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# Datasheet for the decision of 14 April 2015

**Case Number:** T 2552/11 - 3.3.01

**Application Number:** 04744103.5

**Publication Number:** 1644451

**IPC:** C09D5/08, C09D5/10

**Language of the proceedings:** EN

**Title of invention:**
USE OF YTTRIUM, ZIRCONIUM, LANTHANUM, CERIUM, PRASEODYMIUM AND/OR NEODYMIUM AS REINFORCING AGENT FOR AN ANTICORROSION COATING COMPOSITION

**Patent Proprietor:**
NOF Metal Coatings Europe

**Opponent:**
Ewald Dörken AG

**Headword:**
Anticorrosive metallic coatings/NOF

**Relevant legal provisions:**
EPC Art. 133, 100(a), 100(b), 84

**Keyword:**
Representation -
oral submissions by accompanying person (refused)
Inventive step - main request (yes)
Grounds for opposition - insufficiency of disclosure (no)
Grounds for opposition -
lack of clarity no ground for opposition

**Decisions cited:**
G 0004/95, G 0003/14

**Catchword:**

Europäisches Patentamt
European Patent Office
Office européen des brevets

**Beschwerdekammern**
**Boards of Appeal**
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**Case Number: T 2552/11 - 3.3.01**

# D E C I S I O N
# of Technical Board of Appeal 3.3.01
# of 14 April 2015

| | |
|---|---|
| **Appellant:** (Opponent) | Ewald Dörken AG<br>Postfach 163<br>Wetterstrasse 58<br>D-58313 Herdecke (DE) |
| **Representative:** | Kalkoff & Partner<br>Patentanwälte<br>Martin-Schmeisser-Weg 3a-3b<br>44227 Dortmund (DE) |
| **Respondent:** (Patent Proprietor) | NOF Metal Coatings Europe<br>120, rue Galilée<br>ZAET de Creil / Saint-Maximin<br>60100 Creil (FR) |
| **Representative:** | Cabinet Regimbeau<br>20, rue de Chazelles<br>75847 Paris Cedex 17 (FR) |
| **Decision under appeal:** | **Interlocutory decision of the Opposition Division of the European Patent Office posted on 29 September 2011 concerning maintenance of the European patent No. 1644451 in amended form.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | A. Lindner |
| **Members:** | C. M. Radke |
| | L. Bühler |

## Summary of Facts and Submissions

I. The opposition against the grant of European patent No. 1 644 451 sought revocation of the patent as a whole and was based on grounds under Article 100(a)(alleged lack of novelty and inventive step) and (b) EPC.

II. The patent in suit relates to coatings containing particulate metal (hereinafter called "metallic coatings") which comprise certain corrosion inhibitors and may be used e.g. in the automotive industry.

III. The documents cited during opposition include the following:

(D1) FR-A-2 816 641
(D10) A. Kumar et al., Pigment & Resin Technology, vol. 29, no. 5 (2000), 273-276
(D11) S. Powell, Surface Engineering, vol. 16, no. 2 (2000), 169-175
(D14) K. Aramaki, Corrosion Science, vol. 43 (2001), 2201-2215
(D15) A. L. Rudd et al., Corrosion Science, vol. 42 (2000), 275-288
(D16) M. Bethencourt et al., Journal of Alloys and Compounds, vol. 250 (1997), 455-460
(D21) DE-T-693 25 344
(D22) US-B-6 248 184
(D33) Page 4/6 of the "Sicherheitsdatenblatt" on "MOLYBDÄNTRIOXID I" issued on 18 January 2002 by H. C. Starck
(D34) WO-A-02/38 686.

IV. The opponent appealed the interlocutory decision of the opposition division maintaining the patent in amended

form according to auxiliary request 1 submitted during the oral proceedings of 29 June 2011.

