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**Datasheet for the decision  
of 28 April 2022**

**Case Number:** T 2623/19 - 3.3.05

**Application Number:** 06706689.4

**Publication Number:** 1846584

**IPC:** C22C38/06, C22C38/04, C21D8/02,  
C21D6/00

**Language of the proceedings:** EN

**Title of invention:**

AUSTENITIC STEEL HAVING HIGH STRENGTH AND FORMABILITY METHOD  
OF PRODUCING SAID STEEL AND USE THEREOF

**Patent Proprietor:**

Tata Steel IJmuiden B.V.

**Opponent:**

ArcelorMittal

**Headword:**

Austenitic steel/Tata

**Relevant legal provisions:**

EPC Art. 123(2), 83, 54, 56

**Keyword:**

Amendments - extension beyond the content of the application  
as filed (no)

Sufficiency of disclosure - (yes)

Novelty - multiple selection - (yes)

Inventive step - (yes)

**Decisions cited:**

T 0019/90, T 1846/10, T 2050/11, T 0261/15, T 0353/18

**Catchword:**



**Beschwerdekammern**

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Case Number: T 2623/19 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 28 April 2022**

**Appellant:** ArcelorMittal  
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**Decision under appeal:** **Interlocutory decision of the Opposition**  
**Division of the European Patent Office posted on**  
**23 July 2019 concerning maintenance of European**  
**Patent No. 1846584 in amended form.**

**Composition of the Board:**

**Chairman** E. Bendl  
**Members:** T. Burkhardt  
K. Kerber-Zubrzycka

## Summary of Facts and Submissions

I. The opponent's (appellant's) appeal is against the opposition division's decision to maintain European patent No. EP 1 846 584 B1 as amended in the form of the version of auxiliary request 3 then on file.

II. The following documents were among those discussed at the opposition stage:

D1 US 3,847,683 A  
D2 EP 1 937 861 A1, published as WO 2007/024092 A1  
D3 GB 297,420 A  
D4 FR 2 829 775 A1  
D5 FR 2 796 083 A1  
D6 EP 1 449 596 A1  
D7 EP 1 979 500 A1, published as WO 2007/075006 A1

III. Independent claim 1 of the version of auxiliary request 3 then on file (the present main request), on the basis of which the opposition division maintained the patent, reads as follows:

"1. Austenitic steel having high strength and good formability for cold rolling consisting of in weight percent

- 0.05 to 0.75 % C

- 11.0 to 14.9% Mn

- 1.0 to 5.0% Al

- 0 to 2.5% Ni

the remainder being iron and unavoidable impurities, wherein the microstructure comprises at least 80% in

volume of austenite, and wherein (Ni+Mn) is from 11.0 to 15.9%"

Independent claim 9 reads as follows:

"9. Method of producing an austenitic steel strip, having an austenite content according to claim 1 or 2, comprising the steps of

- providing molten steel having a composition according to any one of claims 1 to 7;
- casting said steel in the form of a continuously cast thin slab with a thickness of between 50 and 100 mm, or into a strip-cast strip with a thickness of between 0.5 and 20 mm;
- providing a hot-rolled strip by hot rolling the continuously cast thin slab or the continuously strip-cast strip to the desired hot rolled thickness."

Dependent claims 2 to 8 and 10 to 14 relate to preferred embodiments.

IV. In a communication under Article 15(1) RPBA 2020, the board informed the parties that the appeal was likely to be dismissed.

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

- The deletion of the term "substantially" in the expression "[s]ubstantially austenitic steel" in claim 1 of the main request did not fulfil the requirements of Article 123(2) EPC since claim 1 now encompassed steels with 100% austenite.

- The main request did not fulfil the requirements of Article 83 EPC either, since not all of the steels

having the composition and austenite content of claim 1 inevitably had "high strength and good formability for cold rolling". The patent in suit itself raised serious doubts and disclosed verifiable facts in this regard.

The appellant specifically referred to

- cold-rolled and annealed steel,
- cold-rolled and unannealed steel, and
- steel that was not in the form of a strip, such as an ingot or powder.

- The subject-matter of, *inter alia*, claim 1 lacked novelty over each of D1, D2 and D3. Regarding D1, in order to arrive at the subject-matter of claim 1 it was merely necessary to choose a steel that was not to be hardened and to select an Mn content in the region of overlap.

- The subject-matter of dependent claim 8 lacked novelty over D7, in particular since Examples 1 and 2 inevitably had the required thickness.

- The subject-matter of entity claims 1 to 8 lacked inventive step in view of D1 alone. No surprising effect relating to the combination of the concentration ranges was achieved over the entire scope of claim 1 of the main request . The third and fourth lines of Table 4 showed that the process parameters were more important for formability than the alloy composition. Comparative Example 11 showed even better performances than inventive Example 1, as illustrated by Table 4.

- The subject-matter of method claims 9 to 14 also lacked inventive step in view of D1, optionally in combination with D4, D5 or D6.

- VI. The patent proprietor's (respondent's) arguments are reflected in the Reasons set out below.
- VII. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed. Alternatively, it requested that the patent be maintained in amended form on the basis of one of five auxiliary requests filed with the reply to the statement setting out the grounds of appeal.

## **Reasons for the Decision**

### *Main request*

The main request is identical to the patent as amended according to the version of auxiliary request 3 then on file, on the basis of which the opposition division maintained the patent.

#### 1. Amendments

- 1.1 The appellant objected to the replacement of "*Substantially* austenitic steel" in claim 1 as originally filed (emphasis added by the board) by "Austenitic steel" in claim 1 of the main request. In the appellant's view, claim 1 now encompassed steels with 100% austenite, in contrast to claim 1 as originally filed.

However, the deletion of the word "substantially" in the claims is a normal amendment in the European patent

system since the deletion of this term generally improves the clarity of the claimed subject-matter (see, for example, T 2050/11, point 2.3 of the Reasons).

Moreover, claim 1 comprises the feature "wherein the microstructure comprises at least 80% in volume of austenite", which specifies the meaning of the feature "austenitic steel" in the present case. This feature was already present in claim 2 as originally filed.

The expression "Substantially austenitic steel" in claim 1 as originally filed encompasses the case where the steel is exclusively in the austenitic form, as far as this is technically possible. Such an interpretation is in line with established case law (see T 353/18, last sentence of point 2.5 of the Reasons, for example).

This is confirmed by the first full paragraph on page 4 as originally filed, which states that "it is desirable to have an austenite content which is as high as possible". An austenite content of 100% is not excluded anywhere in the patent in suit.

The requirements of Article 123(2) EPC are therefore fulfilled.

## 2. Sufficiency of disclosure

2.1 In the appellant's view, not all of the steels having the composition and austenite content of claim 1 had "high strength and good formability for cold rolling", as required by claim 1. In this regard, the appellant more specifically referred to



- cold-rolled and annealed steel,
- cold-rolled and unannealed steel, and
- steel that was not in the form of a strip, such as an ingot or powder.

The appellant also referred to T 1846/10, point 29 of the Reasons. This decision proved, in its view, that a patent in suit could itself raise serious doubts and disclose verifiable facts showing that the invention was insufficiently disclosed.

2.2 For the reasons set out below, these arguments are not persuasive, however.

2.2.1 It should be borne in mind that the expression "high strength and good formability for cold rolling" in claim 1 of the main request is to be construed broadly.

2.2.2 According to established case law, an application may only be objected to for lack of sufficient disclosure "if there are serious doubts, substantiated by verifiable facts" (T 19/90, point 3.3 of the Reasons). This also applies to patents. Yet the appellant failed to show (e.g. through experiments) that not all of the steels falling under claim 1 have the required "high strength and good formability for cold rolling".

T 1846/10 does not apply to the present case, since in that case an example of the patent *explicitly* showed that the alleged effect was not attained for all of the embodiments falling under the claim. This is different from the present case, as will be shown below.

2.2.3 The appellant more specifically argued that the skilled person did not know how to prepare a steel that, after

cold rolling, was annealed and yet had "good formability for cold rolling".

In its view, paragraph [0006] of the patent defined good formability by the absence of an intermediate annealing step; an annealing step and good formability for cold rolling were thus mutually exclusive.

This argument is not convincing. The fact that an intermediate annealing step (e.g. annealing before further cold rolling) is not required according to paragraph [0006] of the patent in suit does not allow the reverse conclusion that steel that has been annealed after cold rolling cannot have good formability for cold rolling.

Moreover, while the last sentences of paragraphs [0016] and [0018] of the patent in suit confirm that the steel has good formability after cold rolling and annealing, the patent in suit does not state that cold-rolled and annealed steel does not have the desired property. Furthermore, the appellant has provided no evidence for its allegation.

- 2.2.4 The appellant also argued that the skilled person did not know how to prepare a cold-rolled steel that was not annealed but that nonetheless had good formability for cold rolling. In its view, paragraph [0037] of the patent in suit stated that the steel according to the invention had a high work-hardening potential. Cold rolling inevitably did lead to significant work hardening but according to paragraph [0003] of the patent in suit, this led in turn to a poor formability of the steel for cold rolling.

This argument is not convincing either. Paragraph [0003] of the patent in suit refers to prior-art steels with a higher carbon content than that of the inventive steel (i.e. 1.1 to 1.4% C vs. 0.05 to 0.75% C, see paragraph [0002] of the patent in suit). Hence, neither the amount of "brittle carbides", which cause the poor formability for cold rolling according to paragraphs [0002] and [0003], nor the cold rollability of the inventive and the prior-art steels are necessarily comparable. This is confirmed by paragraph [0010] of the patent in suit.

Again, the appellant has provided no evidence for its allegation.

- 2.3 Finally, the appellant argued that claim 1 was not limited to steel strips, but that ingots or powders, for instance, could not have a "good formability for cold rolling".

Again, there is no evidence for this allegation. Moreover, claim 1 is directed to the skilled person who knows that the claimed steel must be in a form suitable for achieving "good formability for cold rolling". If on the basis of their common general knowledge the skilled person regarded an ingot or powder as not cold-rollable, they knew that the steel would have to be brought into a suitable form before testing for this property. Thus, this objection is not convincing either.

### 3. Novelty

#### 3.1 In the appellant's view:

- the subject-matter of claim 1 lacked novelty in view of each of D1, D2 and D3, and
- the subject-matter of claim 8 lacked novelty over D7.

#### 3.2 According to established case law, it is, however, an artificial and unjustified approach to contemplate the ranges of various parameters *separately* when assessing whether subject-matter is made available in a direct and unambiguous manner (Case Law of the Boards of Appeal, 9th edition, 2019, I.C.6.3.3).

This applies in particular to the interacting elements of a steel, which may form precipitates and solid solutions (see, for example, T 261/15, point 2.3.1 of the Reasons).

#### 3.3 The appellant argued that in order to arrive at the subject-matter of claim 1 it was only necessary to select a steel from D1 that was not to be hardened and that comprised between 7 and 14% Mn and no Cr (column 2, lines 6 to 9 and 32 to 35). It would then only be necessary to select an Mn content within the region of overlap.

This line of argument is not convincing. Within D1, the skilled person would firstly have to select C in the range of overlap (column 1, lines 56/57).

They would then have to select a steel with decreased "stacking fault energy" (column 1, lines 60 to 63) and subsequently specifically select Al over Cr, Co, Si and Cu from the list of elements in column 2, lines 1 to 5,

to achieve this. Subsequently, they would have to choose an Al concentration in the region of overlap.

They would further have to make the choice of a steel that is not to be hardened to have no Cr present (column 2, lines 6 to 36), and then select an Mn content within the region of overlap with claim 1 of the patent in suit (column 2, lines 32 to 35).

Thus, multiple selections are necessary to arrive at the subject-matter of claim 1. For the reasons set out above under point 3.2, this renders the subject-matter of claim 1 novel over D1 (Article 54(1) and (2) EPC).

3.4 Such multiple selections are necessary to arrive at the subject-matter of claim 1 also in view of D2.

The ranges of C and Mn in paragraphs [18] to [22] of D2 and those of claim 1 of the main request do indeed overlap.

It is also necessary to select the presence of Al and for it to be present in an amount within the region of overlap (paragraphs [30] and [31]). Similarly, it is either necessary to decide that Ni is not going to be present or that it is present in an amount within the region of overlap (paragraphs [30] and [34]). Due to the closed form of claim 1 of the main request, it is also necessary to decide in D2 that Cu is not present (paragraph [30]).

With regard to the example "IS1" in Table 1, the board notes that Al is absent, in contrast to claim 1 of the main request.

At least for these reasons, the subject-matter of claim 1 is novel over D2 (Article 54 EPC).

- 3.5 The C range of D3 (claim 2 and line 13), namely 0.8 to 1.7%, is higher than the range of claim 1 of the main request.

At least for this reason, the subject-matter of claim 1 is novel over D3 (Article 54(1) and (2) EPC).

- 3.6 The reasoning set out in points 3.3 to 3.5 above also applies to the other claims that were objected to (Article 54 EPC).

- 3.7 Also in view of the general disclosure of D7, multiple selections are necessary to arrive at the subject-matter of claim 8, since:
- the C ranges of claim 1 of the main request and of D7 (paragraphs [53] and [54]) overlap,
  - the claimed Mn range is a sub-range of the range disclosed in paragraphs [56] to [58], and
  - the range of Al (paragraphs [60] to [65]) overlaps.

In contrast to claim 8 of the patent in suit, which directly or indirectly refers back to claim 1, Examples 1 and 2 (Table 1) of D7 do not necessarily have a thickness of the rolled steel strip in the claimed range. Indeed, the thickness of these examples is not mentioned.

The appellant argued that a strip with a thickness

- of above 20 mm could not be obtained by cold rolling, and
- of below 0.5 mm could not be obtained by hot rolling.

However, the appellant has provided no evidence for these allegations. It is thus not credible that the strips of Examples 1 and 2 of Table 1 cannot have a thickness outside the range of claim 8.

At least for these reasons, the subject-matter of claim 8 is novel over D7 (Article 54 EPC).

- 3.8 Hence, the main request meets the requirements of Article 54 EPC, irrespective of
- whether the priorities of the main request are valid, and
  - whether documents D2 and D7 belong to the state of the art under Article 54(3) EPC.

These questions can therefore remain unanswered.

#### 4. Inventive step

4.1 The invention relates to austenitic steel.

4.2 The appellant considered that D1 was the closest prior art of the subject-matter of claim 1.

This was not contested by the respondent.

Since D1 also relates to austenitic steel and since it additionally discloses numerous features of claim 1 of the main request (see point 3.3 above), D1 is indeed an appropriate starting point for assessing inventive step.

4.3 According to the patent in suit, the problem to be solved is to provide an austenitic steel having high

strength, good formability for cold rolling (paragraph [0006]) and improved weldability (paragraph [0020]).

- 4.4 It is proposed that this problem be solved by the austenitic steel of claim 1 being characterised by the combination of the specific C, Mn, Al and Ni concentration ranges.
- 4.5 The appellant alleged that no technical effect relating to the combination of the concentration ranges of claim 1 was achieved and that the problem to be solved was to merely provide an alternative. The steel of D1 was cold-rollable and therefore necessarily had a "good formability for cold rolling", and this without an annealing step. The appellant also contested that the steel of the inventive examples of Table 4 had an austenite content of at least 80% as required by claim 1. It was equally possible that this content was, although above the minimum content of 75% of claim 1 as originally filed, below 80%. Moreover, comparative Example 11 of the patent in suit, which contained too much Ni according to Table 3, had better (i.e. higher)  $n(10-20)$  and  $r(20)$  values than inventive Example 1, as shown by Table 4. Furthermore, lines 3 and 4 of Table 4, both referring to inventive Example 1, showed that the process parameters of the annealing step were more important for formability for cold rolling than the steel composition. Finally, the problem posed was not solved for steel ingots or powder, since such steels could not have, by their nature, good formability for cold rolling.

However, paragraph [0013] of the patent in suit explains the interaction between C and Al in austenitic steel and the related effect on formability for cold rolling. Moreover, paragraph [0020] explains that the



limited C content of claim 1 results in improved weldability.

Furthermore, while the austenite content of the exemplary steels of the patent in suit is not explicitly disclosed, paragraphs [0038], [0044] and [0046] of the description indicate that Examples 1, 9 and 10 are in accordance with the invention. It is thus reasonable to conclude that the austenite content is above 80%; the appellant has provided no evidence to the contrary.

Since claim 1 merely requires a "good formability for cold rolling" and since the relative term "good" has to be construed broadly, the properties of the examples of lines 3 and 4 of Table 4 fall under the expression "good formability for cold rolling".

Furthermore, inventive Example 1 and comparative Example 11 of the patent in suit (see Table 3 as well as the fourth and penultimate line of Table 4) are not directly comparable since the process parameters (e.g. the coiling temperature and the annealing temperature) are not identical. The appellant has provided no evidence that, for identical process parameters, the strength and cold rollability of a steel having a composition outside the claimed ranges are better than the inventive alloys.

Comparative Example 11 of the patent in suit (see Tables 3 and 4) is also not representative of D1. Thus, the C content of 0.59% of Example 11 is below the range of D1 (column 1, lines 56 and 57).

The appellant's argument regarding steels in forms other than strips, such as ingots or powder, is not

convincing either. The skilled person either knows that ingots/powder and formability for cold rolling are contradictory, in which case they would understand that steels in these forms would have to be brought into a suitable form first in order to assess these properties; or this is not part of common general knowledge, in which case the appellant failed to submit evidence to prove this allegation.

There is hence no reason to doubt that claim 1 of the main request successfully solves the problem posed.

- 4.6 Moreover, the appellant did not indicate anything, either in D1 or in the other prior art on file, that would motivate the skilled person to specifically choose the combination of the claimed concentrations in order to solve the posed problem.

The skilled person could not identify anything in the prior art either, in particular in their common general knowledge or in D4, D5 or D6.

Such a selection is thus the result of a hindsight consideration. Hence, the inventive step of the subject-matter of claim 1 is acknowledged (Article 56 EPC).

- 4.7 For the same reasons as set out above under points 4.1 to 4.6, the subject-matter of independent method claim 9, which is directed to a method of producing a steel having the composition and austenite content of claim 1, also involves an inventive step (Article 56 EPC).

The same reasoning applies to dependent claims 2 to 8 and 10 to 14 (Article 56 EPC).

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:



C. Rodríguez Rodríguez

E. Bendl

Decision electronically authenticated