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Datasheet for the decision of 21 June 2021

Case Number: T 1350/18 - 3.3.05

Application Number: 09709141.7

Publication Number: 2267176

IPC: C22C38/00, C21D9/46, C22C38/06, C22C38/58

Language of the proceedings: EN

Title of invention:
HIGH-STRENGTH HOT-DIP GALVANIZED STEEL SHEET WITH EXCELLENT PROCESSABILITY AND PROCESS FOR PRODUCING THE SAME

Patent Proprietor:
JFE Steel Corporation

Opponent:
ArcelorMittal

Headword:
Galvanized steel sheet/JFE

Relevant legal provisions:
EPC Art. 54(1), 54(3), 56, 83

Keyword:
Sufficiency of disclosure - (yes)
Novelty - main request (yes)
Inventive step - non-obvious modification - main request (yes)

Decisions cited:
T 1764/06

Catchword:

Europäisches Patentamt
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Beschwerdekammern

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Case Number: T 1350/18 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 21 June 2021

Appellant: (Opponent)	ArcelorMittal 24-26, Boulevard d'Avranches 1160 Luxembourg (LU)
Representative:	Lavoix 2, place d'Estienne d'Orves 75441 Paris Cedex 09 (FR)
Respondent: (Patent Proprietor)	JFE Steel Corporation 2-3, Uchisaiwaicho 2-chome Chiyoda-ku Tokyo 100-0011 (JP)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 9 April 2018 rejecting the opposition filed against European patent No. 2267176 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	T. Burkhardt
	S. Fernández de Córdoba

Summary of Facts and Submissions

I. The opponent's (appellant's) appeal lies from the opposition division's decision to reject the opposition against European patent EP 2 267 176 B.

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

D1	EP 2 202 327 A1
D2	JP 2007 197819 A
D2 (EN)	Translation of D2

III. The opposition division held, among other things, that:
- the patent in suit fulfilled the requirements of Article 83 EPC,
- the subject-matter of claim 1 of the patent in suit was novel over D1 and inventive over D2.

IV. Independent claim 1 of the patent as granted reads as follows:

"1. A method for manufacturing a high-strength galvanized steel sheet excellent in formability, comprising manufacturing a cold-rolled steel sheet by subjecting a slab consisting of - on a mass basis - 0.05% to 0.5% C, 0.01% to 2.5% Si, 0.5% to 3.5% Mn, 0.003% to 0.100% P, 0.02% or less S, and 0.010% to 0.5% Al, optionally further containing on a mass basis at least one selected from the group consisting of 0.005% to 2.00% Cr, 0.005% to 2.00% Mo, 0.005% to 2.00% V, 0.005% to 2.00% Ni, 0.005% to 2.00% Cu, 0.01% to 0.20% Ti, 0.01% to 0.20% Nb, 0.0002% to 0.005% B,

0.001% to 0.005% Ca and 0.001% to 0.005% of a REM, the remainder being Fe and unavoidable impurities to hot rolling and then cold rolling; annealing the cold-rolled steel sheet in such a manner that the sheet is heated from a temperature 50°C lower than the Ac_3 transformation point to the Ac_3 transformation point at an average rate of 2 °C/s or less, soaked by holding the sheet at a temperature not lower than the Ac_3 transformation point for 10 s or more, cooled to a temperature 100°C to 200°C lower than the Ms point at an average rate of 20 °C/s or more, and then reheated at 300°C to 600°C for 1 to 600 s; and galvanizing the resulting sheet."

Dependent claim 2 relates to a preferred embodiment.

V. In a communication under Article 15(1) RPBA 2020 the board informed the parties of its preliminary opinion that the appeal was likely to be dismissed.

VI. In response, the appellant withdrew its request for oral proceedings and the oral proceedings, scheduled for 21 June 2021, were cancelled.

VII. The appellant's arguments, as far as relevant to the present decision, may be summarised as follows:

Due to the absence of decimals in the average heating rate of 2°C/s in claim 1, it followed from the usual rounding conventions that the heating rate of 2.3°C/s of Example 24 (Table 3) of the patent in suit fell within the claimed range. Since, moreover, this example did not result in a steel sheet having "excellent formability", as required in claim 1, the invention was not sufficiently disclosed.

It went beyond the skilled person's common general knowledge to control the average heating rate of the steel in the claimed range. The patent in suit also lacked sufficient information in this respect.

The subject-matter of claim 1 of the patent as granted lacked novelty over D1 (Article 54(1) and (3) EPC), in particular since Example 25 of D1 had not only a composition according to claim 1 of the patent in suit but also the desired proportions of phases and microstructures. This implied the claimed average heating rate of 2°C/s or less, which was, in addition, merely an arbitrary selection.

The subject-matter of claim 1 also lacked inventive step over D2, in particular since the only distinguishing feature, i.e. the reheating at 300°C to 600°C, had no technical effect.

VIII. The patent proprietor's (respondent's) arguments, as far as relevant to the present decision, may be summarised as follows:

The heating rate of 2.3°C/s of comparative Example 24 of the patent in suit was outside the range of claim 1.

The patent in suit as a whole disclosed the invention in a manner which was sufficiently clear and complete.

The Article 54(3) EPC document D1 did not disclose an average heating rate of 2°C/s in the vicinity of the Ac_3 transformation point.

Document D2 did not disclose the low heating rate to a temperature below the Ac_3 transformation point, the cooling rate of 20 °C/s or more to a temperature lower

than the Ms point or the re-heating. Starting from D2, the skilled person had no motivation to arrive at the claimed subject-matter.

The main request (patent as granted) therefore fulfilled the requirements of the EPC.

IX. The appellant requested that the decision be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed.

Alternatively, they requested that the patent be maintained as amended on the basis of:
- auxiliary requests 1 to 4 as filed with the reply to the statement setting out the grounds of appeal, or
- auxiliary request 5 as filed with a submission dated 12 September 2019.

Reasons for the Decision

Main request (patent as granted)

1. Sufficiency of disclosure

For the following reasons, the patent in suit fulfils the requirements of Article 83 EPC:

1.1 The appellant was of the opinion that, due to the absence of decimals in the maximum average heating rate of 2°C/s in claim 1, it followed from the usual rounding conventions that the heating rate of 2.3°C/s of Example 24 (Table 3) of the patent in suit fell

within the claimed range. However, since this example did not result in a steel sheet having "excellent formability", as required in claim 1, the invention was not sufficiently disclosed.

This objection is not convincing. According to established case law, sufficiency of disclosure is to be assessed on the basis of the application as a whole (Case Law of the Boards of Appeal, 9th edition 2019, II.C.3.1). This means that the description is also to be taken into consideration, in the present case e.g. to see whether there is additional information as to the accuracy of the measurement of the average heating rate.

In view of the following indications in the patent in suit, the skilled person understands that the average heating rate of 2.3°C/s of Example 24 lies *outside* the claimed range:
- Example 24 in Tables 3 and 5 is labelled as a "*Comparative* example" (emphasis added by the board).
- Apart from the "Heating rate (°C/s)" in Table 3, all the other parameters of Example 24 clearly lie *within* the claimed ranges. It is hence only the heating rate of 2.3°C/s that makes this example "comparative" and not inventive.
- For *all* the examples in Table 3, the average heating rate is given with a precision of one decimal.

In turn, the fact that an average heating rate of 2.3°C/s lies outside the claimed range means that the appellant's allegation that the effect "excellent in formability" in claim 1 is not achieved over the entire ambit of the claim is irrelevant.

The decisions cited by the appellant in this regard relate to cases where the wording of the claims was clearly unambiguous, which is not the case here.

1.2 In the appellant's view, it went beyond the skilled person's common general knowledge to control the average heating rate of the steel in the claimed range. The patent in suit also lacked sufficient information in this respect.

Although the burden of proof in this regard lies with the appellant, it failed to provide evidence for these allegations. Moreover, it is plausible that the skilled person is able to control the average heating rate in the claimed rate by applying their common general knowledge and that even the highest permissible heating rate leaves enough time during the heating for carrying out measurements and control actions.

2. Novelty

2.1 In the appellant's view, the subject-matter of claim 1 lacked novelty over D1 (Article 54(1) and (3) EPC).

In its view, the claimed feature

> "annealing ... in such a manner that the sheet is heated from a temperature 50°C lower than the Ac_3 transformation point to the Ac_3 transformation point at an average rate of 2°C/s or less"

was implied by the fact that Example 25 of D1 (pages 14 and 18) discloses the presence of the chemical elements in the ranges of claim 1 of the patent in suit and the desired proportions of phases and microstructures in the steel.

The board does not share this view. For cases with an average heating temperature of below 2.3°C/s (see also point 1.1 above), it has not been disputed that the desired proportions of phases and microstructures are obtained when the claimed composition and process steps are respected.

However, even under the assumption that Example 25 of D1 *does* disclose the claimed composition and the desired proportions of phases and microstructures in the steel, there is no proof on file that the *reverse conclusion* is also true: indeed, it cannot be excluded that there are also other ways than the claimed method steps to achieve the desired proportions of phases and microstructures.

The fact that the information given in the patent in suit, in particular the examples, does not contradict such a reverse conclusion is not sufficient proof of its validity.

The board therefore concludes that the claimed composition and the desired proportions of phases and microstructures in the steel are not direct and unambiguous proof that the method steps of claim 1 were carried out.

Moreover, at the present stage of the proceedings, the burden of proof lies with the appellant. T 1764/06 and Part G of the Guidelines, cited by the appellant to show the contrary, relate instead to the examination procedure.

2.2 The question of whether the claimed heating rate of 2°C/s or less is an arbitrary selection relates to the assessment of inventive step rather than novelty.

Indeed, the "third criterion" for selection inventions, according to which the selected range must not be an arbitrary specimen of the prior art, no longer appears in the latest version of the Guidelines (see G-VI, 8).

Hence, the average heating rate in the vicinity of the Ac_3 transformation point of 2°C/s or less is indeed a distinguishing feature and the subject-matter of claim 1 is thus novel over D1 (Article 54(1) and (3) EPC).

2.3 For the same reasons, the subject-matter of dependent claim 2 is also novel (Article 54(1) and (3) EPC).

2.4 Consequently, the question of whether Example 25 of D1 truly discloses the desired proportions of phases and microstructures in the steel may be left unanswered.

3. Inventive step

3.1 The invention relates to a method for manufacturing a high-strength galvanised steel sheet.

3.2 Since D2 relates to TRIP (TRansformation Induced Plasticity) steel sheets having good mechanical properties and ductility (abstract), it is an appropriate starting point for assessing inventive step.

Although the respondent considered that TRIP steel related to a different technical field, it did not dispute that D2 might be considered closest prior art.

3.3 According to the patent in suit, the problem to be solved is the provision of a method for manufacturing a

galvanised steel sheet that has a high strength and an excellent formability, in particular high tensile strength TS, elongation El and hole expansion ratio (paragraphs [0001], [0006]).

3.4 The patent in suit proposes to solve this problem by means of the method of manufacturing of claim 1, characterised in:
(a) an annealing step wherein the steel sheet is heated in the vicinity of the Ac_3 transformation point at an average rate of 2°C/s or less,
(b) a cooling step with an average cooling rate of 20°C/s or more, and
(c) a reheating step at 300°C to 600°C for 1 to 600 s

The appellant conceded that (c) was a distinguishing feature but, contrary to its view, features (a) and (b) are distinguishing features, too.

With regard to feature (a), the appellant alleged that the heating rate was *implicitly* disclosed in D2. However, as explained above with regard to D1 (see point 2.1), the composition and structure of the resulting steel are not sufficient evidence of a heating rate in the claimed range since they do not been prove that there are no other ways to yield the desired steel structure.

With regard to feature (b), D2 discloses in paragraphs [0073] and [0075] cooling rates of 3°C/s or more, or 10°C/s or more, but not of 20°C/s or more.

3.5 Tables 1 to 5 of the patent in suit show an effect related to the claimed method. Indeed, the parameters tensile strength TS, elongation El *and* hole expansion have simultaneously elevated values if the chemical

elements are present in the claimed ranges and the claimed method steps are respected.

Moreover, as explained above, a heating rate of 2.3°C/s does not lie within the claimed range (see point 1.1). Consequently, Comparative Example 24 of Table 3 of the patent in suit cannot prove that the problem is not solved over the entire claimed range.

Lastly, the appellant has failed to submit experimental evidence for its allegation that no effect is related to the distinguishing features.

3.6 In paragraph [0075] of D2 a cooling rate of 10°C or more is disclosed, but this is for a different purpose, namely avoiding the formation of pearlite.

Most importantly, there is nothing in D2 to prompt the solution of the problem posed in the claimed manner.

Consequently, the subject-matter of claim 1 is inventive within the meaning of Article 56 EPC.

3.7 For the same reasons, the subject-matter of dependent claim 2 is also inventive (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated