**	***E. coli*** **ATCC® 35218**	**S**	**I**	**R**	**S**	**R**
AK	AMIKACIN	0.5-4	1-4		≤16	32	≥64		
EUCAST	Enterobacteriaceae							≤8	>16
	Pseudomonas spp.							≤8	>16
	Acinetobacter spp.							≤8	>16
	Non-species related breakpoints							≤8	>16
AMS	AMPICILLIN/ SULBACTAM (2/1) [1]	2-8		8-32	≤8	16	≥32		
EUCAST	Enterobacteriaceae							≤8	>8
ATM	AZTREONAM	0.06-0.25	2-8						
CLSI	Enterobacteriaceae				≤4	8	≥16		
	P. aeruginosa				≤8	16	≥32		
	Non-Enterobacteriaceae				≤8	16	≥32		
EUCAST	Enterobacteriaceae							≤1	>4
	Pseudomonas spp.							≤1	>16
	Non-species related breakpoints							≤4	>8
FEP	CEFEPIME	0.015-0.12	0.5-4		≤8	16	≥32		
EUCAST	Enterobacteriaceae							≤1	>4
	Pseudomonas spp.							≤8	>8
	Non-species related breakpoints							≤4	>8

		Quality Control (M.I.C. µg/mL)			**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)	
		E. coli **ATCC® 25922**	***P. aeruginosa*** **ATCC® 27853**	***E. coli*** **ATCC® 35218**	**S**	**I**	**R**	**S**	**R**
CTX	CEFOTAXIME	0.03-0.12	8-32						
CLSI	Enterobacteriaceae				≤1	2	≥4		
	P. aeruginosa				≤8	16-32	≥64		
	Acinetobacter spp.				≤8	16-32	≥64		
	Non-Enterobacteriaceae				≤8	16-32	≥64		
EUCAST	Enterobacteriaceae							≤1	>2
	Non-species related breakpoints							≤1	>2
CAZ	CEFTAZIDIME	0.06-0.5	1-4						
CLSI	Enterobacteriaceae				≤4	8	≥16		
	P. aeruginosa				≤8	16	≥32		
	Acinetobacter spp.				≤8	16	≥32		
	B. cepacia				≤8	16	≥32		
	S. maltophilia				≤8	16	≥32		
	Non-Enterobacteriaceae				≤8	16	≥32		
EUCAST	Enterobacteriaceae							≤1	>4
	Pseudomonas spp.							≤8	>8
	Non-species related breakpoints							≤4	>8
C	CHLORAMPHENICOL	2-8			≤8	16	≥32		
EUCAST	Enterobacteriaceae							≤8	>8
CIP	CIPROFLOXACIN	0.004-0.015	0.25-1						
CLSI	Enterobacteriaceae (except *S. typhi* and extraintestinal *Salmonella* spp.)				≤1	2	≥4		
	S. typhi and extraintestinal *Salmonella* spp				≤0.06	0.12-0.5	1		
	P. aeruginosa				≤1	2	≥4		
	Acinetobacter spp.				≤1	2	≥4		
	Non-Enterobacteriaceae				≤1	2	≥4		
EUCAST	Enterobacteriaceae							≤0.5	>1
	Pseudomonas spp.							≤0.5	>1
	Acinetobacter spp.							≤1	>1
	Non-species related breakpoints							≤0.5	>1
CS	COLISTIN	0.25-2	0.5-4						
CLSI	*P. aeruginosa*				≤2	4	≥8		
	Acinetobacter spp.				≤2	-	≥4		
	Non-Enterobacteriaceae				≤2	4	≥8		
EUCAST	Enterobacteriaceae							≤2	>2
	Pseudomonas spp.							≤4	>4
	Acinetobacter spp.							≤2	>2

		Quality Control (M.I.C. µg/mL)			**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)	
		E. coli **ATCC® 25922**	***P. aeruginosa*** **ATCC® 27853**	***E. coli*** **ATCC® 35218**	**S**	**I**	**R**	**S**	**R**
CN	GENTAMICIN	0.25-1	0.5-2		≤4	8	≥16		
EUCAST	Enterobacteriaceae							≤2	>4
	Pseudomonas spp.							≤4	>4
	Acinetobacter spp.							≤4	>4
	Non-species related breakpoints							≤2	>4
IMI	IMIPENEM	0.06-0.25	1-4						
CLSI	Enterobacteriaceae				≤1	2	≥4		
	P. aeruginosa				≤2	4	≥8		
	Acinetobacter spp.				≤4	8	≥16		
	Non-Enterobacteriaceae				≤4	8	≥16		
EUCAST	Enterobacteriaceae							≤2	>8
	Pseudomonas spp.							≤4	>8
	Acinetobacter spp.							≤2	>8
	Non-species related breakpoints							≤2	>8
LEV	LEVOFLOXACIN	0.008-0.06	0.5-4						
CLSI	Enterobacteriaceae				≤0.12	0.25-1	≥2		
	P. aeruginosa				≤2	4	≥8		
	Acinetobacter spp.				≤2	4	≥8		
	B. cepacia				≤2	4	≥8		
	S. maltophilia				≤2	4	≥8		
	Non-Enterobacteriaceae				≤2	4	≥8		
EUCAST	Enterobacteriaceae							≤1	>2
	Pseudomonas spp.							≤1	>2
	Acinetobacter spp.							≤1	>2
	Non-species related breakpoints							≤1	>2
MRP	MEROPENEM	0.008-0.06	0.25-1						
CLSI	Enterobacteriaceae				≤1	2	≥4		
	P. aeruginosa				≤2	4	≥8		
	Acinetobacter spp.				≤4	8	≥16		
	Non-Enterobacteriaceae				≤4	8	≥16		
EUCAST	Enterobacteriaceae							≤2	>8
	Pseudomonas spp.							≤2	>8
	Acinetobacter spp.							≤2	>8
	Non-species related breakpoints							≤2	>8

