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**Datasheet for the decision  
of 24 August 2016**

**Case Number:** T 1414/12 - 3.2.07

**Application Number:** 03254085.8

**Publication Number:** 1378585

**IPC:** C23C22/34

**Language of the proceedings:** EN

**Title of invention:**

Corrosion resistant trivalent chromium phosphated chemical conversion coatings

**Patent Proprietor:**

United Technologies Corporation

**Opponent:**

Siemens Aktiengesellschaft

**Headword:**

**Relevant legal provisions:**

EPC Art. 56, 123(2), 123(3)

**Keyword:**

Main request - extension of the protection (yes)

Auxiliary request - extension beyond the content of the application as originally filed (no)

Auxiliary request - inventive step (yes)

**Decisions cited:**

G 0001/93, T 0518/99

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
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Case Number: T 1414/12 - 3.2.07

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.07**  
**of 24 August 2016**

**Appellant:** Siemens Aktiengesellschaft  
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**Decision under appeal:** **Interlocutory decision of the Opposition**  
**Division of the European Patent Office posted on**  
**12 June 2012 concerning maintenance of the**  
**European Patent No. 1378585 in amended form.**

**Composition of the Board:**

**Chairman** H. Meinders  
**Members:** G. Patton  
I. Beckedorf

## **Summary of Facts and Submissions**

- I. The appellant (opponent) lodged an appeal against the decision to maintain European patent No. 1 378 585 in amended form, requesting that the decision under appeal be set aside and the patent be revoked.

Opposition had been filed against the patent as a whole and was based on the grounds according to Article 100(a) EPC (novelty and inventive step) and Article 100(c) EPC (extension beyond the content as originally filed).

The opposition division held that:

- the then main request (patent as granted) and the then first and second auxiliary requests contravened Article 123(2) EPC;
- the then third, fourth and fifth auxiliary requests contravened Article 123(3) EPC; and
- none of the ground for opposition prejudiced the maintenance of the patent on the basis of the then sixth auxiliary request, which was only based on the product claims of the patent as granted.

- II. The patent proprietor (respondent) requested that the appeal be dismissed, subsidiarily that oral proceedings be held.
- III. The Board provided the parties with its preliminary non-binding opinion annexed to the summons for oral proceedings that the respondent's request (patent as maintained by the opposition division) appeared not to fulfil the requirements of Article 123(3) EPC and that the subject-matter of claim 1 could be regarded as inventive.

In reaction the respondent filed an auxiliary request with the letter dated 20 July 2016.

- IV. Oral proceedings took place pursuant to Rule 115(2) EPC and Article 15(3) RPBA on 24 August 2016 in the absence of the appellant, as announced with its letter 20 May 2016, during which the following aspects, *inter alia*, were discussed with the respondent:
- allowability of the amendments made to claim 1 of the main request pursuant to Article 123(3) EPC;
  - allowability of the amendments made to claim 1 of the auxiliary request pursuant to Article 123(2) EPC.

The present decision was announced at the end of the oral proceedings.

- V. The following documents of the opposition proceedings are relevant for the present decision:

D3: WO-A-99/08806, cited in the contested patent,  
paragraph [6]

D5: JP-A-7-126859 and PAJ abstract

D7: JP-A-48-080444 and STN abstract

- VI. The wording of claim 1 of the **main request** reads as follows (in bold the amendments with respect to claim 10 of the patent as granted; deletions in strikethrough; emphasis added by the Board):

"An acidic aqueous conversion coating solution ~~for a process as claimed in claim 1~~ which is free of hexavalent chromium, comprises a water soluble trivalent chromium compound, a water soluble fluoride compound, and an additive for improved corrosion resistance properties, characterised in that the

additive is nitrilotris (methylene) triphosphonic acid (NTMP)."

