
Attachment: 4020 Determination of Vertical Axis Deviation and Circular Runout for Glass Containers

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Vertical axis deviation refers to the half of the diameter of the circle made by the center of the bottle mouth around the central axis of the bottle bottom while the bottle rotated around the central axis. It is the horizontal deviation from the center of the bottle mouth to the vertical line through the center of the bottle bottom. Circular runout refers to the maximum variation of the outer diameter while a glass ampoule rotates for a single revolution around the central axis of the bottle bottom.

This method applies for the determination of vertical axis deviation for glass containers for pharmaceutical use with round shape or the axis of the bottle bottom can be fixed, or for the determination of circular runout for glass ampoules.

Instruments: The vertical axis deviation tester or circular runout tester shall comply with several technical requirements: it can ensure that when the bottle bottom of the sample is placed horizontally, the horizontal distance between the center of the bottle mouth and the center of the bottle bottom of the sample can be measured. There shall be means or device to fix the bottle bottom or ensure that the bottle bottom is in contact with the horizontal surface. There shall also be a baseplate or reliable means to rotate the bottle, to ensure that the axis of the bottle bottom always remains stable while the bottle is rotating. There shall be columns with enough height and parallel to the axis of the bottle bottom. The column shall be equipped with a measuring device (such as displacement sensor, scale, dial gauge, or reading microscope, etc.). The measuring device shall be in contact with the outer edge of the bottle mouth. There shall be a contact plane parallel to the outer edge of the bottle mouth to ensure enough contact as the bottle mouth rotates.

Determination: Clamp the bottom of the sample bottle firmly onto the rotating disk of the horizontal stage. In determining the vertical axis deviation, make the bottle mouth contact with the measuring device and rotate the sample 360° to read the maximum and minimum values, or read the vertical axis deviation value directly. In determining the circular runout, make the measuring point (apart from the bottle mouth about 3mm) contact with the measuring device, and rotate the sample 360° to read the maximum and minimum values, or read the result of circular runout directly. If a V-shaped seat is used for measurement, place the sample closely to the inside of the V slot, apply a downward force by hand in the direction of 45 degrees from the horizontal plane. Then rotate the bottle 360° to read the maximum and minimum values, or read the result of vertical axis deviation, circular runout directly.

Result Calculation and Representation

The result of vertical axis deviation is expressed as half of the difference between the maximum and minimum values read in the above determination.

The result of circular runout is expressed as the difference between the maximum and minimum values read in the above determination.

The precision of the measurement shall not be less than 0.1 mm.