		Quality Control (M.I.C. µg/mL)			**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)	
		E. coli **ATCC® 25922**	***P. aeruginosa*** **ATCC® 27853**	***E. coli*** **ATCC® 35218**	**S**	**I**	**R**	**S**	**R**
TZP	PIPERACILLIN / TAZOBACTAM (4 µg/mL) [1]	1-4	1-8	0.5-2					
CLSI	Enterobacteriaceae				≤16	32-64	≥128		
	P. aeruginosa				≤64	-	≥128		
	Acinetobacter spp.				≤16	32-64	≥128		
	Non-Enterobacteriaceae				≤16	32-64	≥128		
EUCAST	Enterobacteriaceae							≤8	>16
	Pseudomonas spp.							≤16	>16
	Non-species related breakpoints							≤4	>16
PB	POLYMYXIN B	0.25-2	1-4						
CLSI	*P. aeruginosa*				≤2	4	≥8		
	Acinetobacter spp.				≤2	-	≥4		
	Non-Enterobacteriaceae				≤2	4	≥8		
TE	TETRACYCLINE	0.5-2	8-32		≤4	8	≥16		
TTC	TICARCILLIN / CLAVULANIC ACID (2 µg/mL) [1]	4-16	8-32	8-32					
CLSI	Enterobacteriaceae				≤16	32-64	≥128		
	P. aeruginosa				≤64	-	≥128		
	Acinetobacter spp.				≤16	32-64	≥128		
	B. cepacia				≤16	32-64	≥128		
	S. maltophilia				≤16	32-64	≥128		
	Non-Enterobacteriaceae				≤16	32-64	≥128		
EUCAST	Enterobacteriaceae							≤8	>16
	Pseudomonas spp.							≤16	>16
	Non-species related breakpoints							≤8	>16
SXT	TRIMETHOPRIM / SULFAMETHOXAZOLE (1/19) [1]	≤0.5	8-32		≤2	-	≥4		
EUCAST	Enterobacteriaceae							≤2	>4
	Pseudomonas spp.							≤4	>4
	Acinetobacter spp.							≤2	>4

Notes:
1. Value on the M.I.C. scale refers to the first component of the combination.

		Examples of ANTIBIOGRAM					
		Enterobacteriaceae	***Acinetobacter* spp.**	***Burkholderia* spp.**	***Pseudomonas* spp.**	***Stenotrophomonas* spp.**	**Mucoid organisms e.g. *Klebsiella* spp., *Enterobacter* spp. and *P. aeruginosa***
		140 mm petri dish	140 mm petri dish	140 mm petri dish	140 mm petri dish	140 mm petri dish	140 mm petri dish
AK	AMIKACIN		✓ or CN		✓ or CN	✓	✓
AMS	AMPICILLIN/ SULBACTAM (2/1)		✓ or TTC			✓ or TTC	
ATM	AZTREONAM	✓			✓		
C	CHLORAMPHENICOL						
CIP	CIPROFLOXACIN	✓ or LEV	✓ or LEV		✓ or LEV	✓ or LEV	✓ or LEV
CS	COLISTIN						
CN	GENTAMICIN	✓ 0.016 - 256 or AK					
IMI	IMIPENEM	✓	✓ or MRP		✓ or MRP		✓
LEV	LEVOFLOXACIN			✓			
MRP	MEROPENEM			✓			
TZP	PIPERACILLIN / TAZOBACTAM (4 µg/mL)	✓			✓		✓
TTC	TICARCILLIN / CLAVULANIC ACID (2 µg/mL)						
SXT	TRIMETHOPRIM / SULFAMETHOXAZOLE (1/19)			✓		✓	
CAZ	CEFTAZIDIME			✓			✓
CTX	CEFOTAXIME						
FEP	CEFEPIME	✓ or CTX	✓ or CAZ		✓ or CAZ	✓ or CAZ	✓

		Quality Control (M.I.C. µg/mL)		**Examples of ANTIBIOGRAM**	
		***E. coli* ATCC® 35218 ESBL negative QC strain**	***K. pneumoniae* ATCC® 700603 ESBL positive QC strain**	**Detection of ESBL**	**Strains with ND results by CTX/CTL and CAZ/CAL**
				90 mm petri dish	90 mm petri dish
CAZ	CEFTAZIDIME [2]	≤ 0.5	8->32		
CAL	CEFTAZIDIME + CLAV. ACID [2]	≤ 0.125	0.125-1		
CTX	CEFOTAXIME [2,3]	≤ 0.25	0.5-2		
CTL	CEFOTAXIME + CLAV. ACID [2]	0.016-0.064	0.125-1		
FEP	CEFEPIME [2,3]	≤ 0.25	0.5-2		
FEL	CEFEPIME + CLAV. ACID [2]	≤ 0.064	0.064-0.25		
CTX/CTL	CEFOTAXIME / CEFOTAXIME + CLAVULANIC ACID (4 µg/mL)			✓	
CAZ/CAL	CEFTAZIDIME / CEFTAZIDIME + CLAVULANIC ACID (4 µg/mL)			✓	
FEP/FEL	CEFEPIME / CEFEPIME + CLAVULANIC ACID (4 µg/mL)				✓

Notes:
2. M.I.C. value below the strip range.
3. Deformation of the ellipse is indicative of ESBL production even if the CTX/CTL or FEP/FEL ratio is <8.

