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**Datasheet for the decision  
of 29 September 2025**

**Case Number:** T 0331/24 - 3.3.05

**Application Number:** 14716760.5

**Publication Number:** 2984198

**IPC:** C22C38/00, C21D1/00

**Language of the proceedings:** EN

**Title of invention:**

PRODUCT FORMED BY HOT FORMING OF METALLIC COATED STEEL SHEET,  
METHOD TO FORM THE PRODUCT, AND STEEL STRIP

**Patent Proprietor:**

Tata Steel IJmuiden B.V.

**Opponents:**

ArcelorMittal  
ThyssenKrupp Steel Europe AG

**Headword:**

Steel Strip/Tata

**Relevant legal provisions:**

EPC Art. 123(2), 83, 56

**Keyword:**

Amendments - allowable (yes)  
Sufficiency of disclosure - (yes)  
Inventive step - (yes)

**Decisions cited:**

G 0002/21, T 0210/05, T 0449/23

**Catchword:**



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

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Case Number: T 0331/24 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 29 September 2025**

**Appellant:** ArcelorMittal  
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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
2 January 2024 concerning maintenance of the  
European Patent No. 2984198 in amended form.**

**Composition of the Board:**

<b>Chair</b>	T. Burkhardt
<b>Members:</b>	G. Glod
	R. Winkelhofer

## **Summary of Facts and Submissions**

- I. The appeals of opponent 1 (appellant 1) and opponent 2 (appellant 2) concern the opposition division's decision finding that European patent No. 2 984 198 in amended form based on then auxiliary request 2 met the requirements of the EPC.
- II. The following documents cited in the impugned decision are of relevance here:
- D5: H. Karbasian and A. E. Tekkaya, Journal of Materials Processing Technology 210, 2010, 2103-18
  - D8: JP 2001 64 751 A
  - D10: US 2012/0006451 A1
  - D11: JP 2011 208 164 A
  - D12: EP 2 053 139 A1
  - D19: JP 2010 43323 A
  - D19a: Machine translation of D19
  - D20: T. Altan, Stamping Journal, December 2006, 40-1
  - D22: Excerpt from Wikipedia of 26 January 2013, "Decarburization"
  - D23: Excerpt from The Great Soviet Encyclopedia, 1979, "Decarburization"
  - D26: Excerpt from Lexikon der Chemie 1998, Spektrum.de, "Verzinken", [www.spektrum.de/lexikon/chemie/verzinken/9759](http://www.spektrum.de/lexikon/chemie/verzinken/9759)
  - D27: D. W. Fan and B. C. De Cooman, Steel Research Int. 83(5), 2012, 412-33
- III. In addition, appellant 2 submitted the following document with their grounds of appeal:

D28: DIN EN ISO 3887, Steels Determination of depth of decarburization, October 2003

IV. During oral proceedings before the board, the respondent (patent proprietor) withdrew their then main request (auxiliary 2 underlying the impugned decision) and made auxiliary request 1 their main request, claim 1 of which reads as follows.

*"1. Method for producing a metallic coated hot formed product, the method comprising the following steps:*

- hot rolling a hot formable steel having the following composition in weight %:*

*C: 0.10 - 0.5, preferably 0.15 - 0.4*

*Mn: 0.5 - 3.0, preferably 1.0 - 2.5*

*Si: 0.1 - 0.5, preferably 0.1 - 0.4*

*Cr: up to 1.0, preferably up to 0.8*

*Ti: up to 0.2, preferably up to 0.1*

*Al: up to 0.2, preferably up to 0.1*

*P: up to 0.1, preferably up to 0.08*

*S: up to 0.05, preferably up to 0.04*

*B: 0.0005 - 0.08, preferably 0.0005 - 0.04*

*optionally Nb up to 2, preferably up to 0.1*

*optionally V up to 2, preferably up to 0.1*

*optionally W up to 3, preferably up to 0.1*

*the remainder being iron and unavoidable impurities, from a finishing rolling temperature between the Ac1 and the Ac3 temperature to the coiling temperature between 450 °C and 750 °C to provide a strip of hot formable steel having a decarburized zone with a controlled depth at both sides of the strip of steel, wherein the decarburized zone has been provided to a depth of 20 to 50 µm;*

- providing a metallic coating on the decarburized steel strip;*

- cutting a blank from the coated strip of metal;*

*- hot forming the coated blank or preformed part into a metallic coated hot formed product."*

Dependent claims 2 to 4 relate to preferred embodiments.

- V. The arguments of the appellants, as far as relevant to the present decision, can be summarised as follows.

