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**Datasheet for the decision  
of 14 September 2006**

**Case Number:** T 0727/03 - 3.3.09

**Application Number:** 94112463.8

**Publication Number:** 0638412

**IPC:** B32B 15/08

**Language of the proceedings:** EN

**Title of invention:**

Polyester film, laminated metal sheet and metal container

**Patentee:**

Toyo Boseki Kabushiki Kaisha

**Opponent:**

ARCELOR France

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step (no)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0727/03 - 3.3.09

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.09  
of 14 September 2006

**Appellant:** ARCELOR France  
(Opponent) 5 rue Luigi Cherubini  
F-93212 La Plaine Saint Denis Cedex (FR)

**Representative:** -

**Respondent:** Toyo Boseki Kabushiki Kaisha  
(Patent Proprietor) No. 2-8, Dojimahama 2-chome  
Kita-ku  
Osaka-shi  
Osaka 530 (JP)

**Representative:** von Kreisler, Alek  
Patentanwälte  
von Kreisler-Selting-Werner  
Bahnhofsvorplatz 1 (Deichmannhaus)  
D-50667 Köln (DE)

**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office orally  
announced on 29 April 2003 and posted  
16 May 2003 concerning maintenance of the  
European patent No. 0638412 in amended form.

**Composition of the Board:**

**Chairman:** P. Kitzmantel  
**Members:** W. Ehrenreich  
W. Sekretaruk

## Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 638 412 in respect of European patent application No. 94 112 463.8 in the name of *Toyo Boseki Kabushiki Kaisha* filed on 10 August 1994 was announced on 13 June 2001. The patent, entitled "*Polyester film, laminated metal sheet and metal container*" was granted with six claims, Claim 1 reading as follows:

"1. A polyester film having a coefficient of friction between the film and a metal at 80°C of not more than 0.45, the polyester composition comprising 0.3-5% by weight in total of at least one component selected from

- polymer particles having an average particle size of 0.5-5 µm,
- inorganic fine particles having an average particle size of 0.5-5 µm,
- thermoplastic resins incompatible with the polyester, and
- combinations thereof,

wherein said polyester film contains a cyclic ethylene terephthalate trimer in a proportion of not more than 0.7% by weight of the total of the polyester."

Claims 2 to 4 were dependent on Claim 1. Claim 5 pertained to a laminated metal sheet on the basis of the polyester film according to Claims 1 to 4 and Claim 6 was directed to a metal container formed from the laminated metal sheet according to Claim 5.

II. Notice of opposition based on the grounds of Article 100(a) EPC was filed by

*Usinor, now Arcelor France*

on 12 March 2002. The only objection was that the claimed invention lacked an inventive step contrary to the requirements of Article 56 EPC.

The documents inter alia relied upon were

A2 US-A 4 348 446

A3 EP-A 0 521 606

A6 US-A 5 144 824

A7 T. H. Begley and H.C. Hollifield in "*Journal of the Association of Official Analytical Chemists*", vol. 72, No. 3, 1989, pages 468 to 470.

III. With the letter dated 16 October 2002 the Patent Proprietor submitted a new set of Claims 1 to 6 as a basis of a new main request. Claim 1 of this request differs from Claim 1 as granted only in that the word "dynamic" has been inserted in line 1 between "of" and "friction". The claimed film is now characterised by a coefficient of dynamic friction. The subsequent claims remained unchanged.

Amended Claim 1 thus starts as follows:

"1. A polyester film having a coefficient of dynamic friction between the film and a metal ..."

IV. With the interlocutory decision orally announced on 29 April 2003 and issued in writing on 16 May 2003 the

Opposition Division maintained the patent on the basis of this new main request.

It was held in the decision that the claimed polyester films differed from the disclosure in A3 and A6 firstly by their low coefficient of dynamic friction caused by the presence of 0.3 to 5% by weight of antiblocking agents, and secondly by their low content of cyclic ethylene terephthalate trimers. These distinguishing measures were not obvious, in particular over a combination of the above documents with A7, the latter pertaining to the migration of *inter alia* cyclic ethylene terephthalate trimers into the food contained in polymeric packages, because A7 was silent about a harmful effect of the trimers on the taste or smell of food.