ESBL Phenotype Interpretation

Negative	M.I.C. ratio of both CAZ/CAL and CTX/CTL	<8
Positive	M.I.C. for CTX ≥0.5 and CTX/CTL ratio	≥8 OR
Positive	M.I.C. for CAZ ≥ 1 and CAZ/CAL ratio	≥8 OR
Positive	M.I.C. for FEP/FEL	≥8
IMPORTANT Positive	"Phantom" zone or distortion of the CTX, CAZ or FEP inhibition ellipse confirms ESBL production, even if the CAZ/CAL, CTX/CTL or FEP/FEL ratio is < 8.	
Non-determinable (ND)	Off-scale results for both CTX/CTL and CAZ/CAL or one negative and the other off-scale. Strains with ND results for CTX/CTL and CAZ/CAL may be tested with FEP/FEL.	

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0, January 2013.
- Rossolini, G.M. et al. (2011). Evaluation of a new gradient-diffusion system for MIC determination with Gram-negative pathogens. ECCMID, poster 572.

MIC Test Strip, Patent No. 1395483

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MIC Test Strip Technical Sheet **Gonococci**

Specimen

Uro-genital tract, oropharynx, conjunctiva, blood, CSF and sterile sites and tissues.

Medium	GC agar base + defined supplements (CLSI) or Mueller Hinton Chocolate Agar (Ref. 10355)
Inoculum	Suspension in broth to 0.5 McFarland (Ref. 80400)
Incubation	36 ± 1 °C / 5% CO_2 / 20-24 hours
Reading precautions	Bactericidal drugs: interpret the M.I.C. at complete inhibition of all growth including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret the M.I.C. at 80% inhibition when trailing is seen.

		Quality Control (M.I.C. µg/mL)	**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Example of ANTIBIOGRAM**
		***N. gonorrohoeae* ATCC® 49226**	**S**	**I**	**R**	**S**	**R**	140 mm petri dish
P	PENICILLIN G [1]	0.25-1	≤0.06	0.12-1	≥2	≤0.06	>1	✓
CRO	CEFTRIAXONE	0.004-0.015	≤0.25			≤0.12	>0.12	✓
CIP	CIPROFLOXACIN	0.001-0.008	≤0.06	0.12-0.5	≥1	≤0.03	>0.06	✓
TE	TETRACYCLINE	0.25-1	≤0.25	0.5-1	≥2	≤0.5	>1	✓

Notes:

1. If beta-lactamase positive, the strain should be reported as resistant to penicillins.

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters, Version 3.0, January 2013.

MIC Test Strip, Patent No. 1395483

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MTS13
Rev.2 / 12.02.2013

MIC Test Strip Technical Sheet **Anaerobes**

Specimen

Blood, wounds, respiratory (transtracheal aspirate) and sterile sites (CNS, tissues, joint fluids).

Medium	Brucella Blood Agar w Hemin and Vitamin K1 (ref. 10245)
Inoculum	Suspension in Brucella or "anaerobic" broth to 1 McFarland (Ref. 80401) turbidity. Make sure anaerobic conditions are kept at all times for obligate anaerobes.
Incubation	35 °C / anaerobic system / 24-72 hours. Obtain rapid anaerobiosis within 1-2 hours for Metronidazole.
Evaluating the results	Bactericidal drugs: interpret the M.I.C. at complete inhibition of growth including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret the M.I.C. at 80% inhibition when trailing is seen. If a "dip" is observed with MIC Test Strip Clindamycin, extrapolate the ellipse to the strip.

