0.004 mm (4 microns) or less.

[0008]

The invention has been completed based on the above finding by the inventors. That is, the following inventions are provided to solve the above-described problems.

The invention provides a copper alloy sheet for terminal and connector materials containing 4.5 mass% to 12.0 mass% of Zn; 0.40 mass% to 0.9 mass% of Sn; 0.01 mass% to 0.08 mass% of P; and 0.20 mass% to 0.85 mass% of Ni with a remainder being Cu and inevitable impurities, in which a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11 \leq [Zn]+7.5\times[Sn]+16\times[P]+8.5\times[Ni] \leq 19$ and have a relationship of $7 \leq [Ni]/[P] \leq 40$ in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation

Ni; and any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe with a remainder being Cu and inevitable impurities, in which a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), a content of Co [Co] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11 \leq [Zn]+7.5\times[Sn]+16\times[P]+10\times[Co]+3.5\times[Ni] \leq 19$ and have a relationship of $7 \leq [Ni]/[P] \leq 40$ in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance, bending workability is $R/t \leq 0.5$ at W bending, solderability is excellent and a Young's modulus is 100×10^3 N/mm^2 or more.

[0011]

According to the copper alloy sheet for terminal and connector materials of the invention, since any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe are contained, it is possible to

including a cold finish rolling step for cold-rolling a copper alloy material in which an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of a number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more and a recovery thermal treatment carried out as necessary after the cold finish rolling step, when the electric conductivity is represented by C (%IACS), tensile strength, proof stress and elongation in a direction forming 0 degrees with respect to a rolling direction are represented by Pw (N/mm^2), Py (N/mm^2) and L (%) respectively, $C \geq 29$, $Pw \geq 500$, $3200 \leq [Pw \times \{(100+L)/100\} \times C^{1/2}] \leq 4100$ or $C \geq 29$, $Py \geq 480$, $3100 \leq [Py \times \{(100+L)/100\} \times C^{1/2}] \leq 4000$ after the cold finish rolling step or after the recovery thermal treatment step, and a ratio of tensile strength in the direction forming 90 degrees with respect to the rolling direction to tensile strength in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05, or a ratio of proof stress in the direction forming 90 degrees with respect to the rolling direction to proof stress in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05.

[Designation of Document] Claims

[Claim 1]

A copper alloy sheet for terminal and connector materials comprising:

4.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P; and

0.20 mass% to 0.85 mass% of Ni,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11 \leq [Zn]+7.5\times[Sn]+16\times[P]+3.5\times[Ni] \leq 19$ and have a relationship of $7 \leq [Ni]/[P] \leq 40$ in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance, bending workability is $R/t \leq 0.5$ at W bending, solderability is excellent, and a Young's modulus is

100×10^3 N/mm^2 or more.

[Claim 2]

A copper alloy sheet for terminal and connector materials comprising:

4.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P;

0.20 mass% to 0.85 mass% of Ni; and

any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), a content of Co [Co] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11\leq[Zn]+7.5\times[Sn]+16\times[P]+10\times[Co]+3.5\times[Ni]\leq19$ and have a relationship of $7\leq[Ni]/[P]\leq40$ in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30%

or less at 150°C for 1000 hours as stress relaxation resistance, bending workability is R/t≤0.5 at W bending, solderability is excellent and a Young's modulus is 100×10^3 N/mm^2 or more.

[Claim 3]

A copper alloy sheet for terminal and connector materials comprising:

8.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P; and

0.40 mass% to 0.85 mass% of Ni,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), and a content of Ni [Ni] (mass%) have a relationship of $17\leq[Zn]+7.5\times[Sn]+16\times[P]+3.5\times[Ni]\leq19$ and have a relationship of $7\leq[Ni]/[P]\leq40$ and $0.55\leq[Ni]/[Sn]\leq1.9$, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation

resistance, bending workability is R/t≤0.5 at W bending, solderability is excellent, stress corrosion crack resistance is excellent and a Young's modulus is 100×10^3 N/mm^2 or more.

[Claim 4]

A copper alloy sheet for terminal and connector materials comprising:

8.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P;

0.40 mass% to 0.85 mass% of Ni; and

any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), a content of Co [Co] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $17\leq[Zn]+7.5\times[Sn]+16\times[P]+10\times[Co]+3.5\times[Ni]\leq19$ and have a relationship of $7\leq[Ni]/[P]\leq40$ and $0.55\leq[Ni]/[Sn]\leq1.9$, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the

precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance, bending workability is R/t≤0.5 at W bending, solderability is excellent, stress corrosion crack resistance is excellent and a Young's modulus is 100×10^3 N/mm^2 or more.