- V. Notice of appeal was filed by the Opponent (hereinafter the Appellant) on 1 July 2003. The Statement of the Grounds of Appeal was submitted on 8 September 2003. The Appellant maintained its objection as to lack of an inventive step of the claimed subject-matter.

The Patent Proprietor (hereinafter the Respondent) defended the patent on the basis of the main request submitted in the first instance opposition proceedings.

- VI. In a communication issued on 24 July 2006 the Board indicated that the document A6 was regarded as representative of the closest prior art and that the question of obviousness of the claimed invention over a combination of A6 with A7 would be an important point of discussion in the oral proceedings, scheduled for 14 September 2006.

VII. In response to the Board's communication the Respondent/Patent Proprietor filed, with the letter dated 11 August 2006, four sets of claims as bases for auxiliary requests 1 to 4. A corrected version of the second and the third auxiliary requests was filed with the letter dated 5 September 2006.

Claim 1 of auxiliary request 1 differs from Claim 1 of the main request only in the limitation of the amount of the cyclic ethylene terephthalate trimer to not more than 0.6% by weight. Claims 2 to 6 remain unchanged.

Relative to Claim 1 of the main request, Claim 1 of auxiliary request 2 indicates that the polyester film is suitable "for laminating on a metal sheet". Furthermore, the method of measuring the coefficient of dynamic friction is part of the Claim. No amendments were made to Claims 2 to 6.

Claim 1 of auxiliary request 3 is based on Claim 1 of auxiliary request 2, with the further amendment as already introduced in auxiliary request 1, that the amount of the cyclic ethylene terephthalate trimer is not more than 0.6% by weight. No amendments were made to Claims 2 to 6.

Auxiliary request 4 differs from the main request and auxiliary requests 1 to 3 in that its subject-matter now pertains to a laminated metal sheet, as claimed in Claim 5 of the previous requests, wherein the polyester film is defined as in Claim 1 of auxiliary request 3. Claim 5 was deleted and Claim 6 was renumbered to read Claim 5.

VIII. The arguments of the Appellant provided orally and in written form may be summarized as follows:

The document A6, lying in the same technical field as the invention and pertaining to resin-coated metallic plates for the preparation of bottles or cans, was representative of the closest prior art.

It was disclosed therein that the polymeric coating provided for instance in the form of a polyester resin composed mainly of ethylene terephthalate units provided excellent mechanical stability and high corrosion resistance of the can. Additives like inorganic antiblocking agents were disclosed which, as was common knowledge, were appropriate for minimising the friction forces and improving the sliding properties of the sheet during processing.

According to the teaching in A6, illustrated by the examples 1 and 2, a coefficient of dynamic friction of less than 0.5 (e.g. 0.17 or 0.25) was required at the temperature of 70 or 90°C during redraw-forming of the can.

It was furthermore common knowledge in the prior art to provide antiblocking agents in amounts and in particle sizes as claimed in order to minimize friction by improving the sliding properties. The addition of inorganic particles in the claimed amounts/average particle sizes was therefore obvious from A6 although these conditions were not expressly disclosed therein.

Therefore, the first problem posed, namely the reduction of interfacial friction forces between polymer-coated metal sheets in order to improve the

processability during forming of cans, had already been solved in A6 by reducing the coefficient of dynamic friction using antiblocking additives in the appropriate amounts/particle sizes corresponding to those of the claimed invention.

Independently therefrom, the invention was concerned with a second problem, namely the avoidance of the migration of polymer impurities into the food inside the can.

The solution to this problem via the reduction of the content of cyclic ethylene terephthalate trimers in the polyester film was obvious from A7.

The claimed subject-matter was therefore not inventive over a combination of A6 with A7.

IX. The Respondent provided the following arguments:

The claimed invention was concerned with the provision of metal containers for food packaging laminated with a polyester film. The film should, on the one hand, provide improved scratch resistance with a view to obtaining containers with good optical appearance even at increased manufacturing speeds. On the other hand, elution of oligomers during heat treatment after packaging the food should be prevented in order to avoid a negative influence on the smell and taste of the food caused by migration of oligomers contained in the polymer film into the food.

These film properties were achieved by reducing the coefficient of dynamic friction between the film and



metal without the use of a lubricant by incorporating inorganic or polymeric particles or combinations thereof in specific amounts and particle sizes and by reducing the content of cyclic ethylene terephthalate trimers below a certain limit.

