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(54) **HIGH-STRENGTH STEEL SHEET FOR CANS AND METHOD FOR MANUFACTURING THE SAME**

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(57) **ABSTRACT**

A steel sheet for cans that has a yield stress of at least 500 Mpa after coating and baking and a method for manufacturing the steel sheet for cans are provided. The steel sheet for cans contains, on the basis of mass percent, C: more than 0.02% but 0.10% or less, Si: 0.10% or less, Mn: 1.5% or less, P: 0.20% or less, S: 0.20% or less, Al: 0.10% or less, N: 0.0120% to 0.0250%, dissolved N being 0.0100% or more, and a remainder of Fe and incidental impurities. A high-strength material can be obtained by maintaining the absolute quantity of dissolved N at a certain value or more and performing hardening by quench aging and strain aging, for example, in a printing process, a film lamination process, or a drying and baking process performed before can manufacturing. In the manufacture, hot rolling is performed at a slab extraction temperature of 1200° C. or more and a finish rolling temperature of (Ar3 transformation temperature—30)° C. or more, and coiling is performed at 650° C. or less.

HIGH-STRENGTH STEEL SHEET FOR CANS AND METHOD FOR MANUFACTURING THE SAME

TECHNICAL FIELD

[0001] The present invention relates to a high-strength steel sheet for cans, which is suitable as a material for cans in which the diameter shape is reduced or increased after three-piece processing, such as welding, or two-piece processing, such as drawing and ironing, and to a method for manufacturing the high-strength steel sheet for cans.

BACKGROUND ART

[0002] In recent years, for the purpose of reducing costs and for the purpose of reducing materials to be used and environmental lead, product development has been performed to decrease the thickness of a product formed of a steel material (steel sheet).

[0003] Since a reduction in the thickness of a product sheet results in lower rigidity, the strength Of steel must be increased to compensate for the reduction in rigidity. However, since higher-strength steel is hard, cracking may occur during a flanging or necking process. To address this problem, various manufacturing methods have been proposed.

[0004] For example, Patent Document 1 proposes a method of performing hot rolling at a temperature of (Ar3 transformation point—30° C.) or more, performing cold rolling, and then performing continuous annealing, while controlling the steel components within a certain range.

[0005] However, in the method according to Patent Document 1, in which P is 0.02% by weight or less to prevent deterioration in flanging and necking formability and corrosion resistance, and the draft in second cold rolling ranges from 15% to 30%, it is difficult to efficiently treat and manufacture thin products, and defective appearance tends to occur. Furthermore, stable manufacturing is difficult to achieve, and therefore some improvements are needed.

[0006] Patent Document 2 proposes a method for manufacturing a steel sheet for cans that has a yield stress of at least 550 MPa after coating and baking, the method including hot rolling at a temperature of (Ar3 transformation point—30° C.) or more, predetermined cooling, coiling, water cooling, cold rolling, and subsequent continuous annealing in a predetermined heating pattern, while the steel components and dissolved N are controlled within a certain range.

[0007] However, in the method according to Patent Document 2, semi-very low carbon material is used, the continuous annealing temperature is increased to secure predetermined dissolved N, and the heating pattern is difficult to control precisely. These make the manufacture difficult. Furthermore, only by securing dissolved N in an amount of at least 80% of N in steel, it is difficult to stably manufacture a steel sheet having a specified strength, because the N content in steel varies. Thus, some improvements are needed. Furthermore, the method according to Patent Document 2 provides small total elongation, resulting in poor processibility.

[0008] The following methods are proposed as representative methods for manufacturing a high-strength steel sheet for cans, and have been appropriately used depending on the type of annealing (for example, Non-patent Document 1).