The requirements of Article 123(2) EPC were not fulfilled. The cooling from the finishing rolling temperature to the coiling temperature was not implicit in claim 1.

The requirements of Article 83 EPC were not fulfilled either. The depth of the decarburised zone was ill-defined, as confirmed by D28. Guidance was lacking on how to achieve the decarburised zone.

The requirements of Article 56 EPC were likewise not fulfilled. Starting from D19/D19a, the problem to be solved was to provide an alternative method. The solution to this problem was obvious. There was no evidence on file that a more ambitious problem was successfully solved. If the respondent wanted to rely on this problem, they had the burden to prove that such a problem was successfully solved.

The subject-matter of claim 1 also lacked an inventive step when starting from each of D8, D10, D11 and D12.

- VI. The relevant arguments of the respondent are reflected in the reasons given below.
- VII. Appellants 1 and 2 request that the decision under appeal be set aside and amended such that the patent be revoked.

The respondent requests that the patent be maintained in amended form on the basis of the main request (submitted as auxiliary request 1 with the reply to the appeal) or, alternatively, one of auxiliary requests 2-9, 14-23, 10a, 10, 11a, 11, 12a, 12, 13a, 13, 24a, 24, 25a, 25, 26a, 26, 27a and 27.

## **Reasons for the Decision**

### *Main request*

#### 1. Article 123(2) EPC

The requirements of Article 123(2) EPC are met for the following reasons.

Compared to claim 13 of the application as filed, the expression "wherein the decarburized zone is provided by cooling a hot rolled strip of hot formable steel" is not present as such in claim 1 of the now main request.

Due to the absence of a verb, the skilled person reading claim 1 would immediately understand that the wording "from a finishing rolling temperature between the Ac1 and the Ac3 temperature to the coiling temperature between 450 °C and 750 °C to provide" in current claim 1 is incomplete. The only viable interpretation, even when considering that some compositions falling within the scope of claim 1 already have an Ac1 to Ac3 range overlapping with the range of 450 to 750°C, is that the *cooling* is executed from the finishing rolling temperature to the coiling temperature. This has to be done to obtain a strip of hot formable steel having a decarburised zone to a depth of 20 to 50 µm.

This is the only technically reasonable understanding that is directly and unambiguously derivable from the disclosure in claim 13 of the application as filed, even without the word "cooling" being mentioned in claim 1. Consequently, the claimed subject-matter does not extend beyond the content of the application as filed.

2. Article 83 EPC

The appellants contest the view that the patent provides enough information to enable the skilled person to carry out the invention. They argue that the skilled person would not know how to obtain the desired decarburised zone. In addition, D28 showed that the feature "decarburised zone having a thickness of 20 to 50  $\mu\text{m}$ " was ill-defined.

This is not persuasive. Claim 1 relates to a method including the feature "*from a finishing rolling temperature between the  $A_{c1}$  and the  $A_{c3}$  temperature to the coiling temperature between 450 °C and 750 °C to provide a strip of hot formable steel having a decarburized zone with a controlled depth at both sides of the strip of steel, wherein the decarburized zone has been provided to a depth of 20 to 50  $\mu\text{m}$* ".

The skilled person reading the claim understands that the finishing rolling temperature and the coiling temperature have to be chosen in the ranges given to obtain the desired decarburised zone. Moreover, the depth has to be one value within a relatively broad range and does not need to be an exact value. Furthermore, the sufficiency of disclosure is to be established on the application as a whole (Case Law of

the Boards of Appeal of the EPO, 11th edn., 2025, II.C.3.1).

The patent discloses in paragraph [0013] that the "low carbon zone" has a carbon content of at most 0.01 weight %. The low carbon zone is the zone which remains of the "decarburized zone" after hot forming of the coated blank. Both the decarburised zone and the low carbon zone are labelled 2 in Figures 1 (B) and 1 (D), respectively. The skilled person knows that the hot forming step may have an influence on the carbon content of the low carbon zone. This means that the carbon content of the low carbon zone is apparently higher than the carbon content of the decarburised zone prior to hot forming due to the diffusion effects of carbon from the substrate into the decarburised layer. Consequently, it is evident for the skilled person that the use of a decarburised zone having a carbon content of at most 0.01 weight % is necessary to arrive at the desired low carbon zone having a carbon content of at most 0.01 weight %. This understanding is also in line with the description of the patent, which does not make any clear distinction between the decarburised zone and the low carbon zone with respect to the carbon content. Paragraph [0031] (lines 28 to 30) indicates that the remainder of the decarburised zone is the low carbon zone. The labelling is not changed but kept as reference numeral 2 in Figure 1 (D). In addition, in paragraph [0011], a low carbon zone *before* coating is mentioned.