		Quality Control (M.I.C. µg/mL)			**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Example of ANTIBIOGRAM**
		B. fragilis **ATCC® 25285**	***B. thetaiotaomicron*** **ATCC® 29741**	***E. lentum*** **ATCC® 43055**	**S**	**I**	**R**	**S**	**R**	140 mm petri dish
AUG	AMOXICILLIN/CLAVULANIC ACID 2/1 [1)]	0.25-1	0.5-2	-	≤ 4	8	≥16	≤4	≥8	
AMS	AMPICILLIN/ SULBACTAM [1)]	0.5-2	0.5-2	0.5-2	≤ 8	16	≥ 32	≤4	≥8	
P	PENICILLIN G	8-32	8-32	-	≤ 0.5	1	≥2	≤0.25	>0.5	✓
FOX	CEFOXITIN	2-8	8-64	2-16	≤ 16	32	≥ 64			✓
CD	CLINDAMYCIN	0.5-2	2-8	0.06-0.25	≤ 2	4	≥8	≤4	>4	✓
ETP	ERTAPENEM	0.06-0.25	0.5-2	0.5-4	≤ 4	8	≥ 16	≤1	>1	✓ or MRP or IMI
IMI	IMIPENEM	0.03-0.12	0.25-1	0.25-2	≤ 4	8	≥ 16	≤2	>8	
MRP	MEROPENEM	0.03-0.25	0.06-0.5	0.125-1	≤ 4	8	≥ 16	≤2	>8	
LZ	METRONIDAZOLE	0.25-1	0.5-2	-	≤ 8	16	≥ 32	≤4	>4	✓
	C. diffcile							≤2	>2	
TZP	PIPERACILLIN/TAZOBACTAM 4[1)]	0.03-0.25	2-16	8-32	≤ 32	64	≥ 128	≤8	>16	✓ or AUG or AMS or TTC
TTC	TICARCILLIN/CLAVULANIC ACID 2[1)]	0.06-0.5	0.5-2	8-32	≤ 32	64	≥ 128	≤8	>16	

Notes:

1. Value on MIC scale refers to the first component of the combination.

References

- CLSI M11-A7. Methods for Dilution Antimicrobial Susceptibility Testing of Anaerobic Bacteria.
- CLSI M100-S23. Performance Standards for Antimicrobial Susceptibility Testing, January 2013.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters, Version 3.1, February 2013.

MIC Test Strip, Patent No. 1395483

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MTS14
Rev.4 / 29.05.2013

MIC Test Strip Technical Sheet ***Campylobacter* spp.**

Specimen

Stools, blood, tissues.

Medium	Mueller Hinton II Agar (Sheep blood 5%) (Ref. 10131)
Inoculum	Suspension of 24-48 hours colonies from blood agar in broth to 1 McFarland (Ref. 80401)
Incubation	Microaerophilic incubation, 10% CO_2/ 5% O_2/ 85% N_2 Do not invert plates due to excessive capsular material that may be produced. *C. jejuni* and *C. coli*: 42 °C for 24 hours; 35 °C for 48-72 hours. *C. fetus* 35 °C for 48 hours.
Evaluating the results	No CLSI criteria available. Use publications for suggestions of possible interpretive criteria.
Reading Precaution	Campylobacter colonies may be translucent and difficult to interpret. Tilt the plate and/or use oblique light or a magnifying glass when reading the M.I.C. end point. Capsular material from highly mucoid strains may deform the inhibition ellipse. Repeat the test if necessary and do not incubate plates upside down. Bactericidal drugs: interpret at complete inhibition of all growth, including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret at 80% inhibition when trailing is seen.

		Quality Control M.I.C. µg/mL		**EUCAST** INTERPRETATION M.I.C. µg/mL		**Example of ANTIBIOGRAM**
		***C. jejuni* ATCC® 33560 35 °C for 48 hours**	***C. jejuni* ATCC® 33560 42 °C for 24 hours [1]**	**S**	**R**	140 mm petri dish
AZM	AZITHROMYCIN	0.03-0.25	0.03-0.12			
CIP	CIPROFLOXACIN	0.06-0.25	0.03-0.12	≤0.5	>0.5	✓
DX	DOXYCYCLINE	0.12-0.5	0.12-0.5			✓ or MRP
E	ERYTHROMYCIN	0.5-2	0.25-2	≤4	>4	✓
CN	GENTAMICIN	0.5-2	0.25-2			✓ 0.016 - 256
LEV	LEVOFLOXACIN	0.06-0.25	0.03-0.25			
MRP	MEROPENEM	0.008-0.03	0.008-0.03			
TE	TETRACYCLINE	0.25-2	0.25-2	≤2	>2	

Notes

1. Some clinical isolates of *C. jejuni* spp. *doyley*, *C. fetus* and *C. lari* may not grow at 42 °C. Test these isolates at 35 °C.

References

- CLSI M45-A, 2006. Methods for Antimicrobial Dilutions and Disk Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria; Approved Guideline.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters, Version 3.0, January 2013.

MIC Test Strip, Patent No. 1395483

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MTS16
Rev.2 / 15.03.2013

MIC Test Strip Technical Sheet **Streptococci**

Specimen
Blood, CSF, wounds, sterile sites (joint fluid, eye, tissues) and respiratory samples (sputum, tracheal aspirate, middle ear fluid, nasopharynx).

	Streptococci	***Abiotrophia* and *Granulicatella* spp.**
Medium	Mueller Hinton II Agar (Sheep blood 5%), Ref. 10131 or Mueller Hinton Fastidious Agar (Horse blood 5% + 20 mg/L β-NAD), Ref. 10132	Mueller Hinton Chocolate + 0.001% pyridoxal HCl + 0.01% cysteine IsoSensitest + 5% human blood + 0.001% pyridoxal HCl + 0.01% cysteine
Inoculum	Suspension in broth to 0.5 McFarland (Ref. 80400)	Suspension in broth to 1 McFarland (Ref. 80401)
Incubation	35 ± 2 °C / 5% CO_2 / 20- 24 hours	35 ± 2 °C / 5% CO_2 / 20- 24 hours
Interpretation	Bactericidal drugs: interpret the M.I.C. at complete inhibition of growth including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret the M.I.C. at 80% inhibition when trailing is seen.	

