CLAIMS

1. A magnetic-disk glass substrate containing an alkali metal component as a glass composition, the magnetic-disk glass substrate comprising:

a pair of main surfaces; and

an outer circumferential side edge surface including an outer side wall surface and outer chamfered surfaces arranged between the outer side wall surface and the main surfaces, the outer side wall surface being a mirror surface,

the outer side wall surface including a surface with a roughness percentage that is 40% or more and 67% or less when a bearing ratio of a roughness cross-sectional area is 50%, in a bearing ratio curve of roughness cross-sectional areas obtained when a surface roughness of the outer side wall surface obtained by etching the outer side wall surface by 2.5 μm is measured.

2. The magnetic-disk glass substrate according to claim 1,

wherein the roughness percentage is 60% or less.

3. The magnetic-disk glass substrate according to claim 1,

wherein the outer chamfered surfaces are mirror surfaces and include a surface with the roughness percentage that is 40% or more and 67% or less when a bearing ratio of a roughness cross-sectional area is 50% in a bearing ratio curve of roughness cross-sectional areas obtained when a surface roughness of the outer chamfered surfaces obtained by etching the outer chamfered surfaces by 2.5 μm is measured.

4. The magnetic-disk glass substrate according to claim 1,

wherein an arithmetic average surface roughness of the mirror surface is 0.015 μm or less.

5. The magnetic-disk glass substrate according to claim 1,

wherein when a measurement point is provided every 30 degrees in a circumferential direction, referenced on a center of the magnetic-disk glass substrate, and a radius of curvature of a cross-sectional shape of a portion at which the outer side wall surface and one of the outer chamfered surfaces are connected to each other at the measurement point is obtained, a difference in the radius of curvature between measurement points is 0.01 mm or less.

6. The magnetic-disk glass substrate according to claim 1,

wherein the magnetic-disk glass substrate is a magnetic-disk glass substrate for a magnetic disk that is configured to be mounted on a hard disk drive together with a magnetic head on which a head disc interface sensor is mounted and that is configured to control a protrusion amount of at least one of a recording element and a reproduction element based on a signal from the head disc interface sensor.

7. The magnetic-disk glass substrate according to claim 1,

wherein the magnetic-disk glass substrate is configured for use as a magnetic disk for an energy-assisted magnetic recording method.

8. The magnetic-disk glass substrate according to claim 1, wherein a glass transition point of glass of the magnetic-disk glass substrate is 600° C. or more.

9. The magnetic-disk glass substrate according to claim 1,

wherein a surface roughness Ra of the main surfaces of the magnetic-disk glass substrate is 0.15 nm or less.

10. The magnetic-disk glass substrate according to claim 1,

wherein a microwaviness μWa of the main surfaces of the magnetic-disk glass substrate is 0.15 nm or less.

11. A magnetic disk comprising:

at least a magnetic layer on at least one of the main surfaces of the magnetic-disk glass substrate according to claim 1.

12. A glass substrate for a magnetic-disk glass substrate containing an alkali metal component as a glass composition, the glass substrate comprising:

a pair of main surfaces; and

an outer circumferential side edge surface including an outer side wall surface and outer chamfered surfaces arranged between the outer side wall surface and the main surfaces, the outer side wall surface being a mirror surface,

the outer side wall surface including a surface with a roughness percentage that is 40% or more and 67% or less when a bearing ratio of a roughness cross-sectional area is 50%, in a bearing ratio curve of roughness cross-sectional areas obtained when a surface roughness of the outer side wall surface obtained by etching the outer side wall surface by 2.5 μm is measured.

13. The glass substrate according to claim 12,

wherein the outer chamfered surfaces are mirror surfaces and include a surface with the roughness percentage that is 40% or more and 67% or less when a bearing ratio of a roughness cross-sectional area is 50% in a bearing ratio curve of roughness cross-sectional areas obtained when a surface roughness of the outer chamfered surfaces obtained by etching the outer chamfered surfaces by 2.5 μm is measured.

