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**Datasheet for the decision  
of 20 September 2016**

**Case Number:** T 1680/14 - 3.2.08

**Application Number:** 07874486.9

**Publication Number:** 2035593

**IPC:** C22C38/04, C22C38/38

**Language of the proceedings:** EN

**Title of invention:**

AUSTENITIC PARAMAGNETIC CORROSION RESISTANT STEEL

**Patent Proprietor:**

Jorgensen Forge Corporation

**Opponents:**

Schoeller- Bleckmann Oilfield Technology GmbH & Co KG  
Böhler Edelstahl GmbH & Co KG

**Headword:**

**Relevant legal provisions:**

EPC Art. 123(2), 56

**Keyword:**

Amendments  
Inventive step

**Decisions cited:**

T 0002/81

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

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Case Number: T 1680/14 - 3.2.08

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.08**  
**of 20 September 2016**

**Appellants:** Schoeller- Bleckmann Oilfield Technology GmbH &  
(Opponents) Co KG  
Böhler Edelstahl GmbH & Co KG  
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**Representative:** Patronus IP Patent- und Rechtsanwälte  
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**Representative:** Grünecker Patent- und Rechtsanwälte  
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**Decision under appeal:** **Interlocutory decision of the Opposition**  
**Division of the European Patent Office posted on**  
**16 June 2014 concerning maintenance of the**  
**European Patent No. 2035593 in amended form.**

**Composition of the Board:**

**Chairman** I. Beckedorf  
**Members:** M. Alvazzi Delfrate  
C. Herberhold

## Summary of Facts and Submissions

- I. By its decision posted on 16 June 2014 the opposition division found that European patent No. 2 035 593, in amended form according to the main request then on file, and the invention to which it related met the requirements of the EPC.
- II. The appellants (opponents) lodged an appeal against that decision in the prescribed form and within the prescribed time limit.
- III. Oral proceedings before the Board of Appeal were held on 20 September 2016, for the course of which reference is made to the minutes. As announced by letter of 2 September 2016 the respondent (patent proprietor) did not attend the oral proceedings, which, in accordance with Rule 115(2) EPC and Article 15(3) RPBA, were held in its absence.

The appellants requested that the decision under appeal be set aside and that the patent be revoked.

The respondent had requested in writing that the appeal be dismissed, or, in the alternative, that in setting aside the decision under appeal the patent be maintained in amended form on the basis of one of the sets of claims filed as auxiliary requests 1 to 5 with letter of 26 January 2015.

- IV. Claim 1 of the **main request** reads as follows:

"An austenitic, paramagnetic material with high strength, ductility, and yield strength and good

corrosion resistance in media with high chloride concentrations, comprising, in wt-%:  
up to 0.035 carbon;  
0.25 to 0.75 silicon;  
22.0 to 25.0 manganese;  
0.75 to 1.00 nitrogen;  
19.0 to 23.0 chromium;  
2.70 to 5.00 nickel;  
1.40 to 1.80 molybdenum;  
0.50 to 1.00 copper;  
0.002 to 0.006 boron;  
up to 0.01 sulfur;  
up to 0.030 phosphorous;  
substantially no ferrite content; and  
balance iron."

The auxiliary requests are not relevant for the present decision.

V. The following documents played a role in the present decision:

D1: EP -A- 1 538 232;

D2: EP -A- 1 624 082;

D8: graph showing the evolution of the price of Mo.

VI. The arguments of the appellants can be summarised as follows:

*Article 123(2) EPC*

According to claim 1 of the main request, the balance of the composition was iron. The application as originally filed disclosed the term "balance" only in the paragraph bridging pages 6 and 7. However, this paragraph disclosed a "balance including iron", thus

allowing, contrary to present claim 1, further alloying elements. Moreover, said passage of the description required "positive amounts" of C, S and P, whereas claim 1 recited contents "up to" certain limits of these elements, thus allowing their content to be zero. Hence, this passage could not serve as a basis for present claim 1. It was true that originally filed claim 1 defined amounts "up to about" specific limits of C, P and S. However, original claim 1 did not mention the balance of the composition and thus could not serve as a basis for present claim 1 either. Therefore, claim 1 of the main request comprised subject-matter that extended beyond the content of the application as originally filed.

Furthermore, claim 1 had also been amended to limit the amounts of Mo and Cu. However, the claims and the description of the application as originally filed (pages 10 and 11) disclosed the limit values according to present claim 1 solely in combination with specific values for the other elements. In particular, claim 8 disclosed the claimed range for Mo only in combination with 0.35 to 0.75 wt% of Cu. As to claim 9, it did not disclose the present range of Mo but a range with an upper limit of 1.75 wt% in combination with a value of 0.5 wt% for the lower limit of the Cu content. Also for this reason claim 1 extended beyond the content of the application as originally filed.

Additionally, the application as originally filed disclosed the ranges of the different alloying elements always in connection with the word "about". Therefore, it did not disclose the exact values, contrary to present claim 1, which no longer contained the word "about". This resulted in a further extension beyond the content of the original application.

Lastly, dependent claims 9 to 14 also extended beyond the content of the application as originally filed, because original claims 10 to 15, on which they were based, depended solely on original claim 1, which, however, related to a composition different from that of present claim 1.

*Inventive step*

D1 represented the closest prior art. The sole possible differences of the claimed material compared with the material disclosed in D1 were the Mo content and the Cu content. A reduced Mo content was rendered obvious by D1 itself in order to reduce the costs, given that the price of this expensive element had dramatically increased, as evidenced by D8. As to the higher Cu content, it either had no effect in view of the negligible difference or was rendered obvious by D2 for enhancing the corrosion resistance. Therefore, the subject-matter of claim 1 did not involve an inventive step.

VII. The arguments of the respondent can be summarised as follows:

*Article 123(2) EPC*

The contested patent provided an austenitic paramagnetic steel alloy containing defined amounts of alloying elements. Steel was an alloy consisting mainly of iron, together with other components. Thus, looking at original claim 1, which defined relevant elemental ranges for the other components, it could be unambiguously concluded that the rest of the alloy had to be iron, in particular because the disclosed example

alloys contained no components other than those recited in claim 1, apart from iron.

The limit values and, as a consequence, the ranges for Mo and Cu were disclosed in the claims and the description. Reference was made also to decision T 2/81 (OJ EPO 1982, 394). These preferred contents of Mo and Cu were to be applied in all alloys and were not dependent on other components. Hence, the restriction of the ranges of Mo and Cu was supported by the application as filed.

Removing the term "about" from a numerical range maintained the explicit, originally disclosed numbers defining the claimed ranges. Therefore, this deletion did not broaden the claimed subject-matter beyond the original disclosure.

As outlined above, claim 1 did not contravene Article 123(2) EPC and, thus, dependent claims 9 to 14, which were based on originally filed claims 10 to 15, also complied with Article 123(2) EPC.

#### *Inventive step*

The contested patent differed from the teaching of D1 at least in the molybdenum and copper content. The effects based on those differences were stabilisation of the passive film and resistance to the initiation of pitting and crevice corrosion. Moreover, the formation of ferrite was prevented by low concentrations of molybdenum in the alloy.

Concerning the molybdenum content, the teaching of D1 clearly taught using more than 1.9 wt% of molybdenum in order to achieve positive effects on corrosion



resistance. D1 did not provide any hint or indication that the same properties could be attained with lower molybdenum content.

Further evidence supporting inventive step of claim 1 over D1 could be found in that the copper content of the composition according to the invention was in the range of 0.5 to 1.0 wt%, compared to less than 0.5 wt% in the composition of D1, which explicitly stated that a copper content higher than 0.5 wt% was disadvantageous.

Even if the person skilled in the art had consulted D2, its teaching rather suggested a high content of copper of 1.0 to 5.0 wt%, i.e. clearly outside the claimed copper range.

At least for these reasons the subject-matter of claim 1 involved an inventive step.

## **Reasons for the Decision**

1. Article 123(2) EPC
  - 1.1 Claim 1 of the main request is directed to an austenitic, paramagnetic material with a composition comprising *inter alia* up to 0.035 wt% carbon, up to 0.01 wt% sulfur and up to 0.030 wt% phosphorous. The balance of the composition is iron.

Originally filed claim 1 was also directed to an austenitic, paramagnetic material with a given composition. Like present claim 1, original claim 1 did

not lay down a lower limit for the contents of C, P and S, because it comprised up to about 0.035 wt% carbon, up to about 0.01 wt% sulfur and up to about 0.030 wt% phosphorous. However, original claim 1 has an "open" composition that allows for the presence of further elements, because the material is merely "comprising" the listed elements. Hence, it does not explicitly specify that the balance is iron, as required by present claim 1. Nor is such a definition to be found in the paragraph bridging pages 6 and 7, because this passage merely refers to "the balance including iron".

However, the teaching of the originally filed application is not limited to its literal disclosure but must be considered from the point of view of the person skilled in the art, who knows that austenitic paramagnetic materials are steels, iron thus representing a major part of the composition. Hence, the person skilled in the art is aware that the balance of the composition must consist of iron and, if further alloying elements are present, said further alloying elements. The application does not mention any further alloying element in addition to those explicitly listed in the claim. The person skilled in the art thus understands that a preferred embodiment of the composition is one that comprises the explicitly listed alloying elements and the balance iron. Accordingly, a composition with the balance being iron is at least implicitly disclosed in the application as originally filed.

- 1.2 It is true that in the original application, in particular in claim 1, the ranges of the alloying elements are disclosed in combination with the term "about", which has now been deleted. The Board concurs with the appellants that this term indicates that some

interval of values around the limit value, for instance around 0.035 wt% for the upper limit of the content of carbon, can be considered. However, at the same time the person skilled in the art clearly understands that also the range having exactly that limit value (in the case of carbon up to 0.035 wt% carbon) can be considered. Hence, no added subject-matter can be seen in respect of the deletion of the term "about" either.

- 1.3 During the opposition proceedings claim 1 was further amended to recite contents of 1.40 to 1.80 wt% molybdenum (in originally filed claim 1 about 1.35 to about 2.00 wt% molybdenum) and 0.50 to 1.00 wt% copper (in originally filed claim 1 about 0.35 to about 1.00 wt% copper). The appellant argued that the newly introduced limit values are disclosed in the application as filed, in particular in the claims, only in combination with specific values of the other alloying elements.

However, the range of 1.40 to 1.80 for Mo and the lower limit of 0.50 for the Cu range are disclosed not only in the claims but also in the description, namely in the last paragraph on page 10 and the first paragraph on page 11. The paragraph on page 10 explicitly discloses as a preferred embodiment the range of 1.40 to 1.80 wt% Mo. The paragraph on page 11 discloses the Cu content as 0.35 to 1.00 wt% with a preferred content in the range of 0.50 to 0.75 wt%, thus inherently disclosing the range of 0.50 to 1.00 wt% (see also T 2/81, *supra*, point 3 of the Reasons). Moreover, in these passages the chosen ranges for Mo and Cu are not associated with any particular value for the contents of the other elements.

Therefore, the limitation of the ranges for Mo and Cu complies with Article 123(2) EPC.

- 1.4 Lastly, dependent claims 9 to 14 are based on claims 10 to 15 as originally filed, which defined preferred values for the yield strength and the PREN value. It is true that original claims 10 to 15 depend on originally filed claim 1, whose composition is different from the composition of present claim 1.

However, the composition of original claim 1 encompasses that of present claim 1. Furthermore, the examples having a composition in accordance with present claim 1 (samples B, C and D) all exhibit PREN values and yield strengths in accordance with original dependent claims 10 to 15 (tables 1 and 2). Hence, the person skilled in the art would have no reason to consider that the conditions defined in original claims 10 to 15 did not apply to the more restricted composition that is now claimed in claim 1. Accordingly, dependent claims 9 to 14 do not introduce subject-matter that extends beyond the content of the original application either.

## 2. Inventive step

- 2.1 D1, like the claimed invention (paragraph [0001] of the patent in suit), relates to an austenitic, corrosion-resistant material (paragraphs [0001] to [0003] and [0009]), and undisputedly represents the closest prior art. The compositions (in wt%) of the material of claim 1 of the main request and that of D1, claim 1, are shown in the following table.

	Main request, claim 1	D1, claim 1
C	0 - 0.035	0 - 0.35
Si	0.25 - 0.75	0 - 0.75
Mn	22.0 - 25.0	19.0 - 30.0
N	0.75 - 1.00	0.35 - 1.05
Cr	19.0 - 23.0	17.0 - 24.0
Ni	2.70 - 5.00	0 - 15.0
Mo	1.40 - 1.80	1.90 - 5.5
Cu	0.50 - 1.00	< 0.5
B	0.002 - 0.006	0 - 0.005
S	0 - 0.01	0 - 0.30
P	0 - 0.030	0 - 0.035
bal.	Fe	Fe and optional amounts W, Co, Al, V, Nb, Ti

2.2 In the composition of claim 1 of the main request, in particular, Mo does not exceed 1.80 wt% (while in D1 it is at least 1.90 wt%) and Cu is at least 0.50 wt% (while in D1 it is less than 0.5 wt% with preferred contents as defined in paragraph [0038] of no more than 0.35 wt%).

According to paragraph [0032] of the patent in suit, Mo is especially effective in increasing resistance to the onset of pitting and crevice corrosion. It is, however, a strong ferrite former and its content must be limited in order to avoid unfavorable magnetic properties (see also paragraph [0007]). As to Cu, as explained in paragraph [0033], its addition, preferably in amounts of at least 0.50 wt%, improves corrosion resistance.

Therefore, starting from D1 the problem solved by the claimed invention is to provide alloys with high

critical pitting potential while maintaining their paramagnetic properties (paragraph [0011] of the patent in suit).

2.3 The claimed solution to the problem above is not rendered obvious by the prior art.

Although it is true that D1 mentions that Mo is an expensive element (as shown also by D8), it teaches that the content of this element should be kept above 1.90 wt%, preferably above 2.05 wt% and even more preferably above 2.5 wt% (paragraph [0028]). Hence, even taking into consideration the cost of Mo, D1 teaches away from reducing of its content to the presently claimed range. For copper too the teaching of D1 does not go in the direction of the patent, since it discloses that the preferred amount of Cu is less than 0.35 wt% and that more than 0.5 wt% causes disadvantages in terms of corrosion resistance (paragraph [0038]). Hence, D1 alone does not lead to the claimed alloy.

Nor does D2 provide such a teaching, because the amounts of Cu taught by D2 in paragraphs [0017] in order to provide corrosion resistance are at least 1 wt% (2.03 wt% in the example in paragraph [0022]) i.e. higher than those stipulated by the patent in suit.

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

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:



C. Moser

I. Beckedorf

Decision electronically authenticated