		Quality Control (M.I.C. µg/mL) ***S. pneumoniae* ATCC® 49619**	**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL) **S**	**I**	**R**	**EUCAST** INTERPRETATION [1] M.I.C. Criteria (µg/mL) **S**	**R**	**Example of ANTIBIOGRAM** 140 mm petri dish
P	PENICILLIN G	0.25-1						✓ 0.002 - 32
CLSI	*Streptococcus* spp. β-Hemolytic Group		≤0.12	-	-			
	Streptococcus spp. Viridans		≤0.12	0.25-2	≥4			
EUCAST	Streptococcus groups A,B,C and G					≤0.25	>0.25	
	Viridans group Streptococci					≤0.25	>2	
CTX	CEFOTAXIME	0.03-0.12						✓ (or CRO)
CLSI	*Streptococcus* spp. β-Hemolytic Group		≤0.5	-	-			
	Streptococcus spp. Viridans		≤1	2	≥4			
EUCAST	Viridans group Streptococci					≤0.5	>0.5	
CRO	CEFTRIAXONE	0.03-0.12						
CLSI	*Streptococcus* spp. β-Hemolytic Group		≤0.5	-	-			
	Streptococcus spp. Viridans		≤1	2	≥4			
EUCAST	Viridans group Streptococci					≤0.5	>0.5	
C	CHLORAMPHENICOL	2-8	≤4	8	≥16	≤8	>8	✓ (or E)
CD	CLINDAMYCIN (ambient)	0.03-0.12	≤0.25	0.5	≥1	≤0.5	>0.5	✓ (or TE)
CD	CLINDAMYCIN (CO_2)	0.064-0.25	≤0.5	1	≥2			
DAP	DAPTOMYCIN	0.064-0.5	≤1	-	-	≤1	>1	
E	ERYTHROMYCIN (ambient)	0.032-0.125	≤0.25	0.5	≥1	≤0.25	>0.5	
E	ERYTHROMYCIN (CO_2)	0.064-0.25	≤1	2	≥4			
OFX	OFLOXACIN	1-4	≤2	4	≥8			✓
TE	TETRACYCLINE	0.06-0.5	≤2	4	≥8	≤1	>2	
VA	VANCOMICIN	0.12-0.5	≤1	-	-	≤2	>2	✓

Note
1. If not specified EUCAST interpretation refers to Streptococcus groups A,B,C and G.

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0 , January 2013.

MIC Test Strip, Patent No. 1395483

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MTS19
Rev.3 / 15.03.2013

MIC Test Strip Technical Sheet **Staphylococci**

Specimen

Blood, wounds, sterile sites (tissues, bone, joints, fluids, CNS) and indwelling devices.

Procedure

Medium: Mueller Hinton II Agar (ref. 10031).
Inoculum: Suspension in physiological solution to 0.5 McFarland (Ref. 80400).
Incubation: 35 ± 2 °C / ambient / 16-20 hours. Interpret vancomycin and oxacillin after 24 hours.
Interpretation of results: Bactericidal drugs: interpret the M.I.C. at complete inhibition of growth including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret the M.I.C. at 80% inhibition when trailing is seen.

ORSA/ OR-CNS (Oxacillin resistant *S. aureus* and Coagulase Negative Staphylococci).
BORSA (Bordeline Oxacillin Resistant *S. aureus*).
Medium: Mueller Hinton Agar + 2% NaCl (Ref. 11206).
Inoculum: Suspension in physiological solution to 0.5-1 McF (heavier inoculum improves detection of low level R).
Incubation: 35 ± 2 °C / ambient / 24 hours for ORSA/ BORSA, 48 hours for ORCNS.
Interpretation of results: Interpret at complete inhibition of all growth; watch for microcolonies, hazes and isolated colonies.

GISA/hGISA (Glycopeptite Intermediate / Resistant and Hetero-Intermediate / Resistant *S. aureus*).
Medium: Brain Heart Infusion Agar (Ref. 10160).
Inoculum: Suspension in broth to 2 McF (heavier inoculum improves detection of hetero-resistance).
Incubation: 35 ± 2 °C / ambient / interpret at 24 hours and confirm at 48 hours.
Interpretation of results: Interpret at complete inhibition; watch for hazes, microcolonies and isolated colonies. Use a magnifying glass, oblique light and tilt the plate.