V. The opposition division decided that the claims of the main request did not meet the requirements of Articles 84 and 123(2) EPC as

- the word "preferably" rendered the claims 3, 5 and 17-18 unclear;
- the reference to "... in aqueous or organic phase" rendered dependent claim 29 unclear due to the fact that the respective independent claims 14 and 20 only referred to an aqueous phase;
- claim 7 had no basis in the application as filed. If it were to be based on original claims 1 and 2 then it should have referred to "one of the ... elements" and not to "at least one".

Auxiliary request 1 was held to be allowable because

- the opponent had not objected to these claims under Articles 84 and 123 and Rule 80 EPC, and nor did the opposition division have any reason to do so;
- the compositions listed in Table 10 showed an improvement in corrosion resistance with respect to composition 1; hence the requirement of Article 83 was met;
- the subject-matter of the claims was novel in view of document (D10) or (D21); ((D10) disclosed neither the combination of oxides and particulate metal nor the solvent phase, and (D21) neither the metal oxides nor the combination of metal salts with $MoO_3$);
- document (D34) was the closest prior art. The subject-matter of claims 1 and 7 differed from that disclosed in document (D34) in that (D34) did not disclose the addition of oxides or salts of Y, Zr,

La, Ce, Pr or Nd. The examples showed that these oxides and salts inhibited corrosion. This was not obvious in view of (D34) alone or in combination with any of the other cited documents.

VI. The claims on file are

claims 1-38 of the main request, submitted during the oral proceedings before the board on 14 April 2015;
and
claims 1-48 of auxiliary request 1,
claims 1-35 of auxiliary request 2,
claims 1-30 of auxiliary request 3,
claims 1-30 of auxiliary request 4 and
claims 1-28 of auxiliary request 5,
all filed under cover of the letter dated 5 June 2012.

The claims of the **main request** correspond to claims 1 to 6, 10 to 19, 24 to 39 and 43 to 48 of the auxiliary request 1 deemed allowable according to the decision under appeal. The independent claims of the main request are claims 1, 11, 33 and 36. They read as follows:

"1. Use of at least one element chosen from among yttrium, zirconium, lanthanum, cerium, praseodymium and neodymium in the form of oxides as reinforcing agent for anticorrosion of a coating composition containing a particulate metal in aqueous phase, for metal parts.

"11. Anticorrosion coating composition for metal parts, characterized in that it contains:
- at least one particulate metal;
- a reinforcing agent for anticorrosion of the composition chosen from among yttrium, zirconium, lanthanum, cerium, praseodymium and neodymium, in the form of oxides;

- a binder; and
- water optionally associated with one or more organic solvents."

"33. Anticorrosion coating for metal parts, characterized in that it is obtained from a coating composition according to any of claims 11 to 32, by spraying, dip-draining or dip-centrifuging, the coating layer being baked by convection or infrared for example, preferably conducted at a temperature of between 79°C and 350°C, for 10 to 60 minutes, by convection."

"36. Metal substrate, preferably in steel, having with an anticorrosion coating according to any of claims 33 to 35."

*VII.* The arguments of the appellant (opponent) as far as relevant for this decision may be summarised as follows:

*Inventive step and sufficiency of disclosure*

During the written proceedings, the appellant considered document (D34) to be the closest prior art. The subject-matter of the present claim differed from that disclosed in (D34) in that different corrosion inhibitors were used. Starting from document (D34), the aim of the person skilled in the art was to replace at least partially the molybdenum oxide which was known to be toxic (see (D33)) by other chromium-free corrosion inhibitors. Such a replacement by the oxides and salts defined in the present claims was obvious in view of many of the documents cited, including (D10), (D11) and (D14).

Table 11 of the patent showed that the claimed effect was not achieved for the oxides of cerium, neodymium and zirconium as compared to composition 15 or - as far as the compositions contained $MoO_3$ - as compared to composition 16. Hence, the subject-matter of the claims was not inventive and the invention was not sufficiently disclosed (Article 100(b) EPC).

