IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

ARCELORMITTAL and ARCELORMITTAL ATLANTIQUE ET LORRAINE	)	
Plaintiffs,	)	
v.	)	C.A. No. 13-685-SLR
AK STEEL CORPORATION,	)	**DEMAND FOR JURY TRIAL**
Defendant.	)	

PLAINTIFFS ARCELORMITTAL AND ARCELORMITTAL ATLANTIQUE ET LORRAINE'S FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiffs ArcelorMittal ("AM") and ArcelorMittal Atlantique et Lorraine ("AMAL") by their undersigned attorneys, bring this complaint for patent infringement against Defendant AK Steel Corporation and, in support thereof, allege as follows:

PARTIES

1. ArcelorMittal France ("AMF") is a corporation duly organized and existing under the laws of France, with its principal place of business at Immeuble Le Cézanne, 6 Rue André Campra, 93200 Saint-Denis, France.

2. Plaintiff AM is a corporation duly organized and existing under the laws of Luxembourg, with its principal place of business at 24-26 Bd d'Avranches, L-1160 Great Duchy of Luxembourg.

3. Plaintiff AMAL is a corporation duly organized and existing under the laws of France, with its principal place of business at Immeuble Le Cézanne, 6 Rue André Campra, 93200 Saint-Denis, France.

4. On information and belief, AK Steel Corporation ("AK Steel") is a Delaware corporation having its principal place of business at 9227 Centre Point Drive, West Chester, Ohio 45069.

THE PATENT-IN-SUIT

5. United States Patent No. 6,296,805 (the " '805 patent") entitled "COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT" was duly and legally issued by the United States Patent and Trademark Office on October 2, 2001. AMF and AMAL jointly own by assignment all right, title and interest in the '805 patent.

6. On August 8, 2011, AMF and AMAL filed a petition with the U.S. Patent and Trademark Office for the reissuance of the '805 patent.

7. On April 16, 2013, the U.S. Patent and Trademark Office duly and legally reissued the '805 patent as U.S. Reissue Patent RE44,153 (the "RE153 patent"). AM and AMAL jointly own by assignment all right, title and interest in the RE153 patent.

8. The RE153 patent contains claims 1-16, which originally appeared in the '805 patent, as well as new claims 17-25.

9. On December 5, 2013, the United States District Court for the District of Delaware entered judgment against AMF and AMAL holding that claims 1-25 of the RE153 patent are invalid because they impermissibly broadened the claims of the '805 patent. In an opinion dated May 12, 2015, the United States Court of Appeals for the Federal Circuit affirmed the district court's finding that claims 1-23 of the RE153 patent are invalid under 35 U.S.C. § 251. The Federal Circuit reversed the finding of the district court that claims 24 and 25 are invalid and remanded the case for further proceedings.

10. On April 15, 2013, AMF and AMAL filed a continuation of the patent application that issued as the RE153 patent. That application was duly and legally issued as U.S. Reissue Patent No. RE44,940 ("the RE940 patent") on June 10, 2014. AM and AMAL jointly own by assignment all right, title and interest in the RE940 patent. In accordance with Local Rule 3.2, a true and correct copy of the RE940 patent is attached hereto as Exhibit A.

JURISDICTION AND VENUE

11. This action for patent infringement arises under 35 U.S.C. §§ 101 *et seq.*

12. This Court has subject matter jurisdiction over this action based on 28 U.S.C. §§ 1331 and 1338(a).

13. This Court has personal jurisdiction over AK Steel because, on information and belief, AK Steel is incorporated under the laws of Delaware. Moreover, in related proceedings, C.A. No. 10-050-SLR, AK Steel has not contested personal jurisdiction, C.A. No. 10-050-SLR, D.I. 146 at ¶ 8, and availed itself of this Court in filing counterclaims. D.I. 146, at ¶¶ 30-48.

14. Venue is proper under 28 U.S.C. §§ 1391(b) and (c) and 1400. Moreover, in related proceedings, C.A. No. 10-050-SLR, AK Steel has not contested venue. *See* C.A. No. 10-050-SLR, D.I. 146 at ¶ 9.

