

WHAT IS CLAIMED IS

1. A method comprising:
 - providing a syringe including and barrel flange and a non-lubricated barrel;
 - inserting a non-lubricated stopper that includes a sealing rib into a placement region located at a proximal end of hybrid insertion device, the hybrid insertion device including, sealing gasket, a conduit, and an insertion tube, the non-lubricated stopper being at least partially covered by a polymer layer;
 - lowering the hybrid insertion device until a distal end of a body of the insertion tube is located a desired distance above a liquid solution located within the syringe;
 - creating a seal between a sealing gasket of the hybrid insertion device and the barrel flange of the syringe;
 - applying a vacuum through a vacuum port fluidly connected to a vacuum gap and being located at a distal end of a vacuum chamber portion of the hybrid insertion device;
 - translating the stopper through insertion tube and the non-lubricated barrel with an insertion rod until a desired headspace between a front edge of the sealing rib and a liquid solution located in the non-lubricated cartridge tube is achieved;
 - retracting the insertion rod away from the hybrid insertion device; and
 - retracting the hybrid insertion device away from the non-lubricated barrel.
2. The method of claim 1, wherein the insertion tube is sized smaller than an inner diameter of the conduit to allow the vacuum gap to be formed therebetween.
3. The method of claim 1 or claim 2, wherein the hybrid insertion device moves into the barrel without contacting an inner surface of the barrel.
4. The method of any one of claims 1 to 3, comprising adding the liquid solution to the non-lubricated barrel prior to creating the vacuum seal between the sealing gasket and the barrel flange.

5. The method of any one of claims 1 to 4, wherein the liquid solution is a therapeutic substance.
6. The method of claim 5, wherein the therapeutic substance contains therein a biologic, a therapeutic compound, or a combination thereof.
7. The method of any one of claims 1 to 6, wherein the vacuum chamber has been electropolished, extrude honed, or a combination thereof.
8. The method of any one of claims 1 to 7, wherein at least the stopper, the sealing gasket, the conduit, the insertion tube, the syringe barrel, the barrel flange, and the insertion pin are free or substantially free of lubricants.
9. The method of any one of claims 1 to 8, wherein a transition zone in the hybrid insertion device tapers from a placement region to the tube body at a taper angle α for transitioning the non-lubricated stopper from the placement region to a proximal end of the barrel.
10. The method of claim 9, wherein the taper angle is between about 0.1 degree and about 20 degrees.
11. The method of any one of claims 1 to 10, wherein the desired headspace ranges from about 0.1 mm to about 25 mm, or from 0.1 mm to about 10 mm, or from about 0.1 mm to about 5 mm, or from about 0.5 mm to about 10 mm, or from about 0.5 to 5 mm, or from 1 mm to about 25 mm, or from about 1 mm to about 10 mm, or from about 1 mm to about 5 mm.
12. The method of any one of claims 1 to 11, wherein the insertion rod includes a pin tip end and the non-lubricated stopper contains therein a cavity to receive the pin tip end.

13. The method of any one of claims 1 to 12, wherein the polymer layer comprises an expanded fluoropolymer layer.
14. The method of claim 13s, wherein the expanded fluoropolymer layer comprises an expanded polytetrafluoroethylene layer.
15. The method of any one of claims 1 to 13, wherein the hybrid insertion device is positioned above and is aligned with the non-lubricated barrel.
16. The method of any one of claims 1 to 15, wherein the insertion rod and hybrid insertion device are retracted simultaneously.
17. The method of any one of claims 1 to 16, wherein the insertion rod is retracted prior to retracting the hybrid insertion device.
18. A method comprising:
providing a syringe including and barrel flange and a non-lubricated barrel;
inserting an insertion tube into a conduit of a vacuum chamber to form a hybrid insertion device, the insertion tube including a body, an insertion body and a distal end;
inserting a non-lubricated stopper that includes a sealing rib into a placement region located at a proximal end of the vacuum chamber, the non-lubricated stopper being at least partially covered by a polymer layer;
lowering the hybrid insertion device until the insertion body of the insertion tube is located a desired distance above a liquid solution located within the non-lubricated barrel;
creating a seal between a sealing gasket of the vacuum chamber and the barrel flange of the syringe;
applying a vacuum through a vacuum port fluidly connected to a vacuum gap and being located at a distal end of the vacuum chamber;

translating the stopper through insertion tube and the non-lubricated barrel with an insertion rod until a desired headspace between a front edge of the sealing rib and a liquid solution located in the non-lubricated barrel is achieved;

retracting the insertion rod away from the hybrid insertion device; and

retracting the hybrid insertion device away from the non-lubricated barrel.