The document A6, representing the closest prior art, was concerned with the provision of thickness-reduced deep-draw-formed metallic cans coated with a thermoplastic resin having a reduced coefficient of dynamic friction. It was derivable from column 2, lines 9/10 that the draw-redraw forming operation is carried out while applying a lubricant. The lubricant which was suggested in column 7, lines 1 to 5 as a possible film additive was used in the examples of A6 by coating it onto both surfaces of the metal plate before the draw-redraw-forming (column 11, lines 5 to 8). Furthermore, the incorporation of very high amounts of inorganic fillers was done in order to hide the metal plate and was not considered to improve the sliding properties of the film (column 7, lines 36 to 54).

It was therefore evident from A6 that the low friction coefficient of the thermoplastic resin disclosed in column 3, lines 2 to 4 was only achieved by adding an external lubricant coating. This was in clear contrast to the teaching of the patent in suit.

Furthermore, A6 did not address the second problem concerning the negative influence of cyclic ethylene terephthalate trimers on the smell and taste of food. Because it was not disclosed in A7 that the content of these trimers in the polymer matrix was critical for

the impairment of odour or taste of the packaged food, a skilled person would not combine A6 with A7 in order to solve the second problem posed.

Even if the skilled person combined A6 with A7, he would not arrive at the trimer content of maximal 0.7%/0.6% by weight as claimed according to the requests because the lowest amount for this oligomer disclosed in table 2 of A7 was 0.7951% by weight, i.e. above the claimed upper limit.

Furthermore, the aforementioned trimer content was very close to the amount of 0.80% by weight of a polyester film used in comparative example 3 of the patent specification exceeding the claimed range and leading to a container with poor gloss due to oligomer precipitation on the film surface.

The claimed subject-matter was therefore inventive over a combination of A6 with A7.

- X. The Appellant requested that the decision under appeal be set aside and that the patent be revoked.
  
- XI. The Respondent requested that the appeal be dismissed and that the patent be maintained on the basis of the main request underlying the appealed decision or that the decision under appeal be set aside and the patent be maintained on the basis of auxiliary request 1 filed with the letter dated 11 August 2006 or auxiliary requests 2 or 3 filed with the letter dated 5 September 2006 or of auxiliary request 4 filed with the letter dated 11 August 2006.

## Reasons for the Decision

1. The appeal is admissible.
2. The amended claims according to the main request and the auxiliary requests 1 to 4 meet the requirements of Article 84 and 123(2) EPC. This was not contested by the Appellant.
3. Inventive step
- 3.1 The subject-matter of the patent in suit

The patent in suit is concerned with a polyester film for laminating with a metal sheet, a laminated metal sheet suitable for the preparation of containers, such as cans or bottles to be filled with beverages, and containers produced by the use of the polyester film.

The film should provide good scratch resistance during the can production process and suppressed elution of oligomers, i.e. cyclic ethylene terephthalate trimers, at heat treatment (such as retort treatment) after food packaging. See page 2, paragraph [0001] and page 3, paragraphs [0011] and [0012].

According to Claims 1 of the main request and the auxiliary requests 1 to 4 the polyester film is characterised by the following features:

- (a) the coefficient of dynamic friction between the film and a metal at 80°C is not more than 0.45;
- (b) the polyester composition comprises 0.3 to 5% by weight of a particulate material selected from:

- polymer particles, average particle size 0.5 to 5  $\mu\text{m}$ ;
  - inorganic fine particles, average particle size 0.5 to 5  $\mu\text{m}$ ;
  - thermoplastic resins incompatible with the polyester;
  - combinations thereof;
- (c) the cyclic ethylene terephthalate trimer content in the polyester is limited to 0.7% by weight (main request, auxiliary request 2), and 0.6% by weight (auxiliary requests 1, 3 and 4), respectively.

The experimental evidence in the patent specification shows that the scratch resistance of the laminated metal sheet is high at a coefficient of dynamic friction within the claimed range and that the elution of oligomer (cyclic trimer) is suppressed when its content is below 0.6% by weight (tables 1 and 2). It is furthermore evident from the comparative examples 4 to 12 that particles which do not meet the claimed requirements (b) have a negative influence on the friction coefficient. A clear link between the nature of the particulate material - the coefficient of dynamic friction - and the scratch resistance is therefore derivable.

