

Identification system for staphylococci, micrococci and related genera

SUMMARY AND EXPLANATION

API® Staph is a standardized system for the identification of the genera *Staphylococcus*, *Micrococcus* and *Kocuria*, which uses miniaturized biochemical tests and a specially adapted database. The complete list of those bacteria that it is possible to identify with this system can be found in the Identification Table at the end of this package insert.

PRINCIPLE

The API Staph strip consists of 20 microtubes containing dehydrated substrates. These microtubes are inoculated with a bacterial suspension, prepared in API Staph Medium, that reconstitutes the tests. During incubation, metabolism produces color changes that are either spontaneous or revealed by the addition of reagents.

The reactions are read according to the Reading Table and the identification is obtained by referring to the Analytical Profile Index or using the identification software.

CONTENT OF THE KIT (Kit for 25 tests)

- 25 API Staph strips
- 25 incubation boxes
- 25 ampules of API Staph Medium
- 25 result sheets
- 1 package insert provided in the kit or downloadable from www.biomerieux.com/techlib

COMPOSITION

Strip

The composition of the API Staph strip is given in the Reading Table of this package insert.

Medium

API Staph Medium 6 mL	Yeast extract	0.5 g
	Bactopeptone (bovine/porcine origin)	10 g
	NaCl	5 g
	Trace elements	10 mL
	Deminerlized water	qsp 1000 mL
	pH : 7.0 - 7.4	

REAGENTS AND MATERIAL REQUIRED BUT NOT PROVIDED

Reagents

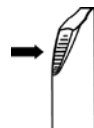
- Mineral oil (Ref. 70 100)
- Reagents : VP 1 + VP 2 (Ref. 70 422)
NIT 1 + NIT 2 (Ref. 70 442)
ZYM A (Réf. 70 494)
ZYM B (Réf. 70 493)
- McFarland Standard (Ref. 70 900)
- API Staph Analytical Profile Index (Ref. 20 590) or **apiweb™** identification software (Ref. 40 011) (consult bioMérieux)

Material

- Pipettes or PSlpettes
- Ampule rack
- Ampule protector
- General microbiology laboratory equipment

WARNINGS AND PRECAUTIONS

- **For *in vitro* diagnostic use and microbiological control.**
- **For professional use only.**
- This kit contains products of animal origin. Certified knowledge of the origin and/or sanitary state of the animals does not totally guarantee the absence of transmissible pathogenic agents. It is therefore recommended that these products be treated as potentially infectious, and handled observing the usual safety precautions (do not ingest or inhale).
- All specimens, microbial cultures and inoculated products should be considered infectious and handled appropriately. Aseptic technique and usual precautions for handling the bacterial group studied should be observed throughout this procedure. Refer to "CLSI® M29-A, *Protection of Laboratory Workers From Occupationally Acquired Infections; Approved Guideline - Current revision*". For additional handling precautions, refer to "Biosafety in Microbiological and Biomedical Laboratories - CDC/NIH - Latest edition", or to the regulations currently in use in each country.
- Do not use reagents past the expiry date.
- Before use, check that the packaging and components are intact.
- Do not use strips which have been damaged : cupules deformed, desiccant sachet open, etc.
- Open ampules carefully as follows :
 - Place the ampule in the ampule protector.
 - Hold the protected ampule in one hand in a vertical position (white plastic cap uppermost).
 - Press the cap down as far as possible.
 - Position the thumb tip on the striated part of the cap and press forward to snap off the top of the ampule.
 - Take the ampule out of the ampule protector and put the protector aside for subsequent use.
 - Carefully remove the cap.
- The performance data presented were obtained using the procedure indicated in this package insert. Any change or modification in the procedure may affect the results.



- Interpretation of the test results should be made taking into consideration the patient history, the source of the specimen, colonial and microscopic morphology of the strain and, if necessary, the results of any other tests performed, particularly the antimicrobial susceptibility patterns.
- It is recommended to perform a quality control test when a new ampule of ZYM B reagent is opened.

STORAGE CONDITIONS

The strips and media should be stored at 2-8°C until the expiry date indicated on the packaging.

SPECIMENS (COLLECTION AND PREPARATION)

API® Staph is not for use directly with clinical or other specimens.

The microorganisms to be identified must first be isolated on a suitable culture medium according to standard microbiological techniques.

INSTRUCTIONS FOR USE

Preparation of the strip

- Prepare an incubation box (tray and lid) and distribute about 5 mL of distilled water or demineralized water [or any water without additives or chemicals which may release gases (e.g. Cl₂, CO₂, etc.)] into the honey-combed wells of the tray to create a humid atmosphere.
- Record the strain reference on the elongated flap of the tray. (Do not record the reference on the lid as it may be misplaced during the procedure).
- Remove the strip from its individual packaging.
- Place the strip in the incubation box.

Preparation of the inoculum

- Subculture the organism onto Columbia blood agar (or P agar) 18-24 hrs. at 36°C ± 2°C.
- Check that the strain belongs to the *Micrococcaceae* family (morphology, Gram stain, catalase etc.) and also check that the culture is pure.
- Open an ampule of API Staph Medium as indicated in the paragraph "Warnings and Precautions".
- Prepare a **homogeneous** bacterial suspension with a turbidity equivalent to 0.5 McFarland. It is recommended to use young cultures (18-24 hours old). This suspension must be used immediately after preparation.

Inoculation of the strip

- Using a pipette or PSlpette, fill the microtubes with the inoculated API Staph Medium. Only fill the tube portion of the microtubes, not the cupules (slightly underfill the microtubes). To avoid the formation of bubbles at the base of the tubes, tilt the strip slightly forward and place the tip of the pipette or PSlpette against the side of the cupule.
- Ensure anaerobiosis in the ADH and URE tests by filling the cupules with mineral oil to form a convex meniscus.
- Close the incubation box.
- Incubate at 36°C ± 2°C for 18-24 hours.

READING AND INTERPRETATION

Reading the strip

- After the incubation period, develop the reactions by adding 1 drop of each of the following reagents and then read all the reactions by referring to the Reading Table :
 - VP test : VP 1 and VP 2 reagents.
Wait 10 minutes. A **violet-pink** color indicates a **positive** reaction. A **pale pink** or **light pink** color obtained after 10 minutes should be considered **negative**.
 - NIT test : NIT 1 and NIT 2 reagents.
Wait 10 minutes. A **red** color indicates a **positive** reaction.
 - PAL test : ZYM A and ZYM B reagents (*).
Wait 10 minutes. A **violet** color indicates a **positive** reaction.
- (*) **It is recommended to control** each ampule of ZYM B before using for the first time.
To do this, it is recommended to use **the strain ATCC® 700404™** indicated in the Quality Control paragraph in order to eliminate any defective reagents.
- Record the results on the result sheet.

Lysostaphin resistance test

Determine resistance to lysostaphin on P agar, as indicated in the following procedure or according to the manufacturer's recommendations.

To perform the test, inoculate the surface of a P agar plate, by flooding it with a bacterial suspension (approximately 10⁷ organisms/mL).

Leave to dry for 10-20 minutes at 36°C ± 2°C.

Place a drop of lysostaphin solution (200 µg/mL) on the surface of the agar.

Incubate for 18-24 hrs. at 35-37°C.

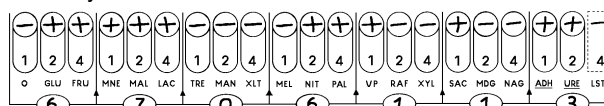
Total or partial lysis of the bacterial culture indicates susceptibility to the enzyme.

This test constitutes the 21st test of the strip. It is considered positive if resistance to lysostaphin is determined.

Interpretation

Identification is obtained with the **numerical profile**.

- Determination of the numerical profile :
On the result sheet, the tests are separated into groups of 3 and a value of 1, 2 or 4 is indicated for each. By adding together the values corresponding to positive reactions within each group, a 7-digit profile number is obtained.
- Identification :
This is performed using the database (V 4.1)
* with the Analytical Profile Index :
- Look up the numerical profile in the list of profiles.
* with the **apiweb™** identification software :
- Enter the 7-digit numerical profile manually via the keyboard.



6 706 113 *Staphylococcus epidermidis*

QUALITY CONTROL

The media, strips and reagents are systematically quality controlled at various stages of their manufacture.

Streamlined quality control may be used to confirm acceptable performance of the API® Staph system after shipping/storage. This methodology may be performed by following the instructions above for testing and meeting the criteria stated in CLSI® M50-A Quality Control for Commercial Microbial Identification Systems.

