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**Datasheet for the decision
of 17 October 2019**

Case Number: T 2243/16 - 3.3.05

Application Number: 03783507.1

Publication Number: 1565586

IPC: C22C21/10

Language of the proceedings: EN

Title of invention:

ALUMINUM ALLOY PRODUCT HAVING IMPROVED COMBINATIONS OF
PROPERTIES

Patent Proprietor:

Arconic Inc.

Opponents:

Aleris Rolled Products Germany GmbH
Constellium Issoire/C-TEC Constellium Technology
Center

Headword:

Aluminium alloy product/Arconic

Relevant legal provisions:

EPC Art. 54, 83, 84, 123(2)

Keyword:

Novelty - main request (no) - auxiliary request (no)
Claims - clarity - auxiliary request (no) - clarity after
amendment (no)
Amendments - allowable (no) - intermediate generalisation
Sufficiency of disclosure - auxiliary request (no) - undue
burden (yes)

Decisions cited:

G 0003/14, G 0002/88, T 1855/06, T 0231/85, T 0201/83

Catchword:



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Case Number: T 2243/16 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 17 October 2019

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 22 July 2016
revoking European patent No. 1565586 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman E. Bendl
Members: T. Burkhardt
 R. Winkelhofer

Summary of Facts and Submissions

- I. The appeal lies from the opposition division's decision to revoke European patent EP 1 565 586.

The opposition division held, *inter alia*, that the patent as granted did not fulfil the requirements of Article 54(1) and (2) EPC in view of O1/D1:

O1/D1 US 2002/0121319 A1

- II. With its grounds of appeal, the patent proprietor (appellant) *inter alia* submitted auxiliary requests 1-9 and the following document:

A7 Declaration by Wei Wang, dated 8 October 2015

- III. Claim 1 of the main request (patent as granted) reads as follows:

"1. Use of 0.01 to less than 0.04% silicon in an aluminium alloy product having improved fatigue failure resistance including, by weight, 7.6 to 8.4% zinc, 2.0 to 2.6% copper, 1.8 to 2.3% magnesium, 0.088 to 0.25% zirconium, the balance to 100 weight % aluminium and impurities, and wherein the weight percent of iron is maintained at 0.01 to 0.09%, for rendering the alloy substantially free of Mg₂Si intermetallic particles."

- IV. Claim 1 of auxiliary request 1 additionally comprises the following feature:

"[...substantially free of Mg₂Si intermetallic particles] in order to eliminate fatigue failure due to crack initiation at Mg₂Si particles."

Claim 1 of auxiliary request 2 differs from that of the main request in that the "alloy product" is actually "an alloy plate product having a thickness of from 7.5 mm (0.3 inch) to 38.1 mm (1.5 inch)".

Claim 1 of auxiliary request 3 differs from that of the main request in that the alloy is "free of Mg₂Si intermetallic particles", not only *substantially* free.

Claim 1 of auxiliary request 4 combines the modifications of auxiliary requests 1 and 3.

Claim 1 of auxiliary request 5 differs from that of the main request in that the alloy is free of Mg₂Si intermetallic particles, not only *substantially* free, and in a reduced upper limit of the silicon content of 0.02 %.

Claim 1 of auxiliary request 6 differs from that of the main request in that the alloy is free of Mg₂Si intermetallic particles, not only *substantially* free, in a reduced upper limit of the silicon content of 0.018% and in a reduced upper limit of the magnesium content of 2.0%.

As compared to claim 1 of the main request, claim 1 of auxiliary request 7 has been restricted to one of the following alloys:

Zn=8.05, Cu=2.15, Mg = 1.89, Zr=0.130, Si=0.020,
Fe=0.030

Zn=8.08, Cu=2.17, Mg = 1.93, Zr=0.120, Si=0.019,
Fe=0.032

Zn=7.92, Cu=2.15, Mg = 1.88, Zr=0.130, Si=0.014,
Fe=0.037

Zn=7.83, Cu=2.10, Mg = 1.88, Zr=0.110, Si=0.029,
Fe=0.039

Zn=8.19, Cu=2.09, Mg=2.00, Zr=0.107, Si=0.018,
Fe=0.032

Zn=7.94, Cu=2.17, Mg = 1.92, Zr=0.117, Si=0.028,
Fe=0.044

Zn=8.08, Cu=2.15, Mg = 1.93, Zr=0.120, Si=0.019,
Fe=0.032

Claim 1 of auxiliary request 8 contains the modifications of auxiliary requests 2 and 7.

As compared to claim 1 of auxiliary request 8, in auxiliary request 9 alloy is free of Mg₂Si intermetallic particles, not only *substantially* free, and the group of possible alloys has been further restricted to:

Zn=8.05, Cu=2.15, Mg=1.89, Zr=0.130, Si=0.020,
Fe=0.030

Zn=8.08, Cu=2.17, Mg = 1.93, Zr=0.120, Si=0.019,
Fe=0.032

Zn=7.92, Cu=2.15, Mg = 1.88, Zr=0.130, Si=0.014,
Fe=0.037

Zn=8.19, Cu=2.09, Mg=2.00, Zr=0.107, Si=0.018,
Fe=0.032

Zn=8.08, Cu=2.15, Mg = 1.93, Zr=0.120, Si=0.019,
Fe=0.032

V. The appellant's arguments, as far as relevant for the present decision, can be summarised as follows:

O1/D1 did not disclose aluminium alloys that were "substantially free of Mg₂Si intermetallic particles", as shown by the calculations in A7. Moreover, the effect of an improved fatigue failure resistance should be considered a further difference when assessing novelty, in line with G 2/88.

Examples 9, 10 and 14 of Table 2 of O1/D1 were comparative examples and therefore also "controls". Consequently, the first part of the footnote of Table 2 did not apply to these samples and O1/D1 thus failed to disclose a silicon concentration of less than 0.04%.

The invention was sufficiently disclosed.

The amendments to the auxiliary requests were clear and supported by the application as originally filed.

Hence, the main request and the auxiliary requests fulfilled the requirements of the EPC.

VI. The opponents' (respondents') arguments, as far as relevant for the present decision, can be summarised as follows:

If not *any* alloy, which satisfied the composition ranges of claim 1 of the contested patent, yielded an alloy being "substantially free of Mg₂Si intermetallic particles" and/or if the Mg₂Si contents of the alloys in O1/D1, as calculated in A7, were not "substantially free of Mg₂Si" there would be a problem of sufficiency of disclosure since the contested patent was silent on how to achieve the absence of Mg₂Si intermetallic particles.

The subject-matter of claim 1 was not novel in view of sample alloys 9, 10 and 14 of O1/D1. In this document, the term "control" only referred to samples 27 and 28. Furthermore, the problem of fatigue was already addressed in O1/D1, and novelty could not be established by the mere discovery of an underlying mechanism. Therefore, G 2/88 did not apply to the present case.

It was not sufficiently disclosed how the claimed aluminium alloy products *free* of Mg₂Si intermetallic particles could be obtained.

A reference to a "plate" in claim 1 caused a lack of clarity if in a claim dependent thereon reference was made to other forms like a sheet (Article 84 EPC).

Intermediate generalisation of specific examples infringed Article 123(2) EPC.

- VII. In a communication according to Article 15(1) RPBA, the parties were informed of the preliminary opinion of the board. Since none of the requests appeared allowable, the dismissal of the appeal seemed to be the most probable outcome of the appeal procedure.
- VIII. Thereupon, the appellant withdrew its request for oral proceedings and the oral proceedings, scheduled for 17 October 2019, were cancelled.
- IX. The appellant requests that the decision be set aside and that the patent be maintained as granted (main request). As an auxiliary measure, it requests that the patent be maintained on the basis of one of auxiliary requests 1-9, all submitted with the grounds of appeal.

The respondents request that the appeal be dismissed.

Reasons for the Decision

1. Main request

For the following reasons, the subject-matter of claim 1 of the contested patent is not novel in view of O1/D1 (Article 54(1) and (2) EPC).

1.1 O1/D1 discloses the use of an aluminium alloy product in aerospace applications (paragraph [0002]) wherein the alloy "exhibit[s] a highly desirable combination of strength, fracture toughness and fatigue performance, in further combination with superior stress corrosion cracking (SCC) resistance" (paragraph [0016]). Figures 12-14 confirm that fatigue is an essential aspect of this "desirable combination".

In the following table, the concentration ranges of claim 1 of the patent in suit are compared to those of aluminium alloys 9, 10 and 14 of Table 2 of O1/D1.

	Claim 1 of patent in suit (wt.%)	O1/D1 Table 2 alloys 9 / 10 / 14 (wt.%)
Si	0.01-0.04	0.03 / 0.03 / 0.03*
Zn	7.6-8.4	7.70 / 8.17 / 8.33
Cu	2.0-2.6	2.46 / 2.05 / 2.04
Mg	1.8-2.3	2.31 / 1.92 / 2.19
Zr	0.088-0.25	0.12 / 0.12 / 0.12*
Fe	0.01-0.09	0.05 / 0.05 / 0.05*
Al and impurities	balance	balance

* According to the footnote of Table 2.

Thus, the Cu, Mg and Zn contents of these alloys in O1/D1 are within the ranges of claim 1 of the contested patent.

Given the usual rounding conventions of numerical values, the Mg content of 2.31% of alloy 9 falls within the claimed range of 1.8 to 2.3%.

Contrary to the appellant's view, the term "controls" in the footnote of Table 2 only refers to samples 27 and 28 in Table 2, not to all comparative samples. This becomes clear when looking at paragraphs [0063, 0064, 0068] and Figures 3-6 where only the samples 27 and 28 are referred to as controls, not the other comparative samples. This means that the Si, Fe, Zr and Ti concentrations in the first two lines of the footnote of Table 2 also apply to samples 9, 10 and 14.

The Ti content of 0.025% in the footnote of Table 2 of O1/D1 is construed as an "impurity" within the meaning of claim 1 of the patent in suit.

- 1.2 While the appellant holds that an Mg_2Si content of 0.03 mol.%, as calculated in A7 (Appendix C) for Example L of the contested patent, may be considered "substantially free of Mg_2Si intermetallic particles" within the meaning of claim 1, it considers 0.04 mol.% or 0.05 mol.%, as calculated for alloys 9, 10 and 14 of O1/D1 in A7 (Appendix A), not substantially free of Mg_2Si intermetallic particles.

The accuracy of these calculations has been contested by the respondents but without providing any evidence (such as measurements) to counter the results of A7. The board, likewise, does not have any concerns

thereto. Consequently, the results of A7 are taken at face value.

Nonetheless, the board does not share the appellant's view. The term "substantially" in claim 1 of the patent in suit is to be construed broadly. Consequently not only amounts of 0.03% but also 0.04% or 0.05% are "*substantially* free of Mg₂Si intermetallic particles".

- 1.3 In the appellant's view, given that claim 1 is a use-claim, the effect of an "improved fatigue failure resistance" in claim 1 should be accounted for as a distinguishing feature in the assessment of novelty, in line with G 2/88. The appellant also drew attention to T 231/85, which is referred to in G 2/88.

This argument is not convincing. The present case appears to be similar to the case underlying T 1855/06. According to this decision, the *ratio decidendi* of G 2/88 (OJ 1990, 93) and G 6/88 (OJ 1990, 114) cannot be applied if the purpose as indicated in the claims is not a *new* technical activity distinguishable from a known one but merely a discovery. If the alleged new effect is only the improvement of a known property, there is all the more reason to deny novelty (catchwords 2 and 3, reasons 6 and 7 of T 1855/06; cf. Case Law of the Boards of Appeal, 9th edition 2019, I.C.8.1.3 e).

In both the patent in suit (paragraphs [0002-0005]) and O1/D1 (paragraph [0002]) the aluminium alloy product is used in aerospace applications. Since fatigue is already an important issue in O1/D1 (paragraph [0016], Figures 12-14), the use of a limited amount of silicon of claim 1 of the contested patent is not a *new* use or

activity that is distinguishable from the known use in O1/D1.

The present situation is hence also quite different from that of T 231/85 (OJ 1989, 74; cf. Case Law I.C. 8.1.1) where a given substance was used for different activities, namely, as fungicide and growth regulator (see headnote 1).

The finding of the contested patent that the absence of Mg₂Si intermetallic particles in the alloy results in an "improved fatigue failure resistance" and of the related failure modes rather appears to be the ex-post-facto discovery of the underlying mechanism in the known use in O1/D1.

Consequently, this feature cannot confer novelty.

- 1.4 The appellant is of the opinion that O1/D1 does not literally disclose the absence of Mg₂Si intermetallic particles.

Admittedly, O1/D1 does not explicitly mention Mg₂Si intermetallic particles. However, the fact that the alloy is "substantially free of Mg₂Si intermetallic particles" within the meaning of claim 1 (see point 1.2 above) has been shown in A7 (Appendix A). Consequently, this feature is implicitly disclosed in O1/D1.

Whether the skilled person would have expected an improved fatigue performance of the comparative alloys 9, 10 and 14 of O1/D1 is irrelevant for the assessment of novelty.

1.5 For these reasons, the subject-matter of claim 1 of the patent as granted is anticipated by O1/D1 (Article 54(1) and (2) EPC).

1.6 Even if (*arguendo*) not *all* the alloys having the concentrations of claim 1 of the patent in suit were substantially intermetallic particle free, the main request would not be allowable.

In this event, the invention would not be sufficiently disclosed, and the requirements of Article 83 EPC would not be met for the reasons put forward under point 4 below with regard to auxiliary request 3.

2. Auxiliary request 1

The additional feature "in order to eliminate fatigue failure due to crack initiation at Mg₂Si particles" in claim 1 further explains why the limited amount of silicon "improve[s] fatigue failure resistance" (see also the explanations given in paragraphs [0025, 0026] of the application as originally filed). Consequently, this feature corresponds to the discovery of an underlying mechanism, not to a new activity (just as the feature "improved fatigue failure resistance" in the main request).

Hence, for analogous reasons as the main request, the new feature cannot confer novelty. Thus, auxiliary request 1 does not fulfil the requirements of Article 54 (1) and (2) EPC vis-à-vis O1/D1, either.

3. Auxiliary request 2

The amendment in claim 1 of auxiliary request 2 that the aluminium alloy product is actually a plate with a specific thickness contradicts dependent claim 2 according to which the alloy product may be, besides a plate, a "sheet, extrusion, forging or casting", as has for instance been objected by respondent 1 on page 19, second full paragraph of its reply to the appeal).

Since the new feature has been taken from the description, namely, from paragraph [0028] of the application as originally filed, this non-compliance with Article 84 EPC is introduced by the amendment, and clarity may be examined (G 3/14, catchword, OJ 2014, A87).

Consequently, auxiliary request 2 fails because of non-compliance with Article 84 EPC.

4. Auxiliary request 3

Claim 1 of auxiliary request 3 differs from that of the main request in that the word "substantially" in the expression "for rendering the alloy *substantially* free of Mg₂Si intermetallic particles" has been deleted.

For the following reasons, this amendment results in non-compliance with Article 83 EPC.

The contested patent itself does not disclose the Mg₂Si concentrations of the samples in Tables II, III and 4 of the patent in suit. These concentrations are only given in A7 (Appendix C).

Accordingly, samples A-C (Table II), J, K (Table III) and V and W (Table 4) of the contested patent, which are labelled "Invention", are indeed free of Mg_2Si intermetallic particles (Mg_2Si content of 0.00 mol.%). On the other hand, the remaining samples of the contested patent that are also labelled "Invention", namely, samples D, I, L and X, do contain small amounts of Mg_2Si , although their compositions satisfy the concentration ranges of claim 1.

However, apart from the concentration ranges in claim 1, there is no additional guidance in the contested patent as to how alloy products that are Mg_2Si intermetallic particle free can be obtained, such as an indication of even more specific sub-ranges of the concentrations or specific process steps during the preparation of the alloy.

Consequently, the skilled person would have had to determine the alloys that are free of intermetallic particles by trial and error within the concentration ranges of claim 1. Given the number and size of these ranges, such experimentation would have amounted to an undue burden.

In other words, the skilled person could not have carried out the invention without undue burden over the whole ambit of claim 1 with the information of the entire patent, even when complemented by their common general knowledge.

Hence, auxiliary request 3 does not meet the requirements of Article 83 EPC.

5. Auxiliary request 4

For the same reason, auxiliary request 4 also does not fulfil the requirements of Article 83 EPC.

6. Auxiliary request 5

For the following reasons, auxiliary request 5 does not fulfil the requirements of Article 123(2) EPC.

According to the appellant, the amended upper Si limit in claim 1 of auxiliary request 5 is based on samples A, V and W in Tables II and 4 of the application as originally filed.

However, these tables also contain further samples. For each sample, in addition to the Si concentration, the concentrations of Fe, Cu, Mg, Zn and Zr are also given. There is no indication or suggestion in the originally filed documents that the upper limit of the silicon concentration in claim 1 may be amended in an isolated manner on the basis of specific alloy samples of the examples while the concentration ranges of the other compounds in claim 1 are kept unchanged.

There is no basis for amending the upper limit of Si but not that of Fe, which is, according to paragraph [0025], the other key compound for fatigue, and that of Mg, which reacts with Si to form Mg_2Si .

T 201/83 as relied upon by the appellant in the given context, does not apply here since, according to that decision, the skilled person would have to have recognised that the isolated value (in the present case, the upper limit of the Si concentration in claim

1) was "not so closely associated with the other features of the example as to determine the effect of that embodiment of the invention as a whole in a unique manner and to a significant degree" (headnote), to comply with Article 123(2) EPC. This is not the case here since, as explained above, the Fe and the Mg concentrations are closely associated with the upper limit of the Si-concentration for the reasons given above.

7. Auxiliary request 6

For the following reasons, auxiliary request 6 does not fulfil the requirements of Article 123(2) EPC either.

In claim 1 of auxiliary request 6, the upper limit of Si and also Mg have been modified. According to the appellant, this amendment finds its basis in sample M in Table III of the contested patent.

However, the upper limit of Fe has remained unchanged. Yet, as explained under point 6, Fe is the other key compound for fatigue according to paragraph [0025] of the application as originally filed, and there is no basis for selectively amending the upper limits of Si and Mg but not that of Fe.

8. Auxiliary requests 7-9

According to the appellant, the alloy of claim 1 of these requests has been restricted to one of several samples of Tables II, III and 4.

The third alloy in claim 1 of all these requests roughly corresponds to alloy samples 'C' and 'J' (Tables II and III respectively in the application as originally filed). However, the original Zr content of 0.120% in these samples has been replaced by 0.130%. Yet there is no basis for this modification in the application as originally filed.

Consequently, auxiliary requests 7-9 are not compliant with Article 123(2) EPC either.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Vodz

E. Bendl

Decision electronically authenticated