[Claim 5]

The copper alloy sheet for terminal and connector materials according to any one of Claims 1 to 4,

wherein the copper alloy sheet for terminal and connector materials is manufactured using a manufacturing step including: a cold finish rolling step for cold-rolling a copper alloy material in which an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more; and a recovery thermal treatment carried out as necessary after the cold finish rolling step,

when the electric conductivity is represented by C (%IACS), tensile strength, proof stress and elongation in a direction forming 0 degrees with respect to a rolling

direction are represented by Pw (N/mm^2), Py (N/mm^2) and L (%)respectively, $C \geq 29$, $Pw \geq 500$, $3200 \leq [Pw \times \{(100+L)/100\} \times C^{1/2}] \leq 4100$ or $C \geq 29$, $Py \geq 480$, $3100 \leq [Pw \times \{(100+L)/100\} \times C^{1/2}] \leq 4000$ after the cold finish rolling step or after the recovery thermal treatment step, a ratio of tensile strength in the direction forming 90 degrees with respect to the rolling direction to tensile strength in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05, or a ratio of proof stress in the direction forming 90 degrees with respect to the rolling direction to proof stress in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05.

[Claim 6]

A method for manufacturing the copper alloy sheet for terminal and connector materials according to any one of Claims 1 to 5, the method comprising, in this order:

a hot rolling step;

a cold rolling step;

a recrystallization thermal treatment step; and

a cold finish rolling step,

wherein a hot rolling initial temperature is in a range of 800°C to 940°C in the hot rolling step, a cooling rate of a copper alloy material in a temperature range of a temperature after final rolling to 350°c or 650°C to

350°C is 1°C/second or more, a percentage of cold working is 55% or more in the cold rolling step, the recrystallization thermal treatment step includes: a heating step for heating the copper alloy material to a predetermined temperature; a holding step for holding the copper alloy material at a predetermined temperature for a predetermined time after the heating step; and a cooling step for cooling the copper alloy material to a predetermined temperature after the holding step, and, in the recrystallization thermal treatment step, when a peak temperature of the copper alloy material is represented by Tmax (°C), a holding time in a temperature range of a temperature 50°C lower than the peak temperature of the copper alloy material to the peak temperature is represented by tm (min), and the percentage of cold working in the cold rolling step is represented by RE (%), $550 \leq Tmax \leq 790$, $0.04 \leq tm \leq 2$, and $460 \leq \{Tmax-40 \times tm^{-1/2}-50 \times (1-RE/100)^{1/2}\} \leq 580$.

[Claim 7]

The method for manufacturing a copper alloy sheet for terminal and connector materials according to Claim 6,

wherein a recovery thermal treatment step is carried out after the cold finish rolling step, and, in the recovery thermal treatment step, when a peak temperature of the copper alloy material is represented by Tmax2 (°C),

a holding time in a temperature range of a temperature 50°C lower than the peak temperature of the copper alloy material to the peak temperature is represented by tm2 (min), and the percentage of cold working in the cold finish rolling step is represented by RE2 (%), $160 \leq Tmax2 \leq 650$, $0.02 \leq tm2 \leq 200$, and $60 \leq \{Tmax2-40 \times tm2^{-1/2}-50 \times (1-RE2/100)^{1/2}\} \leq 360$.

0.004 mm (4 microns) or less.

[0008]

The invention has been completed based on the above finding by the inventors. That is, the following inventions are provided to solve the above-described problems.

The invention provides a copper alloy sheet for terminal and connector materials containing 4.5 mass% to 12.0 mass% of Zn; 0.40 mass% to 0.9 mass% of Sn; 0.01 mass% to 0.08 mass% of P; and 0.20 mass% to 0.85 mass% of Ni with a remainder being Cu and inevitable impurities, in which a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11 \leq [Zn]+7.5\times[Sn]+16\times[P]+3.5\times[Ni] \leq 19$, and the copper alloy sheet is a copper alloy sheet for terminal and connector materials which further has a relationship of $7 \leq [Ni]/[P] \leq 40$ with regard to a content of Ni and a content of P in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation

Ni; and any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe with a remainder being Cu and inevitable impurities, in which a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), a content of Co [Co] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11 \leq [Zn]+7.5\times[Sn]+16\times[P]+10\times[Co]+3.5\times[Ni] \leq 19$, and the copper alloy sheet is a copper alloy sheet for terminal and connector materials which further has a relationship of $7 \leq [Ni]/[P] \leq 40$ with regard to a content of Ni and a content of P in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%, an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, an electric conductivity is 29%IACS or more, a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance, bending workability is $R/t \leq 0.5$ at W bending, solderability is excellent and a Young's modulus is 100×10^3 N/mm^2 or more.