[0009] Hot rolling→pickling→cold rolling→box annealing (BAF)→second cold rolling (draft: 20% to 50%)

[0010] Hot rolling→pickling→cold rolling→continuous annealing (CAL)→second cold rolling (draft: 20% to 50%)

[0011] However, in these methods, since the draft in the second cold rolling is as high as 20% to 50%, the high rolling load results in low operational efficiency. Furthermore, since various viscous rolling oils are used to improve lubricity in rolling, inconsistencies in concentration of the rolling oil and partial oil deposition cause defective appearance after rolling. A high draft results in small total elongation and low processibility. Elongation of a steel sheet in rolling increases a difference between the proof stress in the width direction and the proof stress in the longitudinal direction in accordance with the machine direction and processing direction of a material.

[0012] To address this problem, a method in which the draft in the second cold rolling is reduced is conceivable. However, at a low draft, it is difficult to achieve a desired proof stress.

[0013] Patent Document 1: Japanese Patent No. 3108615

[0014] Patent Document 2: Japanese Unexamined Patent Application Publication No. 2001-107187

[0015] Non-patent Document 1: "Wagakuniniokeru kanyohyomensyorikohan no gijutushi (Technography of surface-treated steel sheets for cans in Japan)", The Iron and Steel Institute of Japan, Oct. 30, 1998, p. 188

[0016] Thus, there is presently no method for manufacturing a thin steel sheet for cans that satisfies both strength and productivity, and such a method is desired.

[0017] In view of the situations described above, it is an object of the present invention to provide a steel sheet for cans that has a yield stress YP of at least 500 MPa after coating and baking and a method for manufacturing the steel sheet for cans.

DISCLOSURE OF INVENTION

[0018] The present invention is as follows:

[0019] [1] A high-strength steel sheet for cans, containing, on the basis of mass percent, C: more than 0.02% and 0.10% or less, Si: 0.10% or less, Mn: 1.5% or less, P: 0.20% or less, S: 0.20% or less, Al: 0.10% or less, N: 0.0120% to 0.0250%, dissolved N being 0.0100% or more, and the balance being Fe and incidental impurities.

[0020] [2] The high-strength steel sheet for cans according to [1], wherein the high-strength steel sheet has a plated layer on the surface thereof.

[0021] [3] A method for manufacturing a high-strength steel sheet for cans, including: hot rolling a steel slab at a slab extraction temperature of 1200° C. or more and a finish rolling temperature of (Ar3 transformation temperature—30)° C. or more, the steel slab containing, on the basis of mass percent, C: more than 0.02% but 0.10% or less, Si: 0.10% or less, Mn: 1.5% or less, P: 0.20% or less, S: 0.20% or less, Al: 0.10% or less, N: 0.0120% to 0.0250%, and the balance being Fe and incidental impurities; coiling at a temperature of 650° C. or less; pickling; cold rolling; and then continuously annealing.

[0022] [4] The method for manufacturing a high-strength steel sheet for cans according to [3], further including second cold rolling at a reduction ratio of 10% or more and less than 20% after the continuous annealing.

[0023] [5] The method for manufacturing a high-strength steel sheet for cans according to [3] or [4], wherein the soaking temperature of the continuous annealing is equal to or higher than the Ar1 transformation temperature.

[0024] [6] The method for manufacturing a high-strength steel sheet for cans according to any one of [3] to [5], further including plating after the continuous annealing or the second cold rolling.

[0025] In the present specification, all the percentages of components of steel are based on mass percent. The term "high-strength steel sheet for cans", as used herein, refers to a steel sheet for cans that has a yield stress YP of at least 500 MPa after coating and baking.

[0026] A high-strength steel sheet for cans according to the present invention is intended for a material for cans.

[0027] Whether the presence or absence of surface treatment, the high-strength steel sheet for cans may be subjected to tin plating, nickel-tin plating, chromium plating (so-called tin-free plating), or organic coating, and can be used in a wide variety of applications.

[0028] The thickness of the steel sheet is not limited to a particular value, but is preferably 0.3 mm or less and more preferably 0.2 mm or less to get the most out of the present invention. 0.170 mm or less is particularly preferred.

BEST MODES FOR CARRYING OUT THE INVENTION

[0029] As a result of diligent research to solve the problems described above, the present inventors have obtained the following findings.

[0030] The present inventors have found that a high-strength material can be obtained by using a low carbon material as the composition, maintaining the absolute quantity of dissolved N at a certain value or more, and performing hardening by quench aging and strain aging, for example, in a printing process, a film lamination process, or a drying and baking process before can manufacturing.

[0031] Thus, in the present invention, a high-strength steel sheet for cans has been completed by controlling the components on the basis of these findings.

[0032] The present invention will be described in detail below.

[0033] A high-strength steel sheet for cans according to the present invention is a steel sheet for cans that has a yield stress YP of at least 500 MPa after coating and baking.

[0034] In the present invention, by using a low carbon material, maintaining the absolute quantity of dissolved N at a certain value or more, and performing age hardening after coating and baking, a high-strength steel sheet for cans can be efficiently produced without second cold rolling or by second cold rolling at a low draft. A steel sheet for cans manufactured without second cold rolling, that is, manufactured by temper rolling of about 1% after continuous annealing has a total elongation E1 of at least 20% after coating and baking. A steel sheet for cans subjected to second cold rolling at a draft of 10% or more but less than 15% has a total elongation E1 above 10% after coating and baking.

[0035] The composition of a steel sheet for containers according to the present invention will be described below. C: More than 0.02% but 0.10% or less

[0036] C is effective in increasing the strength of steel by solid solution strengthening, but forms carbide, thus reducing the ductility and therefore the processibility of a steel sheet. A higher amount of C component results in a hard steel sheet after second cold rolling, thus reducing can productivity and necking formability. C greatly increases the hardness of a weld, thus causing HAZ cracking in flanging. Because more than 0.10% C significantly exhibits these effects, C is 0.10% or less. On the other hand, at an excessively low C content, the strength is secured only at a draft in second cold rolling as high as 20% or more. Thus, C is more than 0.02%. Preferably, C ranges from 0.03% to 0.05%.

Si: 0.10% or Less

[0037] Si increases the strength of steel by solid solution strengthening. However, the addition of a large amount of Si causes problems, such as deterioration in surface treatment and corrosion resistance. Thus, Si is limited to 0.10% or less. When particularly high corrosion resistance is required, Si is preferably 0.02% or less.

Mn: 1.5% or Less

[0038] Mn is effective in preventing hot tearing caused by S. Mn is appropriately added depending on the S content to effectively prevent cracking. To produce these effects, at least 0.20% Mn is preferably added. Mn also has an effect of reducing the size of crystal grains. However, the addition of a large amount of Mn tends to cause a deterioration in corrosion resistance, provides a steel sheet that is harder than required, and causes a deterioration in flanging and necking formability. Thus, the upper limit is 1.5%. Preferably, Mn ranges from 0.20% to 0.30%.

P: 0.20% or Less

[0039] P provides very hard steel, causes a deterioration in flanging and necking formability, and causes a considerable deterioration in corrosion resistance. Thus, in the present invention, P is limited to 0.20% or less. Preferably, P ranges from 0.001% to 0.018%.

S: 0.20% or Less

[0040] S exists as an inclusion in steel, reduces the ductility of a steel sheet, and causes a deterioration in corrosion resistance. Thus, S is 0.20% or less. Preferably, S ranges from 0.001% to 0.018%.

Al: 0.10% or Less

[0041] Al combines with dissolved N to form AlN and is effective in reducing the amount of dissolved N. An increase in Al content results in an increase in recrystallization temperature. Thus, the annealing temperature must be increased. In high-temperature annealing, the formation of AlN reduces the amount of dissolved N, reduces age hardening, and therefore reduces the strength of a steel sheet. In a low carbon material, such a phenomenon is noticeable at an Al content above 0.10%. Thus, Al is limited to 0.10% or less. Al is desirably 0.020% or more in view of stable operation of a steel melting process. Preferably, Al ranges from 0.020% to 0.060%.

N: 0.0120% to 0.0250%

[0042] N promotes age hardening. Thus, in the present invention, N is positively included. In a low carbon material, age hardening is highly promoted at a N content of 0.0120% or more. However, at a N content above 0.0250%, the risk of cracking in rolled material (slab) increases considerably. Thus, N ranges from 0.0120% to 0.0250%. Dissolved N in steel sheet for cans (cold-rolled steel sheet): 0.0100% or more

[0043] To achieve substantial age hardening, which is characteristic of the present invention, the amount of dissolved N

in a steel sheet for cans (cold-rolled steel sheet) must be 0.0100% or more. This is the most important requirement in the present invention.

[0044] A cold-rolled steel sheet according to the present invention is preferably manufactured by pickling a hot-rolled sheet, performing cold rolling, performing continuous annealing, and, if necessary, performing second cold rolling. In this continuous annealing process, because AlN tends to be precipitated out, it is important to control a process in which the amount of dissolved N in a steel sheet for cans (cold-rolled steel sheet) is not less than 0.0100%. In the present invention, the amount of N in the form of AlN (hereinafter referred to as "N as AlN") is determined by an extraction analysis after dissolution in bromine ester as usually performed, and the N as AlN is subtracted from the total N content to determine the amount of dissolved N.

[0045] Preferably, the total of the amount of dissolved N and the amount of dissolved C is 0.0150% or more. The amount of dissolved C may be determined by internal friction measurement or by subtracting the C content in a precipitate extracted from a steel sheet from the total C content.

[0046] The remainder are Fe and incidental impurities.

[0047] The remainder other than the components described above are Fe and incidental impurities. For example, incidental impurities may be 0.01% or less Sn.

[0048] A method for manufacturing a high-strength steel sheet for cans according to the present invention will be described below.

[0049] A high-strength steel sheet for cans according to the present invention is manufactured by the following method. First, a molten steel having the composition described above is melted by a generally known melting method using a converter or the like and is formed into a rolled material (slab) by a generally known casting method, such as a continuous casting method. The rolled material is then hot-rolled into a hot-rolled sheet. At that time, the slab extraction temperature is 1200° C. or more, and the finish rolling temperature is (Ar3 transformation temperature—30)° C. or more (suitably, at least Ar3 transformation temperature). The hot-rolled sheet is then coiled at 650° C. or less, is pickled, is cold-rolled, and is continuously annealed. If necessary, second cold rolling is further performed at a draft of 10% or more but less than 20% (suitably, 10% or more but less than 15%). Plating may also be performed.

[0050] The following is a detailed description.

Slab Extraction Temperature: 1200° C. or More

[0051] To achieve 0.0100% or more dissolved N in a steel sheet for cans, a slab is heated in a furnace and is extracted at a temperature of 1200° C. or more. This aims at promoting the decomposition of AlN to achieve a predetermined amount of dissolved N. Preferably, a slab is introduced into and heated in a furnace maintained at this temperature. Finish rolling temperature: (Ar_3 transformation point—30° C.) or more

[0052] In the present invention, the finish rolling temperature in hot rolling is (Ar_3 transformation point—30° C.) or more to effectively reduce the precipitation of AlN and to prevent a deterioration in anisotropy and processibility. At a finish rolling temperature below (Ar_3 transformation point—30° C.), AlN is precipitated out considerably, dissolved N decreases, and anisotropy and processibility deteriorates. Preferably, the finish rolling temperature is at least the Ar_3 transformation point.

[0053] After finish rolling, preferably, forced cooling is performed by water cooling. This can reduce the precipitation of AlN.

Coiling Temperature: 650° C. or Less

[0054] The coiling temperature is 650° C. or less to reduce nitrogen fixation by Al. At a coiling temperature above 650° C., the precipitation of AlN increases considerably, and dissolved N decreases. Thus, the intended age hardening cannot be achieved. More preferably, the coiling temperature is 600° C. or less to consistently achieve substantial age hardening.