		Quality Control (M.I.C. µg/mL)		**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Examples of ANTIBIOGRAM**			
		***S. aureus* ATCC® 29213**	***S. aureus* ATCC® 43300**	**S**	**I**	**R**	**S**	**R**	**ORSA/ORCNS/ BORSA (Mueller Hinton + 2% NaCl)** 90 mm petri dish	**Detection of glycopeptide resistance** 90 mm petri dish	**For confirmed ORSA/ORCNS (Muller Hinton Agar)** 140 mm petri dish	**For Non-ORSA/ ORCNS (Mueller Hinton Agar)** 140 mm petri dish
AUG	AMOXICILLIN/CLAVULANIC ACID 2/1 [1]	0.12-0.5		≤4	-	≥8			✓			
P	PENICILLIN G	0.25-2		≤0.12	-	≥0.25	≤0.12	>0.12				✓
C	CHLORAMPHENICOL	2-16		≤8	16	≥32	≤8	>8				
CIP	CIPROFLOXACIN	0.12-0.5		≤1	2	≥4	≤1	>1				✓
CD	CLINDAMYCIN	0.06-0.25		≤0.5	1-2	≥4	≤0.25	>0.5			✓	✓
DAP	DAPTOMYCIN	0.12-1		≤1	-	-	≤1	>1			✓	
E	ERYTHROMYCIN	0.25-1		≤0.5	1-4	≥8	≤1	>2				✓
CN	GENTAMICIN	0.12-1		≤4	8	≥16	≤1	>1				
LNZ	LINEZOLID	1-4		≤4	-	≥8	≤4	>4			✓	✓
RD	RIFAMPICIN	0.004-0.015		≤1	2	≥4	≤0.06	>0.5				
TEC	TEICOPLANIN	0.25-1		≤8	16	≥32						
	S. aureus						≤2	>2				
	Coagulase Negative Staphylococci						≤4	>4				
TE	TETRACYCLINE	0.12-1		≤4	8	≥16	≤1	>2				
TGC	TIGECYCLINE	0.03-0.25					≤0.5	>0.5				

		Quality Control (M.I.C. µg/mL)		**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Examples of ANTIBIOGRAM**			
		***S. aureus* ATCC® 29213**	***S. aureus* ATCC® 43300**	**S**	**I**	**R**	**S**	**R**	**ORSA/ORCNS/ BORSA (Mueller Hinton + 2% NaCl)** 90 mm petri dish	**Detection of glycopeptide resistance** 90 mm petri dish	**For confirmed ORSA/ORCNS (Muller Hinton Agar)** 140 mm petri dish	**For Non-ORSA/ ORCNS (Mueller Hinton Agar)** 140 mm petri dish
SXT	TRIMETHOPRIM / SULFAMETHOXAZOLE 1/19 [1]	≤0.5		≤2	-	≥4	≤2	>4				✓
VA	VANCOMICIN S. *aureus* *Staphylococcus* spp. Coagulase Negative Staphylococci	0.5-2		 ≤2 ≤4	 4-8 8-16	 ≥16 ≥32	 ≤2 ≤4	 >2 >4			✓	
	ORSA											
OX	OXACILLIN *S. aureus* and *S. lugdunensis* Cogulase Negative Staphylococci except *S. lugdunensis*	0.12-0.5	16 - 24	 ≤2 ≤0.25	 - -	 ≥4 ≥0.5			✓			
	GISA/hGISA											
TEC	TEICOPLANIN	0.5-2								✓		
VA	VANCOMICIN	1-4								✓		

Phenotype Interpretation

	OXACILLIN	AMOXICILLIN/CLAVULANIC ACID
ORSA (mecA+)	≥4	≥8 [1]
ORCNS (mecA+)	≥0.5	≥8 [1]
BORSA (mecA-)	≥4	≤4 [1]
	VANCOMICIN	TEICOPLANIN
GISA/hGISA	≥8	AND ≥8 OR ≥12

Notes

1. Value on the M.I.C. scale refers to the first component of the combination.

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0, January 2013.
- Stefani, S. et al (2011). A new reliable screening method for the evaluation of VISA and hVISA strains by "Vancomycin-Teicoplanin MIC Test Strip" (VTMTS). ECCMID poster 776.

MIC Test Strip, Patent No. 1395483

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MTS20
Rev.2 / 15.03.2013

MIC Test Strip Technical Sheet ***Helicobacter pylori***

Specimen

Stomach biopsy, composed of samples from multiple sites.

Medium	Mueller Hinton II Agar (Sheep blood 5%) (Ref. 10131)
Inoculum	72 h (or older) viable colonies are suspended in broth (Mueller Hinton or other) supplemented with 5% serum; adjust turbidity to 3 McFarland. Use 1 MIC Test Strip per 90 mm plate; position the handle of the strip against the edge of the plate.
Incubation	35 ± 2 °C/ microaerophilic (atmosphere produced by a gas-generating system suitable for Campylobacter) 72 hours (or longer i.e. until a visible inhibition ellipse is seen). For metronidazole, a 24 hours anaerobic pre-incubation followed by 48 hours or longer microaerophilic incubation has been recommended by some investigators as a better option.
Reading precautions	*H. pylori* colonies are pin-point, translucent and difficult to see. Tilt the plate and/or use oblique light or a magnifying glass when reading the M.I.C. endpoint. Bactericidal drugs: interpret the M.I.C. at the point of complete inhibition of all growth, including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret the M.I.C. of hazy zone edges at 80% inhibition.

		Quality Control (M.I.C. µg/mL) ***H. pylori* ATCC® 43504**	**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL) **S**	**I**	**R**	**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL) **S**	**R**	**Example of ANTIBIOGRAM** 140 mm petri dish
AML	AMOXICILLIN	0.015-0.12	≤1	-	≥1	≤0.12	>0.12	✓
CLR	CLARITHROMYCIN	0.015-0.12	≤0.25	5	≥1	≤0.25	>0.5	✓
LZ	METRONIDAZOLE	64-256	≤4	-	≥4	≤8	>8	✓
TE	TETRACYCLINE	0.12-1	≤2	-	≥2	≤1	>1	✓

References

- CLSI M100-S20, 2010. Performance Standards for Antimicrobial Susceptibility Testing.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0, January 2013.

