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(54) **Offset printing plate and process for the manufacture thereof.**

(57) The plate, in particular an aluminium plate, is provided with a ceramic coating of sodium and/or potassium silicate, which is 0.5-4 μm thick and has a roughness value (R_a) of 0,3-0.9 μm. An additional coating of light sensitive lacquer is applied in a standard manner on this coating. The process according to the invention consists of the electrolytic treatment of the aluminium plate with direct current and in a electrolyte containing sodium and/or potassium silicate.

EP 0 514 312 A1

Background of the Invention

Field of the Invention

The invention concerns a surface treatment of aluminium sheets whose advantages and properties make them particularly suitable for the manufacture of presensitized offset printing plates of all kinds and of the so-called wipe-on plates. The invention concerns in particular an offset printing plate which can be manufactured with this treatment and a process for the manufacture of these plates.

Reference of the Prior Art

Conventional offset printing plates manufactured according to the state of the art consist of pure aluminium or an aluminium alloy and require a multi-step surface treatment prior to the application of the light sensitive coatings. The millfinished aluminium surface is brushgrained and/or electrograined to provide a better adhesion of the photolacquer and the required damping water for printing. Subsequent anodization provides better abrasion resistance and hereby better durability of the plates in the printing press. A typical treatment consists of: etching/degreasing in alkaline solution - pickling in acid - electrograining with alternating current - anodizing with direct current-posttreatment by dipping in acid, the so-called "sealing". In many cases this is proceeded by a brushgraining using a brush and aqueous abradant suspension. A thorough rinsing with water is required between the two treatment stages and at the finish. Plates that are to be subsequently coated with positive lacquer, negative lacquer, or are to be provided with light sensitive coatings for electrophotography or for the silver salt process require a surface treatment that is specifically suited to the respective case.

Summary of the Invention

The object of the invention is to create an aluminium surface of at least equivalent quality to that created by conventional processes, but with considerably less process stages and expenditure in material and energy.

The offset printing plate referred to comprises a sheetlike member constituted: by aluminium with a degree of purity of not less than 90% Al; by an aluminium alloy; or by a laminated foil of aluminium and a base material, at least one of the surfaces of said sheetlike member containing a fixed coating of sodium and/or potassium silicate in a thickness of from 0.5 to 4 μm at a mean roughness value (Ra) ranging from 0.3 to 0.9 μm.

According to a further feature of the invention, said silicate coating is covered by an additional coating formed: by a light sensitive positive or negative acting photolacquer, by an electrophotographic acting photocoating or by a silver salt sensitized photocoating of standard type.

The said base material may be polyester, acetate, a laminated polymer, a waterproofed paper or other appropriate material.

In turn, the said alloy may comprise magnesium, iron, titanium or other metal.

Tests surprisingly showed that a single stage surface treatment of the aluminium was sufficient to meet the technical and quality requirements for offset printing plates.

This treatment is characterized in that a sheetlike member constituted: by aluminium with a degree of purity of not less than 90% Al; by an aluminium alloy; or by a laminated foil of aluminium and a base material, is subjected to an electrolytic treatment in an electrolyte containing sodium and/or potassium silicate in a concentration of 4-30 wt% related to the overall weight of electrolyte.

Preferably according to the invention, the electrolyte includes possible further additives such as wetting agents, buffers, stabilizers and/or inhibitors.

According to a further preferred feature of the invention, said electrolytic treatment is carried out at bath temperatures ranging from 10 to 50°C.

The invention also contemplates that said treatment be carried out anodically with direct current and that the quantity of electricity used is 30-90 kCm^{-2}.

Detailed Description of the Invention

The millfinished aluminium sheet is thereby dipped, without any pretreatment, in an electrolyte whose water contains sodium/potassium silicate in a concentration of 4-30 wt%, and is anodized at a constant amperage. The voltage thereby gradually increases and can, depending on the process parameters, reach 300V or more. The quantity of electricity used ranges from 30 to 90 kCm^{-2} (kiloCoulomb/m^2). On the treated and immediately adjacent aluminium surfaces firmly adhering ceramic crystals are formed by a controlled fusion at temperatures of up to 1200°C. The particle size and amount of these crystals depends on the temperature and the composition of the electrolyte, amperage, electrode gap and treatment period.

The plating created according to the invention is completely different from currently standard types of anodization of aluminium surfaces. It is very hard and abrasion proof, yet nevertheless has good absorbency for retaining and storing the damping water required for offset printing. It is inert and requires no posttreatment or so-called "sealing". It is therefore equally suitable for coating with positive and negative acting photolacquers, with zinc salts or organic compounds of sensitized coatings for electrophotography and with silver salts sensitized photocoatings. The special type of surface graining achieved eases the

air drain during contacting and exposure of the place in the vacuum printing down frame. It is therefore not necessary to give the photolacquer a grained surface by the addition of colourless pigments or cover it with an additional water soluble matt coating.

The electrolyte contains no aggressive acids and does not enrich itself in use with aluminium salts. It is therefore long-lived, easy to maintain and minimizes the waste-water treatment. The thickness of the coating and the surface roughness thereof can be reliably controlled by varying the composition and temperature of the electrolyte, as well as the amperage and the treatment period. The well-known "edge effect" which occurs in electrograining and also in all other electroplating processes with flat objects-i.e. higher concentration of the current on the outer edges than in the middle of the object - does not occur with this process. The process is suitable both for the treatment of trimmed sheets and for endless strips from coil.

EXAMPLE 1

A 450 x 500 mm "litho" quality aluminium sheet is treated, without any pretreatment, in an electrolyte whose 20 1 overall capacity is made up of approx. 15 l water, 4 kg potassium waterglass of density D = 1.309 and a mole ratio of 3.41, 140 g potassium hydroxide and 10 g citric acid, filled up to 20 l with water. The aluminium sheet is anodically connected to a direct current source with automatic amperage stabilization. The cathode - also of aluminium or lead, high-grade steel or titanium - is brought to a distance of approx. 10 cm from the anode. A constant current of 35 amperes is switched on for 5 minutes, during which time the voltage gradually rises to 250V. The electrolyte temperature is kept at 20°C. After washing with demineralized water and drying, the aluminium plate is ready for coating with photolacquer. The mean roughness value according to DIN is R_a = 9.5 µm, the increase in thickness approx. 4 µm.

EXAMPLE 2

As in Example 1, however the 20 l overall electrolyte solution contains: 1100 g potassium waterglass of density D = 1,263 and a mole ratio of 3.82, 178 g potassium hydroxide and 10 g citric acid. The voltage increases up to 300V. The mean roughness value according to DIN is Ra = 6.5 µm, the increase in thickness approx. 8 µm.

EXAMPLE 3

As in Example 2, however aluminium sheet mechanically roughened in standard manner, i.e. with brush and aqueous abradant solution. The mean roughness value is R_a = 5 µm.

Claims

1.- An offset printing plate comprising a sheetlike member constituted: by aluminium with a degree of purity of not less than 90% Al; by an aluminium alloy; or by a laminated foil of aluminium and a base material, at least one of the surfaces of said sheetlike member containing a fixed coating of sodium and/or potassium silicate in a thickness of from 0.5 to 4 µm at a mean roughness value (R_a) ranging from 0.3 to 0.9 µm.

2.- The plate of claim 1, wherein said silicate coating is covered by an additional coating formed: by a light sensitive positive or negative acting photolacquer, by an electrophotographic acting photocoating or by a silver salt sensitized photocoating of standard type.

3.- A process for the manufacture of offset printing plates in which a sheetlike member constituted: by aluminium with a degree of purity of not less than 90% Al; by an aluminium alloy; or by a laminated foil of aluminium and a base material, is subjected to an electrolytic treatment in an electrolyte containing sodium and/or potassium silicate in a concentration of 4-30 wt% related to the overall weight of electrolyte.

4.- The process of claim 3, wherein the electrolyte includes further additives such as wetting agents, buffers, stabilizers and/or inhibitors.

5.- The process of claim 3, wherein said electrolytic treatment is carried out at bath temperatures ranging from 10 to 50°C.

6.- The process of any one of claims 3 to 5, wherein said treatment is carried out anodically with direct current and that the quantity of electricity used is 30-90 kCm^{-2}.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 50 0055

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 166 777 (E.A.CASSON JR. ET AL) * examples * ---	1-6	B41N3/03
X	US-A-3 956 080 (R.J.HRADCOVSKY ET AL) * examples * * column 6, line 37 - line 42 * * column 6, line 55 - column 7, line 4 * ---	1-6	
X	US-A-3 720 164 (E.A.CASSON JR.) * examples * ---	1-6	
X	WORLD PATENTS INDEX Week 7317, Derwent Publications Ltd., London, GB; AN 73-24134U & JP-A-48 012 930 (KANSAI PAINT CO LTD) 26 December 1970 * abstract * ---	1-6	
A	EP-A-0 089 510 (AMERICAN HOECHST CORPORATION) * page 4, line 11 - page 5, line 6 * ---	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	EP-A-0 154 201 (HOECHST AKTIENGESELLSCHAFT) * claim 1 * * page 11, line 15 - page 12, line 21 * -----	2	B41N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 JULY 1992	MARKHAM R.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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