Testing may be conducted using *Staphylococcus capitis* ATCC® 35661™ to evaluate the performance of the XYL test. Tests performed by bioMérieux has shown that the XYL test is the most labile on the API Staph strip. When testing the strip, *Staphylococcus capitis* ATCC® 35661™ can be used to detect degradation.

For those users who are required to perform **comprehensive quality control** testing with the strip, the following three strains should be tested to demonstrate positive and negative reactivity for the most the API Staph test.

- | | | | |
|----------------------------------|---------------|---------------------------------|---------------|
| 1. <i>Staphylococcus capitis</i> | ATCC® 35661™ | 3. <i>Staphylococcus lentus</i> | ATCC® 700403™ |
| 2. <i>Staphylococcus xylosus</i> | ATCC® 700404™ | | |

ATCC : American Type Culture Collection, 10801 University Boulevard, Manassas, VA 20110-2209, USA.

	0	GLU	FRU	MNE	MAL	LAC	TRE	MAN	XLT	MEL	NIT	PAL	VP	RAF	XYL	SAC	MDG	NAG	ADH	URE
1.	-	+	+	+	-	-	-	V	-	-	+	-	+	-	-	-*	-	-	+	-
2.	-	+	+	+	+	+	+	+	+	-	+	+	V	-	+	+	-	+	-	+
3.	-	+	+	+	+	+	+	+	V	+	+	V	V	+	+	+	+	+	-	-

* This result may vary depending on the culture medium used.

Profiles obtained after culture of the strains on sheep blood agar.

It is the responsibility of the user to perform Quality Control in accordance with any local applicable regulations.

LIMITATIONS OF THE METHOD

- The API Staph system is designed uniquely for the identification of the species included in the database (see Identification Table at the end of this package insert). It cannot be used to identify any other micro-organisms or to exclude their presence.
- Only pure cultures of a single organism should be used.

RANGE OF EXPECTED RESULTS

Consult the Identification Table at the end of this package insert for the range of expected results for the various biochemical reactions.

PERFORMANCE

- Staphylococci
2104 collection strains and strains of various origins belonging to species included in the database were tested :
 - 92.49 % of the strains were correctly identified (with or without supplementary tests).
 - 4.42 % of the strains were not identified.
 - 3.09 % of the strains were misidentified.

Micrococci/Kocuria

171 collection strains and strains of various origins belonging to species included in the database were tested :

- 87.72 % of the strains were correctly identified (with or without supplementary tests).
- 7.60 % of the strains were not identified.
- 4.68 % of the strains were misidentified.

WASTE DISPOSAL

Dispose of used or unused reagents as well as any other contaminated disposable materials following procedures for infectious or potentially infectious products.

It is the responsibility of each laboratory to handle waste and effluents produced according to their type and degree of hazardousness and to treat and dispose of them (or have them treated and disposed of) in accordance with any applicable regulations.

WARRANTY

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READING TABLE

TESTS	ACTIVE INGREDIENTS	QTY (mg/cup.)	REACTIONS / ENZYMES	RESULT	
				NEGATIVE	POSITIVE
0	No substrate		Negative control	red	—
GLU	D-glucose	1.56	(Positive control) (D-GLUcose)	red *	yellow
FRU	D-fructose	1.4	acidification (D-FRUctose)		
MNE	D-mannose	1.4	acidification (D-ManNosE)		
MAL	D-maltose	1.4	acidification (MALtose)		
LAC	D-lactose (bovine origin)	1.4	acidification (LACtose)		
TRE	D-trehalose	1.32	acidification (D-TREhalose)		
MAN	D-mannitol	1.36	acidification (D-MANnitol)		
XLT	xylitol	1.4	acidification (XyLiToI)		
MEL	D-melibiose	1.32	acidification (D-MELibiose)		
NIT	potassium nitrate	0.08	Reduction of NITrates to nitrites		
PAL	β-naphthyl phosphate	0.0244	ALkaline Phosphatase	<u>ZYM A + ZYM B / 10 min</u> yellow violet	
VP	sodium pyruvate	1.904	Acetyl-methyl-carbinol production (Voges Proskauer)	<u>VP 1 + VP 2 / 10 min</u> colorless-light pink violet-pink	
RAF	D-raffinose	1.56	acidification (RAFfinose)	red	yellow
XYL	D-xylose	1.4	acidification (XYLose)		
SAC	D-saccharose (sucrose)	1.32	acidification (SACcharose)		
MDG	methyl-αD- glucopyranoside	1.28	acidification (Methyl-αD- Glucopyranoside)		
NAG	N-acetyl-glucosamine	1.28	acidification (N-Acetyl-Glucosamine)		
<u>ADH</u>	L-arginine	1.904	Arginine DiHydrolase	yellow	orange-red
<u>URE</u>	urea	0.76	UREase	yellow	red-violet

The acidification tests should be compared to the negative (0) and positive (GLU) controls.

