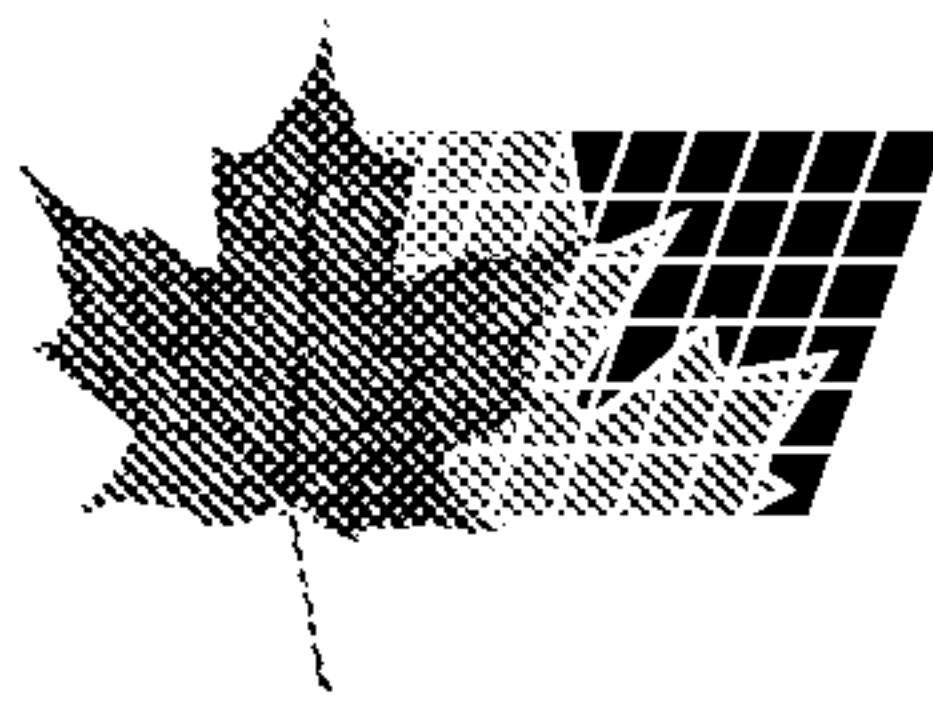




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(54) **ALLIAGES ALUMINIUM-MAGNESIUM SOUDABLES,
RESISTANT A LA CORROSION, EN PARTICULIER POUR LA
PRODUCTION DE MOYENS DE TRANSPORT**
(54) **WELDABLE, CORROSION-RESISTANT A1MG ALLOYS,
ESPECIALLY FOR MANUFACTURING MEANS OF
TRANSPORTATION**

(57) L'invention concerne un alliage aluminium-magnésium soudable, résistant à la corrosion, constitué d'au moins: 3-5 % en poids de magnésium (Mg), 0,05-0,15 % en poids de zirconium (Zr), 0,05-0,12 % en poids de manganèse (Mn), 0,01-0,2 % en poids de titane (Ti), 0,05-0,5 % en poids d'un ou de plusieurs éléments du groupe du scandium et/ou du terbium (Tb), l'alliage contenant (au moins du scandium), ainsi que d'aluminium et des impuretés inévitables comportant, au maximum, 0,02 % en poids de silicium (Si).

(57) The invention relates to weldable, corrosion-resistant aluminum-magnesium alloys consisting at least of 3-5 % by weight magnesium (Mg), 0.05-0.15 % by weight zirconium (Zr), 0.05-0.12 % by weight manganese (Mn), 0.01-0.2 % by weight titanium (Ti), 0.05-0.5 % by weight of one or more elements of the group consisting of scandium and/or terbium (Tb), wherein at least scandium is contained, in addition to aluminum and inevitable impurities with a maximum of 0.2 % by weight silicon (Si).