MIC Test Strip, Patent No. 1395483

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MTS21
Rev.2 / 15.03.2013

MIC Test Strip Technical Sheet ***Streptococcus pneumoniae***

Specimen
Blood, CSF and respiratory sites (sputum, tracheal aspirate, middle ear fluid, nasopharynx).

Medium	Mueller Hinton II Agar (Sheep blood 5%), Ref. 10131 or Mueller Hinton Fastidious Agar (Horse blood 5% + 20 mg/L β-NAD), Ref. 10132.
Inoculum	Suspension in Mueller Hinton Broth (Ref. 24107) to 0.5 McFarland (Ref. 80400). 1 McFarland (Ref. 80401) for mucoid.
Incubation	35 ± 2 °C/ 5% CO_2/ 20-24 hours.
Interpretation of results	Bactericidal drugs: interpret the M.I.C. at complete inhibition of growth including microcolonies, hazes and isolated colonies. Bacteriostatic drugs: interpret the M.I.C. at 80% inhibition when trailing is seen.

		Quality Control (M.I.C. µg/mL) ***S. pneumoniae*** **ATCC® 49619**	**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL)			**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL)		**Examples of ANTIBIOGRAM**	
			S	**I**	**R**	**S**	**R**	140 mm petri dish	90 mm petri dish
AZM	AZITHROMYCIN (Ambient)	0.06-0.25	≤0.5	1	≥2	≤0.25	>0.5		
AZM	AZITHROMYCIN (CO_2) [1]	0.5-2	≤4	8	≥16				
P	PENICILLIN G	0.25-1						✓ 0.002 - 32	✓ 0.002 - 32
	Parenteral (non-meningitis)		≤2	4	≥8	≤0.06	>2		
	Parenteral (meningitis)		≤0.06	-	≥0.12	≤0.06	>0.06		
	Oral		≤0.06	0.12-1	≥2				
CTX	CEFOTAXIME	0.03-0.12				≤0.5	>2	✓ (or CRO)	✓ (or CRO)
	meningitis		≤0.5	1	≥2				
	non-meningitis		≤1	2	≥4				
CRO	CEFTRIAXONE	0.03-0.12				≤0.5	>2	✓ (or CTX)	✓ (or CTX)
	meningitis		≤0.5	1	≥2				
	non-meningitis		≤1	2	≥4				
C	CHLORAMPHENICOL	2-8	≤4	-	≥8	≤8	>8		
CLR	CLARITHROMYCIN (Ambient)	0.03-0.12	≤0.25	0.5	≥1	≤0.25	>0.5		
CLR	CLARITHROMYCIN (CO_2) [1]	0.064-0.25	≤0.5	1	≥2				
CD	CLINDAMYCIN (Ambient)	0.03-0.12	≤0.25	0.5	≥1	≤0.5	>0.5		
CD	CLINDAMYCIN (CO_2) [1]	0.064-0.25	≤0.5	1	≥2				
ETP	ERTAPENEM	0.03-0.25	≤1	2	≥4	≤0.5	>0.5		
E	ERYTHROMYCIN (Ambient)	0.03-0.12	≤0.25	0.5	≥1	≤0.25	>0.5	✓	
E	ERYTHROMYCIN (CO_2) [1]	0.064-0.25	≤1	2	≥4				
IMI	IMIPENEM	0.03-0.12	≤0.12	0.25-0.5	≥1	≤2	>2		
LEV	LEVOFLOXACIN	0.5-2	≤2	4	≥8	≤2	>2		
LNZ	LINEZOLID	0.25-2	≤2	-	-	≤2	>4		

		Quality Control (M.I.C. µg/mL) ***S. pneumoniae* ATCC® 49619**	**CLSI** INTERPRETATION M.I.C. Criteria (µg/mL) **S**	**I**	**R**	**EUCAST** INTERPRETATION M.I.C. Criteria (µg/mL) **S**	**R**	**Examples of ANTIBIOGRAM** 140 mm petri dish	90 mm petri dish
MRP	MEROPENEM	0.06-0.25	≤0.25	0.5	≥1			✓	
	meningitis					≤0.25	>1		
	non-meningitis					≤2	>2		
OFX	OFLOXACIN	1-4	≤2	4	≥8	≤0.12	>4		
TE	TETRACYCLINE	0.06-0.5	≤1	2	≥4	≤1	>2		
SXT	TRIMETHOPRIM/ SULFAMETHOXAZOLE 1/19 [2]	0.12-1	≤0.5	1-2	≥4	≤1	>2	✓	
VA	VANCOMYCIN	0.12-0.5	≤1	-	-	≤2	>2	✓	

Notes

1. CLSI broth microdilution uses ambient incubation while agar based methods use CO_2 incubation that causes a pH decrease and may affect activity of macrolides and lincosamides. Quality control ranges and interpretive criteria for MIC Test Strip are adjusted for CO_2 incubation.
2. Values on the MIC scale refer to the first component of the combination.

References

- CLSI M100-S23, 2013. Performance Standards for Antimicrobial Susceptibility Testing.
- CLSI M7-A9, 2012. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically.
- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 3.0 , January 2013.

