

SBS Proposed Microplate Specifications

Revised July 1999

Comment: The dimensions chosen are a summary of the comments received. The ± 0.010 (± 0.25 mm) tolerance is within current manufacturing tolerances. It will preclude using the same injection-molding tool for resins with different shrink rates. A polystyrene plate and a polypropylene plate could not be produced in the same tool. Two separate tools would be required.

Standard 1: External Microplate Dimensions

1.1 Footprint

1.11 The outside dimension of the base footprint shall be as follows.

- Length 5.030 inches ± 0.010 (127.76 mm ± 0.25)
- Width 3.365 inches ± 0.010 (85.47 mm ± 0.25)

These dimensions are to be measured at the four outside corners.

1.12 The sides and ends will be straight within ± 0.020 inch (± 0.50 mm). This is defined as the maximum variation from a theoretical line connecting the applicable outside corners. When the plate width or length is measured at its point of maximum deflection, it will be as follows.

- Length 5.030 inches ± 0.020 (127.76 mm ± 0.50)
- Width 3.370 inches ± 0.020 (85.60 mm ± 0.50)

The centerline of the outside footprint dimensions shall be coincident with the centerline of the well to well spacing.

1.13 The plate shall have sufficient rigidity to allow its handling by automated mechanical means. The rigidity shall be such that the deflection of each side of the plate shall be no more than 0.020 inches (0.25 mm) under XX psi/pascal of pressure.

Comments: The exact wording of this section and the value of XX are yet to be determined

1.2 Corner Radius

1.21 The four outside corners of the plate's bottom flange shall have a corner radius to the outside of 0.125 inch ± 0.062 (3.2 mm ± 1.6)

1.3 External Clearance to the Plate Bottom

1.31 The plane of the bottom external surface of the wells, defined by the perimeter of the outside perimeter wells, shall be 0.040 inch ± 0.010 (1.0 mm ± 0.25 mm) above the resting plane. This is shown as WH on the figures.

Comments: The corner radius serves as a lead in, for the plate, and is not a locator dimension. Thus a wider tolerance on the radius is allowable.

There is discussion the dimension marked as WH in the figures. In the 96 well standard. WH is defined as 0.040 ± 0.010 inches. This was to assure the bottom of one plate, when stacked on another, would clear any projections on the top surface of the bottom plate, which is limited to 0.030 inches by paragraph 2.2 of standard 2. The reasoning behind standardizing the WH height was to define the location of the well bottom for instruments such as readers. It also provides an approximation of well depth for pipettor applications, since the plate height is defined in section 1.2.

2.0 Plate Designation

2.1 A microplate meeting all of the requirements mentioned in this specification may be labeled as meeting the "SBS Microplate Standard 1 specifications". The use of these names or marks on plates not meeting the above requirements is prohibited.

Comments: SBS does not want to be in the business of maintaining standards. We only offer these specifications as a service to our members. However, we are investigating the possibility of submitting these specifications to the ISO or NIST organizations to specify and maintain a microplate standard.

Standard 2: Microplate Height

1.0 Plate Height

1.1 The plate heights shall be defined as follows:

- Standard height: 0.565 inch \pm 0.010 (14.35 mm \pm 0.25)
- Double height: 1.130 inch \pm 0.010 (28.70 mm \pm 0.25)
- Deep Well: 1.695 inch \pm 0.010 (43.05 mm \pm 0.25)

This is measured from the bottom-resting plane to the maximum protrusion from the plate.

Comments: Plate heights should be set for the three major plate depths, not just a standard microplate. This is important for a variety of stacking, storage, and pipetting instrumentation.

2.0 Top Surface

2.1 The maximum allowable projection above the top stacking surface is 0.030 inch (0.75 mm). The top stacking surface is defined as that surface on which another plate would rest when stacked one on another.