14. The glass substrate according to claim 12,

wherein an arithmetic average surface roughness of the mirror surface is 0.015 μm or less.

15. The glass substrate according to claim 12,

wherein when a measurement point is provided every 30 degrees in a circumferential direction, referenced on a center of the glass substrate, and a radius of curvature of a cross-sectional shape of a portion at which the outer side wall surface and one of the outer chamfered surfaces are connected to each other at the measurement point is obtained, a difference in the radius of curvature between measurement points is 0.01 mm or less.

16. The glass substrate according to claim 12,

wherein the glass substrate is a glass substrate for the magnetic-disk glass substrate configured to be mounted on a hard disk drive together with a magnetic head on which a head disc interface sensor is mounted and that is configured to control a protrusion amount of at least one of a recording element and a reproduction element based on a signal from the head disc interface sensor.

17. The glass substrate according to claim 12,

wherein the glass substrate is a glass substrate for the magnetic-disk glass substrate that is to be used as a magnetic disk for an energy-assisted magnetic recording method.

18. The glass substrate according to claim 12,

wherein a glass transition point of glass of the glass substrate is 600° C. or more.

19. A method for manufacturing a magnetic-disk glass substrate, the method comprising:

preparing the glass substrate according to claim 12; and

polishing the main surfaces of the glass substrate.

20. A method for manufacturing a magnetic disk, comprising:

preparing the magnetic-disk glass substrate manufactured by the method according to claim 19; and

forming a magnetic layer on at least one of the main surfaces of the magnetic-disk glass substrate.

~~1. A magnetic-disk glass substrate containing an alkali metal component as a glass composition, wherein~~

~~the magnetic-disk glass substrate comprises a pair of main surfaces and an outer circumferential side edge surface,~~

~~the outer circumferential side edge surface is a mirror surface, and~~

~~the outer circumferential side edge surface includes a surface such that in a bearing ratio curve of roughness cross-sectional areas obtained when a surface roughness of the edge surface obtained by etching the outer circumferential side edge surface by 2.5 μm is measured, a roughness percentage when a bearing ratio of a roughness cross-sectional area is 50% is 40% or more.~~

~~2. The magnetic-disk glass substrate according to claim 1, wherein~~

~~the roughness percentage is 60% or less.~~

~~3. The magnetic-disk glass substrate according to claim 1 or 2, wherein~~

~~the outer circumferential side edge surface includes a side wall surface of the substrate and a chamfered surface provided between the side wall surface and each of the main surfaces of the magnetic-disk glass substrate, and~~

~~the side wall surface and the chamfered surface include a surface such that in the bearing ratio curve, the roughness percentage when the bearing ratio of the roughness cross-sectional area is 50% is 40% or more.~~

~~4. The magnetic-disk glass substrate according to any one of claims 1 to 3, wherein~~

~~an arithmetic average surface roughness of the mirror surface is 0.015 μm or less.~~

~~5. The magnetic-disk glass substrate according to any one of claims 1 to 4, wherein~~

~~the outer circumferential side edge surface includes a side wall surface of the substrate and a chamfered surface provided between the side wall surface and each of the main surfaces of the magnetic-disk glass substrate, and~~

~~when a measurement point is provided every 30 degrees in a circumferential direction, referenced on a center of the magnetic-disk glass substrate, and a radius of curvature of a cross-sectional shape of a portion at which the side wall surface and the chamfered surface are connected to each other at the measurement point is obtained, a difference in the radius of curvature between measurement points is 0.01 mm or less.~~

~~6. The magnetic-disk glass substrate according to any one of claims 1 to 5, wherein~~

~~the magnetic-disk glass substrate is a magnetic-disk glass substrate that is to be mounted on a hard disk drive together with a magnetic head on which a HDI (head disc interface) sensor is mounted and that is capable of controlling a protrusion amount of at least one of a recording element and a reproduction element based on a signal from the HDI sensor.~~

~~7. The magnetic-disk glass substrate according to any one of claims 1 to 5, wherein~~