MIC Test Strip, Patent No. 1395483

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MIC Test Strip Technical Sheet **Direct MIC**

Direct MIC Testing of Critical Specimens

INTENDED USE

Direct specimen testing may provide faster information for therapy guidance and/or correction of empiric therapy in urgent clinical situations. However, results with direct specimen testing must always be considered preliminary and the clinician cautioned until confirmed by standardised pure isolate testing.

DIRECT SPECIMEN TESTING WITH MIC TEST STRIP

- Positive blood culture specimen testing with Gram positive and negative aerobes, anaerobes and yeast, have been investigated and published.
- Sputum testing for patients with cystic fibrosis and lower respiratory tract secretion samples from ventilator associated pneumonia (VAP) have also been studied.
- Variations in inoculum, type of organisms and potential contamination will not affect results significantly, as these phenomena can be visually inspected on the agar plate.

TEST PROCEDURE

1. Specimens: CSF, urines, sputum, respiratory tract samples and positive blood cultures from critical infections and critical patients.
2. Perform Gram stain or India ink / Lacto-phenol cotton blue stain (yeast) and examine microscopically.
3. Use a rich media and different incubation conditions to cover different suspected organisms:

Gram positive aerobes:	Mueller Hinton Agar + 5% blood/ 35°C/ ambient and 5% CO_2/ 20-48h
Gram negative aerobes:	Mueller Hinton Agar + 5% blood/ 35°C/ ambient/ 20-48h
Anaerobes:	Plate 1 – Brucella agar + 5% blood + vitamin K (1 µg/mL) + hemin (5 µg/mL) (BBA) 35°C/ anaerobic system/ 24-48h Plate 2 – Mueller Hinton agar +5% blood/ 35°C/ ambient/ 20-48h
Yeast:	RPMI / 35°C/ moist in plastic bag/ 24-48h

4. When testing sputum, sputulise the sample.
5. Pipette 0.3 mL of the undiluted positive blood culture, CSF or urine onto the agar plate and streak out evenly. If cells are sparse (microscopy), centrifuge to concentrate, re-suspend and streak. For sputum, moisten the swab with the sputolysed specimen and streak evenly onto the agar plate.
6. Test key Gram positive or Gram negative drugs as guided by Gram stain, icroscopy and suspected/ expected pathogens. For yeast, test fluconazole, itraconazole, voriconazole and amphotericin.
7. Start examining agar plates for preliminary results if growth is clearly visible for rapidly growing aerobes after 6-8h, 12-16h, then confirm again at 24h or longer. For sputum, incubate 48-72h.
   - Resistant results are considered more useful.
   - Susceptible results should be treated with caution until confirmed by standardised testing.
8. For sputum, identify the different colony morphotypes, species, growth patterns and respective MTS endpoints. Document the interaction between pathogens and normal flora, take a photograph of the agar plate to document significant findings and discuss with the treating clinician.
9. Always inform and caution the clinician that:
   - A modified procedure was used to generate preliminary results only.
   - Final results from standardised testing are pending.
10. ALWAYS CONFIRM DIRECT TESTING RESULTS WITH THE STANDARDISED OVERNIGHT MTS PROCEDURE.
11. Initiate this procedure simultaneously with direct testing and report results as soon as available.
12. Collect data to validate rapid specimen versus pure isolate testing.
13. Run QC organisms on all test occasions.

ANTIBIOGRAM – EXAMPLES ONLY (PLEASE USE YOUR OWN FORMULARY)			
Gram positive aerobic diplococci	Penicillin G (P) 0.002 - 32 µg/mL Cefotaxime (CTX) 0.002 - 32 µg/mL	Meropenem (MRP) Vancomycin (VA)	Trimethoprim / Sulfamethoxazole (SXT) Erythromycin (E)
Gram positive aerobic cocci	Gatifloxacin (GAT) Cefoxitin (FOX)	Gentamicin (CN) Linezolid (LNZ)	Penicillin G (P) 0.016 - 256 µg/mL Vancomycin (VA)
Gram negative aerobic bacilli	Amikacin (AK) Ciprofloxacin (CIP)	Aztreonam (ATM) Imipenem (IMI)	Cefepime (FEP) Piperacillin / Tazobactam (TZP)
Anaerobes cocci/ bacilli	Penicillin G (P) 0.016 - 256 µg/mL Imipenem (IMI)	Cefoxitin (FOX) Metronidazole (LZ)	Clindamycin (CD) Piperacillin / Tazobactam (TZP)
Yeast	Fluconazole (FLU) Amphotericin B (AMB)	Itraconazole (ITC)	Voriconazole (VO)

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- CLSI M100-S22, 2012. Performance Standards for Antimicrobial Susceptibility Testing.
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- CLSI M11-A7, 2007. Methods for Dilution Antimicrobial Susceptibility Testing of Anaerobic Bacteria.
- CLSI M11-S1 Performance Standards for Antimicrobial Susceptibility Testing of Anaerobic Bacteria.
- CLSI M27-A3. Reference Method for Broth Dilution Antifungal Susceptibility Testing of Yeasts; Approved Standard - Third Edition.
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- EUCAST. Breakpoint tables for interpretation of MICs and zone diameters Version 2.0, January 2012.
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