aluminum alloy plate produced by the method for producing aluminum alloy sheets has high corrosion resistance and mechanical properties.

The patent application CN104152759 relates to Al-Mg alloys with high strength and resistance to alloy corrosion and a technology for preparation thereof. The components of the alloy are as follows as a percentage by mass: 5.0 to 6.5% Mg, 1.2 to 2.5% Zn, 0 to 0.4% Cu, 0.4 to 1.2% Mn, 0 to 0.1% Cr, 0 to 0.15% Ti, 0.05 to 0.25% Zr, 0 to 0.4% Fe, 0 to 0.4% Si and the rest Al and unavoidable impurities. The manufacturing method includes the steps of casting, homogenization, hot rolling, recrystallization annealing, cold rolling, stabilization treatment and pre-drawing.

The patent application CN106244872 relates to a preparation method for a panel of average thickness made from Al-Mg aluminum alloy having high corrosion resistance for marine applications. The preparation method comprises the steps of homogenization, annealing heat treatment, hot rolling, cold rolling and heat treatment stabilization heat treatment.

The patent application WO2018104004 relates to a method for manufacturing a product made from wear-resistant rolled aluminum alloy comprising the steps consisting of: providing an aluminum alloy slab having Mg at 4.20% to 5.5%, Mn at 0.50% to 1.1% up to 0.40%, Si up to 0.30%, Cu up to 0.20%, Cr up to 0.25%, Zr up to 0.25%, Zn up to 0.30%, Ti up to 0.25%, hot rolling to an intermediate thickness of 15 mm to 40 mm and then hot rolling to a final thickness of 3 mm to 15 mm and wherein the exit temperature of the hot mill is between 130° and 285°C, and then cooling to ambient temperature. This application also does not mention corrosion behavior.

The problem to which the present invention attempts to respond is therefore proposing AlMgMn alloy rolled products having, after long-term exposure, improved corrosion behavior while keeping good mechanical characteristics before and after welding, having good fatigue behavior and being able to be produced at less cost.

Summary

In an aspect of the present disclosure, there is provided a method for manufacturing an aluminum alloy sheet, wherein

a) an aluminum alloy is prepared, with the composition, as % by weight

Mg: 4.0-5.2,

Mn: 0.40-1.0,

Zn: 0.15-0.40,

at least one element selected from Ti, Cr, Cu and Zr, with a content, if it is selected, of 0.01-0.15 for Ti, 0.05-0.25 for Cr, 0.02-0.25 for Cu, 0.05-0.25 for Zr,

Fe: < 0.40,

Si: < 0.40,

other elements or impurities < 0.05 each and < 0.15 in total, the remainder aluminum,

b) a slab is cast by vertical semicontinuous casting,

c) optionally, said slab is homogenized,

d) said optionally homogenized slab is hot rolled, in two successive steps, in order to obtain a sheet

d1) a hot-rolling step on a reversible mill to a thickness of between 12 and 35 mm,

d2) a hot-rolling step on a tandem mill to a thickness of between 3 and 12 mm, wherein the final temperature is at least 240°C and is less than 300°C,

e) optionally, said sheet is cold rolled, to a thickness of between 1 and 7 mm,

f) optionally, a final heat treatment of said optionally cold-rolled sheet is carried out at a temperature below 300°C.

In another aspect of the present disclosure, there is provided an aluminum alloy sheet with a thickness of between 1 and 12 mm with a composition, as % by weight,

Mg: 4.0-5.2,

Mn: 0.40-1.0,

Zr: 0.15-0.40,

at least one element selected from Ti, Cr, Cu and Zr, with a content, if it is selected, of 0.01-0.15 for Ti, 0.05-0.25 for Cr, 0.02-0.25 for Cu, 0.05-0.25 for Zr,

Fe: < 0.40,

Si: < 0.40,

other elements or impurities < 0.05 each and

< 0.15 in total, the remainder aluminum,

able to be obtained by the method disclosed herein having, after exposure of 7 days at 100°C, a weight loss of less than 15 mg/cm2 during a corrosion test in accordance with ASTM G67.

In a further aspect of the present disclosure, there is provided a use of a sheet disclosed herein in naval construction or for constructing industrial vehicles.

Object of the invention

The applicant has found that some AlMgMn alloys can be made more resistant to the sensitizing effect of a long-term exposure when they are obtained by a specific manufacturing method.

The applicant has in particular found that, in a specific range of Mg, Mn and Zn content, these alloys have a particular and well-defined microstructure, which results from a set of parameters of the manufacturing method.