* When MNE and XLT are preceded or followed by positive tests, then an orange test should be considered negative.

- The quantities indicated may be adjusted depending on the titer of the raw materials used.
- Certain cupules contain products of animal origin, notably peptones.

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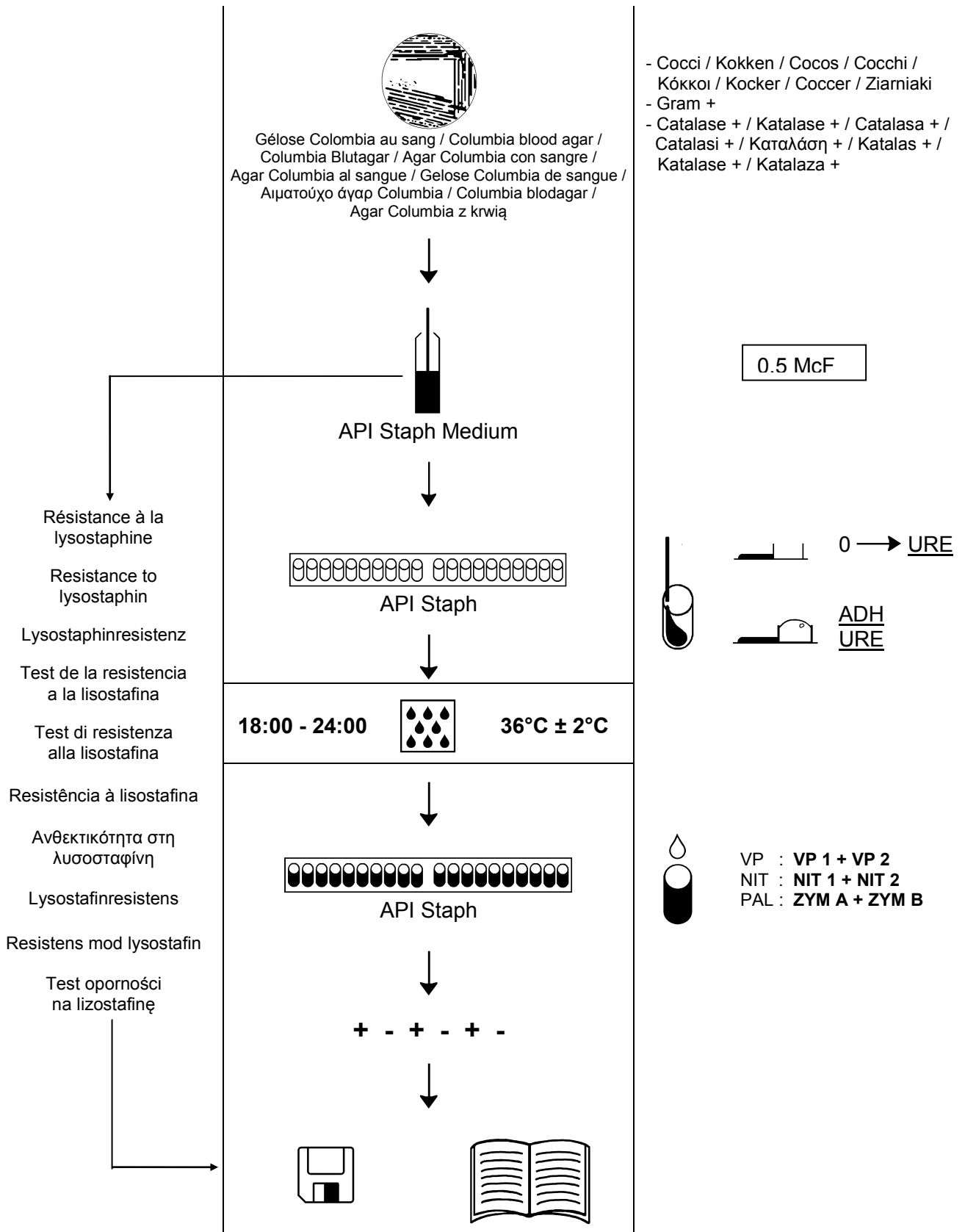


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METHODOLOGIE / PROCEDURE / METHODIK / TECNICA / PROCEDIMENTO / ΔΙΑΔΙΚΑΣΙΑ / METOD / METODYKA



**TABLEAU D'IDENTIFICATION / IDENTIFICATION TABLE / PROZENTTABELLE /
TABLA DE IDENTIFICACION / TABELLA DI IDENTIFICAZIONE / QUADRO DE IDENTIFICAÇÃO /
ΠΙΝΑΚΑΣ ΤΑΥΤΟΠΟΙΗΣΗΣ / IDENTIFIERINGSTABELL / IDENTIFIKATIONSTABEL /
TABELA IDENTYFIKACJI**









% de réactions positives après 18-24 h à 36°C ± 2°C / % of reactions positive after 18-24 hrs. at 36°C ± 2°C /
% der positiven Reaktionen nach 18-24 h bei 36°C ± 2°C / % de las reacciones positivas después de 18-24 H a 36°C ± 2°C /
% di reazioni positive dopo 18-24 ore a 36°C ± 2°C / % das reacções positivas após 18-24 H a 36°C ± 2°C /
% θετικών αντιδράσεων μετά από 18-24 ώρες στους 36°C ± 2°C / % positiva reaktioner efter 18-24 h. vid 36°C ± 2°C /
% af positive reaktioner efter 18-24 timer ved 36°C ± 2°C / % pozytywnych reakcji po 18-24 godzinach w 36°C ± 2°C

API STAPH	V4.1	0	GLU	FRU	MNE	MAL	LAC	TRE	MAN	XLT	MEL	NIT	PAL	VP	RAF	XYL	SAC	MDG	NAG	ADH	URE	LSTR
<i>Staphylococcus aureus</i>	0	100	100	95	96	88	91	80	0	0	83	97	78	1	0	97	2	90	80	80	0	
<i>Staphylococcus auricularis</i>	0	100	99	36	72	10	90	9	0	0	81	0	1	0	0	40	0	15	90	1	0	
<i>Staphylococcus capitis</i>	0	100	99	80	43	22	2	36	0	0	86	23	90	0	0	50	0	1	85	35	0	
<i>Staphylococcus caprae</i>	0	100	99	70	10	75	74	10	0	0	99	95	99	0	0	0	0	1	99	60	0	
<i>Staphylococcus carnosus</i>	0	100	100	99	0	99	99	99	0	0	99	83	83	0	0	0	0	100	100	0	0	
<i>Staphylococcus chromogenes</i>	0	100	100	99	79	100	100	13	0	0	96	96	1	0	1	100	0	31	89	95	0	
<i>Staphylococcus cohnii ssp cohnii</i>	0	100	99	66	99	2	97	88	33	0	21	66	94	0	0	2	0	9	2	1	0	
<i>Staph. cohnii ssp urealyticum</i>	0	100	100	99	98	98	100	94	64	0	1	94	87	0	0	0	0	98	0	99	0	
<i>Staphylococcus epidermidis</i>	0	100	99	70	99	81	2	0	0	1	80	84	68	1	0	97	4	18	73	88	0	
<i>Staphylococcus haemolyticus</i>	0	99	75	5	99	80	91	60	0	1	78	3	57	0	0	98	13	83	85	1	0	
<i>Staphylococcus hominis</i>	0	98	94	41	97	50	86	28	0	1	82	27	70	1	0	97	4	50	43	84	0	
<i>Staphylococcus hyicus</i>	0	100	99	99	0	87	99	0	0	0	90	90	15	0	0	99	2	93	100	68	0	
<i>Staphylococcus lentus</i>	0	100	100	100	100	100	100	100	7	99	92	21	57	100	100	100	28	100	0	1	0	
<i>Staphylococcus lugdunensis</i>	0	100	89	88	99	66	99	0	0	0	99	16	99	0	0	100	0	90	1	50	0	
<i>Staphylococcus saprophyticus</i>	0	100	99	2	97	90	99	88	22	0	35	14	79	1	0	96	1	70	30	65	0	
<i>Staphylococcus schleiferi</i>	0	100	80	100	0	1	71	0	0	0	99	97	99	0	0	0	0	94	99	0	0	
<i>Staphylococcus sciuri</i>	0	99	99	99	99	70	93	98	0	0	83	67	30	0	16	95	7	68	0	0	0	
<i>Staphylococcus simulans</i>	0	100	100	57	11	95	92	73	4	0	83	27	38	0	4	97	2	90	97	84	0	
<i>Staphylococcus warneri</i>	0	99	99	50	98	19	96	70	0	0	23	16	90	0	0	99	0	6	77	97	0	
<i>Staphylococcus xylosus</i>	0	100	100	92	81	85	95	90	30	9	82	75	67	11	82	87	10	80	5	90	0	
<i>Kocuria kristinae</i>	0	99	96	99	90	9	84	3	0	0	6	3	93	0	0	90	12	0	0	0	97	
<i>Kocuria varians/rosea</i>	0	91	92	8	1	1	8	1	0	0	75	4	8	4	8	4	0	1	1	29	95	
<i>Micrococcus spp</i>	0	2	4	0	1	0	1	0	0	0	8	15	1	0	0	1	0	1	11	11	91	

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**TABLE DES SYMBOLES / INDEX OF SYMBOLS / SIMBOLE / CUADRO DE SIMBOLOS /
TABELLA DEI SIMBOLI / QUADRO DOS SÍMBOLOS / ΠΙΝΑΚΑΣ ΣΥΜΒΟΛΩΝ / SYMBOLER /
SYMBOLFORTEGNELSE / TABELA SYMBOLI**

Symbole / Symbol Símbolo / Símbolo Σύμβολο	Signification / Meaning / Bedeutung Significado / Significato / Επεξήγηση Betydelse / Betydning / Znaczenie
	Référence du catalogue Catalogue number (GB) / Catalog number (US) Bestellnummer / Número de catálogo / Numero di catalogo Referência de catálogo / Αριθμός καταλόγου Katalognummer / Katalognummer / Numer katalogowy
	Dispositif médical de diagnostic in vitro In Vitro Diagnostic Medical Device / In Vitro Diagnostikum Producto sanitario para diagnóstico in vitro Dispositivo medico-diagnostico in vitro Dispositivo médico para diagnóstico in vitro In Vitro Διαγνωστικό Ιατροτεχνολογικό προϊόν Medicintekniska produkter för in vitro diagnostik Medicinsk udstyr til in vitro-diagnostik / Wyrób do diagnostyki In Vitro
	Fabricant / Manufacturer / Hersteller / Fabricante Fabbicante / Κατασκευαστής / Tillverkare / Producent
	Limites de température / Temperature limitation Temperaturbegrenzung / Limite de temperatura Limiti di temperatura / Limites de temperatura Περιορισμοί θερμοκρασίας / Temperaturbegränsning Temperaturbegrænsning / Przestrzegać zakresu temperatury
	Utiliser jusque / Use by / Verwendbar bis Fecha de caducidad / Utilizzare entro / Prazo de validade Ημερομηνία λήξης / Använd före / Holdbar til / Użyć przed
	Code du lot / Batch code / Chargenbezeichnung / Código de lote Codice del lotto / Código do lote / Αριθμός Παρτίδας Lot nummer / Lotnummer / Kod partii
	Consulter les instructions d'utilisation Consult Instructions for Use Gebrauchsanweisung beachten Consulte las instrucciones de uso Consultare le istruzioni per l'uso Consulte as instruções de utilização Συμβουλευτείτε τις οδηγίες χρήσης Se handhavandebeskrivningen / Se brugsanvisning Sprawdź w instrukcji obsługi
	Contenu suffisant pour "n" tests Contains sufficient for <n> tests Inhalt ausreichend für <n> Prüfungen Contenido suficiente para <n> ensayos Contenuto sufficiente per "n" saggi Conteúdo suficiente para "n" ensaios Περιεχόμενο επαρκές για «ν» εξετάσεις Räcker till "n" antal tester Indeholder tilstrækkeligt til "n" test Wystarczy na wykonanie <n> testów