### 3.2 The closest prior art

As uncontested by the Parties, A6 represents the closest prior art.

A6 discloses a resin film coating, *inter alia* composed of a thermoplastic polyester based mainly on ethylene

terephthalate units, a metal sheet laminated with the film and a metal container (e.g. a can) formed from the laminated metal sheet (Claim 1 in conjunction with column 6, lines 10 to 39 and column 4, lines 10 to 18). The can is suitable for filling with beverages, such as Cola (column 10, lines 60 to 64).

The incorporation of known additives, like inorganic antiblocking agents, into the film is described in column 7, lines 1 to 5.

It is pointed out in columns 2/3, bridging paragraph, and column 4, lines 13 to 33 of A6 that the manufacture of the can by a draw-redraw-forming process has to be carried out at a temperature at which the coefficient of dynamic friction - which is measured between the film coated metal plates and steel compression plates of the measuring device according to the method disclosed in column 4, lines 41 to 63 - is smaller than 0.5, especially smaller than 0.4, because above this range mechanical problems occur. For example, breaking or peeling is caused inside the resin layer or between it and the metal substrate.

This implies that a low coefficient of dynamic friction is an important criterion for the mechanical stability and the maintenance of the physical integrity of the resin coating on the metal substrate during processing. Mechanical stability and physical integrity of course include scratch resistance in order to avoid scratches on the surface of the can caused by high friction forces during the process of manufacture.

According to the examples 1 and 2 of A6 (cf. table 1) at processing temperatures (at redrawing) of 70°C and 90°C the coefficient of dynamic friction of the resin

coating is 0.17 and 0.25, respectively. These values are well below the upper limit of 0.45, which present Claim 1 specifies for a temperature of 80°C.

Notwithstanding the fact that the friction coefficients indicated in A6 and in the patent specification are measured differently (A6, column 4, lines 41 to 59; patent specification page 6, paragraph [0053]), the Board has no doubt that the coefficient of dynamic friction of the films disclosed in A6 is within the claimed range, because no reasons have been provided to suggest that the different measuring methods would lead to results which would not at least be of the same order of magnitude.

It is also not evident, and it has not been argued, that the values for the coefficient of dynamic friction in those claims which do not indicate the method of measurement (i.e. Claims 1 of the main request and the first auxiliary request) have to be considered differently from those where according to the claims the method is defined (i.e. Claims 1 of the auxiliary requests 2 to 4).

Therefore, the above considerations apply to Claims 1 of all requests.

The Respondent contends, by reference to column 2, lines 9/10 and column 11, lines 5/6, that according to the teaching of A6 the presence of a lubricant or a lubricant coating was indispensable for obtaining the desired low coefficient of dynamic friction, whereas such a lubricant was not necessary for the claimed invention.

The Board does not share the Respondent's view. There is no disclosure in A6 according to which the indicated values for the coefficient of dynamic friction would be linked to the presence of a lubricant. In contrast, in column 3, lines 3/4 it is disclosed that the coefficient of dynamic friction of the thermoplastic resin (emphasis added) is smaller than 0.5. A similar disclosure is found in column 4, lines 16/17.

It has therefore to be assumed that the indicated values reflect the coefficient of dynamic friction of the resin in the absence of a lubricant. This all the more so, as the explanation of the method of measuring the dynamic friction indicated in column 4, lines 41 to 59 is silent as to any requirement to add any lubricant to the resin before or during measurement.

The passages in columns 2 and 11 of A6 referred to by the Respondent and concerning the use of lubricants during the draw-redraw-forming process of the can are therefore considered to merely suggest the use of conventional processing aids; it is noted in this context that the use of conventional ingredients, lubricants inclusive, is fully within the ambit of the claimed invention (cf. paragraph [0035] of the patent specification) without any suggestion concerning a possible contribution to the resin film's friction properties.

### 3.3 Problem and solution

In the light of the above, the claimed invention differs from the subject-matter disclosed in A6 in two aspects, namely

- (a) the definition of the amount and average particle size of the particulate additive and
- (b) the indication that the content of the cyclic ethylene terephthalate trimer is present in a proportion of not more than either 0.7% by weight (main request, auxiliary request 2) or 0.6% by weight (auxiliary requests 2, 3, 4).

