Accessible Bio Education Standard (ABES):
Wetware Consumables (-W)

Life science research is vast, varied, and in many cases specialized to the topic being undertaken. Thousands of laboratories around the world have their own “secret sauce”; with methods of doing science, preferred equipment, consumables, and reagents.

In order to address this variation and establish a common understanding between companies providing services and products to the life science education sector, Amino Labs Inc. has established the Accessible Bio Education Standard (ABES). ABES is a growing list of specifications that will help companies build products that are compatible with one another, with the goal of making the biological products more accessible and desirable to end-consumers as well as reduce cost of manufacturing for companies. This will translate into customers such as parents and teachers finding it simpler to order and buy products, and thanks to cross compatibility, make it less costly to set up educational and home labs. Ultimately, it will make exploring biology easier and safer for future scientists and enthusiasts.

If you’re an individual, company, government organization, non-governmental organization, co-op, or student and whether it be for-profit or not-for-profit, consider ABES-W for your wetware offerings. If you are building and selling wetware products such as DNA plasmids, petri dishes for growing and culturing cells, transformation kits, DNA assembly kits, *etc*., we encourage you to adopt ABES-W - the “W” referring to wetware so that consumers may mix and match between products and compliant hardware systems, breathing life into their own creations.

If your products do comply with **ABES-W** specifications, you are encouraged to place the ABES-W wetware logo on your product as a symbol that customers will recognize for compatibility with their other purchases. Pdf and Png version are available for use, email us at abes@amino.bio

ABES

Below are some more specific reasons why you should make your products ABES-W compliant:

- so Amino Labs customers can directly use your wetware products with their Amino Labs hardware.

  Amino Labs wetware enables a great first step for our customers to begin exploring the world of biotechnology development, however, we believe that our customers should have as many experiences as possible, even if this means enabling Amino Labs

customers' to buy competing products.

- so you can have access to AminoLabs customer base.

  AminoLabs is very passionate about helping people explore biology, so much so, that we want the *accessible biology* ecosystem to thrive. By designing your products and implementing these specifications, you have a well defined target market.

- to lower the overall cost of products and pass those savings on to the end customers.

  Amino Labs spent much effort designing our wetware products not just for optimal function, but also for cost savings and ecological considerations. Following the specifications means that less reagents are used, shipping products requires smaller boxes with less weight, and the waste at the end of experiments is reduced. All of these benefit the customer and do not hinder their ability to explore biology.

Is there something missing from this specifications sheet? Do you need more information?
Email abes@amino.bio

Consumables Specifications

Tubes

Small Screw-top microcentrifuge tubes:

- polypropylene
- optimal tube is 0.5 mL microcentrifuge screw top tube (non-skirted)
- Max RCF of 15,000 x *g* or greater
- a tip diameter of 4.7625 mm (3/16”) or less with a tube taper of 10 degrees or less
- sterile
    - *screw top tubes are optimal because they seal most securely and prevent evaporation*
    - *samples requiring immersive incubation (completely surrounded by a desired temperature), should not exceed a volume of 100 µL in a 0.5 mL non-skirted microcentrifuge tube*
    - *e.g. http://store.biobasic.com/product/tc135-sw-size-1pk/*

Screw-top microcentrifuge tubes:

- polypropylene
- 1.5 mL or less (non-skirted) can also be used
- Max RCF of 15,000 x *g* or greater
- a tip diameter of 4.7625 mm (3/16”) or less with a tube taper of 10 degrees
- sterile
    - *samples requiring immersive incubation (completely surrounded by a desired temperature), should not exceed a volume of 150 µL in a 1.5 mL non-skirted microcentrifuge tube*
    - *e.g. http://store.biobasic.com/product/tc122-sn-size-1pk/*

Petri dishes (cell culture)

- polypropylene
- 60 mm in diameter or smaller
- 12 - 15 mm plate depth
- sterile

Inoculation loops

- 1 µL (blue in colour)
- 10 µL (yellow in colour)
- sterile

Reagents (*E. coli)*

DNA

If you are a supplier solely of DNA and wish to be ABES-W compliant so as to offer DNA plasmids to educational customers exploring with E. coli, implement the following specifications for simplified user experiences without micropipets. This enables end-users to use 1 uL inoculating loops:

- at least 25 µL of DNA be added to a 0.5 mL (non-skirted) microcentrifuge tube
- DNA concentration should be 10-50 ng per µL
- A 1 uL inoculating loop will transfer between 1 µL and 2 µL of DNA
- if end-users wish to use micropipets, they transfer between 1 µL and 2 µL of DNA (no more than 2 µL as this will hinder the transformation reaction)
- the buffer used to suspend/store the DNA, should have a molar concentration less than or equal to 10 mM (e.g. less than or equal to 10 mM Tris-Cl pH 8)
- in the case of a DNA ligation or DNA assembly reaction where enzymes are added, the end product used to transform cells, should be no less than 20 ng and no more than 5 µL

Transformation

if you are a supplier of transformation kits used for E. coli colony transformations, the following minimal requirements and quality control metrics should be achieved:

- using the ABES-W DNA specifications above, and the ABES-W consumables specifications, the end results on a single selective LB agar plate should be greater than 20 successfully engineered bacterial colonies, with no satellite colonies, or other non-specific growth (unless this is a learning objective within your product).

if you are a supplier of individual components of a transformation kits (growth media, recovery media, transformation buffer), a recommended test for minimal performance is as follows:

- the volume of transformation buffer per reaction should be between 50 µL and 100 µL
- using a colony transformation protocol where:
    - streaked *E. coli* are grown at 37 C for no more than 16 hours
    - ~10 small colonies of 1mm or smaller are suspended in transformation buffer, mixed with DNA (as per ABES-W above) and the sample is heat shocked as per your protocol
    - a 1:5 volumetric ratio of transformation buffer to recovery media is used to recover cells
    - recovery at 37 C is no more than 60 minutes
    - 100-200 µL of sample is plated onto selective LB agar (see ABES-W above)
    - post incubation results in greater than 20 colonies.