[0011]

According to the copper alloy sheet for terminal and connector materials of the invention, since any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe are contained, it is possible to

including a cold finish rolling step for cold-rolling a copper alloy material in which an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of a number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more, when the electric conductivity is represented by C (%IACS), tensile strength, proof stress and elongation in a direction forming 0 degrees with respect to a rolling direction are represented by Pw (N/mm^2), Py (N/mm^2) and L (%) respectively, $C \geq 29$, $Pw \geq 500$, $3200 \leq [Pw \times \{(100+L)/100\} \times C^{1/2}] \leq 4100$ or $C \geq 29$, $Py \geq 480$, $3100 \leq [Py \times \{(100+L)/100\} \times C^{1/2}] \leq 4000$ after the cold finish rolling step or after the recovery thermal treatment step, and a ratio of tensile strength in the direction forming 90 degrees with respect to the rolling direction to tensile strength in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05, or a ratio of proof stress in the direction forming 90 degrees with respect to the rolling direction to proof stress in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05.

Claims

1. A copper alloy sheet for terminal and connector materials comprising:

4.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P; and

0.20 mass% to 0.85 mass% of Ni,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11 \leq [Zn]+7.5\times[Sn]+16\times[P]+3.5\times[Ni] \leq 19$, and the copper alloy sheet is a copper alloy sheet for terminal and connector materials which further has a relationship of $7 \leq [Ni]/[P] \leq 40$ with regard to a content of Ni and a content of P in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%,

an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm,

an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more,

an electric conductivity is 29%IACS or more,

a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance,

bending workability is R/t≤0.5 at W bending,

solderability is excellent, and

a Young's modulus is 100×10^3 N/mm^2 or more.

2. A copper alloy sheet for terminal and connector materials comprising:

4.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P;

0.20 mass% to 0.85 mass% of Ni; and

any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), a content of Co [Co] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $11\leq[Zn]+7.5\times[Sn]+16\times[P]+10\times[Co]+3.5\times[Ni]\leq19$, and the copper alloy sheet is a copper alloy sheet for terminal and connector materials which further has a relationship of $7\leq[Ni]/[P]\leq40$ with regard to a content of Ni and a content of P in a case in which the content of Ni is in a range of 0.35 mass% to 0.85 mass%,

an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm,

an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion

of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more,

an electric conductivity is 29%IACS or more,

a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance,

bending workability is R/t≤0.5 at W bending,

solderability is excellent, and

a Young's modulus is 100×10^3 N/mm^2 or more.

3. A copper alloy sheet for terminal and connector materials comprising:

8.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P; and

0.40 mass% to 0.85 mass% of Ni,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), and a content of Ni [Ni] (mass%) have a relationship of $17\leq[Zn]+7.5\times[Sn]+16\times[P]+3.5\times[Ni]\leq19$ and have a relationship of $7\leq[Ni]/[P]\leq40$ and $0.55\leq[Ni]/[Sn]\leq1.9$,

an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm,

an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion

of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more,

an electric conductivity is 29%IACS or more,

a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance,

bending workability is R/t≤0.5 at W bending,

solderability is excellent,

stress corrosion crack resistance is excellent and

a Young's modulus is 100×10^3 N/mm^2 or more.

4. A copper alloy sheet for terminal and connector materials comprising:

8.5 mass% to 12.0 mass% of Zn;

0.40 mass% to 0.9 mass% of Sn;

0.01 mass% to 0.08 mass% of P;

0.40 mass% to 0.85 mass% of Ni; and

any one or both of 0.005 mass% to 0.08 mass% of Co and 0.004 mass% to 0.04 mass% of Fe,

with a remainder being Cu and inevitable impurities,

wherein a content of Zn [Zn] (mass%), a content of Sn [Sn] (mass%), a content of P [P] (mass%), a content of Co [Co] (mass%) and a content of Ni [Ni] (mass%) have a relationship of $17\leq[Zn]+7.5\times[Sn]+16\times[P]+10\times[Co]+3.5\times[Ni]\leq19$ and have a relationship of $7\leq[Ni]/[P]\leq40$ and $0.55\leq[Ni]/[Sn]\leq1.9$,

an average crystal grain diameter is in a range of 2.0 μm

to 8.0 μm,

an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more,

an electric conductivity is 29%IACS or more,

a percentage of stress relaxation is 30% or less at 150°C for 1000 hours as stress relaxation resistance,

bending workability is $R/t \leq 0.5$ at W bending,

solderability is excellent,

stress corrosion crack resistance is excellent and

a Young's modulus is 100×10^3 N/mm^2 or more.

