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**Datasheet for the decision  
of 11 March 2010**

**Case Number:** T 0956/07 - 3.2.08

**Application Number:** 96944361.3

**Publication Number:** 0874917

**IPC:** C21D 9/46

**Language of the proceedings:** EN

**Title of invention:**

Process and apparatus to enhance the paintbake response and aging stability of aluminum sheet materials and product therefrom

**Patentee:**

Reynolds Metals Company

**Opponents:**

Alcan Technology and Management Limited  
Aleris Aluminum Duffel BVBA

**Headword:**

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**Relevant legal provisions:**

EPC Art. 123(2)

**Relevant legal provisions (EPC 1973):**

EPC Art. 54(1), 54(2), 56, 84

**Keyword:**

"Clarity of amendments (main and first auxiliary request - no)"

"Novelty (second auxiliary request - no; third auxiliary request - yes)"

"Amendments (third auxiliary request, numerical range - allowable)"

"Inventive step (third auxiliary request - yes)"

**Decisions cited:**

T 0002/81

**Catchword:**

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Case Number: T 0956/07 - 3.2.08

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.08**  
**of 11 March 2010**

**Appellant II:** Alcan Technology and Management Limited  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
11 April 2007 concerning maintenance of the  
European patent No. 0874917 in amended form.

**Composition of the Board:**

**Chairman:** R. Ries  
**Members:** M. Alvazzi Delfrate  
U. Tronser

## Summary of Facts and Submissions

- I. With its decision given to the post on 11 April 2007 the opposition division held that European patent No. 874 917 in amended form according to the second auxiliary request then on file met the requirements of the EPC.
- II. Appellant I (patent proprietor) lodged an appeal against this decision on 8 June 2007, paying the appeal fee on the same day. The statement setting out the grounds for appeal was filed on 13 August 2007.
- III. A further appeal was lodged by appellant II (opponent I) on 12 June 2007, and the appeal fee was paid on the same day. The statement setting out the grounds for appeal was filed on 3 August 2007.
- IV. Oral proceedings were held on 11 March 2010.

Appellant I requested that the decision under appeal be set aside and the patent be maintained on the basis of the claims according to the main request or the first auxiliary request, respectively, submitted with letter dated 11 February 2010, or on the basis of the second auxiliary request submitted during the oral proceedings or in the alternative to dismiss opponent's I appeal.

Appellant II requested that the decision under appeal be set aside and that the European patent No. 874 917 be revoked.

The respondent (opponent II) requested that the appeal of the patent proprietor is dismissed.

V. During the oral proceedings appellant I objected to the respondent pleading on the third auxiliary request, since this request, corresponding to the version of the patent underlying the appealed decision, could not be challenged by the respondent. Being sub-authorized by the representative of appellant II, the representative of the respondent was allowed by the Board to plead on this matter as well.

VI. Claim 1 of the main request reads as follows:

"A method of making a Mg-Si containing aluminum alloy sheet product from an aluminum alloy having magnesium and silicon as alloying elements which comprises the steps of providing an Al-Mg-Si-containing aluminum alloy, subjecting said aluminum alloy to hot rolling and subsequent cold rolling to form a cold rolled sheet product, solution heat treating the cold rolled sheet product, and quenching the solution heat treated product, characterized by:

(a) rapidly heating said quenched sheet product to a pre-aging temperature between 65° and 93°C, as said sheet product is continuously moved through means for heating the sheet product; and

(b) ambient cooling said sheet in coil form from said pre-aging temperature to ambient temperature at a cooling rate of between 1,1 to 3,3 °C per hour, said heating and ambient cooling improving paintbake response and lowering strength in the prepaintbaked condition of said aluminum alloy sheet product."

Claim 1 of the first auxiliary request departs from claim 1 of the main request in that the strength in the prepaintbaked condition of the aluminium alloy sheet

product is lowered "... compared to standard T4 yield strength ...".

Claim 1 of the second auxiliary request departs from claim 1 of the main request in that the requirement of " ... lowering strength in the prepaintbaked condition ... " of the aluminium alloy sheet product has been deleted.

Claim 1 of the third auxiliary request departs from claim 1 of the second auxiliary request in that the pre-aging temperature is "... between 65° (150°F) and 79°C (175°F) ..." and in that "... the time between the end of said quenching and said heating is less than about 5 minutes".