INFRINGEMENT OF THE RE940 PATENT

15. AM and AMAL incorporate each of the preceding paragraphs 1-14 as if fully stated herein.

16. On information and belief, AK Steel makes, offers to sell and/or sells aluminum coated, boron-containing steel sheet products in the United States. On information and belief, the aluminum coated, boron-containing steel sheet products are formed by a process

involving, among other things, hot rolling, cold rolling, and coating the steel with aluminum. On information and belief, the aluminum coated, boron-containing steel sheet products are intended for further processing, including heat treatment and stamping, to form, *inter alia*, components for use in automobiles.

17. On information and belief, when the aluminum coated, boron-containing steel sheet products are further processed, including by heat treatment and stamping, at least some of the products have an ultimate tensile strength greater than 1500 MPa and a predominantly martensitic microstructure.

18. On information and belief, automotive parts suppliers, among others, directly infringe one or more of the claims of the RE940 patent when they make, use, offer to sell and/or sell steel meeting the limitations of those claims, or products incorporating steel meeting the limitations of those claims. On information and belief, companies that process steel manufactured by AK Steel, for example by heat treating and stamping, directly infringe one or more of the claims of the RE940 patent when they make, offer to sell and/or sell steel meeting the limitations of those claims. On information and belief, to the extent that AK Steel makes, offers to sell and/or sells steel meeting the limitations of one or more of the claims of the RE940 patent, AK Steel also directly infringes those claims.

19. On information and belief, AK Steel induces infringement of one or more of the claims of the RE940 patent by direct infringers. AK Steel is aware of the claims of the RE940 patent and that steel made, used, offered for sale and/or sold by the direct infringers constitutes infringement of such claims. Specifically, AK Steel was informed through its counsel via an email on July 6, 2015 of the issuance of the RE940 patent. On information and belief, in supplying steel to direct infringers that either before or after further processing meets

the limitations of one or more of the claims of the RE940 patent, AK Steel specifically intends that the direct infringers will make, use, offer to sell and/or sell infringing products. Among other things, AK Steel is aware of one or more automotive product specifications requiring steel having an ultimate tensile strength of greater than 1500 MPa and a predominately martensitic microstructure, and has designed its product, including its carbon content, so that upon processing, it will meet such specifications. On information and belief, AK Steel is aware that at least some of its product, upon processing, achieves an ultimate tensile strength of greater than 1500 MPa and has a predominately martensitic microstructure.

20. On information and belief, AK Steel contributorily infringes one or more of the claims of the RE940 patent by offering to sell and/or selling within the United States, coated steel that meets the limitations of one or more of the claims of the RE940 patent. On information and belief, the coated steel sold by AK Steel has a carbon content suited to the desired ultimate tensile strength and martensitic microstructure achieved through processing, and is not a staple article or commodity of commerce suitable for substantial non-infringing use. On information and belief, AK Steel specifically intends that the direct infringers will make, use, offer to sell and/or sell infringing product. Among other things, AK Steel is aware of automotive product specifications requiring steel having an ultimate tensile strength of greater than 1500 MPa and a martensitic microstructure and has designed its product, including its carbon content, so that upon further processing, it will meet such specifications. On information and belief, AK Steel knows that its aluminum coated boron steel sheet products are especially made or especially adapted for use in an infringement of the RE940 patent. On information and belief, AK Steel is aware that at least some of its product, either before or after further processing, achieves an ultimate tensile strength of greater than 1500 MPa and a martensitic microstructure.

21. AM and AMAL have been damaged by such infringement and will continue to be damaged by such infringement unless AK Steel is enjoined from infringing by this Court.

PRAYER FOR RELIEF

WHEREFORE**,** AM and AMAL respectfully request:

(1) an injunction against continued infringement (35 U.S.C. § 283);

(2) an award of damages adequate to compensate AM and AMAL for AK Steel's infringement of the RE940 patent after its issuance on June 10, 2014, together with interest and costs as fixed by the Court (35 U.S.C. § 284);

(3) their costs (Fed. R. Civ. P. 54(d)); and

(4) any other relief appropriate under the circumstances.

DEMAND FOR JURY TRIAL

Pursuant to Federal Rule of Civil Procedure 38(b), Plaintiffs AM and AMAL hereby demand a trial by jury of all issues so triable in this action.

Respectfully submitted,

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EXHIBIT A

US00RE44940E

(19) **United States**

(12) **Reissued Patent**

Laurent et al.

(10) **Patent Number: US RE44,940 E**

(45) **Date of Reissued Patent: *Jun. 10, 2014**

(54) **COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT**

(71) Applicants: **Arcelormittal France**, Saint-Denis (FR); **Arcelormittal Atlantique Et Lorraine**, Saint Denis (FR)

(72) Inventors: **Jean-Pierre Laurent**, Istres (FR); **Jean-Paul Hennechart**, Floing (FR); **Dominique Spehner**, Sedan (FR); **Jacques Devroc**, Salon de Provence (FR)

(73) Assignees: **ArcelorMittal France**, Saint-Denis (FR); **ArcelorMittal Atlantique et Lorraine**, Saint Denis (FR)

(*) Notice: This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/863,100**

(22) Filed: **Apr. 15, 2013**

Related U.S. Patent Documents

Reissue of:

(64) Patent No.: **6,296,805**
Issued: **Oct. 2, 2001**
Appl. No.: **09/350,100**
Filed: **Jul. 9, 1999**

U.S. Applications:

(63) Continuation of application No. 13/205,126, filed on Aug. 8, 2011, now Pat. No. Re. 44,153, which is an application for the reissue of Pat. No. 6,296,805.

(30) **Foreign Application Priority Data**

Jul. 19, 1998 (FR) 98 08793

(51) **Int. Cl.**

C21D 8/02 (2006.01)
B32B 15/08 (2006.01)
C22C 38/06 (2006.01)
C22C 38/18 (2006.01)

(52) **U.S. Cl.**

USPC **420/104**; 428/653; 428/939; 148/531; 148/537

(58) **Field of Classification Search**

None

See application file for complete search history.

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Primary Examiner — David Sample

(74) *Attorney, Agent, or Firm* — Baker & Hostetler LLP; David W. Schumaker

(57) **ABSTRACT**

Hot-rolled steel sheet which then can be cold-rolled, coated, the steel in the sheet having the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, the shoot ensuring a very high mechanical resistance after thermal treatment and the aluminum-based coating ensuring a high resistance to corrosion.

13 Claims, No Drawings

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COATED HOT- AND COLD-ROLLED STEEL SHEET COMPRISING A VERY HIGH RESISTANCE AFTER THERMAL TREATMENT

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

Notice: More than one reissue application has been filed for the reissue of U.S. Pat. No. 6,296,805. This application is a reissue continuation of U.S. application Ser. No. 13/205,126, filed Aug. 8, 2011, which is an application for reissue of U.S. Pat. No. 6,296,805.

The invention relates to a coated, hot- and cold-rolled steel sheet comprising a very high resistance after thermal treatment.

In this technical area, the proposed solutions involving an increase in the mechanical characteristics are accomplished to the detriment of shaping properties. There is a solution consisting in separating the shaping properties and those required for use. The characteristics required for use are obtained through a thermal treatment subsequent to or concomitant with shaping. In this case, the proposed sheets are not delivered coated because of problems of holding power of the coating at the time of thermal treatment. Coating therefore is performed on finished castings, which requires a careful cleaning of the surfaces and the hollowed portions. In addition, the thermal treatment must be performed under a controlled atmosphere in order to prevent any decarbonization and oxidation of the metal in the sheet. Steel sheets for thermal treatment do not have any precoating which requires post-treatments of scouring, pickling and coating.

At the time of continuous coating of flat hot- and cold-rolled products, preliminary annealing and cooling preceding or following the zinc- or aluminum-based coating operation, are used only to bring the sheet to a temperature close to that of the bath or to restore the mechanical properties of the sheet degraded at the time of cold-rolling. These thermal cycles are chosen in terms of the composition of the steel so that no allotropic transformation takes place at the time of the thermal cycle, the objective being to obtain mechanical characteristics similar to those measured on the steel sheet delivered uncoated.

The purpose of the invention is to produce a hot- or cold-rolled steel sheet of a desired thickness, coated, and affording extensive shaping possibilities and which, after thermal treatment performed on the finished casting, makes it possible to obtain a mechanical resistance in excess of 1000 MPa, a substantial resistance to shocks, fatigue, abrasion and wear, while retaining a good resistance to corrosion as well as a good capacity for painting and gluing. It also is possible to carry out hot-shaping with hardening in the tool making it possible to obtain the same properties.

The subject of the invention is a hot-rolled steel sheet, which then can be cold-rolled, coated, the steel in the sheet having the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1% silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%

phosphorus<0.01%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, the sheet ensuring a very high mechanical resistance after thermal treatment and the aluminum-based coating ensuring a high resistance to corrosion.

