Internal distribution code:

(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 2 March 2022

Case Number: T 2114/19 - 3.3.05

Application Number: 12871249.4

Publication Number: 2826882

IPC: C22C38/06, C22C38/60, C22C33/04, C22C38/00, C22C38/02, C21D8/12, C21D9/46, C21D6/00, B21B1/00, C22C38/04, H01F1/16

Language of the proceedings: EN

Title of invention:
NON-ORIENTED ELECTRICAL STEEL PLATE AND MANUFACTURING PROCESS THEREFOR

Patent Proprietor:
Baoshan Iron & Steel Co., Ltd.

Opponent:
ThyssenKrupp Steel Europe AG

Headword:
Electrical steel plate/Baoshan

Relevant legal provisions:
EPC Art. 54(1), 54(2), 56, 123(2)
RPBA 2020 Art. 12(4), 13(2)

Keyword:
Novelty - main request (no) - public prior use (no)
Inventive step - auxiliary request (yes)
Amendment after summons - exceptional circumstances (no) - taken into account (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2114/19 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 2 March 2022

Appellant: (Opponent)	ThyssenKrupp Steel Europe AG Kaiser-Wilhelm-Strasse 100 47166 Duisburg (DE)
Representative:	Cohausz & Florack Patent- & Rechtsanwälte Partnerschaftsgesellschaft mbB Bleichstraße 14 40211 Düsseldorf (DE)
Respondent: (Patent Proprietor)	Baoshan Iron & Steel Co., Ltd. No.885 Fujin Road Baoshan District Shanghai 201900 (CN)
Representative:	Zumstein, Angela Maiwald Patentanwalts- und Rechtsanwaltsgesellschaft mbH Elisenhof Elisenstraße 3 80335 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 14 May 2019 concerning maintenance of the European Patent No. 2826882 in amended form.**

Composition of the Board:

Chairman	E. Bendl
Members:	T. Burkhardt
	O. Loizou

Summary of Facts and Submissions

I. The opponent's (appellant's) appeal lies from the opposition division's decision to maintain the European patent No. 2 826 882 B as amended on the basis of the then first auxiliary request.

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

E9 "Produktkatalog. Nichtkornorientiertes Elektroband PowerCore®.", XP055442629, ThyssenKrupp Stahl, June 2006, pp. 16-19

E10 Acceptance test certificate for order 6012711 (shipment 80176751) dated 13 March 2006, XP055442631, ThyssenKrupp Steel, pp. 1-2

E20 Analytical results relating to the electromagnetic properties of PowerCore® 400-50 AP as determined on 1 January 2012

E22 Invoice 8735082 dated 8 December 2005, ThyssenKrupp steel Europe, pp. 1-5

E23 Confirmation of payment of invoice E22

E24 Analytical results relating to melt no. 3661, ThyssenKrupp Steel Europe AG, 25 October 2005

III. The opposition division held, *inter alia*, that claims 1 and 3 of the then auxiliary request 1 (current main request) were novel *vis-à-vis* the alleged public prior use mainly corresponding to documents E9, E10 and E22 to E24.

In particular, in its view, an apparent inconsistency regarding the iron loss values at 1.0 T at 50 Hz,

$P_{10/50}$, between the table on page 17 of E9 and the measured value of E10 casts doubt on the reliability of the data of E9.