[0055] In the present invention, after coiling, air cooling or water cooling is preferably performed in a coiled state. While water cooling can increase productivity, air cooling is preferred in terms of uniform quality of a steel sheet in the sheet width direction and the longitudinal direction.

Pickling and Cold Rolling

[0056] A hot-rolled sheet thus manufactured is pickled and cold-rolled into a cold-rolled sheet. Pickling follows a routine procedure, and surface scale is removed with an acid, such as hydrochloric acid or sulfuric acid. The cold-rolling draft also follows a routine procedure and increases with decreasing sheet thickness.

Soaking Temperature in Continuous Annealing: 600° C. or More (Suitable Conditions)

[0057] In a continuous annealing process, soaking is preferably performed at a temperature of 600° C. or more. At a soaking temperature of 600° C. or more, recrystallization proceeds fast, strain caused by cold rolling does not remain, and a sheet has high ductility and is suitable for press working. Soaking at the Ar1 transformation point or higher can further improve the strength and is therefore preferred. It is surmised that soaking at the Ar1 transformation point or higher partly forms a pearlite structure, which contributes to the improved strength.

[0058] As long as being within this temperature range, there is no need to maintain a constant temperature. In view of operational stability, a substantial soaking time of at least 10 s is sufficient.

[0059] After continuous annealing, temper rolling of about 1% is preferably performed to control the surface roughness and the hardness.

[0060] A cold-rolled steel sheet manufactured through these processes has a total elongation E1 of at least 20% after coating and baking and is a steel sheet for cans that has excellent processibility.

[0061] After continuous annealing, second cold rolling at a draft of 10% or more but less than 20% may be performed. The second cold rolling mainly aims at further increasing the strength. At a draft of 10% or more, the strength can be further increased. At a draft below 20%, the strengthening effect can be achieved while the elongation (the total elongation E1 in the range of 8% to 15% after coating and baking) and the processibility are maintained. In particular, at a draft of 10% or more but less than 15% in the second cold rolling, the total elongation E1 above 10% after coating and baking can be achieved.

[0062] At a draft below 20%, the strengthening effect can be achieved while the elongation and the processibility are maintained. A cold-rolled steel sheet subjected to the second cold rolling at a draft of 10% or more but less than 20% has a

total elongation E1 in the range of 8% to 15% after coating and baking and is a very high strength steel sheet for cans that has excellent processibility. The draft is preferably 10% or more but less than 15%, and a cold-rolled steel sheet having a total elongation E1 of 10% or more after coating and baking can be manufactured.

[0063] A cold-rolled steel sheet is manufactured through these processes. The cold-rolled steel sheet is a hard material due to coating and baking before can manufacturing (before press working), and its superiority is more effectively demonstrated when the cold-rolled steel sheet is applied to an ultrathin steel sheet having a thickness of 0.3 mm or less. The cold-rolled steel sheet manufactured through the processes described above is a high-strength steel sheet for cans that contains 0.0100% or more dissolved N and that has a yield stress YP of at least 500 MPa after coating and baking. Furthermore, a steel sheet for cans according to the present invention can exhibit large elongation and therefore has excellent processibility.

[0064] A steel sheet for cans according to the present invention has undergone substantial age hardening because of dissolved N. Thus, a steel sheet for cans according to the present invention has a yield stress YP of at least 500 MPa after coating and baking, and the reduction in the thickness of the steel sheet can be achieved advantageously. A cold-rolled steel sheet according to the present invention, effectively utilizing the effects of dissolved N, has an increased strength after reflowing after plating, and a substantial age hardening phenomenon may occur during a coating and baking process after press forming, thus resulting in a tremendous increase in the strength of cans.

[0065] In the present invention, a plated layer may be formed on a surface (at least one side) of a cold-rolled steel sheet thus manufactured to form a plated steel sheet. As the plated layer formed on the surface, any plated layer to be applied to a steel sheet for cans is applicable. Examples of the plated layer include tin plating, chromium plating, nickel plating, and nickel chromium plating. After the plating, coating or an organic resin film may be applied without any problem.

Example 1

[0066] A steel composed of the components shown in Table 1 was melted in a converter and was formed into a slab by a continuous casting method. The slab was then hot-rolled under the conditions shown in Table 2 to form a hot-rolled sheet having a thickness of 2.0 mm. The hot-rolled sheet thus formed was then descaled by pickling, was cold-rolled, and was continuously annealed under the conditions shown in Table 2. Part of the sheets were subjected to second rolling. Thus, a cold-rolled steel sheet having a final thickness of 0.17 mm was manufactured.

TABLE 1

	Chemical components (% by mass)						
Steel No.	C	Si	Mn	P	S	Al	N
A	0.044	0.01	0.25	0.017	0.010	0.035	0.0148
B	0.015	0.02	0.30	0.012	0.017	0.009	0.0160

TABLE 2

		Hot rolling								
		Ar3	Slab			Cold	Ar1	Continuous annealing		Second cold
Steel sheet No.	Steel No.	transformation point ° C.	extraction temperature ° C.	Finish rolling temperature ° C.	Coiling temperature ° C.	rolling Draft %	transformation point ° C.	Annealing temperature ° C.	Soaking time s	rolling Draft %
1*	A	860	1210	890	590	91.4	723	680	14	—
2*	A	860	1150	890	590	91.4	723	680	14	—
3*	B	870	1210	890	590	91.4	723	760	14	—
4	A	860	1200	900	600	90.0	723	690	15	15
5*	A	860	1230	890	590	91.4	723	740	14	—
6	A	860	1250	900	590	90.5	723	690	15	10

*Temper rolling at a draft of 1.1% was performed after continuous annealing.

[0067] The cold-rolled steel sheet thus manufactured was subjected to the measurement of the amount of dissolved N and a tensile test before and after a bake hardenability test.

(i) Analysis of the Amount of Dissolved N

[0068] The N content in a cold-rolled steel sheet was analyzed by chemical analysis, and the amount of N in the form of AlN was determined by an extraction analysis after dissolution in bromine ester. The amount of dissolved N in the cold-rolled steel sheet was calculated by ((the N content in the cold-rolled steel sheet)−(the amount of N in the form of AlN)).

(ii) Tensile Test

[0069] A JIS 13-B test piece for tensile test was sampled in the rolling direction from the central part of a cold-rolled steel sheet in the width direction and was subjected to a tensile test at a strain rate crosshead speed of 10 m/s to determine the yield stress YP and the total elongation E1. The tensile test was performed within one day after manufacture. The JIS 13-B test piece for tensile test was selected to minimize the breakage outside the gage marks.

(iii) Bake Hardenability Test

[0070] A JIS 13-B test piece for tensile test was sampled in the rolling direction from the central part of a cold-rolled steel sheet in the width direction, was subjected to 2% tensile prestraining, was then temporarily unloaded, and was subjected to heat treatment at 210° C. for 20 min, which corresponded to coating and baking. Before and after this test, the tensile test described in (ii) was performed.

[0071] Table 3 shows the results.

TABLE 3

	Cold-rolled steel sheet			After coating and baking		
Steel sheet No.	Dissolved N %	Strength YP MPa	Total elongation El %	Strength YP MPa	Total elongation El %	Note
1	0.0106	490	23	510	23	Example
2	0.0055	435	25	450	23	Comparative example
3	0.0104	470	22	490	21	Comparative example
4	0.0102	530	12	540	10	Example
5	0.0103	510	24	530	22	Example
6	0.0112	520	13	530	12	Example

[0072] Table 3 shows that Nos. 1, 4, 5, and 6 according to working examples had a sufficient yield stress YP and total elongation E1 after coating and baking and had a sufficient strength and processibility, for example, for three-piece processing.