During the oral proceedings, the appellant relied on document (D14) as the closest prior art. It defined the problem to be solved as to improve the anticorrosive properties of the coating composition. Although salts of cerium were used in this document, the document disclosed that it was cerium oxide which formed the protective layer on the metal. Therefore, the person skilled in the art would rather add cerium oxide directly. Whether the metal was in particulate form or not was not relevant for the anticorrosive effect of cerium oxide. Therefore, the subject-matter of the claims was obvious in view of document (D14). When asked by the board, the appellant indicated that cerium oxide was moderately soluble in water.

Claims 33-39 of the main request related to coatings and to coated substrates as such. According to document (D34), the cerium salt was converted to a cerium oxide layer on the metal. Once this layer was formed, coatings made from coating compositions containing a cerium oxide could not be distinguished from those containing a cerium salt.

*Clarity of the claims*

Furthermore, the appellant argued that the expression "aqueous phase" in claim 1 was vague and rendered the claims unclear.

VIII. The arguments of the respondent (patentee) as far as relevant for this decision may be summarised as follows:

*Oral submission by the accompanying person*

The letter announcing that Mr. Jeworrek would give a statement during oral proceedings did not indicate precisely what he would be speaking about. Therefore, the conditions laid down in decision G 4/95 were not met and he should not be allowed to speak during the oral proceedings.

*Inventive step*

The respondent considered document (D34) to be the closest prior art. This document did not disclose the addition of compounds of Y, Zr, La, Ce, Pr or Nd. The technical effect achieved was to improve the anticorrosive effect of the coatings disclosed in document (D34). Even if one combined the teachings of document (D34) with those of (D14) or of any other of the cited documents one would not end up with the claimed invention. Document (D14) neither disclosed coatings containing particulate metal nor recommended using the cerium compound in the form of an oxide. The person skilled in the art would not have used cerium oxide because it was less soluble than the salts used in document (D14).

Table 10 of the patent showed that all the oxides increased the resistance to polarisation and thus

inhibited corrosion. Hence, the problem posed was solved over the whole breadth of the claims.

*Article 100(b) EPC*

For these reasons, the patent supplied the person skilled in the art with sufficient information to enable him to achieve the anticorrosive effect and thus to carry out the claimed invention over the whole breadth of the claims.

*Article 84 EPC*

The alleged lack of clarity concerned features which were already present in claim 1 as granted, and thus was not to be taken into account in opposition appeal proceedings.

IX. The board enclosed a communication with the summons to oral proceedings dated 3 November 2014. In this communication, the board

- indicated that it considered document (D34) to represent the closest prior art;
- gave reasons why it considered that no grounds under Article 100(b) EPC prejudiced the maintenance of the patent and
- indicated that the alleged lack of clarity was already present in the claims as granted and thus could not prejudice the maintenance of the patent.

X. The appellant announced in its letter dated 18 March 2015 that Mr. Jeworrek would make a statement during the oral proceedings.

XI. The appellant (opponent) requested that the decision under appeal be set aside and that European patent No. 1 644 451 be revoked.

The respondent (patentee) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims of the main request filed during the oral proceedings of 14 April 2015 or, alternatively, on the basis of one of auxiliary requests 1 to 5 filed with the reply to the statement of grounds of appeal of 5 June 2012.

XII. Before closing the oral proceedings the chairman announced the decision of the board.

## Reasons for the Decision

1. The appeal is admissible.

2. Oral submissions by the accompanying person

2.1 The appellant announced in its letter dated 18 March 2015 that "Dr. Christoph Jeworrek will give a statement in court as an expert for chemistry. He will refer to the prior art documents cited by the opponent".

The appellant did not provide any evidence indicating that Mr. Jeworrek met the requirements of Article 133 EPC to represent the appellant, nor could his name be found in the list of professional representatives before the EPO.

During the oral proceedings of 14 April 2015 the respondent requested that Mr. Jeworrek not be heard. It

emphasised that the appellant had not specified on what subject Mr. Jeworrek was supposed to speak.

2.2 According to decision G 04/95 (OJ EPO 1996, 412), oral submissions by an accompanying person are not a matter of right, but are subject to the permission and discretion of the EPO (see point (3)(a) of the order).

The criteria to be considered by the EPO when exercising this discretion are specified in this decision as follows (see point (3) of the order):

"(i) The professional representative should request permission for such oral submissions to be made. The request should state the name and qualifications of the accompanying person, and should specify the subject-matter of the proposed oral submissions.
(ii) The request should be made sufficiently in advance of the oral proceedings so that all opposing parties are able properly to prepare themselves in relation to the proposed oral submissions.
(iii) ... ."

The statement that Mr. Jeworrek would "refer to the prior art documents cited by the opponent" is very general.

Therefore, the information provided by the appellant about the subject-matter of Mr. Jeworrek's proposed oral submissions was not sufficient to enable the respondent to prepare itself properly.

For these reasons, the board exercised the discretion referred to in G 04/95 by not permitting oral submissions from Mr. Jeworrek.

*Main request*

3. Inventive step

3.1 The objective of the patent in suit was "to develop an anticorrosion coating for metal parts, preferably free of hexavalent chromium, that has anticorrosion properties" (see paragraph [0001]).

3.2 The closest prior art

Whereas the respondent considered document (D34) to be the closest prior art, the appellant argued during oral proceedings before the board that document (D14) was the closest state of the art.

The closest state of the art is normally a prior-art document disclosing subject-matter with the same objectives as the claimed invention and having the greatest number of relevant technical features in common.

The objective defined in point 3.1 above corresponds to that of document (D14) which refers to the treatment of zinc surfaces to prevent corrosion (see the title) and to the replacement of chromate as a corrosion inhibitor (see the first paragraph under the heading "1. Introduction" on page 2201). Likewise, the object of document (D34) was "to develop an anti-corrosion coating for metal parts, preferably a coating free of hexavalent chromium, which is endowed with improved anti-corrosion properties" (see page 1, lines 4-7).

3.2.1 The coating composition as defined in the present claims contains

- a particulate metal and

- oxides of Y, Zr, La, Ce, Pr and/or Nd

(see claim 1 under point VI above).

Whereas neither (D14) nor (D34) discloses the use of oxides of Y, Zr, La, Ce, Pr and/or Nd, only document (D34) teaches coating compositions containing particulate metal (see claim 1 of (D34)).

3.2.2 Therefore, document (D34) rather than (D14) qualifies as the closest prior art.

3.2.3 Document (D34) claims the use of $MoO_3$ as a corrosion inhibitor in anticorrosion coating compositions containing particulate metal in aqueous phase (see claim 1).

The composition may be used in the motor-vehicle industry (see page 1, line 12).

The subject-matter of the present independent claims differs from that disclosed in document (D34) only in that (D34) does not disclose the addition of oxides of Y, Zr, La, Ce, Pr and/or Nd.

3.3 The problem to be solved

3.3.1 The French equivalent (D1) of document (D34) is cited in paragraph [0002] of the patent in suit. The patent in suit defines the problem to be solved as "to improve the anti-corrosion properties of compositions containing particulate metal" (see paragraph [0005]).

3.3.2 Neither the patent in suit (or the respective application as filed) nor document (D34) gives any indication that the problem to be solved was a partial or total replacement of toxic molybdenum oxide ($MoO_3$) as

a corrosion inhibitor. Therefore, the board is not convinced by the appellant's line of argumentation (see the first paragraph under the heading "*Inventive step and sufficiency of disclosure*" under point VII above).

Moreover, the person skilled in the art was not likely to pose such a problem, as the data-sheet (D33) reports damage to the respiratory tract and lung cancer only upon inhalation of $MoO_3$. The aquatic toxicity is rather low. As $MoO_3$ as a constituent of an anticorrosive coating is not likely to be inhaled but rather may be washed out by water, the aquatic toxicity seems to be more relevant. Finally, even if the person skilled in the art considered $MoO_3$ to be rather toxic, he would replace it by another corrosion inhibitor only if the latter was less toxic at the concentration required to achieve the same corrosion-inhibiting effect. There is no evidence that the salts and oxides mentioned in the present claims could serve this purpose (see point 3.3.2 of the board's communication of 3 November 2014).