The wording of claim 1 of the **auxiliary request** reads as follows (in bold the amendments with respect to claim 1 of the main request; emphasis added by the Board):

"An acidic aqueous conversion coating solution which is free of hexavalent chromium, comprises a water soluble trivalent chromium compound, a water soluble fluoride compound, and an additive for improved corrosion resistance properties, characterised in that the additive is nitrilotris (methylene) triphosphonic acid (NTMP), **wherein the said solution is suitable for a process for preparing a corrosion-resistant trivalent chromium coating on metal substrates having an aluminium oxide surface which comprises treating the substrates with said solution wherein phosphonate groups of the organic amino-phosphonic acid compound are adsorbed on the aluminium oxide surface of the metal substrate to form an Al-O-P covalent bond and subsequent formation of a network of hydrophobic layer over all active corrosion sites.**"

VII. The appellant argued essentially as follows

*Main request*

Product claim 1 of the main request corresponds to product claim 10 of the patent as granted with the deletion of the reference to the process claim 1 of the patent as granted. This deletion implies that the claimed product no longer mandatorily was to be suitable "*to form an Al-O-P covalent bond and subsequent formation of a network of hydrophobic layer*

*over all active corrosion sites", resulting in an extension of the scope of the product as claimed by the patent as granted, contrary to Article 123(3) EPC.*

*Auxiliary request*

Only "long chain functionalized organic amino-phosphonic acid compounds" are disclosed in the application as originally filed to provide the claimed result: "...to form an Al-O-P covalent bond and subsequent formation of a network of hydrophobic layer over all active corrosion sites". Since these compounds are not specified in claim 1 the requirements of Article 123(2) EPC are not fulfilled.

Starting from D3 as the closest prior art, the only distinguishing feature of claim 1 is the use of nitrilotris (methylene) triphosphonic acid (NTMP) as additive in the solution. The problem to be solved is hence to provide a suitable phosphonate in the composition of D3 favorably acting on corrosion protection.

D7 discloses the use of NTMP as corrosion inhibitor in a solution. Consequently, the skilled person combining the teaching of D3 and D7 will arrive at the claimed subject-matter in an obvious manner.

The same applies when starting from D5 as closest prior art and combining it with the teaching of D7.

VIII. The respondent argued essentially as follows

*Main request*

The wording "for a process as claimed in claim 1" in claim 10 of the patent as granted has no limitation effect on the claimed product. Hence, it can be deleted without contravening Article 123(3) EPC.

Product claim 10 of the patent as granted is an independent claim of a different category than process claim 1 of the patent as granted and, hence, as such comprises all essential physical features.

Claim 1 of the main request is equivalent in scope to claim 2 of the application as filed which does not refer to any process claim. The mandatory acknowledgement of novelty and inventive step necessary when granting the patent was clearly not based on the wording "for a process as claimed in claim 1" but on the additive NTMP.

There is further no evidence that there exist conversion coating solutions within the scope of claim 1 of the main request that would not be suitable for use in a process of claim 1 as granted.

The feature of product claim 10 of the patent as granted "for a process as claimed in claim 1" has no clear technical meaning so that it can be deleted without contravening Article 123(3) EPC.

*Auxiliary request*

The passage of page 2, lines 13-19, of the application as originally filed, specific to long chained



functionalized organic amino-phosphonic acid compounds, does not exclude the formation of a network of hydrophobic layer with the additive NTMP.

As explicitly disclosed in the application as originally filed, the additive NTMP leads to an improved corrosion protection by forming Al-O-P bonds. This mechanism is similar to that described for long chain functionalized organic amino-phosphonic acid compounds. The skilled person will then immediately and unambiguously derive that the hydrophobic layer referred to in the application as originally filed, with the latter compounds, is also to be formed with NTMP.

Therefore, the requirements of Article 123(2) EPC are fulfilled.

Vis-à-vis D5 to be considered as the closest prior art the only distinguishing feature of claim 1 is the use of nitrilotris (methylene) triphosphonic acid (NTMP) as additive in the solution. It has the technical effect of having a good corrosion resistance as is already obtained in D5. The problem to be solved is hence to provide an alternative corrosion inhibitor for conversion coating solutions for aluminium alloys.

D7 discloses the use of NTMP as corrosion inhibitor in a solution, however, to be used for the treatment of steels. The skilled person would therefore not think of combining the teaching of D7 relating to the treatment of steel with the conversion coating solution of D5 relating to the treatment of aluminium.

Should D3 be regarded as the closest prior art, the combination of its teaching with that of D7 would

result in a conversion coating solution comprising hexavalent chromium, i.e. falling outside the claimed solution, since D3 discloses that the optional trivalent Cr is added when hexavalent Cr is present.