~~the magnetic-disk glass substrate is a glass substrate that is to be used as a magnetic disk for an energy-assisted magnetic recording method.~~

~~8. The magnetic-disk glass substrate according to any one of claims 1 to 7, wherein~~

~~the magnetic-disk glass substrate is made of glass having a glass transition point of 600°C or more.~~

~~9. The magnetic-disk glass substrate according to any one of claims 1 to 8, wherein~~

~~an arithmetic average roughness Ra of each of the main surfaces of the magnetic-disk glass substrate is 0.15 nm or less.~~

~~10. The magnetic-disk glass substrate according to any one of claims 1 to 9, wherein~~

~~a microwaviness μWa of each of the main surfaces of the magnetic-disk glass substrate is 0.15 nm or less.~~

~~11. A magnetic-disk, the magnetic disk comprising:~~

~~the magnetic-disk glass substrate according to any one of claims 1 to 10, and~~

~~a magnetic layer on the main surfaces of the magnetic-disk glass substrate.~~

~~12. A glass substrate containing an alkali metal component as a glass composition, the glass substrate being an original substrate for a magnetic-disk glass substrate, wherein~~

~~the glass substrate comprises a pair of main surfaces and an outer circumferential side edge surface,~~

~~the outer circumferential side edge surface is a mirror surface, and~~

~~the outer circumferential side edge surface includes a surface such that in a bearing ratio curve of roughness cross-sectional areas obtained when a surface roughness of the edge surface obtained by etching the outer circumferential side edge surface by 2.5 μm is measured, a roughness percentage when a bearing ratio of a roughness cross-sectional area is 50% is~~

~~40% or more.~~

~~13. The glass substrate according to claim 12, wherein~~

~~the roughness percentage is 60% or less.~~

~~14. The glass substrate according to claim 12 or 13, wherein~~

~~the outer circumferential side edge surface includes a side wall surface of the substrate and a chamfered surface provided between the side wall surface and each of the main surfaces of the glass substrate, and~~

~~the side wall surface and the chamfered surface include a surface such that in the bearing ratio curve, the roughness percentage when the bearing ratio of the roughness cross-sectional area is 50% is 40% or more.~~

~~15. The glass substrate according to any one of claims 12 to 14, wherein~~

~~an arithmetic average surface roughness of the mirror surface is 0.015 μm or less.~~

~~16. The glass substrate according to any one of claims 12 to 15, wherein~~

~~the outer circumferential side edge surface includes a side wall surface of the substrate and a chamfered surface provided between the side wall surface and each of the main surfaces of the glass substrate, and~~

~~when a measurement point is provided every 30 degrees in a circumferential direction, referenced on a center of the glass substrate, and a radius of curvature of a cross-sectional shape of a portion at which the side wall surface and the chamfered surface are connected to each other at the measurement point is obtained, a difference in the radius of curvature between measurement points is 0.01 mm or less.~~

~~17. The glass substrate according to any one of claims 12 to 16, wherein~~

~~the glass substrate is an original glass substrate for a magnetic-disk~~

~~glass substrate that is to be mounted on a hard disk drive together with a magnetic head on which a HDI (head disc interface) sensor is mounted and that is capable of controlling a protrusion amount of at least one of a recording element and a reproduction element based on a signal from the HDI sensor.~~

~~18. The glass substrate according to any one of claims 12 to 17, wherein the glass substrate is an original glass substrate for a magnetic-disk glass substrate that is to be used as a magnetic disk for an energy-assisted magnetic recording method.~~

~~19. The glass substrate according to any one of claims 12 to 18, wherein the glass substrate is made of glass having a glass transition point of 600°C or more.~~

~~20. A method for manufacturing a magnetic-disk glass substrate, the method comprising a processing of polishing the main surfaces of the glass substrate according to any one of claims 12 to 19.~~

~~21. A method for manufacturing a magnetic-disk, the method comprising a processing of forming a magnetic layer on main surfaces of the magnetic-disk glass substrate manufactured by the method according to claim 20.~~