VII. The following documents are relevant for the present decision:

- E1: JP -A- 06 272 002 (reference is made to the English translation);
- E2: JP -A- 02 209 457 (reference is made to the English translation) as well as computer-translation E2A;
- E4: US -A- 3 135 633; and
- E5: H. Suzuki et al. "A Consideration of Two-step Ageing in Al-Mg-Si Alloy" translated from Keikin-zoku (Journal Japan Institute of Light Metals) (1980) Vol. 30, No. 11, pages 609-611

VIII. Appellant I 's arguments can be essentially summarised as follows:

*Clarity of the main request and first auxiliary request*

The wording relating to the lowering of the strength in the pre-paintbaked condition was explicitly introduced in claim 1, despite already being achieved by the process without this feature, to clarify the difference in respect of E1. Since it was clear that the lowering of the strength was achieved in view of the standard T4 material, the introduction of this functional feature in claim 1 of the main and the first auxiliary requests did not render the claim unclear.

*Second auxiliary request: novelty in view of E1*

E1 disclosed a pre-aging treatment at 100°C as a comparative example (example H of table 2). Therefore, E1 led away from the pre-aging temperature according to claim 1, which, not exceeding 93°C, should thus be seen as novel.

Moreover, E1 did not disclose a cooling rate for the coiled product. Accordingly, the subject-matter of claim 1 was also novel over E1 by virtue of the range of the cooling rate after the pre-aging treatment.

*Third auxiliary request: Article 123(2) EPC*

The range of pre-aging temperatures between 65° (150°F) and 79°C (175°F), whose limits were disclosed in the application as filed, was to be seen as disclosed in said application, in accordance with the considerations given in decision T 0002/81. Moreover, the claimed range was also supported by examples which exhibited

favourable properties. Accordingly, the introduction of this range complied with the requirements of Article 123(2) EPC.

*Third auxiliary request: novelty*

The pre-aging temperature according to claim 1 was novel in view of E2, since this document disclosed merely a broad range of 50 to 150°C for this thermal treatment. Moreover, E2 clearly required controlling the cooling of the coil by maintaining it above a given temperature. Therefore, an ambient cooling of the coil according to claim 1 was not disclosed in E2 either. In addition E2 did not disclose the combination of hot and cold rolling of the process of claim 1, which, as a consequence, was a further distinguishing feature. Accordingly, the subject-matter of claim 1 was novel in view of E2.

Since a pre-aging temperature between 65° and 79°C was not disclosed by E1 either, novelty of the subject-matter of claim 1 in respect of E1 should be acknowledged in view of this feature as well.

*Third auxiliary request: inventive step*

The object of the claimed invention resided in achieving improved forming properties and paintbake response, which could be maintained after natural aging.

Starting from E1 as the most relevant prior art, it was not obvious to adopt a pre-aging temperature in the



range defined in claim 1, since E1 explicitly taught higher temperatures for this treatment.

Also starting from E2 the claimed process was not obvious, since none of the documents E1, E2 or E5 hinted to the claimed pre-aging temperature and since a controlled cooling was presented as essential in E2.

Accordingly, the subject-matter of claim 1 involved an inventive step.

- IX. The arguments of appellant II and the respondent can be essentially summarised as follows:

*Clarity of the main request and first auxiliary request*

The introduction of the functional feature in claim 1 rendered the claim unclear, since it was doubtful with what value the strength of the product was to be compared and what process features were defined by this functional definition.

*Second auxiliary request: novelty in view of E1*

Tables 2 and 3 of E1 were to be considered in combination. Therefore, it was clear that the treatment of example H of table 2 was indicated as comparative solely because it was applied in table 3 to a composition of the alloy outside the claimed scope. As a consequence, the person skilled in the art would also have seriously considered performing the pre-aging at the lower temperatures of the range according to E1, i.e. at about 100°C or even at the lower limit of about

90°C. Accordingly, the pre-aging temperature of claim 1 was known from E1.

Even if claim 1 appeared to define a very precise cooling rate, this feature, considered in the light of the description, merely defined the natural cooling of a coiled sheet. This cooling of the coil was standard as could be seen in E4 and as was also disclosed in E1. Therefore, the cooling rate of claim 1 was also known from E1.

Since E1 further disclosed the remaining features of claim 1, its subject-matter lacked novelty.

*Third auxiliary request: Article 123(2) EPC*

In the present case the lower limit of a preferred range (79°C) had been transformed into the upper limit of the claimed range. Therefore, the facts were different from those underlying decision T 2/81, which was not applicable. Neither the originally filed claims nor the examples of Figure 5, which disclosed the pre-aging temperatures only in combination with a dwell time falling outside the claimed range of less than about 5 minutes, disclosed a range having an upper limit of 79°C. Therefore, the introduction of said limit contravened the requirements of Article 123(2) EPC.