Overall, claim 1 does not further define the decarburised zone, which may at most constitute a lack of clarity. However, the skilled person trying to reproduce the claimed process knows, based on the teaching of the whole patent, that the decarburised

zone should have a carbon content that is compatible with a carbon content of at most 0.01 weight % in the low carbon zone to obtain the desired metallic coated hot formed product.

Under these circumstances, the existence of different degrees of decarburisation in D28 at most relates to a clarity issue under Article 84 EPC. The question of the admission of this document can thus be left open.

It is true that D22 and D23 disclose that heating is important for the decarburisation. However, in the case in hand, paragraph [0024] of the patent indicates that during the cooling of the strip on the run-out table, the decarburised zone is formed. The patent also discloses in paragraph [0033] that some routine experiments are needed to arrive at the desired decarburisation depth. This paragraph does not directly refer to the temperatures recited in paragraph [0024], as pointed out by the appellants, but the skilled person understands that the routine variation of the temperatures given in paragraph [0024] and the cooling will allow adjusting the depth of the decarburised zone. At least there is no evidence to the contrary. Therefore, the skilled person will arrive at a decarburised zone of 20 to 50  $\mu\text{m}$  by following the claimed process and adapting the heating and cooling with a few routine experiments.

Consequently, the requirements of Article 83 EPC are met.

3. Article 56 EPC

3.1 The invention relates to a steel sheet having a metallic coating.

3.2 D19/D19a is a suitable starting point for inventive step. In D19/D19a, the steels C, D and G are treated according to the conditions H3, H4 and H7, respectively, shown in Table 2. The obtained decarburised zone has a thickness of 3, 4 and 5  $\mu\text{m}$ , respectively (Table 3). These examples constitute embodiments that cannot be combined with other information of the description (T 210/05, Reasons 2.3). It is not contested that D19/D19a does not explicitly disclose:

- (i) a finishing rolling temperature of these steels between the  $A_{c1}$  and  $A_{c3}$  temperatures
- (ii) a decarburised zone with a thickness of 20 to 50  $\mu\text{m}$

It can be left open whether D19/D19a discloses:

- (iii) a metallic coating provided on the decarburised steel
- (iv) a blank cut from the coated strip of metal

3.3 According to the patent, the problem to be solved is to provide a method for producing a steel sheet having a metallic coating, a reduced tendency of micro-crack formation and increased bendability (paragraph [0008] of the patent).

3.4 The proposed solution to this problem is a method according to claim 1 characterised in at least that the finishing rolling temperature is between the  $A_{c1}$  and  $A_{c3}$  temperatures and that the decarburised zone of the hot formable steel has a thickness of 20 to 50  $\mu\text{m}$ .

3.5 It thus needs to be evaluated whether the problem is successfully solved. This was also the main point of debate in the current case.

The patent itself does not exemplify the claimed process and does not contain any comparative examples over D19/D19A. On the other hand, the appellants did not provide any examples either.

In accordance with G 2/21 (Reasons 26), cited by the appellants, to determine the objective technical problem, the technical results and effects achieved by the claimed invention as compared with the closest prior art must be assessed. Thus, it rests with a patent proprietor to properly demonstrate that the purported advantages of the claimed invention have successfully been achieved. The principle of free evaluation of evidence *"can be defined in abstract and general terms as allowing and, by the same token, requiring a judicial body, like the boards of appeal, to decide according to its own discretion and its own conviction, by taking account of the entire content of the parties' submissions and, where appropriate, any evidence admissibly submitted or taken, without observing formal rules, whether a contested factual assertion is to be regarded as true or false"* (G 2/21, Reasons 30). This is also in line with the observation made in T 449/23 (Reasons 2.5.6(a)), also cited by the appellants, that *"the burden of proof depends on a party's substantive case"*.

In the case in hand, the patent explains in paragraph [0021] that a decarburised zone as defined in the patent (see point 2. above) having a thickness of 20 to 50  $\mu\text{m}$  allows obtaining a metal affected zone and a low carbon layer for steels with a metal coating. This is further illustrated and explained in Figure 1 and paragraph [0031]. The finishing rolling temperature in combination with the cooling are important for

obtaining the decarburised zone (paragraph [0024]), this zone being of relevance for obtaining the desired effect. In addition, the example in the patent (paragraphs [0034] to [0036] and Figure 2), albeit not a process according to claim 1 (for being a cold-rolled strip), illustrates that a zinc-coated steel produced from a steel strip having a decarburised zone has a better bendability than a zinc-coated steel produced from a steel strip without such a zone.

