[Means for Solving the Problem]

[0018]

(1) A steel sheet for a drawn can according to an aspect of the present invention, as a chemical composition, contains, by mass%, C: 0.0060% to 0.0110%, Si: 0.50% or less, Mn: 0.70% or less, P: 0.070% or less, S: 0.050% or less, Sol. Al: 0.005% to 0.100%, N: less than 0.0025%, Nb satisfying Expression (1), B: 0% to 0.0030%, and Ti: 0% to 0.035% with a remainder of Fe and an impurity, has a ferrite single-phase structure with a crystal grain size number of 11.0 or more, a sheet thickness is 0.15 to 0.50 mm, in an L direction of the steel sheet after an ageing treatment at 100°C for one hour, a yield strength YP is 220 to 290 MPa, a tensile strength TS is 330 to 390 MPa, a total elongation EL is 32% or more, and a yield point elongation YP-EL is 0%, and in the steel sheet after the ageing treatment at 100°C for one hour, an average plastic strain ratio r_m is more than 1.35 and an in-plane anisotropy Δr is -0.30 to +0.15.

$$500 \times C \leq Nb/C \leq 8.0 \qquad (a)$$

Here, to element symbols in Expression (a), the amounts (% by mass) of the corresponding elements are assigned.

[0019]

(2) The cold rolled steel sheet for a drawn can according to (1), may further include: any one of the group consisting of a Ni-plated layer, a Ni diffusion plated layer, a Sn-plated layer, and a tinfree steel (TFS)-plated layer on a surface.

[0020]

(3) The cold rolled steel sheet for a drawn can according to (2) may include a Ni diffusion plated layer having an adhesion amount of Ni of 9.0 to 27.0 g/m^2, in which, in the case of analyzing a concentration of Fe in a surface layer of the Ni

diffusion plated layer by XPS, the concentration of Fe may be 3% to 80% by mass%.

The crystal grain size number is preferably 11.2 or more.

[0063]

The crystal grain size number of the ferrite grain refers to a crystal grain size number according to JIS G 0551 (2013). Specifically, the grain size number is measured by observing an L-section (a section parallel to a rolling direction and a sheet thickness direction) of the cold rolled steel sheet by an optical microscope, according to a comparison method (refer to 7.2 of JIS G 0551 (2013)).

[0064]

[Mechanical characteristics]

The yield strength YP, the tensile strength TS, the total elongation EL, and the yield point elongation YP-EL, in the L direction (rolling direction), and the average plastic strain ratio rm value and the in-plane anisotropy Δr ; after the ageing treatment at 100°C for one hour (referred to as the progressive ageing treatment) are as described below.

YP: 220 to 290 MPa,

TS: 330 to 390 MPa,

El≥32%

YP-El=0

Average plastic strain ratio rm >1.35

In-plane anisotropy Δr: -0.30 to +0.15

When YS or TS is below the lower limit, a necessary strength cannot be obtained. When YS exceeds the upper limit, the forming load increases, and forming becomes difficult. When TS exceeds the upper limit, the formability deteriorates, and a risk causing secondary working embrittlement increases.

When the total elongation El or the average plastic strain ratio rm becomes

steel sheets with the respective test numbers were obtained using the above-described method according to JIS G 0551 (2013). The obtained results are shown in Table 2-1, Table 2-2, Table 4-1, and Table 4-2.

When the structure was a ferrite single-phase structure and the crystal grain size number was 11.0 or more, the surface roughening resistance was determined to be excellent.

[0093]

[Test for evaluating mechanical characteristics]

JIS No. 5 tensile test pieces were produced from the cold rolled steel sheets and the Ni diffusion plated cold rolled steel sheets with the respective test numbers. Parallel portions of the tensile test pieces were parallel to the L direction (rolling direction) of the cold rolled steel sheets and the Ni diffusion plated cold rolled steel sheets. A progressive ageing treatment was carried out on the produced tensile test pieces. Specifically, an ageing treatment was carried out on the respective tensile test pieces at 100°C for one hour.

A tensile test was carried out according to JIS Z 2241 (2011) on the tensile test pieces after the progressive ageing treatment at room temperature (25°C) in the atmosphere, thereby obtaining yield strengths YP (MPa), tensile strengths TS (MPa), total elongations EL (%), and yield point elongations YP-EL (%). The obtained results are shown in Table 2-1, Table 2-2, Table 4-1, and Table 4-2.

[0094]

[Test for measuring rm values and Δr values]

JIS No. 13 B tensile test pieces (according to the regulation of JIS Z 2201) parallel to individual directions of being parallel, 45°, and 90° with respect to the rolling direction were produced from the cold rolled steel sheets and the Ni diffusion

[Document Type] CLAIMS

What is claimed is:

1. A cold rolled steel sheet for a drawn can comprising, as a chemical composition, by mass%:

C: 0.0060% to 0.0110%;

Si: 0.50% or less;

Mn: 0.70% or less;

P: 0.070% or less;

S: 0.050% or less;

Sol. Al: 0.005% to 0.100%;

N: less than 0.0025%;

Nb satisfying Expression (1);

B: 0% to 0.0030%; and

Ti: 0% to 0.035%

with a remainder of Fe and an impurity,

wherein the steel sheet for a drawn can include a ferrite single-phase structure with a crystal grain size number of 11.0 or more,

a sheet thickness is 0.15 to 0.50 mm,

in an L direction of the steel sheet after an ageing treatment at 100°C for one hour,

a yield strength YP is 220 to 290 MPa,

a tensile strength TS is 330 to 390 MPa,

a total elongation EL is 32% or more,

a yield point elongation YP-EL is 0%, and

in the steel sheet after the ageing treatment at 100°C for one hour,

an average plastic strain ratio r_m is more than 1.35, and