*Third auxiliary request: novelty*

The claimed pre-aging temperature could not be considered a purposive selection within the range of 50°-150°C disclosed in E2, since no improvement in

respect of the pre-aging at 93°C, lying outside the claimed range, could be seen. Accordingly, the range of the pre-aging temperature according to claim 1 was known from E2.

Moreover, the "temperature-retaining method" of E2 merely indicated the cooling of the sheet after coiling, since this configuration retained the heat. Therefore, E2 disclosed the natural cooling of the sheet in coiled state.

Additionally, the term "rolled aluminium sheet" in E2 clearly indicated a sheet produced by hot rolling and cold rolling, since this was the typical way of obtaining a rolled sheet in industry.

Since the remaining features of claim 1 were also known from E2, the subject-matter of claim 1 was not novel.

*Third auxiliary request: inventive step*

In the event that novelty was acknowledged and starting from E1, it would have been obvious to adopt lower pre-aging temperatures, this being the sole distinguishing feature of the method of claim 1, to provide better forming properties. E5 (Figures 1b and 5b) showed that pre-aging at temperatures lower than 100°C resulted in lower hardness, rendering the forming easier. Moreover, also E2, disclosing pre-aging at temperatures as low as 50°C, would have rendered it obvious to carry out pre-aging at the temperature given in claim 1, since it was obvious for the person skilled in the art that lower temperatures lead to better forming properties.

Therefore, the subject-matter of claim 1 was obvious in view of E1 in conjunction with E5 or with E2.

Additionally, even if the pre-aging temperature were to be considered as novel in view of E2, it would have been rendered obvious by E5 to adopt this temperature for the reasons given above. Therefore, the subject-matter of claim 1 was also obvious in view of E2 in conjunction with E5.

### **Reasons for the Decision**

1. The appeals are admissible.
2. Procedural matters

Although in the present situation the respondent is not permitted to submit requests with respect to the version of the patent upheld in the appealed decision, the Board cannot see any reason why his arguments should not be heard, since the representative of appellant II sub-authorized the representative of the respondent to plead on this matter.

3. Main and first auxiliary requests

Claim 1 of the main request has been amended in respect of the claim as granted to recite that the heating and ambient cooling achieve "... lowering strength in the prepaintbaked condition of said aluminum alloy sheet product". This feature attempts to define the claimed process in a functional way, i.e. by reference to a technical result to be achieved.

According to the established jurisprudence of the Boards of Appeal (Case Law of the Boards of Appeal of the European Patent Office, 5<sup>th</sup> edition 2006, II.B.1.2.2, page 196) a functional feature is permissible only (i) if, from an objective viewpoint, such feature cannot otherwise be defined more precisely without restricting the scope of the invention and (ii) if this feature provides instructions which are sufficiently clear for the expert to reduce it to practice without undue burden.

In the present case the functional definition relates to heating and ambient cooling steps. Both the heating and the cooling of an aluminium sheet can be completely defined by reference to process parameters. Even appellant I itself acknowledged that the features already present in granted claim 1, i.e. heating time and cooling rate, were sufficient to define a process leading to the desired lowering of the strength. Therefore, condition (i) mentioned above is not met and the amendment renders claim 1 of the main request unclear (Article 84 EPC).

The objection above applies also to claim 1 of the first auxiliary request.

Hence claim 1 of the main request and claim 1 of the first auxiliary request fail to satisfy the requirements of Article 84 EPC and are therefore not allowable.

4. Second auxiliary request

E1 (see in particular the abstract) discloses a method of making an aluminium alloy sheet from an aluminium alloy having magnesium and silicon as alloying elements, the method comprising the steps of providing an Al-Mg-Si-containing aluminium alloy, subjecting said aluminium alloy to hot rolling and subsequent cold rolling to form a cold rolled sheet product, solution heat treating the cold rolled sheet product, and quenching (at a cooling rate of at least 100°C/min, see the abstract) the solution heat treated product.

E1 also describes rapidly heating (see the abstract) said quenched sheet product as said sheet product is continuously moved through an induction heating system. According to E1, which also discloses the reasons for this choice, this treatment is performed at a pre-aging temperature as low as 90° and as high as 160°C (see for instance abstract or claim 1 or paragraphs [0010], [0018], and [0023]). Therefore, E1 clearly and unambiguously discloses the value of 90°C, making it clear that it is possible to treat the sheet at temperatures as low as that, irrespective of the fact that, for whatever reason, a pre-aging treatment at 100°C has been chosen and is indicated in table 2 as relating to a comparative example. Accordingly, E1 also anticipates a pre-aging temperature ranging between 65° and 93°C.