Given this, the appellants' argument based on D28 that the decarburised zone was undefined and arbitrary is not convincing. Such a decarburised zone can be obtained by the claimed process (paragraph [0024]), and the patent provides some indication about its meaning (paragraph [0013]).

The appellants are right only in so far as the exact depth of the different zones shown in Figure 1 (D) depends on the type of coating, thickness of the coating and process conditions.

They also alleged that a heavy coating such as the one described in D26 (Zn: 300 to 400 g/m<sup>2</sup>) would require a significant amount of heating and thus would completely consume the decarburised zone. Consequently, no low carbon zone would be left, and the desired effect would not be obtained.

However, evidence is lacking to support this allegation or to show that the claimed depth of the decarburised zone does not provide a sufficient safety margin to ensure that a low carbon zone remains. In addition, evidence is lacking that shows that a decarburised zone having a thickness of 20 to 50 µm does not allow obtaining the desired effect for a metallic coating

that the skilled person regards as technically applicable in the process claimed.

Although the patent contains no direct comparison with D19/D19a, the appellants did not provide a persuasive reason to doubt the explanation given in paragraph [0021]. Consequently, the posed problem is successfully solved. There is no need to redefine the problem in less ambitious terms, as done by the appellants.

In the case in hand, the situation is different from T 449/23 as referred to by the appellants. In that case (Reasons 2.5.5), the board agreed with the opponent that in the absence of any evidence, the statements of the proprietor amounted to theoretical considerations which were not sufficient to render the alleged effects credible. However, in the current case, an effect can be recognised based on the explanations of the underlying mechanism given in the patent and on the results of the example, even though the product was obtained by a process that is not claimed.

3.6 The proposed solution is not obvious for the following reasons.

D19/D19a does not deal with micro-crack formation and increased bendability and the role of the decarburised zone in that respect. Even if it were assumed that D19/D19a described in paragraphs [0008] and [0009] a better formability, which would imply better bendability, D19 does not deal with the combination of bendability and micro-cracks. There is, therefore, no pointer towards changing the thickness of the steels obtained according to H3, H4 and H7, respectively. D19/D19a generally teaches that the decarburised zone can be in the range of 2  $\mu\text{m}$  to 5% of the plate thickness (i.e. 2  $\mu\text{m}$  to 160

µm in the examples of D19/D19a) (paragraph [0029]) but does not provide any explanation that a narrow range of 20 to 50 µm is beneficial. Such a range may be contemplated by a skilled person looking for an alternative, but the problem to be solved here is more ambitious. Furthermore, D19/D19a does not suggest applying a finishing rolling temperature between the Ac1 and Ac3 temperatures, this temperature being important for obtaining the desired decarburised zone. In addition, hot dip galvanising or alloying hot dip galvanising is generally taught in D19/D19a (paragraph [0036]), but it is not evident that this coating is done on the decarburised steel strip of the examples.

Even if the teaching of D27 that hot forming was to be done with coated blanks is considered, there is still no teaching about the benefits of a decarburised zone of 20 to 50 µm.

3.7 Appellant 1 also brought forward each of D8, D10, D11 and D12 as possible starting points for inventive step. One of their assumptions was that the presence of a decarburised zone would be implicit in view of the process conditions disclosed in these documents.

This understanding is not accepted by the board. The wording "to provide" in claim 1 implies that the finishing rolling temperature and the coiling temperature have to be chosen such that the desired decarburised zone is obtained. There is no evidence that such a decarburised zone would be obtained for any composition falling within the scope of claim 1 at any finishing rolling temperature between the Ac1 and Ac3 temperatures, and at any coiling temperature between 450 and 750°C, in line with the observations made above for Article 83 EPC.

Documents D8, D10, D11 and D12 do not deal with a decarburised zone and its role in providing the desired effect (reduced tendency of micro-crack formation and increased bendability). Consequently, there is no reason why the skilled person would try to achieve a decarburised zone having a thickness of 20 to 50  $\mu\text{m}$  in the steels disclosed in those documents.

Documents D5, D27 and D20 used as further secondary documents in support of the inventive-step attack do not provide any information on a decarburised zone either.

3.8 In summary, the subject-matter of claim 1 involves an inventive step. The same applies to dependent claims 2 to 4.

3.9 The requirements of Article 56 EPC are met.

## 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 on the basis of the main request, submitted as auxiliary request 1 with the reply to the appeal, and the description to be adapted.

The Registrar:

The Chair:



C. Vodz

T. Burkhardt

Decision electronically authenticated