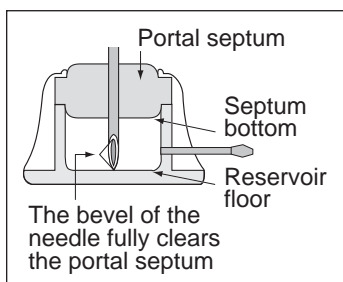


## Understanding Needle Clearance

### What is portal needle clearance?

Portal needle clearance is a measure of the distance between the bottom of the portal septum and the reservoir floor as it compares to the height of the bevel of various gauges of non-coring needles.



A portal is said to have a specific gauge needle clearance if the bevel of the gauge needle is totally unobstructed by the portal septum when the needle is fully inserted into the portal.

For example, 19 gauge

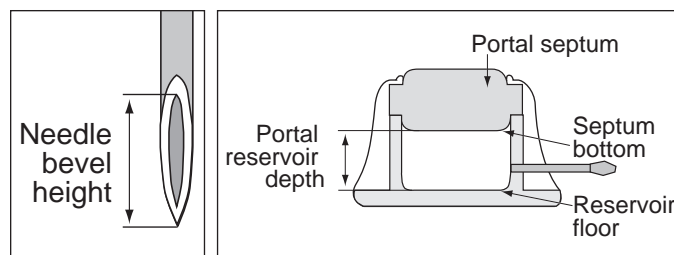
needle clearance means that the entire bevel of a 19 gauge non-coring needle fully clears the portal's septum and is unobstructed by it. Because smaller gauge needles have smaller bevel heights, a needle of the same length, but with a smaller gauge, would also be unobstructed when fully inserted into the portal.

### What does "fully inserted into the portal" mean?

Full insertion of a needle into a portal means that the point of the needle has made contact with the portal reservoir floor. To accomplish this, a needle of appropriate length must be chosen and inserted through the septum until contact with the reservoir floor is felt. A needle too short to reach the reservoir floor, or a needle not fully inserted, can be totally or partially obstructed by the portal septum, even in a portal with adequate needle clearance.

### How is needle clearance determined?

Needle clearance is determined by comparing the measures of needle bevel height and portal reservoir depth. The needle bevel height is the measure of the distance from the point of the needle to the top of the needle bevel opening. The portal reservoir depth is the



measure of the distance between the bottom of the portal septum and the floor of the reservoir.

If the reservoir depth is greater than the needle bevel height, the portal is said to have clearance for that needle gauge.

### Do all portals have the same needle clearance?

No. Different portals have different needle clearances. In general, the higher the portal, the greater the needle clearance. Needle clearance is directly related to portal height. Reservoir depth and septum thickness are the predominant determinants of portal height. Larger gauge needle clearance requires greater reservoir depth and, in general, a higher portal.

### Why is needle clearance important?

The rate of flow through an implantable access system is determined by all of the components of the system, including the needle. Generally, a larger needle is expected to provide a higher flow rate. However, if a larger gauge needle bevel is obstructed by the portal septum, the flow will be less than expected.

In summary, portal needle clearance indicates the largest needle gauge that will fully clear the portal septum. Needle clearance provides the information necessary to choose the needle gauge, which can optimize flow in a particular implantable access system. Should a patient's therapy require a large gauge needle, a portal can be selected that provides clearance for the required needle.