2.2 When resting on a flat surface, the top surface of the plate must be parallel to the resting surface within 0.030 inch (0.75 mm)

3.0 Plate Designation

3.1 A microplate meeting all of the requirements mentioned in this specification may be labeled as meeting the “SBS Microplate Standard 2 specifications”. The use of these names or marks on plates not meeting the above requirements is prohibited.

Comments: SBS does not want to be in the business of maintaining standards. We only offer these specifications as a service to our members. However, we are investigating the possibility of submitting these specifications to the ISO or NIST organizations to specify and maintain a microplate standard.

Standard 3a: Short Bottom Outside Flange

Comments: A shorter flange height allows room for larger barcodes to be applied to the microplate.

1.0 *Bottom Outside Flange*

- 1.1 The bottom outside flange, defined as dimension FH in the figures, shall be 0.09 inch \pm 0.010 (2.29 mm \pm 0.25 mm). This is measured from the bottom-resting plane to the top of the flange.
- 1.2 The bottom flange width measured at the top of the flange, defined as dimension FW on the figures, shall be 0.060 inch \pm 0.010 (1.50 mm \pm 0.1).

Comments: A minimum flange width is essential in the design to accommodate stacker escapements. Changing the flange width to a wider tolerance of +0.020 inch will provide the plate designer wider latitude, without impacting the stacker requirements.

2.0 *Plate Designation*

- 2.1 A microplate meeting all of the requirements mentioned in this specification may be labeled as meeting the “SBS Microplate Standard 3a specifications”. The use of these names or marks on plates not meeting the above requirements is prohibited.

Comments: SBS does not want to be in the business of maintaining standards. We only offer these specifications as a service to our members. However, we are investigating the possibility of submitting these specifications to the ISO or NIST organizations to specify and maintain a microplate standard.

Standard 3b: Tall Bottom Outside Flange

Comments: A larger flange height is more compatible with robot fingers that need to manipulate lidded microplates by grabbing them on the flange.

1.0 *Bottom Outside Flange*

- 1.1 The bottom outside flange, defined as dimension FH in the figures, shall be 0.240 inch \pm 0.010 (6.10 mm \pm 0.25 mm). This is measured from the bottom-resting plane to the top of the flange.
- 1.2 The bottom flange width measured at the top of the flange, defined as dimension FW in the figures, shall be 0.060 inch \pm 0.010 (1.50 mm \pm 0.1).

Comments: A minimum flange width is essential in the design to accommodate stacker escapements. Changing the flange width to a wider tolerance of +0.020 inch will provide the plate designer wider latitude, without impacting the stacker requirements.

2.0 *Plate Designation*

- 2.1 A microplate meeting all of the requirements mentioned in this specification may be labeled as meeting the “SBS Microplate Standard 3b specifications”. The use of these names or marks on plates not meeting the above requirements is prohibited.

Comments: SBS does not want to be in the business of maintaining standards. We only offer these specifications as a service to our members. However, we are investigating the possibility of submitting these specifications to the ISO or NIST organizations to specify and maintain a microplate standard.

Standard 4: Well Dimensions

1.0 Well Arrangement

- 1.1 The wells in a microplate should be arranged in a ratio of 2 wells per row to 3 wells per column. (i.e. 4 x 6 for a 24 well, 8 X 12 for a 96 well, and 16 X 24 for a 384 well)
- 1.2 The distance between the center of the plate and the center of the top row of wells is as follows:
- 24 wells: 1.063 inches (27.00 mm)
 - 96 wells: 1.240 inches (31.50 mm)
 - 384 wells: 1.320 inches (33.50 mm)
- 1.3 The distance between the center of the plate and the center of the left column of wells is as follows:
- 24 wells: 1.772 inches (45.00 mm)
 - 96 wells: 1.949 inches (49.50 mm)
 - 384 wells: 2.028 inches (51.50 mm)

Comments: There was discussion concerning locating the top left well from the adjacent outside edges, as opposed to locating the wells on a common centerline with the external dimension. Some plate readers push the plate into the upper left-hand corner and locate the top left well from that reference. This method compensates for the variation that currently exists in plate length and width. However, as this new standard defines length and width more precisely, it becomes a moot point as to whether the top left well is located from the upper left corner or from the common centerline.