As a consequence, the improvement of the anti-corrosion properties of compositions containing particulate metal as mentioned in point 3.3.1 above constitutes the problem to be solved.

3.4 The problem solved

The appellant argued that Table 11 of the patent showed that the claimed effect was not achieved for the oxides of cerium, neodymium and zirconium. In making this argument, the appellant did not take into account the remaining comparative tests disclosed in the patent in suit. The experiments listed in Table 10 show that the oxides of each of the elements listed in claim 1 of the

main request increase the polarisation resistance of the coated substrates with respect to the respective comparative composition 15 or 16, and thus inhibit corrosion. For this reason, the board is satisfied that the problem mentioned above is solved over the whole breadth of the claims (see point 3.3.1 of the board's communication of 3 November 2014).

3.5 The solution of the problem

As a solution to this problem the present claims require the use of at least one oxide of yttrium, zirconium, lanthanum, cerium, praseodymium and/or neodymium in the coating composition.

3.5.1 Document (D34) as such does not disclose or suggest the addition of any compound of any of the above elements. Consequently, this document alone cannot render the subject-matter of the present claims obvious.

Hence, it has to be assessed whether the teaching of any other document(s) of the prior art would have indicated to the person skilled in the art that the addition of oxides of Y, Zr, La, Ce, Pr and/or Nd to the coating compositions disclosed in document (D34) would solve the problem defined above.

3.5.2 In this respect, the appellant relied on document (D14).

This document deals with the treatment of a zinc surface with cerium(III)nitrate ($Ce(NO_3)_3$) in order to prevent corrosion by NaCl (see the title). The aim was to find "acceptable and effective corrosion inhibitors as alternatives of chromates ... for protection of zinc and galvanized steel from corrosion". It is also reported

that corrosion of galvanised steel by sodium chloride is suppressed by $CeCl_3$ (see page 2202, lines 1-8).

The corrosion inhibiting effect of $Ce(NO_3)_3$ is explained by the fact that a protective layer of $Ce(OH)_3$ is formed on the zinc surface because the solubility product of $Ce(OH)_3$ ($1.6 \times 10^{-20}$) is much lower than that of $Zn(OH)_2$. Said hydroxide $Ce(OH)_3$ loses water to form the corresponding oxide $Ce_2O_3$. The intermediate steps of the formation of the layer of $Ce_2O_3$ are illustrated in equations (8) to (11) on pages 2205-2206.

The appellant argued that the person skilled in the art was inclined to use a cerium oxide directly instead of waiting for the oxide layer to be formed by reaction of the cerium salt. This argument implies that the person skilled in the art would consider it obvious that the use of a cerium oxide instead of $Ce(NO_3)_3$ would result in an equivalent protective layer on the zinc surface within a comparable time frame.

However, as the appellant admitted, the corresponding cerium oxide $Ce_2O_3$ is only moderately soluble in water. This is in line with the low solubility product of the hydrate $Ce(OH)_3$ of $1.6 \times 10^{-20}$ mentioned above. The person skilled in the art would have expected that the low solubility of the cerium oxide would limit the diffusion of cerium ions to the zinc surface and thus retard or even inhibit the formation of the protective layer of $Ce(OH)_3$ and/or $Ce_2O_3$. For these reasons, he would not have expected that the addition of a cerium oxide to the coating compositions disclosed in document (D34) would increase the corrosion resistance of metals coated therewith. Accordingly, the use of respective **salts** as corrosion inhibitors is also recommended in documents

- (D11) (see the "rare earth metal salts" mentioned in the sentence bridging the columns of the abstract on the front page);
- (D15) (see the nitrates of Ce, La and Pr mentioned in the penultimate full paragraph on page 276);
- (D16) (see the title); and
- (D22) (see the title).