Inventive step is hence to be acknowledged for the subject-matter of claim 1.

### **Reasons for the Decision**

1. Main request - allowability of amendments

1.1 Claim 1 of the main request is based on claim 10 of the patent as granted (see point VI above) in which the reference to process claim 1 has been deleted.

The appellant has raised an objection pursuant to Article 123(3) EPC arguing that the deletion of the reference to claim 1 of the patent as granted would result in an extension of the scope of the product claim 10 of the patent as granted.

In that respect it has to be determined whether the process of claim 1 of the patent as granted implies limitations to the product of claim 10 of the patent as granted.

1.2 The Board shares the appellant's view that the product of claim 10 of the patent as granted has to be suitable for performing the process of claim 1 of the patent as granted, i.e. the additive needs to be suitable "*to form an Al-O-P covalent bond and subsequent formation of a network of hydrophobic layer over all active corrosion sites*".

By the deletion of the reference to the process of claim 1, it is **no longer mandatory** that the claimed product be suitable for the *formation of a network of hydrophobic layer over all active corrosion sites*. The scope has therefore been extended to acidic aqueous conversion coating solutions which are not suitable for forming a network of hydrophobic layer over all active corrosion sites.

Hence, contrary to the findings of the opposition division (impugned decision, point 7.3.3) and to the respondent's view put forward at the oral proceedings, the reference to claim 1 imposes a clear limitation onto the product of claim 10 of the patent as granted so that claim 1 of the main request, now without that reference, contravenes Article 123(3) EPC.

- 1.3 The respondent's arguments that the appellant has not adduced any evidence that there exist conversion coating solutions within the scope of claim 1 of the patent as maintained that would not be suitable for use in a process of claim 1 as granted is not convincing.

As a matter of fact, what matters is whether the composition as claimed would **inevitably** lead to the formation of a network of hydrophobic layer over all active corrosion sites. This appears, however, not to be the case since there is no basis to be found in the contested patent for such a conclusion.

- 1.4 Contrary to the respondent's view, the Board is of the opinion that the feature of the process claim 1 of the patent as granted of a "subsequent formation of a network of hydrophobic layer over all active corrosion sites" has a clear technical meaning for the skilled person in the present technical field. Indeed, he knows

the technical effect(s) of a hydrophobic layer. Thus, such a technical feature cannot be deleted (by the deletion of the reference to process claim 1 of the patent as granted) without contravening Article 123(3) EPC (Case Law of the Boards of Appeal, 8th Edition 2016, II.E.3.1 and 3.2; G 1/93, OJ EPO 1994, 541, points 13 and 16 of the reasons). As the features at stake are technically significant the decision T 518/99 (not published in OJ EPO, point 4.5.2 of the reasons) cited by the respondent at the oral proceedings does not apply.

1.5 The Board shares the respondent's view that product claim 10 of the patent as granted is indeed an independent claim. In that respect, however, the reference to process claim 1 is an essential feature of the claimed product. The fact that product claim 10 of the patent as granted is an independent claim does not, however, allow to leave out of consideration the limitations implied by the reference to the process of claim 1, as discussed under point 1.2 above.

1.6 The respondent's argument that claim 1 of the main request would be equivalent in scope to claim 2 of the application as filed relates to the fulfilment of the requirements of Article 123(2) EPC, not to those of Article 123(3) EPC. Hence, it cannot be convincing in that respect.

This also applies to the reasons brought up for assessing novelty and inventive step of the claimed subject-matter of the patent as granted which relate to the fulfilment of the requirements of Articles 54(1) and 56 EPC in the examination procedure.

1.7 At the oral proceedings, the Board made clear that, due to the wording "comprises" used in the claim, the claimed conversion coating solution is open to any additional compounds, including compounds with technical effects adverse to those sought of forming an Al-O-P covalent bond and a network of hydrophobic layer. Therefore, claim 1 of the main request encompasses conversion coating solutions not necessarily suitable for the process of claim 1 of the patent as granted, i.e. not suitable to achieve the effects claimed therein, contrary to the claimed products of the patent as granted.

As further discussed at the oral proceedings, even a restriction to a specific NTMP content, as defined for instance in claims 2 or 3 of the main request, would not enable to overcome the objection in view of the open composition of the claimed conversion coating solution.