[0073] No. 6 according to a working example, which was subjected to second cold rolling at a draft of 10%, had a total elongation E1 above 10%, that is, 12% after coating and baking, in spite of the second cold rolling.

[0074] By contrast, Nos. 2 and 3 according to comparative examples had an insufficient yield stress YP, did not have the strength and processibility required for three-piece processing, and therefore cannot be subjected to specified processing.

[0075] Thus, the present invention can provide a high-strength steel sheet for cans that has a yield stress YP of at least 500 MPa after coating and baking.

[0076] Furthermore, in the present invention, by using a low carbon material, maintaining the absolute quantity of dissolved N in a cold-rolled steel sheet at a certain value or more by (1) containing a predetermined amount of N as a component, (2) setting the slab extraction temperature at 1200° C. or more to decompose AlN produced in slab casting, and (3) coiling a hot-rolled coil at 650° C. or less to reduce the precipitation of AlN, and performing age hardening after coating and baking, a high-strength steel sheet for cans can be efficiently produced without second cold rolling or by second cold rolling at a low draft.

[0077] A high-strength steel sheet for cans according to the present invention manufactured without second cold rolling, that is, manufactured by temper rolling of about 1% after continuous annealing has a total elongation E1 of at least 20% after coating and baking. In a high-strength steel sheet for cans subjected to second cold rolling, the draft in the second cold rolling can be set at a suitable range of 10% or more but less than 15% to achieve the total elongation E1 above 10% after coating and baking.

INDUSTRIAL APPLICABILITY

[0078] In a steel sheet for cans according to the present invention, coating and baking after forming greatly increases the yield stress and accordingly the strength of cans, thus contributing to the reduction in the thickness of the steel sheet.

1. A high-strength steel sheet for cans, comprising, on the basis of mass percent, C: more than 0.02% and 0.10% or less, Si: 0.10% or less, Mn: 1.5% or less, P: 0.20% or less, S: 0.20% or less, Al: 0.10% or less, N: 0.0120% to 0.250%, dissolved N being 0.0100% or more, and the balance being Fe and incidental impurities.

2. The high-strength steel sheet for cans according to claim **1**, wherein the high-strength steel sheet has a plated layer on the surface thereof.

3. A method for manufacturing a high-strength steel sheet for cans, comprising: hot rolling a steel slab at a slab extraction temperature of 1200° C. or more and a finish rolling temperature of (Ar3 transformation temperature—30)° C. or more, the steel slab containing, on the basis of mass percent, C: more than 0.02% but 0.10% or less, Si: 0.10% or less, Mn: 1.5% or less, P: 0.20% or less, S: 0.20% or less, Al: 0.10% or less, N: 0.0120% to 0.0250%, and the balance being Fe and incidental impurities; coiling at a temperature of 650° C. or less; pickling; cold rolling; and then continuously annealing.

4. The method for manufacturing a high-strength steel sheet for cans according to claim **3**, further comprising second cold rolling at a reduction ratio of 10% or more and less than 20% after the continuous annealing.

5. The method for manufacturing a high-strength steel sheet for cans according to claim **3**, wherein the soaking temperature of the continuous annealing is equal to or higher than the Ar1 transformation temperature.

6. The method for manufacturing a high-strength steel sheet for cans according to Claim **3**, further comprising plating after the continuous annealing or the second cold rolling.

7. The method for manufacturing a high-strength steel sheet for cans according to claim **4**, wherein the soaking temperature of the continuous annealing is equal to or higher than the Ar1 transformation temperature.

8. The method for manufacturing a high-strength steel sheet for cans according to claim **4**, further comprising plating after the continuous annealing or the second cold rolling.

9. The method for manufacturing a high-strength steel sheet for cans according to claim **5**, further comprising plating after the continuous annealing or the second cold rolling.

10. The method for manufacturing a high-strength steel sheet for cans according to claim **7**, further comprising plating after the continuous annealing or the second cold rolling.

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