3.5.3 Therefore, the subject-matter of

- claims 1 to 10 which relate to the use of the **oxides** of Y, Zr, La, Ce, Pr or Nd in coating compositions; and
- claims 11 to 32 which relate to the respective coating compositions

involves an inventive step.

3.5.4 Claims 33 to 39 relate to the corresponding coating and coated metal substrates (see the wording of independent claims 33 and 36 cited under point VI above). The appellant was of the opinion that these coatings and substrates could not be distinguished from those where a salt instead of an oxide of Y, Zr, La, Ce, Pr and/or Nd is used (see the penultimate paragraph under point VII above). This argument is based on the conclusion drawn in document (D14) that the cerium salt is converted to a cerium oxide layer on the zinc surface.

This argument suggests that the oxides of Y, Zr, La, Ce, Pr and/or Nd are completely converted into an oxide layer on the metal surface. It does not take into account the fact that such a conversion takes place only to the extent that ions of these metals diffuse to the metal surface.

The diffusion of these ions to the metal surface is limited not only by the limited solubility of the oxides

discussed above, but also by the fact that claim 33 requires

- that the coating is baked and
- that it contains a binder (note that claim 33 refers to the compositions "according to any of claims claims 11 to 32", namely to compositions containing a binder).

Baking will evaporate any solvent and thus render the coating solid. Diffusion within a solid is much slower than in a liquid phase. The binder dilutes the coating and thus forms a further obstacle to diffusion.

Due to this restricted diffusion, the board proceeds from the fact that the coatings and coated substrates according to claims 33 to 39 still contain distinct particles of oxides of Y, Zr, La, Ce, Pr and/or Nd and thus may be distinguished clearly from respective coatings into which these elements were incorporated in the form of their salts. This means that the coatings of claims 33-35 and the respective coated substrates of claims 36 to 39 cannot be produced by any combination of the teachings of documents (34) and (14) but require the non-obvious addition of Y, Zr, La, Ce, Pr and/or Nd in the form of oxides (see point 3.5.3 above).

Hence, the subject-matter of claims 33 to 39 also involves an inventive step.

3.5.5 It is apparent from point 3.5.2 above that the conclusions drawn in points 3.5.3 and 3.5.4 would be no different if document (D14) was considered to represent the closest prior art.

4. Article 100(b) EPC

The appellant based its objection on the fact that Table 11 of the patent shows no improvements in corrosion inhibition upon the addition of the oxides of cerium, neodymium and zirconium. It concluded that the invention was not sufficiently disclosed (Article 100(b) EPC). For the reasons set out under point 3.4 above, the board does not share this view.

Hence, no grounds under Article 100(b) EPC prejudice the maintenance of the patent in suit.

5. Clarity of the claims

The appellant argued that the expression "aqueous phase" in claim 1 was vague and rendered the claims unclear.

A lack of clarity is not a ground for opposition under Article 100 EPC. Accordingly, it was decided in G 03/14 of 24 March 2015 that

"the claims of the patent may be examined for compliance with the requirements of Article 84 EPC only when, and then only to the extent that the amendment introduces non-compliance with Article 84 EPC"
(see the order).

The expression "aqueous phase" already formed part of claim 1 as granted. The appellant had not claimed, and nor does the board have any reason to believe, that any amendment after grant introduced the alleged lack of clarity.

Hence, the alleged lack of clarity also does not prejudice the maintenance of the patent.

6. The appellant has not raised any further objections against the claims of the main request, and nor is the board aware of any deficiency which might prejudice the maintenance of the patent based on that request.

Consequently, there is no need to deal with the auxiliary requests.

## Order

## For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent with the following claims and a description to be adapted thereto:

Claims Nos. 1 to 38 of the main request filed during the oral proceedings of 14 April 2015.

The Registrar: The Chairman:

M. Schalow A. Lindner

Decision electronically authenticated