E1 further describes ambient cooling said sheet in coil form from the pre-aging temperature to ambient temperature, since the coil of E1 is cooled by radiation at room temperature (see abstract). This measure results in good paintbake response and forming

properties (see for instance paragraphs [0001] and [0004] and table 3).

According to the wording of present claim 1, the ambient cooling of the coil from said pre-aging temperature to ambient temperature is carried out at a cooling rate of between 1,1 to 3,3 °C per hour. However, it is apparent from the description that the cooling rate of claim 1, albeit being indicated with a precision of 0,1 °C, is merely an approximation of the empirical data of the natural cooling rate of metal coils, which is not linear and varies significantly during the cooling (see paragraphs [0032] to [0034], in particular point 2., and Figure 4). Therefore, it is clear to the person skilled in the art considering the claims, the description and the drawings, that the claimed scope should be regarded as encompassing any process involving natural cooling of a coil from said pre-aging temperature to ambient temperature. Since E1 discloses this natural cooling (see for instance abstract and paragraph [0018]), no difference can be seen in this respect between the claimed process and the process described in E1.

Accordingly, the subject-matter of claim 1 of the second auxiliary request lacks novelty.

5. Third auxiliary request

5.1 Article 123(2) EPC

In claim 1 the pre-aging temperature is "... between 65° (150°F) and 79°C (175°F) ..." This range cannot be found expressis verbis in the application as filed, which

discloses for the pre-aging temperature a broader range of between 150° and 250°F (see claim 2) and a preferred narrower range of between 175° and 225°F (see claim 3).

The question to be answered when examining for compliance with the requirements of Article 123(2) EPC is whether the patent as amended comprises subject-matter extending beyond the application as filed, i.e. subject-matter not directly and unambiguously derivable from said application.

In the present case the lower limit (150°F) and the upper limit of the claimed range (175°F) correspond respectively to the lower limit of the broader range and the lower limit of the preferred range as originally disclosed. Therefore, the presently claimed range, being one of the two possible part-ranges lying within the broader range on either side of the preferred range, is immediately apparent from the application as filed.

Moreover, the application as filed discloses pre-aging treatments at 150°F and 175°F resulting, in accordance with its object (see page 6, lines 7-11), in excellent properties in terms of paintbake response, resistance to natural aging and improved formability (see Figures 5 to 7). Since they are also carried out in combination with a dwell time of two minutes (see Figures 6 to 7 and page 14, first paragraph), there is no indication that these treatments are inevitably linked to a dwell time longer than five minutes. Therefore, the person skilled in the art reading the application as filed would immediately recognise the



range between 65° (150°F) and 79°C (175°F) according to claim 1 and also seriously consider working in it.

Under these circumstances, there is no doubt that this range can be directly and unambiguously derived from the patent application as originally filed.

Accordingly, the requirements of Article 123(2) EPC are met.

## 5.2 Novelty

5.2.1 E2, relating to a continuous annealing furnace for treating aluminium sheets prior to paint baking, discloses a method of making a Mg-Si containing aluminium alloy sheet product from an aluminium alloy having magnesium and silicon as alloying elements (such as AA 6009, 6010) which comprises the steps of providing an Al-Mg-Si-containing aluminium alloy (see page 3, lines 2-6), solution heat treating a rolled sheet product made of this alloy, quenching the solution heat treated product, rapidly heating said quenched sheet product to a pre-aging temperature, as said sheet product is continuously moved through means for heating the sheet product; and cooling said sheet in coil form from said pre-aging temperature to ambient temperature (see page 6, lines 13-20 and Figure 2). In the operation of the furnace of E2 the time between the end of quenching and the rapid heating is less than about 5 minutes (see Figure 4).

E2 discloses merely that the sheet which is solution heat treated is a rolled sheet. It must thus be concluded that E2 does not disclose subjecting said

aluminium alloy to hot rolling and subsequent cold rolling to form a cold rolled sheet product.

More importantly however, the pre-aging temperature according to E2 is in the range between 50 and 150°C. Therefore, the range according to present claim 1, between 65° and 79°C, is a selection from the broader numerical range known from E2. According to the established jurisprudence of the Boards of Appeal (Case Law of the Boards of Appeal of the European Patent Office, 5<sup>th</sup> edition 2006, I.C.4.2.1, page 96) a sub-range selected from a broader numerical range of the prior art is considered novel if each of the following three criteria is satisfied:(a) the selected sub-range is narrow compared to the known range;(b) the selected sub-range is sufficiently far removed from any specific examples disclosed in the prior art;(c) the selected range is not an arbitrary specimen of the prior art, i.e. not a mere embodiment of the prior art, but another invention (purposive selection, new technical teaching). In the present case no specific example is disclosed in E2 and the selected range is undisputedly narrow compared to the known range. Moreover, Figures 5 to 7 show that the claimed range provides excellent paintbake response, formability and natural age resistance and that these properties are not provided over the whole known range. Therefore, the selected range is also a purposeful selection within the range known from E2 and each of the three criteria above is met. Accordingly, the selected range of the pre-aging temperatures is novel over E2.

E2 provides a description of the operation of the furnace (see page 6, lines 11-23), applying to all the

examples of the furnace disclosed in this document. According to this description, the treated sheet is wound into a coil which is then kept at a required temperature for the required time using an appropriate temperature-retaining method. Since the latter step is applied to the coil, it clearly indicates a temperature-retaining measure which is taken in addition to the coiling. Therefore, E2 does not disclose ambient cooling of said sheet in coil form from said pre-aging temperature to ambient temperature at a cooling rate of between 1,1 and 3,3 °C per hour.

Accordingly, the subject-matter of claim 1 is novel over E2.

5.2.2 E1 teaches performing the reheating after quenching within a very short time, i.e. within 10 minutes (see paragraphs [0019] and [0020]). Therefore, it is considered that a range of less than about 5 minutes as given in claim 1, being a selection of a broad numerical range from a known range, is disclosed by E1.

However, E1 recites a range between 90° and 160°C for the pre-aging temperature. Therefore, the claimed process, defining a pre-aging temperature between 65° (150°F) and 79°C (175°F), is novel over E1.

5.3 Inventive step

5.3.1 Starting from the method disclosed in E1 as the most promising springboard, the objective problem underlying the claimed invention is seen in providing good resistance to natural aging and formability in combination with a high paintbake response.

The solution to this problem is achieved by a pre-aging temperature in the range between 65° and 79°C. Said treatment not only provides good forming properties and paintbake response of the sheet immediately after cooling to room temperature (see Figure 5) but also, which is especially important, maintains those properties after natural aging (see Figures 6 and 7).

E1 itself, teaching maintaining a pre-aging temperature of at least 90°C (see for instance paragraph [0018]), leads away from the claimed invention.

E5 does not disclose a pre-aging treatment at a temperature within the range of present claim 1 and is completely silent on resistance to natural aging. In particular Figures 1b and 5b do not relate to this effect. Figure 1b does not provide any information about the forming properties of the product before paintbaking, since it shows the properties of the products after aging at 175°C for 100 min. Figure 5b, showing the evolution of the hardness during aging, does not take into consideration the natural aging resistance. Moreover, this Figure shows that pre-aging treatments at temperatures lower than 100°C result, in comparison with samples which have not been pre-aged, in a higher hardness before aging and lower or equal hardness after aging, i.e. they are disadvantageous both in terms of forming properties and strength after paintbaking (see also E5, point 4. Discussion). Therefore, E5 does not give a hint to solve the problem above according to claim 1.

E2 discloses a broad temperature range of 50° to 150°C for the pre-aging without giving any detail of the influence of the temperature in this range on the sheet properties. Accordingly, it does not lead to the claimed process either.

Therefore, none of the documents E1, E2 or E5 renders it obvious to solve the problem above according to claim 1 when starting from the method disclosed in E1.

- 5.3.2 The objective problem underlying the claimed invention starting from the process described in E2 may be seen in providing good resistance to natural aging and formability while maintaining good paintbake response.

This problem is solved by selecting in the broad temperature range disclosed in E2 a pre-aging temperature in the range between 65° and 79°C and by ambient cooling the coil as defined in claim 1.

As explained above none, of the documents E1, E2 or E5 renders it obvious to solve the problem above by means of the pre-aging temperature according to claim 1.

Last but not least the arguments of appellant I with respect to document E4 (column 1, lines 15 to 18 and column 4, lines 4 to 16) cannot change this reasoning given that this document merely discloses the restriction of the time interval between quenching and preliminary aging carried out between 100° and 250°C to less than 5 minutes.

- 5.3.3 Therefore, the subject-matter of claim 1 involves an inventive step.

**Order**

**For these reasons it is decided that:**

1. The appellant I 's (patent proprietor's) appeal with regard to its main request and first and second auxiliary requests is dismissed.
2. The appellant II 's (Opponent I 's) appeal is dismissed.

The Registrar:

The Chairman:

V. Commare

R. Ries