ABSTRACT

Weldable, corrosion-resistant, aluminum-magnesium alloy consisting of 3 - 5 %w/w magnesium (Mg), 0.05 - 0.15 %w/w zirconium (Zr), 0.05 - 0.12 %w/w manganese (Mn), 0.01 - 0.2 %w/w titanium (Ti), 0.05 - 0.5 %w/w of one or more elements from the scandium group and/or terbium (Tb), wherein at least scandium (Sc) is included, along with aluminum, and unavoidable contamination does not exceed 0.2 %w/w silicon (Si).

**Weldable, Corrosion-Resistant, High-Magnesium-Content
Aluminum-Magnesium Alloy, in particular for Traffic
Engineering**

The invention relates to a weldable, corrosion-resistant, high-magnesium-content aluminum-magnesium alloy, which contains a ternary aluminum-scandium-zirconium phase as the essential component. Such an alloy is known from US 5,624,632, for example, and is of interest above all for applications in aeronautics due to its low density, high strength and corrosion resistance. Adding rare earth or rare earth-like elements generates dispersoids in the aluminum-magnesium alloy, which produce a higher strength and corrosion resistance according to the above US patent. The above US patent makes no statement as to the weldability of such an alloy.

The object of this invention is to provide a weldable, corrosion-resistant, high-magnesium-content aluminum-magnesium alloy, which is at least as good as the known alloy in terms of strength and corrosion behavior, and exhibits a high recrystallization threshold to go along with a good weldability. This object is achieved by an aluminum-magnesium alloy according to claim 1.

In comparison to the known alloy, this new alloy exhibits above all a distinctly lower manganese share, wherein an improved corrosion resistance was surprisingly found, primarily in the sensitized state of the parts made out of this alloy, e.g., when cold-formed parts are subjected to an elevated temperature over a prolonged period. It is assumed that these positive properties are determined primarily by the ratio of manganese to scandium. An improved corrosion resistance is observed at a ratio of Mn to Sc < 2 . Along with acting as a grain growth inhibitor, the

- 2 -

titanium share not present in the known alloy helps to increase strength, since titanium can replace the zirconium in the ternary Al-Sc-Zr phase, wherein the solubility of titanium is lower than that of zirconium, however.

It has also been shown that scandium can be replaced by terbium, at least within certain limits. However, more terbium than the amount of scandium being replaced must be added to achieve constant properties.

A particularly favorable alloy for motor vehicles, ships or airplanes contains at least 0.15 %w/w scandium. Lanthanidene is preferably added in amounts ranging from 0.05 and 0.35 %w/w, wherein this range relates to the total mixture when using a lanthanidene mixture. The alloy tolerates silicon contamination of up to 0.2 %w/w; primarily the dynamic properties deteriorate at above this level.

- 3 -

CLAIMS

1. Weldable, corrosion-resistant, aluminum-magnesium alloy consisting of 3 - 5 %w/w magnesium (Mg), 0.05 - 0.15 %w/w zirconium (Zr), 0.05 - 0.12 %w/w manganese (Mn), 0.01 - 0.2 %w/w titanium (Ti), 0.05 - 0.5 %w/w of one or more elements from the scandium group and/or terbium (Tb), wherein at least scandium (Sc) is included, along with aluminum (Al), and unavoidable contamination does not exceed 0.2 %w/w silicon (Si).
2. AlMg alloy according to claim 1, characterized by the fact that the ratio of manganese to scandium is less than 2.
3. AlMg alloy according to claim 1 or 2, characterized by the fact that at least 0.15 %w/w scandium (Sc) is included.
4. AlMg alloy according to one of the claims 1 to 3, characterized by the fact that 0.05 - 0.35 %w/w of one or more elements of lanthanidene, in particular Cer (Ce), neodyme (Nd), Europium (Eu), gadolinium (Gd), dysprosium (Dy), holmium (Ho) or erbium (Er) is included.
5. Rolled, extruded, welded or forged component for an airplane, in particular for a fuselage, a ship or a motor vehicle, consisting of an AlMg alloy according to one of claims 1 to 4.