IV. With its statement setting out the grounds of appeal, the appellant additionally submitted the following documents:

E30 Wikipedia entry for "Magnetische Permeabilität", 2018

E31 Wikipedia entry for "Magnetische Polarisation", 2017

V. Independent claim 1 of the main request (patent as maintained by the opposition division) reads as follows:

"1. A non-oriented electrical steel sheet, the casting slab of which consists of:
Si: 0.1~2.0wt%; Al: 0.1~1.0wt%; Mn: 0.10~1.0wt%; C: ≤0.005wt%; P: ≤0.2wt%; S: ≤0.005wt%; N: ≤0.005wt%; optionally one or both of Sn and Sb with a total amount of ≤0.3wt%; and balance being Fe and other unavoidable impurities,
and the magnetic permeability of the steel sheet satisfies the following formulas (1) and (2):
$\mu_{10} + \mu_{13} + \mu_{15} \geq 13982 - 586.5P_{15/50}$ (1)
$\mu_{10} + \mu_{13} + \mu_{15} \geq 10000$ (2)
wherein μ_{10}, μ_{13} and μ_{15} respectively represent the relative magnetic permeability at magnetic inductions of 1.0T, 1.3T and 1.5T at 50Hz; $P_{15/50}$ represents the iron loss at 50Hz and under a magnetic induction of 1.5T, $P_{15/50}$ in formula (1) is calculated as a dimensionless numerical value."

VI. In independent claim 1 of the auxiliary request 1, the feature "optionally one or both of Sn and Sb with a total amount of ≤0.3wt%" is replaced by "one or both of Sn and Sb with a total amount of 0.04~0.1wt%".

Independent claim 3 of auxiliary request 1 reads as follows:

"4. A method for producing the steel sheet according to anyone of Claims 1 or 2, which includes steps of steelmaking, hot rolling, acid pickling, cold rolling and annealing in sequence, wherein a final rolling temperature (FDT) of the hot rolling process satisfies the following formula (4):
$830 + 42 \times (Si + Al) < FDT < 880 + 23 \times (Si + Al)$ (4),
wherein Si and Al respectively represent the weight percentages of elements Si and Al, and the unit of FDT is °C, and in the hot rolling process, the time interval t1 between the end of a rough rolling of the intermediate slab and the start of the finishing rolling in F1 frame is controlled to be ≥20 sec., and the time interval t2 between the end of the finishing rolling of the intermediate slab and the start of a laminar cooling process is controlled to be ≥5 sec."

Dependent claims 2 and 4 of auxiliary request 1 relate to preferred embodiments.

VII. In a communication under Article 15(1) RPBA, the board informed the parties of its preliminary opinion that the main request did not appear to fulfil the requirements of Article 54(1) and (2) EPC *vis-à-vis* the alleged public prior use mainly corresponding to documents E9, E10 and E22 to E24.

VIII. In response, the patent proprietor (respondent) presented further arguments and its own reading of the data from the figure on page 19 of E9 as well as the determination of the corresponding relative magnetic permeabilities.

IX. The appellant's arguments, where relevant to the present decision, may be summarised as follows.

The public prior use corresponding to cold strip no. 22686999 (in the following "cold strip '99"), as illustrated by documents E9, E10 and E22 to E24, anticipated the subject-matter of claim 1 of the main request.

The respondent's reading of the data from the figure on page 19 of E9 and determination of the relative permeabilities from this data, as filed after the board's communication under Article 15(1) RPBA 2020, were late filed without cogent reasons and should not be admitted.

The appellant had no objections to auxiliary request 1.

X. The respondent's arguments, where relevant to the present decision, may be summarised as follows.

There was no direct link between documents E10 and E22 to E24, in particular because of the difference relating to the names of the client, the spellings of the steel grade, the weights of the shipments and the number of parcels.

It could not be ascertained that cold strip '99 had the electromagnetic properties of PowerCore® 400-50 AP as disclosed in E9 and that it had relative magnetic

permeabilities μ_{10}, μ_{13} and μ_{15} as well as an iron loss $P_{15/50}$ that fulfilled the inequalities of claim 1 of the patent in suit.

Significant deviations in the appellant's reading of data from E9 in the opposition and appeal proceedings also showed that the retrieved data were not reliable.

This was confirmed by the fact that the iron loss $P_{10/50}$ of cold strip '99, i.e. 1.79 W/kg according to E10, exceeded the maximum value of 1.70 W/kg given in the table on page 17 of E9.

In other words, the public prior use was not proven up to the hilt.

The respondent's reading of the data from the figure on page 19 of E9 and determination of the relative permeabilities from this data, as filed with the submission dated 30 December 2021, merely represented a further development of arguments already presented in the reply to the statement setting out the grounds of appeal and should therefore be admitted. It was moreover a response to the board's communication, in particular to the second full paragraph on page 8. The results showed that cold strip '99 did not fulfil the inequalities (1) and (2) of claim 1 of the main request.

Auxiliary request 1 also fulfilled the requirements of the EPC.

XI. The appellant requested that the decision under appeal be set aside and that the set of claims maintained by the opposition division (current main request of the respondent) be rejected.

The respondent requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form on the basis of one of two auxiliary requests filed with its reply to the grounds of appeal.

Reasons for the Decision

Main request

The main request corresponds to the amended patent as maintained by the opposition division.

1. Article 54 EPC

1.1 In the appellant's view, the subject-matter of claim 1 of the main request was anticipated by the public prior use cold strip '99. This strip resulted from melt no. 3661.

The evidence presented for this public prior use is mainly based on acceptance test certificate E10 in combination with the electromagnetic properties of the PowerCore® 400-50AP grade as disclosed in brochure E9 describing the general properties of the kind of steels cold strip '99 belongs to. The values of E9 can be converted into the relative permeabilities μ_r that appear in claim 1 of the patent in suit. Documents E22 to E24 disclose details of the delivery of cold strip '99 to the client.

1.2 Admission of the respondent's reading of data from E9

After the board had issued its preliminary opinion, the respondent submitted for the first time on 30 December 2021 its own reading and determination of electromagnetic properties from the graph on page 19 of E9.

In the respondent's view, this reading was merely a further development of arguments already presented in its reply to the statement setting out the grounds of appeal.

However, for the reasons set out below, the respondent's reading of the data and determination of relative permeabilities constitute an amendment to the respondent's case, and the board exercised its discretion and did not admit them (Article 13(2) RPBA 2020).

In the notice of opposition, the appellant explained how it had determined the relative permeabilities μ_{10}, μ_{13} and μ_{15} from the curve corresponding to grade "400-50 AP" in the figure on page 19 of E9. Throughout the opposition proceedings, the now respondent criticised the now appellant's reading in general terms but did not provide its own reading.

In its reply to the statement setting out the grounds of appeal, the respondent again alleged in a general manner that the relative permeabilities μ_r obtained by the appellant from the figures of E9 were not "reliable" (paragraphs 57 and 58). To substantiate this allegation, the respondent more specifically hinted at:

- an apparent inconsistency between the iron loss $P_{10/50}$ in the table on page 17 of E9 (1.70 W/kg maximum) and the value given in E10 (1.79 W/kg)
- differing values for the iron loss $P_{15/50}$ and the relative permeabilities μ_{10} presented by the appellant during the opposition and appeal proceedings

Only in the reply to the board's preliminary opinion did the respondent point to practical problems in the reading of data from the figure on page 19 of E9. For the first time, it confronted the appellant and the board with concrete values different to the ones which formed the basis for the considerations during the opposition proceedings and most of the appeal proceedings. The respondent's submission therefore showed for the first time the criticality of the precision of the reading. In other words, for most of the proceedings, the respondent argued that the right-hand sides of inequalities (1) and (2) were not anticipated by the prior use, whereas in its latest submission, the focus changed to the parameters of the left-hand side of the inequalities.

Hence, the respondent's submission is not merely the corroboration of an existing line of argument but an attempt to substantiate in an entirely different manner the general allegation that data cannot be reliably retrieved from the figure on page 19 of E9.

The submission can also not be considered to have been triggered by the board's communication, in particular by the second full paragraph on page 8. Indeed, throughout the entire opposition and appeal proceedings, the then opponent has shown its way of retrieving the data from the figure on page 19 of E9

and that the cold strip '99 fulfilled the inequalities of claim 1 of the patent in suit. But only a couple of weeks prior to the oral proceedings, the respondent came up with values different to the ones under discussion so far.

Indeed, only in its latest submission did the respondent present values according to E9 lying outside the claimed ranges. It stated that this difference was the result of the appellant's imprecise reading of the graphs on page 19 of E9, where even a deviation of a tenth of a millimetre changed the outcome. However, confronting the other party with contradicting values close to the oral proceedings does not leave it enough time to make counter-arguments and provide further evidence with respect to the measurements which had been on file for years.

This amendment to the respondent's case was submitted at a very late stage in the appeal proceedings, i.e. more than five months after the board's communication under Article 15(1) RPBA 2020 and less than nine weeks before the oral proceedings. If admitted, the highly contradictory statements would probably necessitate a postponement of the oral proceedings. This clearly goes against procedural economy.

The respondent has indicated no other reasons, let alone any "exceptional circumstances, which have been justified with cogent reasons", why it did not provide its alternative reading at an earlier stage.

For these reasons, the amendment of the respondent's case is contrary to the requirement of procedural economy and significantly increases the complexity of the case (Article 13(1) RPBA 2020). Moreover, because

of the lateness of the submission, its admission would have been unfair to the appellant.

1.3 Substantive discussion of novelty *vis-à-vis* cold strip '99

In its reply to the statement setting out the grounds of appeal, the respondent disputed that the typical electromagnetic properties disclosed in E9 for "PowerCore® 400-50AP" grade steel sheets were necessarily those of cold strip '99 of E10 and E22 to E24. It could therefore not be ascertained that cold strip '99 had relative magnetic permeabilities μ_{10}, μ_{13} and μ_{15} and an iron loss $P_{15/50}$ that fulfilled the inequalities of claim 1 of the patent in suit.

The respondent has not disputed that cold strip '99 discloses all the other features of claim 1.

Indeed, the composition disclosed on page 2 of E10 falls within the ranges of claim 1 of the main request.

For the following reasons, the respondent's arguments why cold strip '99 was not novelty-destroying for the subject-matter of claim 1 are not convincing.

1.3.1 Public accessibility of the alleged public prior use

The respondent alleges that it contested the public availability of the alleged public prior use in its reply to the statement setting out the grounds of appeal. However, paragraphs 46 to 59 of the respondents reply, to which the respondent refers, do not support its allegations because these paragraphs do not address accessibility/availability but the alleged missing link between the different documents, in particular between

documents E10 and E9. Thus, the respondent's challenge to the availability of the prior use also has to be regarded as late filed without indication of any cogent reasons and is therefore not taken into consideration (Article 13(2) RPBA 2020).

1.3.2 As explained below (see point 1.3.5), all the values retrieved from E9 fulfil the inequalities of claim 1 of the patent in suit.

In line with this, the crucial property iron loss $P_{15/50}$ of 3.89 W/kg of PowerCore® 400-50 AP (see E10) is well below the maximum value of 4.00 W/kg given in the table on page 17 of E9.

This confirms the direct link between document E9 and E10 and also E22 to E24.

1.3.3 While the names of the recipient "Dr. Karl Bausch GmbH & Co." (E10) and "Hidria Bausch GmbH" (E22, page 3) are not identical, the postal address, the part of the names "Bausch", the shipment number 6012711, the weight of 17,230 kg and the number of ten parcels (accounting for the *ranges* of parcels in E10, namely between BP00305808-10 and BP00305882-85) in E9 and E10 are identical and prove that the same shipment is the object of documents E10 and E22.

1.3.4 While the respondent observed that the publication dates of Wikipedia entries E30 and E31 were after the effective date of the patent in suit and notwithstanding the question of admissibility of these documents, it did not contest the validity of the relationships given in these documents *per se* and that the relationship was known to the skilled person.

The appellant has indeed used the relationship $\mu_r = (J + \mu_0*H)/\mu_0/H$ (or $\mu_r = J/\mu_0/H + 1$) since the notice of opposition to determine the relative permeabilities μ_r from the magnetic polarisation J and the magnetic field strength H as read from the figure on page 19 of E9 (see for example the end of page 7).

There is no evidence on file that these equations do not correspond to the well-known macroscopic Maxwell equations. Although its content has not been taken into consideration in the appeal proceedings, even the respondent used this relationship in its submission dated 30 December 2021.

There is hence no evidence that these relationships are not suitable for determining the relative magnetic permeabilities μ_{10}, μ_{13} and μ_{15} from the data retrieved from the figure on page 19 of E9.

1.3.5 While the magnetic properties of PowerCore® 400-50AP can only be determined with a certain degree of precision from the graphs of E9, *all* the retrieved values taken into account indicate that the PowerCore® 400-50 AP cold strip '99 fulfils the inequalities (1) and (2) of claim 1 of the patent in suit. Indeed, these inequalities are fulfilled irrespective of:

- which $P_{15/50}$ value from paragraph 54 of the reply to the statement setting out the grounds of appeal is used, be it 3.36 (appellant's reading from the graph on page 18 of E9 in the first-instance proceedings), 3.396 (statement setting out the grounds of appeal), 4.00 (maximum value indicated in the table on page 17 of E9), 3.89 (value of E10) or 3.53 W/kg (value of E20)

- whether (see paragraph 51 of the reply) the relative permeability μ_{10} is taken as 6632 (notice of opposition) or 6392 (appellant's statement setting out the grounds of appeal)

1.3.6 The fact that the maximum core loss of 1.70 W/kg for PowerCore® 400-50AP at 50 Hz at 1.0 T in the table on page 17 of E9 is merely "a reference value and [...] for information only" (see the footnote of the table) explains the alleged contradiction with the slightly higher value of 1.79 W/kg mentioned in E10. This alleged contradiction can thus not show that E9 and E10 relate to electrical steel sheets with different compositions/properties or that "PowerCore® 400 - 50 AP" (E9) and "PowerCore® 400-50AP" (E10/E22) relate to different sorts of steel sheets.

The board therefore does not share the opposition division's view that the different $P_{10/50}$ values amount to a contradiction that puts into question the reliability of all the data of E9.

1.3.7 For these reasons, all the admissible elements on file, without exception, show that cold strip '99 does fulfil the inequalities of claim 1 of the patent in suit.

1.4 For these reasons, the availability and the novelty-destroying character of cold strip '99 have been proven beyond any reasonable doubt ("up to the hilt").

The subject-matter of claim 1 of the main request is hence anticipated by the public prior use relating to PowerCore® 400-50AP cold strip '99 (Article 54(1) and (2) EPC).

Auxiliary request 1

Auxiliary request 1 is identical to auxiliary request 3 of the opposition stage, which had been filed as auxiliary request 2 on 30 April 2018. It had thus been admissibly filed at the opposition stage, and there is consequently no reason not to admit this request (Article 12(4) RPBA 2020).

The appellant indicated that it had no objections to this request.

For the reasons set out below, auxiliary request 1 meets the requirements of the EPC.

2. Article 123(2) EPC

Independent entity claim 1 is based on claim 1 as well as on page 9, lines 15 to 17 as originally filed.

Independent method claim 3 is based on:
- claim 4 as originally filed
- claim 6 or page 4, lines 1 to 5 as originally filed
- claim 8 or page 4, lines 9 to 13 as originally filed

Dependent claims 2 and 4 are respectively based on claims 3 and 5 as originally filed.

3. Patentability

No novelty or inventive-step objections to auxiliary request 1 are on file.

For the following reasons, the requirements of Articles 54 and 56 EPC are met.

3.1 The melt of cold strip '99 does not have the claimed Sn and/or Sb content (see E10 and E24).

The subject-matter of claim 1 of auxiliary request 1 is hence novel (Article 54(1) and (2) EPC).

3.2 There is no evidence on file to show that the claimed Sn and/or Sb content do not solve the problem of reducing the oxidation inside the surface (see paragraph [0044] of the patent in suit).

There is also no evidence on file proving that the skilled person would add Sn and/or Sb in the claimed manner without inventive skill to solve the posed technical problem of providing a non-oriented electrical steel sheet with low iron loss and high magnetic permeability.

Consequently, the subject-matter of claim 1 of auxiliary request 1, and thus also of the remaining claims, fulfils the requirements of Article 56 EPC.

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 claims of auxiliary request 1 as filed with the reply to the statement of grounds of appeal and a description to be adapted if necessary.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated