CLAIMS:

1. A method for producing a monocrystalline silicon ingot having a neck and a main body suspended from the neck by the horizontal magnetic field Czochralski method, the monocrystalline silicon ingot being grown in an ingot puller apparatus having a heat shield, the method comprising:

contacting a seed crystal with a silicon melt held within a crucible;

pulling a neck from the silicon melt, wherein:

a horizontal magnetic field is not applied to the melt while the neck is pulled from the melt;

the crucible is rotated at a crucible rotation rate of 8 rpm or more while pulling the neck from the melt; and

a distance between the melt and a bottom of the heat shield is at least 60 mm while pulling the neck from the melt; and

pulling an ingot main body from the melt, the main body being suspended from the neck, wherein a horizontal magnetic field is applied to the melt while the ingot main body is pulled from the melt.

2. The method as set forth in claim 1 comprising pulling an outwardly flaring portion of the ingot, the outwardly flaring portion being disposed between the neck and the ingot main body, wherein a horizontal magnetic field is not applied to the melt while pulling the outwardly flaring portion from the melt.

3. The method as set forth in claim 2 wherein a magnetic field is not applied to the melt while pulling the outwardly flaring portion.

4. The method as set forth in any one of claims 1 to 3 wherein a magnetic field is not applied to the melt while pulling the neck from the melt.

5. The method as set forth in any one of claims 1 to 4 comprising pulling an outwardly flaring portion of the ingot, the outwardly flaring portion being disposed between the neck and the ingot main body, wherein a horizontal magnetic field is not applied to the melt while pulling at least a portion of the outwardly flaring portion from the melt, wherein the distance between the melt and the bottom of the heat shield is at least 40 mm while pulling the outwardly flaring portion from the melt.

6. The method as set forth in any one of claims 1 to 4 comprising pulling an outwardly flaring portion of the ingot, the outwardly flaring portion being disposed between the neck and the ingot main body, wherein a horizontal magnetic field is not applied to the melt while pulling at least a portion of the outwardly flaring portion from the melt, wherein the distance between the melt and the bottom of the heat shield is at least 60 mm while pulling the outwardly flaring portion from the melt.

7. The method as set forth in any one of claims 1 to 6 wherein the neck is grown at a pull rate of at least 1.5 mm/min.

8. The method as set forth in claim 7 wherein the neck is growth at a pull rate of less than 4.5 mm/min.

9. The method as set forth in any one of claims 1 to 8 comprising pulling an outwardly flaring portion of the ingot, the outwardly flaring portion being disposed between the neck and the ingot main body, the outwardly flaring portion having a height that is at least 220 mm.

10. A method for producing a monocrystalline silicon ingot having a neck and a main body suspended from the neck by the horizontal magnetic field Czochralski method, the monocrystalline silicon ingot being grown in an ingot puller apparatus having a heat shield, the method comprising:

contacting a seed crystal with a silicon melt held within a crucible;

pulling a neck from the silicon melt, wherein:

a horizontal magnetic field is applied to the melt while the neck is pulled from the melt, the horizontal magnetic field being generated at a magnetic flux density of 1500 gauss or less;

the crucible is rotated at a crucible rotation rate of 8 rpm or more while pulling the neck from the melt; and

a distance between the melt and a bottom of the heat shield is at least 60 mm while pulling the neck from the melt; and

pulling an ingot main body from the melt, the main body being suspended from the neck, wherein a horizontal magnetic field is applied to the melt while the ingot main body is pulled from the melt.

11. The method as set forth in claim 10 comprising pulling an outwardly flaring portion of the

ingot, the outwardly flaring portion being disposed between the neck and the ingot main body, wherein a horizontal magnetic field is not applied to the melt while pulling a portion of the outwardly flaring portion.

12. The method as set forth in claim 10 comprising pulling an outwardly flaring portion of the ingot, the outwardly flaring portion being disposed between the neck and the ingot main body, wherein a horizontal magnetic field is applied to the melt while pulling a portion of the outwardly flaring portion.

13. The method as set forth in claim 12 wherein the horizontal magnetic field is between 0 gauss to 1500 gauss at an outwardly flaring portion diameter of less than 120 mm.

14. The method as set forth in claim 13 wherein the horizontal magnetic field is increased during growth of a portion of the outwardly flaring portion.

15. The method as set forth in any one of claims 10 to 14 wherein the neck is grown at a pull rate of at least 1.5 mm/min.

16. The method as set forth in claim 15 wherein the neck is growth at a pull rate of less than 4.5 mm/min.

17. The method as set forth in any one of claims 10 to 16 comprising pulling an outwardly flaring portion of the ingot, the outwardly flaring portion being disposed between the neck and the ingot main body, the outwardly flaring portion having a height that is at least 220 mm.