There is a need for further improved vacuum chamber elements, especially in terms of corrosion resistance, homogeneity of properties throughout the thickness and machinabilty. Corrosion resistance and mechanical properties must be improved throughout the entire thickness of the aluminum alloy plate, in particular to facilitate machining and to allow any part of the plate to come into contact with the atmosphere of the chamber. There is also a need for improved thick aluminum alloy plates for the production of vacuum chamber components.

~~Subject~~Summary

The ~~first subject of the~~present disclosure provides ~~is~~ a vacuum chamber obtained by machining and surface treatment of a plate of thickness at least equal to 10 mm of aluminum alloy, composed as follows, in weight %, Si: 0.4 – 0.7; Mg: 0.4 - 0.7; Ti : 0.01 - < 0.15, Fe < 0.25; Cu < 0.04; Mn < 0.4; Cr : 0.01 - < 0.1; Zn < 0.04; other elements < 0.05 each and < 0.15 in total, the rest aluminum.

In a first aspect, there is provided a vacuum chamber element obtained by machining and surface treatment of a plate of thickness at least equal to 10 mm of aluminum alloy, composed as follows, in weight %, Si: 0.4 – 0.7; Mg: 0.4 - 0.7; Ti : 0.01 - < 0.15, Fe < 0.25; Cu < 0.020.04; Mn < 0.4; Cr : 0.01 - < 0.1; Zn < 0.04; other elements < 0.05 each and < 0.15 in total, the rest aluminum.

In another aspect, there is provided a method of manufacturing a vacuum chamber element wherein successively,

a. a rolling slab made of an aluminum alloy according to the present disclosure is cast,

b. optionally, said rolling slab is homogenized,

c. said rolling slab is rolled at a temperature above 450°C to obtain a plate having a thickness at least equal to 10 mm,

d. solution heat treatment of said plate is carried out, and it is quenched,

e. after solution heat treatment and quenching, said plate is stress-relieved by controlled stretching with permanent elongation of 1 to 5%,

f. the stretched plate then undergoes aging,

g. the aged plate is machined into a vacuum chamber element,

h. the vacuum chamber element so obtained undergoes surface treatment, preferably including anodizing at a temperature of between 10 and 30°C with a solution comprising

Claims

1. Vacuum chamber element obtained by machining and surface treatment of a plate of thickness at least equal to 10 mm of an aluminum alloy, composed as follows, in weight %, Si: 0.4 – 0.7; Mg: 0.4 - 0.7; Ti : 0.01 - < 0.15, Fe < 0.25; Cu < 0.020.04; Mn < 0.4; Cr : 0.01 - < 0.1; Zn < 0.04; other elements < 0.05 each and < 0.15 in total, the rest aluminum.

2. Element according to claim 1 wherein the manganese content is lower than 0.04 % by weight and preferably lower than 0.02 % by weight

3. Element according to either of claims 1 to 2 wherein the chromium content is from 0.01 to 0.04 % by weight and preferably from 0.01 to 0.03 % by weight.

4. Element according to any one of claims 1 to 3 wherein the iron content is from 0.05 to 0.2 % by weight and preferably from 0.1 to 0.2 % by weight.

5. Element according to any one of claims 1 to 4 wherein the silicon content is from 0.5 to 0.6 % by weight.

6. Element according to any one of claims 1 to 5 wherein the magnesium content is from 0.5 to 0.6 % by weight.

7. Element according to any one of claims 1 to 6 wherein the copper content is ~~lower than 0.02 % by weight and preferably~~ lower than 0.01 % by weight.

8. Element according to any one of claims 1 to 7 wherein the zinc content is lower than 0.02 % by weight and preferably lower than 0.001 % by weight.

9. Element according to any one of claims 1 to 8 wherein the titanium content is from 0.01 to 0.1 % by weight and preferably from 0.01 to 0.05 % by weight.

10. Element according to any one of claims 1 to 9 wherein said plate is such that the variation in the thickness of the average linear intercept length in the plane L/ST, named