2. Auxiliary request - allowability of amendments

2.1 Compared with claim 1 of the main request, product claim 1 of the auxiliary request comprises the features of the process claim 1 of the patent as granted (see point VI above). In fact, claim 1 of the auxiliary request corresponds to claim 10 of the patent as granted. Consequently the requirements of Article 123(3) EPC are fulfilled.

The remaining issue with respect to the allowability of the amendments relates to the fulfillment of the requirements of Article 123(2) EPC.

2.2 The opposition division, as also argued by the appellant, held that the patent as granted contravened

Article 123(2) EPC since **only** "long chain functionalized organic amino-phosphonic acid compounds" are disclosed in the description of the application as originally filed, page 2, lines 13-19, as enabling to provide the result introduced in claim 1 during examination "...to form an Al-O-P covalent bond and subsequent formation of a network of hydrophobic layer over all active corrosion sites" (impugned decision, point 2.1.3). Since these compounds with "long chain functionalized organic amino-phosphonic acid compounds" are not specified in process claim 1 of the patent as granted, the requirements of Article 123(2) EPC are not fulfilled.

Although not explicit from the appellant's written submissions, the Board considers that this objection with the corresponding reasoning is also maintained by the appellant against product claim 10 of the patent as granted, i.e. against product claim 1 of the auxiliary request (see in that respect the impugned decision, point 3, dealing with the then auxiliary request 2 in which NTMP is specified in claim 1 like in claim 1 of the auxiliary request).

2.3 The Board shares the respondent's view that the passage of page 2, lines 13-19, of the application as originally filed does not state that the formation of a network of hydrophobic layer cannot be obtained with NTMP. As a matter of fact, the skilled reader would not conclude from this specific disclosure on long chained functionalized organic amino-phosphonic acid compounds that NTMP would be excluded for obtaining the claimed result.

In fact, the skilled person will understand from page 8, lines 9-11 of the application as originally filed

(see also page 3, lines 3-12 and page 4, lines 21-30), that the additive NTMP leads to an improved corrosion protection by **forming Al-O-P bonds** like on page 2, lines 13-19 with long chain functionalized organic amino-phosphonic acid compounds. He will then realise that the hydrophobic layer referred to on page 2 of the application as originally filed is also to be formed subsequently to the Al-O-P bonds obtained with NTMP.

Consequently, although not explicitly disclosed, the skilled person, taking into account the content of the application as originally filed as a whole, will immediately and unambiguously derive that the formation of a network of hydrophobic layer over all active corrosion sites also arises with the additive NTMP.

Therefore the requirements of Article 123(2) EPC are fulfilled.

3. Auxiliary request - novelty

Since none of the available prior art documents discloses in combination all the features of claim 1 of the auxiliary request, novelty of its subject-matter is acknowledged. This has not been contested by the appellant.

4. Auxiliary request - inventive step

In view of the appellant's lack of reaction to the filing of the auxiliary request, the Board considers that the lack of inventive step objections raised with the appellant's written submissions against claim 1 of the main request are maintained similarly against claim 1 of the auxiliary request. Hence, the appellant

contests the inventive step of the subject-matter of claim 1 on the basis of:

- the combination of the teachings of D3 and D7; and
- the combination of the teachings of D5 and D7.

#### 4.1 Closest prior art

4.1.1 The appellant considers that either D3 or D5 could be selected as the closest prior art, while the respondent argues that D5 should be selected as the closest prior art.

For the Board, since both D3 and D5, like claim 1, deal with conversion coating solutions to be used for improving the corrosion resistance of aluminium alloy surfaces, they both represent plausible closest prior arts (D3, page 1, lines 18-21 and page 2, lines 19-21; D5, title). The invention has to be inventive over any plausible prior art.

4.1.2 As agreed with by the parties (see appellant's statement of grounds, point 2, first and second paragraphs; respondent's reply, point 15) D3 discloses a coating process using a conversion coating solution which comprises, among other components (page 2, line 19 to page 3, line 24; page 4, line 23 to page 7, line 4):

- water;
- fluorometallate anions including at least 4 fluorine atoms ("component (A)");
- a component of phosphorous-containing phosphonate anions such as phosphonic acids and their salts ("component (B)");
- an oxidizing agent (not being trivalent chromium cations) ("component (C)"); and



- optionally components including trivalent chromium cations ("component (D)") and free fluoride ions ("component (E)") (see also impugned decision, point 7.4.3).

- 4.1.3 As also agreed with by the parties (see appellant's statement of grounds, point 2, last paragraph; respondent's reply, point 18), D5 discloses, abstract, an acidic aqueous conversion coating solution which is free of hexavalent chromium, comprising a water soluble trivalent chromium compound ("ions (B)"), a water soluble fluoride compound (compound (C)) and an additive such as a phosphonic acid ("ions (A)") for improved corrosion resistance properties (see also impugned decision, point 7.4.4).
- 4.1.4 In view of the above, neither D3 nor D5 discloses the use of an organic amino-phosphonic acid, more specifically NTMP, in the solution.
- 4.1.5 The Board shares the appellant's view that D3 teaches that materials containing hexavalent chromium could be omitted from the disclosed solution, i.e. from the "oxidizing agent" (component (C)), because of fear of pollution and/or personal hazard (page 5, line 11 to page 6, line 7). Other components listed on page 5, lines 11-16, could indeed be used in order to adjust the "oxidizing power" of the component (C).

There is, however, no disclosure nor any suggestion in D3 towards adding the optional trivalent Cr (component (D)) when the hexavalent Cr is **not present**. On the contrary, the teaching of D3 is that the optional trivalent Cr is added when hexavalent Cr **is present** (page 6, lines 8-13). This is further reflected by the examples of D3 in which both trivalent and hexavalent

Cr are present (see for instance Group 1, page 15, line 30 to page 17, line 2; see also claims 2-4, 6-8, 11-12, 13-14, 17-18 and 20).

Therefore, contrary to the appellant's view, D3 does not disclose nor suggest a conversion coating solution in which **only** trivalent Cr is present as required in claim 1. As put forward by the respondent, D3 discloses the use of trivalent Cr together with hexavalent Cr only. Consequently, D3 is more remote from the claimed subject-matter than D5, which does not show hexavalent Cr.

4.1.6 Hence, the Board shares the respondent's view that D5 is to be regarded as the closest prior art for the subject-matter of claim 1 (impugned decision, points 7.4.10 and 7.4.11).

4.2 Distinguishing features

As accepted by the respondent (see point VIII above), the only distinguishing feature of claim 1 over D5 is the use of nitrilotris (methylene) triphosphonic acid (NTMP) as additive in the solution.

4.3 Technical effect

The technical effect associated with the distinguishing feature is that good corrosion resistance is obtained for aluminium alloys (see contested patent, Table II), which is the same technical effect as disclosed in D5 (abstract).

4.4 Problem to be solved

The problem to be solved is hence to provide an alternative corrosion inhibitor for conversion coating solutions for aluminium alloys (impugned decision, point 7.4.14).

#### 4.5 Obviousness

D7, abstract, discloses the use of NTMP as corrosion inhibitor in a solution to be used for the treatment of steels.

The Board cannot find fault in the reasoning of the impugned decision, point 7.4.14, that the skilled person would not think of applying the teaching of D7 relating to the treatment of **steel** to the conversion coating solution of D5 relating to the treatment of **aluminium**, not even as an alternative.

#### 4.6 Starting from D3, for argument's sake

In view of the disclosure of D3 discussed under points 4.1.2 and 4.1.5 above, the distinguishing features of claim 1 over D3 are that:

- the solution is free of hexavalent chromium **and** comprises a water soluble trivalent chromium compound; and
- the additive is nitrilotris (methylene) triphosphonic acid (NTMP)

The Board shares the respondent's view that the combination of the teaching of D7 with the solution of D3 would lead to a conversion coating solution comprising hexavalent as well as trivalent chromium, i.e. a conversion coating solution falling outside the claimed solution.

4.7 In view of the above, the subject-matter of claim 1 of the auxiliary request is inventive.

## Order

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

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form on the basis of the following documents:
  - claims 1 to 6 filed as auxiliary request with letter of 20 July 2016;
  - description pages 2 to 4 filed during the oral proceedings before the Board;
  - figures 1 to 8 of the patent as granted.

The Registrar:

The Chairman:



G. Nachtigall

H. Meinders

Decision electronically authenticated