

Reference Material 8376

Microbial Pathogen DNA Standards for Detection and Identification

REFERENCE MATERIAL INFORMATION SHEET

Purpose: This reference material (RM) is intended for harmonizing measurements of abundance and identity using next-generation sequencing-based metagenomics.

Description: A unit of RM 8376 consists of 20 tubes (components) containing either bacterial (19 tubes) or human (1 tube) genomic DNA in an aqueous buffer (1 × Tris-EDTA). Each component contains approximately 100 µL of solution. The bacterial components are at a nominal concentration of 50 ng/µL, while the human DNA is nominally 100 ng/µL.

Non-Certified Values: Non-certified values are best estimates based on currently available information. However, they do not meet NIST's criteria for certification. Non-certified values do not provide metrological traceability to the International System of Units (SI) or other higher-order reference system [1]. Non-certified values for chromosomal copy number concentration are provided below. The non-certified values are metrologically traceable to the materials and procedures used in their determination.

Part	Name	Organism	Chromosomal Copy Number Concentration ×10 ⁶ (copy/µL) ^(a)
A	<i>E. coli</i> ATCC ^{®(b)} 43895 TM DNA	<i>Escherichia coli</i> O157:H7	8.84 ± 0.38
B	<i>E. coli</i> ATCC [®] BAA-2309 TM DNA	<i>Escherichia coli</i> O104:H4	8.89 ± 0.28
C	<i>S. enterica</i> ATCC [®] 700720 TM DNA	<i>Salmonella enterica</i> subsp. <i>enterica</i>	9.72 ± 0.38
D	<i>S. enterica</i> ATCC [®] 12324 TM DNA	<i>Salmonella enterica</i> subsp. <i>arizonae</i>	10.84 ± 0.52
E	<i>S. aureus</i> ATCC [®] BAA-44 TM DNA	<i>Staphylococcus aureus</i>	16.49 ± 0.76
F	<i>S. aureus</i> ATCC [®] 12600 TM DNA	<i>Staphylococcus aureus</i>	17.38 ± 0.68
G	<i>S. epidermidis</i> ATCC [®] 12228 TM DNA	<i>Staphylococcus epidermidis</i>	15.99 ± 0.60
H	<i>P. aeruginosa</i> ATCC [®] BAA-47 TM DNA	<i>Pseudomonas aeruginosa</i>	8.27 ± 0.34
I	<i>A. baumannii</i> ATCC [®] 19606 TM DNA	<i>Acinetobacter baumannii</i>	12.01 ± 0.56
J	<i>N. meningitidis</i> ATCC [®] 13077 TM DNA	<i>Neisseria meningitidis</i>	21.67 ± 0.94
K	<i>S. pyogenes</i> ATCC [®] 12344 TM DNA	<i>Streptococcus pyogenes</i>	22.55 ± 0.86
L	<i>E. faecalis</i> ATCC [®] 19433 TM DNA	<i>Enterococcus faecalis</i>	14.75 ± 0.50
M	<i>A. xylosoxidans</i> ATCC [®] 27061 TM DNA	<i>Achromobacter xylosoxidans</i>	7.28 ± 0.36
N	<i>A. hydrophila</i> ATCC [®] 35654 TM DNA	<i>Aeromonas hydrophila</i>	9.97 ± 0.34
O	<i>K. pneumoniae</i> ATCC [®] 13883 TM DNA	<i>Klebsiella pneumoniae</i>	7.68 ± 0.36
P	<i>S. sonnei</i> ATCC [®] 25931 TM DNA	<i>Shigella sonnei</i>	9.67 ± 0.36
Q	<i>V. furnissii</i> ATCC [®] 35016 TM DNA	<i>Vibrio furnissii</i>	9.70 ± 0.36
R	<i>L. monocytogenes</i> ATCC [®] 19115 TM DNA	<i>Listeria monocytogenes</i>	17.39 ± 0.64
S	<i>L. pneumophila</i> ATCC [®] 33152 TM DNA	<i>Legionella pneumophila</i>	13.63 ± 0.46
T	<i>Homo sapiens</i> GM24385 DNA	Human	0.0323 ± 0.0015

^(a) The values are expressed as $x \pm 2u(x)$, where x is the value and $u(x)$ is the standard uncertainty of x . The standard uncertainty combines reaction volume, unit, and repetition. While the best estimate value lies within the interval $x \pm 2u(x)$, this interval may not include the true value. For guidance in using and propagating this uncertainty, see reference 2.

^(b) American Type Culture Collection (ATCC).

Period of Validity: The non-certified values are valid within the measurement uncertainty specified until **31 December 2029**. The value assignments are nullified if the material is stored or used improperly, damaged, contaminated, or otherwise modified.

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Information Sheet Revision History on Last Page

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Maintenance of Non-Certified Values: NIST will monitor this material to the end of its period of validity. If substantive technical changes occur that affect the non-certified values during this period, NIST will update this Reference Material Information Sheet and notify registered users. RM users can register online from a link available on the NIST SRM website or fill out the user registration form that is supplied with the RM. Registration will facilitate notification. Before making use of any of the values delivered by this material, users should verify they have the most recent version of this documentation, available through the NIST SRM website (<https://www.nist.gov/srm>).

Safety: RM 8376 IS INTENDED FOR RESEARCH USE. This is a bacterial and human DNA source material. RM 8376 is a Biosafety Level 1 material and should be handled according to applicable federal, state, and/or local regulations and according to policies and procedures of recipient's organization.

This RM was developed after an appropriate human subjects research determination by NIST.

Storage: For optimal longevity, RM 8376 material should be stored at 4 °C in the dark. The material will remain stable at room temperature for extended periods of time (approximately 22 °C, 11 weeks) if the tubes remain sealed.

Do not freeze the material, as this can alter the concentration and structure of the DNA. Diluted material is unstable, and not suitable for storage. Do not expose any DNA solution to direct sunlight.

Use: Prior to removing sample aliquots for analysis, the vial should be **mixed by horizontal vortexing for 5 seconds** and briefly centrifuged without opening the vial cap. For the reference values to be valid, materials should be withdrawn soon after opening the vials and processed without delay. Dilutions of aliquots of these materials may be made as appropriate for each application, but they must be used immediately.

Additional Information: The ATCC trademark and trade name, and any and all ATCC catalog numbers are trademarks of the American Type Culture Collection.

REFERENCES

- [1] Beauchamp, C.R.; Camara, J.E.; Carney, J.; Choquette, S.J.; Cole, K.D.; DeRose, P.C.; Duewer, D.L.; Epstein, M.S.; Kline, M.C.; Lippa, K.A.; Lucon, E.; Molloy, J.; Nelson, M.A.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sander, L.C.; Schiel, J.E.; Sharpless, K.E.; Toman, B.; Winchester, M.R.; Windover, D.; *Metrological Tools for the Reference Materials and Reference Instruments of the NIST Material Measurement Laboratory*; NIST Special Publication (NIST SP) 260-136, 2021 edition; National Institute of Standards and Technology, Gaithersburg, MD (2021); available at <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2021.pdf> (accessed Dec 2024).
- [2] Possolo, A.; *Evaluating, Expressing, and Propagating Measurement Uncertainty for NIST Reference Materials*; NIST Special Publication (NIST SP) 260-202; U.S. Government Printing Office: Washington, DC (2020); available at <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-202.pdf> (accessed Dec 2024).

Information Sheet Revision History: 16 December 2024 (Change of period of validity; editorial changes); 02 June 2021 (Original certificate date).

Certain commercial equipment, instruments, or materials may be identified in this Reference Material Information Sheet to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Users of this RM should ensure that the Reference Material Information Sheet in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, MD 20899-2300; telephone (301) 975-2200; e-mail srminfo@nist.gov; or the Internet at <https://www.nist.gov/srm>

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