Two separate and independent problems are solved by these distinguishing features:

- (a) the adjustment of the coefficient of dynamic friction via selection of suitable amounts and average particle sizes of the particulate additives;
- (b) the avoidance of the migration of oligomer impurities into the polyester film.

### 3.4 Obviousness

#### 3.4.1 Problem (a)

The Respondent argues with reference to A6, column 7, lines 1 to 5, that the addition of antiblocking agents and/or lubricants "according to known recipes" was only a very general disclosure which did not motivate a skilled person to incorporate into the resin film particles having this function in the specific amounts and average particle sizes essential for the claimed invention.

This argument is not convincing.

It is general common knowledge of a skilled person that inert particulate antiblocking/lubricant additives



perform their beneficial friction-reducing function only under certain conditions, including appropriate particle sizes and amounts. This is confirmed by the disclosure in A2, column 2, lines 46 to column 3, line 2 indicating that for the preparation of polyester films with a kinetic coefficient of friction of not more than 0.3 inert fine additives of average particle size not in excess of 2.5  $\mu\text{m}$  are added in amounts of 0.08 to 2% by weight.

A skilled person starting from A6 and intending to adjust the coefficient of dynamic friction of a polyester resin film by the addition of antiblocking/lubricating agents, would therefore follow his general common knowledge as represented eg by the suggestions in A2 and would thus apply the particles in amounts and with particle sizes lying within the claimed range.

The solution to the problem (a) is therefore obvious from A6 in combination with general common knowledge and A2. This applies to the subject-matter of all requests.

#### 3.4.2 Problem (b)

A6, which relates to cans filled with food in the form of beverages, does not mention the problem of adverse effects of oligomer impurities on the smell or taste of food.

The problem that polyester-coated metal cans can adversely affect the quality of food caused by the elution of oligomers from the polyester coating is however well-known in the prior art. This problem is

mentioned in the patent specification itself in the section "Background of the invention"; cf. paragraph [0009].

A skilled person, looking for a solution to this problem would therefore consider A7, which states on page 468, left hand column, that potentially harmful residual oligomer compounds in PET soft drink bottles or metallised PET films for food packaging migrate into the food at high temperature packaging conditions. Cyclic tris(ethylene terephthalate) is expressly disclosed as one potential oligomer, which is indicated to be present in common PET "*at relatively high concentration of approximately 1%*" (page 469, left column under "Recovery Studies").

Although impairment of smell and taste by such oligomers is not explicitly indicated in A7, a skilled person being aware from the disclosure in A7 that such residual compounds in polymers are potentially harmful to the consumer would certainly be prompted by this information to minimise the cyclic trimer content of PET to a value considerably below 1% in order to avoid a negative influence of any kind on the packaged food inside the can.

The adjustment of the cyclic trimer content to a maximum of either 0.7% by weight, as claimed according to the main request and auxiliary request 2, or 0.6% by weight, as claimed in the auxiliary requests 1, 3 and 4, is therefore a measure the skilled person being aware of the possibly hazardous character of these polymerisation by-products would without any doubt envisage; in these circumstances, finding out the

desired maximum concentrations is a matter of routine optimization not involving an inventive step.

The value of 7951 ppm (0.7951% by weight) cyclic trimer in table 2 of A7 pointed out by the Respondent in the oral proceedings refers to the content of cyclic ethylene terephthalate trimer in commercially available PET materials and does not, for the reasons mentioned above, prevent a skilled person from further reducing this amount, thereby also minimising disadvantages in optical appearance caused by deposits of the oligomer on the outer surface of the can referred to as another disadvantage of too high a trimer content in the outer can coating (patent specification page 4, lines 52 to 53).

The claimed solution of the problem (b) is therefore obvious from a combination of A6 with A7.

### 3.5 Conclusion

For the reasons mentioned in points 3.1 to 3.4, the subject-matter claimed in the main request and the auxiliary requests 1 to 4 does not meet the requirements of Article 56 EPC.

**Order**

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

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar

The Chairman

G. Röhn

P. Kitzmantel