2.0 Well Shape

- 2.1 The diameter of round wells is to be as follows:
- 24 wells: 0.551 inches (14.00 mm)
 - 96 wells: 0.276 inches (7.00 mm)
 - 384 wells: 0.138 inches (3.50 mm)
- 2.2 Square shaped wells should have a height and width equivalent to the above diameters.

3.0 Well Spacing

- 3.1 The well to well spacing in both horizontal and vertical directions, measured well center to well center, is to be as follows:
- 24 wells: 0.709 inches (18.00 mm)
 - 96 wells: 0.354 inches (9.00 mm)
 - 384 wells: 0.177 inches (4.50 mm)
- 3.2 The tolerance on the center to center spacing is ± 0.003 inches (± 0.08 mm). The tolerances are non-cumulative. This is defined as follows. Each well will be within ± 0.003 inch (0.08 mm) of its theoretical centerline position when measured on a straight line between the first and last wells in that row or column.

4.0 Well Markings

- 4.1 The top left well of the plate shall be marked in a distinguishing manner.
- 4.11 The top left well of the plate can be marked with the letter A or numeral 1 located on the left-hand side of the well.
- 4.12 The top left well of the plate can be marked with a numeral 1 located on the upper side of the well.
- 4.2 Additional markings may be provided.

Comments: Should a standard be set for marking the wells? If so, how are rows of a 1536 well to be marked when we pass the letter Z? Should numbers be used or double letters? Are the wells of such a plate too small to be marked? Also by specifying that the top left corner be cut at an angle, we can mark well 1.

5.0 Plate Designation

- 5.1 A microplate meeting all of the requirements mentioned in this specification may be labeled as meeting the "SBS Microplate Standard 4 specifications". The use of these names or marks on plates not meeting the above requirements is prohibited.

Comments: *SBS does not want to be in the business of maintaining standards. We only offer these specifications as a service to our members. However, we are investigating the possibility of submitting these specifications to the ISO or NIST organizations to specify and maintain a microplate standard.*

Standard 5: Lid Design

1.0 Lid Dimensions

1.1 Lid Footprint

1.11 The outside dimension of the lid footprint shall be as follows.

- Length 5.030 inches \pm 0.010 (127.76 mm \pm 0.25)
- Width 3.365 inches \pm 0.010 (85.47 mm \pm 0.25)

These dimensions are to be measured at the four outside corners.

1.12 The sides and ends will be straight within \pm 0.020 inch (\pm 0.50 mm). This is defined as the maximum variation from a theoretical line connecting the applicable outside corners. When the lid width or length is measured at its point of maximum deflection, it will be as follows.

- Length 5.030 inches \pm 0.020 (127.76 mm \pm 0.50)
- Width 3.370 inches \pm 0.020 (85.60 mm \pm 0.50)

1.13 The lid shall have sufficient rigidity to allow its handling by automated mechanical means

1.2 Lid Height

1.21 The side flanges of the lid will have a height of at least 0.240 inch \pm 0.010 (6.10 mm \pm 0.25)

Comments: The height of the lid is important in order to allow it to also be manipulated by robotic fingers.

Some of the lids currently of the market are too short for this.

There are a variety of modifications that have been made to the lid today. For example, some vendors offer lids with cutouts to provide functionality that is similar to what was originally envisioned with the “Vees” included in the original SBS recommendations. These options are acceptable within these specifications as long as the overall dimension of the lid remains unchanged.

2.0 Plate Designation

2.1 A microplate meeting all of the requirements mentioned in this specification may be labeled as meeting the “SBS Microplate Standard 5 specifications”. The use of these names or marks on plates not meeting the above requirements is prohibited.

Comments: SBS does not want to be in the business of maintaining standards. We only offer these specifications as a service to our members. However, we are investigating the possibility of submitting these specifications to the ISO or NIST organizations to specify and maintain a microplate standard.