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Datasheet for the decision of 20 February 2025

Case Number: T 0667/23 - 3.3.05

Application Number: 16884235.9

Publication Number: 3400316

IPC: C22C21/02, B22D11/00

Language of the proceedings: EN

Title of invention:
NEW 6XXX ALUMINUM ALLOYS, AND METHODS OF MAKING THE SAME

Patent Proprietor:
Arconic Technologies LLC

Opponents:
Novelis Inc.
C-TEC CONSTELLIUM TECHNOLOGY CENTER / CONSTELLIUM NEUF-BRISACH
Alvance Aluminium Duffel BV

Headword:
Aluminum Alloys/Arconic

Relevant legal provisions:
EPC Art. 54, 56, 83, 123(2)

Keyword:

Novelty - (yes)
Sufficiency of disclosure - (yes)
Amendments - allowable (yes)
Inventive step - main request (no) - auxiliary request 1 (no) - auxiliary request 2 (yes)

Decisions cited:

T 0198/84, T 0026/85, T 0279/89, T 0939/92, T 1102/00, T 0538/04, T 0210/05, T 0759/10, T 0673/12, T 0107/14, T 0261/15, T 2623/19, T 1688/20, T 0989/22

Catchword:

The concept that a claimed sub-range must be "narrow" compared to the known range and "sufficiently far removed" from any specific examples cannot be reconciled with direct and unambiguous disclosure (T 1688/20 followed).

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Beschwerdekammern

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Case Number: T 0667/23 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 20 February 2025

Appellant 1: (Patent Proprietor)	Arconic Technologies LLC 201 Isabella Street Pittsburgh, PA 15212 (US)
Representative:	Forresters IP LLP Skygarden Erika-Mann-Straße 11 80636 München (DE)
Appellant 2: (Opponent 1)	Novelis Inc. 3560 Lenox Road, Suite 2000 Atlanta, GA 30326 (US)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted on 22 February 2023 concerning maintenance of the European Patent No. 3400316 in amended form.**

Composition of the Board:

Chairman E. Bendl
Members: G. Glod
P. Guntz

Summary of Facts and Submissions

I. The appeals of the patent proprietor (appellant 1) and the opponent 1 (appellant 2) lie from the opposition division's decision finding that European patent No. 3 400 316 in amended form based on auxiliary request 2 met the requirements of the EPC.

II. The following documents used in the impugned decision are of relevance.

D1: JP 2007-009262 A
D1a: Machine translation of D1
D5: EP 0 531 118 A1
D12: M. M. R. Jaradeh, Doctoral Thesis 2006, chapter 1
D13: Aluminum Casting Technology, 1986, 21-2
D21: P. Barrand and R. Gadeau, L'aluminium, Tome 1, 1964, 540-1
D29a: Declaration of Els Verboom, including Enclosures 1 and 2
D29b: 658 aluminium alloy screenshot
D29c: 658 aluminium alloy and customer specifications screenshot
D29d: Alloy 658 composition range
D29e: Alloy 658 deliveries
D29f: Alloy 2630301 analysis sheet 1
D29g: Alloy 2630301 analysis sheet 2
D29h: Spedition delivery printout
D29i: Printout on the deliveries in the scheduling agreement
D29j: Printout from opponent's SAP system on deliveries in scheduling agreement
D29k: Invoice
D291: Invoice
D29m: Booking system printout

D29n: Delivery printouts
D29o: Account printout
D29p: Customer payment printout
D30: CN 101 935 785 A

III. Claim 1 of the main request underlying the decision under appeal reads as follows.

"*1. A 6xxx aluminum alloy consisting of:*
1.03 - 1.40 wt. % Si;
0.32 - 0.51 wt. % Mg;
wherein a ratio of wt.% Si to wt.% Mg is in the range of from 2.0: 1 (Si:Mg) to 4.5: 1 (Si:Mg);
0.15 - 0.25 wt. % Cu;
0.08 - 0.30 wt. % Fe;
0.02 - 0.09 wt. % Mn;
0.01 - 0.06 wt. % Cr;
0.01 - 0.14 wt. % Ti;
≤ 0.25 wt. % Zn;
the balance being aluminum and impurities, wherein the aluminum alloy includes ≤ 0.05 wt. % of any one impurity, and wherein the aluminum alloy includes ≤ 0.15 in total of all impurities."

Claim 1 of auxiliary request 1 is identical to claim 1 of the main request.

In claim 1 of auxiliary request 2, the amount of Ti has been amended to:
"*0.06 - 0.14 wt.% Ti*"

IV. Appellant 1's (the patent proprietor's) arguments relevant to the present decision can be summarised as follows for the main request and auxiliary request 1.

The wt.% of Si in combination with the wt.% Mg in claim 1 of the main request resulted in an improved combination of properties. The amount of Si could not be isolated from the amount of Mg. If the amount of Mg or Si were changed, the amount of the other element had to be changed as well. D1/D1a did not teach the combination of 1.03-1.40 wt.% Si with 0.32-0.51 wt.% Mg. The example alloys of D1/D1a all comprised 1.00 wt.% or significantly less Si. There was no motivation to increase the amount of Si.

The arguments on auxiliary request 2 are reflected in the Reasons for the Decision given below.

V. Appellant 2 (opponent 1) and the respondents (opponents 2 and 3) contested, *inter alia*, novelty and inventive step of claim 1 of the main request and auxiliary request 1 over D1/D1a.

Their arguments relevant to the present decision for auxiliary request 2 can be summarised as follows.

The requirements of Article 123(2) EPC were not met since the change from "consisting essentially of" to "consisting of" was not allowed.

The requirements of Article 83 EPC were not met. There was no teaching on how a cast 6xxx aluminium alloy strip could undergo thickness reduction of up to 50% in a first rolling stand and up to 70% in a second rolling stand by pure cold rolling.

The subject-matter of claim 1 of auxiliary request 2 lacked novelty over D1/D1a. The claimed lower limit of 0.06 wt.% for Ti fell inside the preferred range of D1/

D1a and was not sufficiently far removed from example C1.

In any case, the subject-matter of claim 1 of auxiliary request 2 lacked an inventive step when starting from D1/D1a as the closest prior art. Neither the differing Si content nor the differing Ti content led to a technical effect. The comparison of alloys CC1 and CC3 of D1/D1a did not allow establishing a technical effect. These alloys differed not only in their Ti content but also in their Mg content and consequently in the Si:Mg ratio. In addition, the processing of alloy CC1 differed from the processing of alloy CC3, as was evident when comparing Tables 2 and 8 of the patent. The problem to be solved could only be seen in the provision of an alternative alloy. The solution was obvious in view of one of D5, D12, D13 and D21. Even if the problem were to provide improved corrosion, D12 clearly taught the addition of Ti in excess of 0.1%. The effect of Ti on corrosion was also evident from the title of citation [52] of D12. Furthermore, Ti counteracted intergranular corrosion caused by an excess of silicon, as indicated in D12.

A similar reasoning applied when starting from the prior use documented by D29a to D29p since the only difference was also the amount of Ti.

Therefore, the requirements of Article 56 EPC were not met.

VI. At the end of the oral proceedings of 20 February 2025, the requests of the parties were as follows. For simplicity, the parties are referred to as the patent proprietor, opponent 1, opponent 2 and opponent 3 in the following.

The patent proprietor requests that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of the main request or auxiliary request 1. Alternatively, it requested that opponent 1's appeal be dismissed.

Opponent 1 requests that the decision under appeal be set aside and that the patent be revoked.

Opponents 2 and 3 request that the patent proprietor's appeal be dismissed.

Reasons for the Decision

Main request

1. Article 54 EPC

1.1 D1/D1a discloses an alloy C1 falling within the scope of claim 1 except that alloy C1 contains 1.00 wt.% Si. The opponents mainly argued that the lower endpoint of the claimed range (1.03 wt.%) could not establish novelty since it was not far removed from the example. Reference was made to decision T 673/12.

The board is not convinced by the opponents' arguments.

The concept that a claimed sub-range must be "narrow" compared to the known range and "sufficiently far removed" from any examples disclosed in the prior art originates from decisions T 198/84 (Reasons 5), which is summarised briefly in T 279/89 (Reasons 4.1). It has been accepted as a kind of novelty test for selection inventions. This board agrees with T 1688/20 (Reasons 3.2.1) that this concept is not in agreement with

direct and unambiguous disclosure, which is the uncontested criterion established later on in the case law for evaluating novelty. As explained in T 1688/20, the relative terms "narrow" and "sufficiently far removed" do not provide objective, solid and consistent criteria for establishing the novelty of a selected sub-range. Therefore, these terms are dependent on the case and context and involve considerations linked to the technical effect of the range. Consequently, the concept cannot be reconciled with direct and unambiguous disclosure. It is instead considered to be relevant for inventive step. In fact, neither T 198/84 nor T 279/89 even mentions direct and unambiguous disclosure.

Furthermore, T 198/84 and T 279/89 did not relate to multiple ranges as the case in hand but to a singular range.

In the case in hand, the ranges cannot be regarded individually but only in combination (see T 2623/19, Reasons 3.2 citing T 261/15, Reasons 2.3.1). In addition, an example is an embodiment that cannot be combined with the description (see T 210/05, Reasons 2.3). T 538/04 cited by opponent 1 also followed the criteria established in T 198/84 and T 279/89 but did not deal with direct disclosure.

For multiple ranges, the concept of "seriously contemplating" as described in T 26/85 is not in line with direct and unambiguous disclosure. Instead, when multiple ranges are involved, "seriously contemplating" is linked to the desired effect, which implies considerations known for inventive step (T 989/22, Reasons 1).

Decision T 673/12 also relied on the criteria established in T 198/84 and T 279/89 but did not deal with direct and unambiguous disclosure.

To conclude, the alloy C1 of D1/D1a does not directly and unambiguously disclose an alloy according to claim 1.

D1/D1a (paragraphs [0012] to [0017] of D1) discloses the following preferred ranges in wt.%: Si 0.4 to **1.1**, Mg **0.4** to 0.8, Cu 0.02 to **0.2**, Fe 0.2 to 0.3, Mn **0.02** to 0.15, Cr **0.02** to 0.15, Ti ≤ **0.03**.
The alloy claimed can only be arrived at by choosing several endpoints (in bold) from the disclosure of D1/D1a. This cannot be considered direct and unambiguous disclosure.

To summarise, D1/D1a does not anticipate the subject-matter of claim 1 of the current request.

1.2 The question of novelty over D17, D29a-D29p and D30 does not need to be addressed here since the main request fails for lack of inventive step.

2. Article 56 EPC

2.1 The invention relates to a 6xxx aluminium alloy.

2.2 D1/D1a and in particular alloy C1 is a suitable starting point for inventive step. D1 also relates to a 6000 series "aluminium alloy having excellent formability and excellent thermal conductivity, strength and bendability" (D1a, page 4, lines 147 to 153). It has an objective similar to the patent. The fact that the alloy of claim 1 of the current request is intended for automotive applications is irrelevant

since such a feature is not part of claim 1. Claim 1 is a product claim and not a use claim.

2.3 The problem to be solved by the patent is to provide an alloy having an improved combination of strength, formability and/or corrosion resistance (paragraph [0002] of the patent in suit).

2.4 The patent proposes to solve the problem by an alloy according to claim 1 characterised in that the alloy contains 1.03 to 1.40 wt.% Si.

2.5 It is not credible that the problem is successfully solved since D1/D1a also relates to an improved combination of properties. There is no evidence that a small change in Si compared to alloy C1 of D1/D1a would lead to an improved combination of properties. Such an improvement is also not apparent from the data in the patent. Therefore, the board agrees with the opposition division that an effect over D1/D1a is not credibly shown for the change in Si (point 3.1., page 16 of the impugned decision). Consequently, the problem needs to be redefined in less ambitious terms and can be seen as the provision of an alternative alloy.

2.6 The solution to this not very ambitious problem is obvious.

If the problem to be solved is the provision of an alternative, the presence of an incentive towards the solution is not mandatory (T 1102/00, point 14 of the Reasons).

D1/D1a teaches in claim 1 Si of 0.2 to 1.5 wt.% and a preferred range of Si of 0.4 to 1.1 wt.% (D1a, page 7, line 262). Claim 1 of D1/D1a discloses 0.2 to 1.5 wt.%

Mg. The preferred range of Mg is 0.4 to 0.8 wt.% (D1a, page 8, line 296). Therefore, starting from alloy C1, the skilled person has many options to vary the components, including Si and Mg in view of the general teaching given in claims 1 and 2 of D1/D1a. It is true that D1/D1a teaches that the amount of Si and the amount of Mg should be balanced (D1a: page 6, lines 243 to 245), but there is no clear teaching on how this balance should look. The skilled person understands that working in the preferred ranges of Si and Mg already implies the right balance. When working within these ranges, some of the possible alloys will not fall within the scope of the claim, but many others will. However, a mere arbitrary choice made from the possible solutions cannot be regarded as involving an inventive step (T 939/92, Reasons 2.5.3).

2.7 Therefore, the subject-matter of claim 1 lacks an inventive step in view of D1/D1a alone.

3. The main request fails.

Auxiliary request 1

4. Article 56 EPC

Claim 1 is identical to claim 1 of the main request. This requests fails for the same reasons as the main request.

Auxiliary request 2

5. Article 123(2) EPC

Opponent 1 argued that the change of "consisting essentially of" to "consisting of" was not directly and

unambiguously derivable from the application as originally filed. Reference was also made to T 759/10.

The board is not convinced by this argument.

Claim 1 of the application as originally filed lists the same components as claim 1 of the current request. In addition, the balance was defined as aluminium and impurities. The skilled person reading that original claim understands that "consisting essentially of" in that context is limited to the listed components and possibly further components not materially affecting the essential characteristics of the alloy. However, it is evident from the exemplified alloys CC1, CC2, CC3 and CC4 that preferably no component other than those listed is present. It is true that the sentence under Table 1 of the application as filed does not state any limit for the impurities. However, the skilled person immediately understands that the limit is the same as given in claim 1 since these alloys are supposed to be according to claim 1. It is directly and unambiguously derivable that no other components are supposed to be present. Therefore, the change from "consisting essentially of" to "consisting of" is directly and unambiguously derivable from the application as originally filed. This case is very similar to T 107/14, where a change from "comprising" to "consisting of" was accepted.
T 759/10 cited by opponent 1 is not of relevance since the original composition was defined by "comprising" and the examples did not provide a pointer towards "consisting essentially of" but rather indicated that components other than those listed in claim 1 could be present.

The requirements of Article 123(2) EPC are met.

6. Article 83 EPC

Opponent 1 argued that claim 11 was insufficiently disclosed since a first cold rolling stand and a second cold rolling stand did not permit reducing the thickness by 50 and 70%, respectively.

This is not convincing. There is no evidence on file to support this allegation. In addition, claim 8 (which claim 11 refers to) is not limited to 50 and 70% thickness reduction in steps (b)(ii) and (b)(iii) but to a very broad range (1 to 50% and 1 to 70%, respectively). Even if it were accepted that the upper limits were possibly difficult to attain, there is still no evidence that the alleged problem was such that the skilled person was not able to obtain substantially all embodiments falling within the ambit of the claim (Case Law of the Boards of Appeal of the EPO, 10th edn., 2022, II.C.5.4).

The requirements of Article 83 EPC are met.

6.1 Article 54 EPC

The requirements of Article 54 EPC are met for the following reasons.

D1/D1a does not directly and unambiguously disclose an alloy composition containing 1.03 to 1.40 wt.% Si (see point 1.1 above) and 0.06 to 0.14 wt.% Ti.

The alloys 25 and 26 of D17 do not contain 0.15 to 0.25 wt.% Cu and 0.06 to 0.14 wt.% Ti.

Regardless of whether the alloy 2630301 (D29f) was delivered prior to the priority date of the patent in suit, it does not contain 0.06 to 0.14 wt.% Ti.

D30 at least does not disclose 0.01 to 0.06 wt.% Cr and 0.06 to 0.14 wt.% Ti.

7. Article 56 EPC

7.1 The invention relates to a 6xxx aluminium alloy.

7.2 As indicated above, D1/D1a and in particular alloy C1 is a suitable starting point for inventive step.

7.3 The problem to be solved by the patent is to provide an alloy having an improved combination of strength, formability and/or corrosion resistance (paragraph [0002]).

7.4 The patent proposes to solve the problem by an alloy according to claim 1 characterised in that the alloy contains 1.03 to 1.4 wt.% Si and 0.06 to 0.14 wt.% Ti.

7.5 It is accepted that the problem is successfully solved. The comparison of alloys CC1 and CC3, which mainly differ in the content of Ti (0.09 vs 0.026), shows that alloy CC1 has improved corrosion resistance (see Table 6 and Table 12).