The other characteristics of the invention are:

the composition by weight of the sheet preferably is the following:
0.20%<carbon<0.5%
0.8%<manganese<1.5%
0.1% silicon<0.35%
0.01%<chromium<1%
titanium<0.1%
aluminum<0.1%
phosphorus<0.05%
sulfur<0.03%
0.0005%<boron<0.01%, the remainder being iron and impurities inherent in processing.

in the composition by weight of the sheet, the titanium content with respect to the nitrogen content is in excess of 3.42, the boron no longer being able to be combined with the nitrogen.

the metal bath for the coating contains in its basic composition by weight, from 9% to 10% silicon, from 2% to 3.5% iron, the remainder being aluminum.

the metal bath for the coating contains in its basic composition by weight, from 2% to 4% iron, the remainder being aluminum.

The invention also concerns a process for producing a casting starting from the coated sheet in which, after shaping, the coating of the casting is subjected to an increase in temperature at a speed in excess of 5° C./second, which may exceed 600° C./second.

A further characteristic of the process is:

the coating and the casting are heated to a temperature in excess of 750° C.

The invention also concerns the use of the hot-rolled steel sheet which then can be cold-rolled and coated, for structural and/or anti-intrusion or substructure castings for a land motor vehicle, such as, for example, a bumper bar, a door reinforcement, a wheel spoke.

The description which follows wilt make the invention clearly understood.

The sheet according to the invention which derives, by reason of its processing, from a hot-rolling mill, possibly may be cold-rerolled again depending on the final thickness desired. It then is coated with an aluminum-based coating, for example by dipping in a bath containing, in addition, from 8% to 11% silicon, from 2% to 4% iron, the sheet having a high mechanical resistance after thermal treatment and a high resistance to corrosion, as well as a good capacity for painting and gluing.

The coating has in particular the function of protecting the basic sheet against hot as well as cold corrosion. The mechanical characteristics in the delivery state of the sheet according to the invention allow a great variety of shaping, in particular a deep stamping. The thermal treatment applied at the time of a hot-shaping process or alter shaping makes it possible to obtain high mechanical characteristics which may exceed 1500 MPa for mechanical resistance and 1200 MPa for the limit of elasticity. The final mechanical characteristics are adjustable and depend on the carbon content of the steel and on the thermal treatment.

At the time of thermal treatment performed on a finished casting or at the time of a hot-shaping process, the coating

forms a layer having a substantial resistance to abrasion, wear, fatigue, shock, as well as a good resistance to corrosion and a good capacity for painting and gluing.

According to the invention, the steel the weight composition of which is the following:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon <0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, is processed in the form of a hot-rolled and possibly cold-rolled sheet to obtain the desired thickness. The steel sheet then is coated by dipping, after pickling, in an aluminum bath containing either from 8% to 11% silicon and 2% to 4% iron, or from 2% to 4% iron, or even in an aluminum bath preferably containing from 9% to 10% silicon and 2% to 3.5% iron.

In an example of implementation of a coating of the sheet by dipping in a metal bath containing an aluminum alloy comprising a proportion of approximately 90% aluminum, the coating layer comprises a first alloy layer in contact with the surface of the steel. This layer, directly in contact with the surface of the sheet, is highly alloyed with iron.

A second coating layer, on top of the first, contains approximately 90% aluminum and may contain silicon and a small amount of iron, depending on the composition of the bath.

The first alloy layer may crack when the sheet is shaped for the manufacture of castings.

According to the invention, after the shaping of the casting, the coating is subjected to an increase in temperature at a speed in excess of 5° C./second, which may exceed 600° C./second. This rise in temperature makes possible a rapid remelting of the aluminum which fills in the cracks generated by the operation of shaping of the casting.

Another advantage of the invention lies in the fact that the diffusion of the iron in the coating will be initiated at high temperature. One thus will have a better cohesion between coating and steel in the sheet. In another form of the invention, the thermal treatment may be performed locally, in heavily deformed zones.

In an example of implementation, the steel sheet according to the invention containing 0.21% carbon, 1.14% manganese, 0.020% phosphorus, 0.0038% sulfur, 0.25% silicon, 0.040% aluminum, 0.009% copper, 0.020% nickel, 0.18% chromium, 0.0040% nitrogen, 0.032% titanium, 0.003% boron, 0.0050% calcium is coated with an aluminum-based layer about 20 μm in thickness.

According to the invention the sheet, in the delivery state in a coil or in sheeting, the thickness of which may range between 0.25 mm and 15 mm, has good shaping properties and a good resistance to corrosion as well as a good capacity for painting or gluing.

The sheet, a coated siderurgic product, has a substantial resistance to corrosion in the delivery state, during shaping and thermal treatments as well as during usage of the finished casting. After thermal treatment, a substantial mechanical resistance, which may exceed 1500 MPa, is obtained. The presence of the coating at the time of thermal treatment of the castings makes it possible to prevent any decarbonization of the base metal as well as any oxidation. That is an undeniable advantage, in particular in the case of hot-shaping. Furthermore, heating of the treated casting does not require a furnace having a controlled atmosphere to prevent a decarbonization.

Thermal treatment of the metal in the sheet consists in a heating at a temperature ranging between Ac1, starting temperature of austenitic transformation, for example 750° C. and 1200° C., in a furnace, for a period which depends on the temperature to be reached and the thickness of the casting sheet. The composition is optimized so as to limit the enlargement of the grains at the time of thermal treatment. If the structure sought is completely martensitic, the holding temperature should be in excess of Ac3, for example 840° C., ending temperature of austenitic formation. The temperature holding should be followed by a cooling adjusted to the final structure sought. For a completely martensitic structure and for a steel having the composition of the example, the speed of cooling should be in excess of the critical speed of hardening which is 27° C./s for an austenitizing at 900° C. for 5 min., the sheet having a thickness of approximately 1 mm.

It also is possible to obtain in particular ferrito-bainitic or ferrito-martensitic structures, by a heating at a temperature ranging between Ac1, for example 750° C. and Ac3, for example 840° C., followed by an appropriate cooling. According to the level of resistance to be achieved and the thermal treatment applied, one or several of these phases is/are present in variable proportions. For the highest resistance levels, the structure is composed predominantly of martensite.

Chromium, manganese, boron and carbon are added, in the composition of the steel according to the invention, for their effect on hardenability. In addition, carbon makes it possible to achieve high mechanical characteristics thanks to its effect on the hardness of the martensite.

Aluminum is introduced into the composition in order to trap oxygen and to protect the effectiveness of the boron.

Titanium, the ratio of the content of which with respect to the nitrogen content should be in excess of 3.42, is introduced in order to prevent combining of the boron with the nitrogen, the nitrogen being combined with titanium.

The alloying elements, Mn, Cr, B, make possible a hardenability allowing hardening in the stampers or the use of mild hardening fluids limiting deformation of the castings at the time of thermal treatment. In addition, the composition according to the invention is optimized from the point of view of weldability.

The steel in the sheet may undergo a treatment for globularization of sulfides performed with calcium, which has the effect of improving the fatigue resistance of the sheet.

The steel is particularly suited to the production of structural and anti-intrusion castings.

The proposed coating makes it possible to avoid different surface-preparation operations such as for steel sheets for thermal treatment not having any coating.

The modulation of thermal treatment parameters makes it possible to achieve, with a given composition, different levels of hot and cold sheet resistance according to the thickness sought.

At the time of thermal treatment, the base coating, of aluminum for example, is transformed into a layer alloyed with iron and comprising different phases depending on the thermal treatment and having a considerable hardness which may exceed 600 HV100 g.

Table 2 presents an example of maximal resistance of the steel sheet according to the invention after thermal treatment.

Thermal treatment	Rm (MPa)
850° C./5 min.	1695
990° C./5 min.	1675
950° C./5 min.	1665

What is claimed is:

[1. A hot-rolled coated steel sheet comprising a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating, wherein the steel in the sheet comprises the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01% <chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, and the steel sheet has a very high mechanical resistance after thermal treatment and the aluminum or aluminum alloy coating provides a high resistance to corrosion of the steel sheet.**]**

[2. The coated steel sheet according to claim **1**, wherein the composition by weight of the sheet further comprises the following:

0.20%<carbon<0.5%
0.8%<manganese<1.5%
0.1%<silicon<0.35%
0.01%<chromium<1%
titanium<0.1%
aluminum<0.1%
phosphorus<0.05%
sulfur 0.03%
0.0005%<boron<0.01%, the remainder being iron and impurities inherent in processing.**]**

[3. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **2**, to an increase in temperature at a speed in excess of 600° C./second.**]**

[4. A process for producing a casting comprising
shaping the coated steel sheet of claim **2**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.**]**

[5. The coated steel sheet according to claim **1**, wherein the ratio of titanium to nitrogen in the steel sheet in weight % is in excess of 3.42.**]**

[6. A process for producing a casting comprising
shaping the coated steel sheet of claim **5**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.**]**

[7. The coated steel sheet according to claim **1**, wherein the aluminum or aluminum alloy coating comprises from 9% to 10% silicon by weight, from 2% to 3.5% iron by weight, the remainder being aluminum.**]**

[8. A process for producing a casting comprising
shaping the coated steel sheet of claim **7**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.**]**

[9. The coated steel sheet according to claim **1**, wherein the coating comprises from 2% to 4% iron by weight, the remainder being aluminum.**]**

[10. A process for producing a casting comprising
shaping the coated steel sheet of claim **9**,

subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./sec.**]**

[11. A process for producing a casting comprising
shaping the coated steel sheet of claim **1**,
subjecting the shaped coated steel sheet to an increase in temperature at a speed in excess of 5° C./second.**]**

[12. The process according to claim **11**, wherein the casting is heated to a temperature in excess of 750° C.**]**

[13. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **1** to an increase in temperature at a speed in excess of 600° C./second.**]**

[14. A land motor vehicle comprising the heat treated coated steel of claim **13**.**]**

[15. A land motor vehicle comprising the coated steel sheet of claim **1**.**]**

[16. A heat treated coated steel sheet prepared by subjecting the coated steel sheet according to claim **1** to a temperature in excess of 750° C.**]**

17. A hot-rolled coated steel sheet comprising a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating, wherein said coated steel sheet is in the form of a delivery coil and the steel in the sheet comprises the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, and the steel sheet has a very high mechanical resistance in excess of 1500 MPa after thermal treatment and the aluminum or aluminum alloy coating provides a high resistance to corrosion of the steel sheet.

18. The coated steel sheet of claim 17 that is manufactured by a process comprising providing said hot rolled sheet; and coating said hot rolled sheet with an aluminum coating or aluminum alloy coating.

19. The coated steel sheet of claim 18 wherein said aluminum or aluminum alloy coating is obtained by hot-dipping and comprises, before said thermal treatment, a first alloy layer in contact with the surface of the steel, and a second alloy layer on top of the first alloy layer.

20. The coated steel sheet of claim 19 wherein the first coating layer comprises iron.

21. The coated steel sheet of claim 19 wherein the second coating layer comprises iron.

22. The coated steel sheet of claim 17 wherein the aluminum coating or aluminum alloy coating has a thickness of about 20 micrometers.

23. The coated steel sheet of claim 17 wherein the steel in the sheet is treated with calcium.

24. A coated steel sheet according to claim 17, manufactured by a process comprising a step of cold-rolling before said aluminum or aluminum alloy coating.

25. The coated steel sheet of claim 24 that is composed predominately of martensite.

26. The coated steel sheet of claim 24 wherein said subsequent thermal treatment includes hot-shaping the coated steel sheet, and cooling the hot-shaped sheet at a rate that produces martensitic structures, ferrite-martensitic structures , or ferrite-bainitic structures.

27. A hot-rolled coated steel sheet comprising a hot-rolled steel sheet coated with an aluminum or aluminum alloy coating, wherein the steel in the sheet comprises the following composition by weight:

0.15%<carbon<0.5%
0.5%<manganese<3%
0.1%<silicon<0.5%
0.01%<chromium<1%
titanium<0.2%
aluminum<0.1%
phosphorus<0.1%
sulfur<0.05%
0.0005%<boron<0.08%, the remainder being iron and impurities inherent in processing, and the steel sheet has a very high mechanical resistance in excess of 1500 MPa after a subsequent thermal treatment, and the aluminum or aluminum alloy coating provides a high resistance to corrosion and prevents decarburization during said subsequent thermal treatment of the steel sheet.

28. The coated steel sheet of claim 27 that is composed predominately of martensite.

29. The coated steel sheet of claim 27 wherein said subsequent thermal treatment includes hot-shaping the coated steel sheet, and cooling the hot-shaped sheet at a rate that produces martensitic structures, ferrite-martensitic structures, or ferrite-bainitic structures.

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