5. The copper alloy sheet for terminal and connector materials according to any one of Claims 1 to 4,

wherein the copper alloy sheet for terminal and connector materials is manufactured using a manufacturing step including: a cold finish rolling step for cold-rolling a copper alloy material in which an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more,

when the electric conductivity is represented by C (%IACS),

tensile strength, proof stress and elongation in a direction forming 0 degrees with respect to a rolling direction are represented by Pw (N/mm^2), Py (N/mm^2) and L (%) respectively, $C \geq 29$, $Pw \geq 500$, $3200 \leq [Pw \times \{(100+L)/100\} \times C^{1/2}] \leq 4100$ or $C \geq 29$, $Py \geq 480$, $3100 \leq [Py \times \{(100+L)/100\} \times C^{1/2}] \leq 4000$ after the cold finish rolling step,

a ratio of tensile strength in the direction forming 90 degrees with respect to the rolling direction to tensile strength in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05, or a ratio of proof stress in the direction forming 90 degrees with respect to the rolling direction to proof stress in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05.

6. The copper alloy sheet for terminal and connector materials according to any one of Claims 1 to 4,

wherein the copper alloy sheet for terminal and connector materials is manufactured using a manufacturing step including: a cold finish rolling step for cold-rolling a copper alloy material in which an average crystal grain diameter is in a range of 2.0 μm to 8.0 μm, an average particle diameter of circular or elliptical precipitates is in a range of 4.0 nm to 25.0 nm or a proportion of the number of precipitates having a particle diameter in a range of 4.0 nm to 25.0 nm in the precipitates is 70% or more; and a recovery thermal treatment carried out after

the cold finish rolling step,

when the electric conductivity is represented by C (%IACS), tensile strength, proof stress and elongation in a direction forming 0 degrees with respect to a rolling direction are represented by Pw (N/mm^2), Py (N/mm^2) and L (%) respectively, $C \geq 29$, $Pw \geq 500$, $3200 \leq [Pw \times \{(100+L)/100\} \times C^{1/2}] \leq 4100$ or $C \geq 29$, $Py \geq 480$, $3100 \leq [Py \times \{(100+L)/100\} \times C^{1/2}] \leq 4000$ after the recovery thermal treatment step,

a ratio of tensile strength in the direction forming 90 degrees with respect to the rolling direction to tensile strength in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05, or a ratio of proof stress in the direction forming 90 degrees with respect to the rolling direction to proof stress in a direction forming 0 degrees with respect to the rolling direction is in a range of 0.95 to 1.05.

7. A method for manufacturing the copper alloy sheet for terminal and connector materials according to any one of Claims 1 to 6, the method comprising, in this order:

a hot rolling step;

a cold rolling step;

a recrystallization thermal treatment step; and

a cold finish rolling step,

wherein a hot rolling initial temperature is in a range of 800°C to 940°C in the hot rolling step, a cooling rate of a

copper alloy material in a temperature range of a temperature after final rolling to 350°c or 650°C to 350°C is 1°C/second or more,

a percentage of cold working is 55% or more in the cold rolling step,

the recrystallization thermal treatment step includes: a heating step for heating the copper alloy material to a predetermined temperature; a holding step for holding the copper alloy material at a predetermined temperature for a predetermined time after the heating step; and a cooling step for cooling the copper alloy material to a predetermined temperature after the holding step, and

in the recrystallization thermal treatment step, when a peak temperature of the copper alloy material is represented by Tmax (°C), a holding time in a temperature range of a temperature 50°C lower than the peak temperature of the copper alloy material to the peak temperature is represented by tm (min), and the percentage of cold working in the cold rolling step is represented by RE (%), $550 \leq Tmax \leq 790$, $0.04 \leq tm \leq 2$, and $460 \leq \{Tmax-40 \times tm^{-1/2}-50 \times (1-RE/100)^{1/2}\} \leq 580$.

8. The method for manufacturing a copper alloy sheet for terminal and connector materials according to Claim 7,

wherein a recovery thermal treatment step is carried out after the cold finish rolling step, and

in the recovery thermal treatment step, when a peak temperature of the copper alloy material is represented by Tmax2 (°C), a holding time in a temperature range of a temperature 50°C lower than the peak temperature of the copper alloy material to the peak temperature is represented by tm2 (min), and the percentage of cold working in the cold finish rolling step is represented by RE2 (%), $160 \leq Tmax2 \leq 650$, $0.02 \leq tm2 \leq 200$, and $60 \leq \{Tmax2-40 \times tm2^{-1/2}-50 \times (1-RE2/100)^{1/2}\} \leq 360$.