Opponent 1 argued that CC1 and CC3 also differed in their Mg contents and consequently in the ratio of Si:Mg. In addition, the processing of alloy CC1 differed from the processing of alloy CC3. Therefore, the effect could not be attributed to Ti alone.
This is not convincing. Opponent 1 has not submitted any data to corroborate its allegation. In addition,

its position is not in line with the position taken for the main request. If a difference of 0.03 wt.% for Si is supposed to be without effect, it is not credible that a difference of 0.01 wt.% for Mg would have a noticeable effect. Furthermore, the difference in processing between the CC1 alloy (cast gauge of 0.140 with a first stand reduction of 25% and a second stand reduction of 24% to obtain a final gauge of 0.0591 inch (Table 2)) and the CC3 alloy (cast gauge of 0.135 with a first stand reduction of 24% and a second stand reduction of 23% to obtain a final gauge of also 0.0591 inch (Table 8)) is very limited. A skilled person does not expect this difference to change the corrosion properties. They link corrosion properties to the chemical composition. There is no evidence that contradicts this conclusion.
Consequently, there is no need to redefine the problem in less ambitious terms.

7.6 The solution is not obvious for the following reasons.

7.6.1 D1/D1a does not deal with the problem of corrosion. Although D1/D1a generally indicates that Ti should be 0.2 or less wt.%, all the examples only contain 0.03 wt.%. This value is also in line with the teaching on page 8, lines 312 to 317 of D1a. Therefore, there is no incentive to increase the amount of Ti to 0.06 wt.% or more.

7.6.2 D5 does not relate to corrosion resistance. It is doubtful that the skilled person trying to solve the posed problem would turn to D5. Even if they did, D5 instead teaches towards 0.01 or 0.02 wt.% Ti in view of the examples. Furthermore, 0.03 wt.% Ti as used in alloy CC1 of D1/D1a falls within the range taught in D5

(0.01 to 0.15 wt.%) (page 3, line 53). Based on D5, there is no reason to change the amount of alloy CC1.

7.6.3 D12 indicates on page 8 (last sentence before chapter 1.3) that it is believed that if Ti is added in excess of 0.1%, improved corrosion resistance can be obtained. However, there is no clear teaching under which conditions such an addition is to be envisaged. There is also no definition of "in excess". In excess of 0.1 wt.% would be instead understood as higher than 0.14 wt.% than up to this value. In addition, no comment is made on the impact of such amounts on the other properties such as strength and formability. D12 instead teaches an amount of 0.02 wt.% Ti (page 5, first full paragraph).
Regardless of whether the argument based on the title of reference [52] is to be considered, there is no indication in the title of the titanium concentrations to be used.
It is true that the penultimate paragraph of page 7 of D12 mentions intergranular corrosion in the case of silicon excess, but there is no definition of silicon excess and no indication that Ti can be used in such a case to counteract corrosion.
The question of whether D12 is to be read in combination with Al-Ti-B master alloys - which would imply the presence of B in the final alloy, contrary to the alloy claimed - can be left open.

7.6.4 D13 discloses that the usual amount of refiner added is approximately 0.05 to 0.15 wt.% Ti. However, D13 does not address the problem posed and does not address corrosion. Therefore, there is no reason, without the benefit of hindsight, to turn to D13 and add 0.06 to 0.14 wt.% Ti to solve the problem posed.

7.6.5 The addition of both Ti and B is taught in D21, but not in the context of corrosion. Claim 1 excludes the intentional addition of B. There is no reason for the skilled person trying to solve the posed problem to turn to D21. If they did, the addition of Ti was associated with the addition of B.

7.7 D29a to D29p were also used as a starting point for inventive step. Even if the alloy 2630301 (D29f) was delivered prior to the priority date of the patent in suit, the same argument applies as when starting from D1/D1a. The differentiating feature with respect to the alloy of D29f is also the amount of Ti. This alloy 2630301 has a specific composition. There is no clear teaching in the prior art that an increase in solely the amount of Ti would lead to improved corrosion resistance while maintaining the other properties.

7.8 The subject-matter of claim 1 involves an inventive step. The same applies for claims 2 to 12, which directly or indirectly relate to claim 1.

Order

For these reasons it is decided that:

Both appeals are dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated