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**Datasheet for the decision
of 30 April 2010**

Case Number: T 1178/07 - 3.2.07

Application Number: 02425153.0

Publication Number: 1354815

IPC: B65D 77/06

Language of the proceedings: EN

Title of invention:

Electrostatic charge-free container

Patentee:

Daviplast - Serviços de Consultoria, Sociedade Unipessoal LDA.

Opponent:

PROTECHNA S.A.

Headword:

-

Relevant legal provisions:

EPC Art. 56, 123(2)

Keyword:

"Admissibility of new documents (yes - prima facie relevant)"

"Inventive step (main request and remaining first auxiliary request - no)"

"Allowability of amendments (first auxiliary request - yes; second to sixth auxiliary requests - no, extending beyond content of application as originally filed)"

Decisions cited:

-

Catchword:

-



Case Number: T 1178/07 - 3.2.07

D E C I S I O N
of the Technical Board of Appeal 3.2.07
of 30 April 2010

Appellant:
(Opponent)

PROTECHNA S.A.
Avenue de la Gare 14
CH-1701 Fribourg (CH)

Representative:

Pürckhauer, Rolf
Am Rosenwald 25
D-57234 Wilnsdorf (DE)

Respondent:
(Patent Proprietor)

Daviplast - Serviços de Consultoria, Sociedade
Unipessoal LDA.
Avenida Do Infante 50
PT-9000 Funchal, Madeira (PT)

Representative:

Perani, Aurelio
Perani Mezzanotte & Partners
Piazza San Babila, 5
I-20122 Milano (IT)

Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 16 May 2007
rejecting the opposition filed against European
patent No. 1354815 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: H. Meinders
Members: H. Hahn
E. Dufrasne

Summary of Facts and Submissions

I. The opponent (appellant) lodged an appeal against the decision of the Opposition Division to reject the opposition against European patent No. 1 354 815. With the grounds of appeal the appellant submitted arguments that the subject-matter of claim 1 lacks inventive step in view of a combination of the teaching of D1 (EP-B-0 674 470) with the teaching of either D4 (EP-A-0 499 052) or D5 (EP-B-0 632 848), newly filed with the appeal.

II. The opposition had been directed against the patent in its entirety under Article 100(a) EPC, for lack of inventive step.

The Opposition Division held that the subject-matter of claims 1 to 5 of the patent as granted was novel with respect to D1, D2 (WO-A-01 86225) and D3 (DE-B-10 28 408). Furthermore, the subject-matter of claims 1 to 5 was considered to involve an inventive step with respect to a combination of D1 with either D2 or D3.

III. The Board arranged for oral proceedings and with a communication annexed to the summons dated 1 February 2010 it presented its preliminary opinion concerning claims 1-5 of the patent as granted.

The Board stated amongst others that the newly filed documents D4 and D5 appeared to be highly relevant with respect to a process including the PVD metal coating of thermoplastic parts with a plasma pre-treatment of the surface to be coated, in order to improve the adhesion

of the thin metallic layer to be applied and thus with respect to the issue of inventive step of the subject-matter of claim 1 as granted. Consequently, it would be discussed whether or not D4 and/or D5 would be allowed into the appeal procedure.

With respect to the respondent's auxiliary request of a remittal in case that D4 and/or D5 would be admitted it remarked that it is within the Board's discretion to do so but that it would be discussed whether or not the case should be remitted to the department of first instance.

With respect to inventive step the Board remarked, provided that it were to decide **not** to remit the case to the department of first instance, that then D1 was considered to represent the closest prior art.

Taking account of the distinguishing features it needed to be discussed as to whether the person skilled in the art would incorporate, in the process of fabricating the blow-moulded thermoplastic container of D1, the pre-treatment and metal coating of the container in accordance with e.g. the teaching of the process of D5 and whether or not the person skilled in the art would then arrive at the subject-matter of claim 1 of the patent as granted.

The parties were given the opportunity to file observations to the communication.

- IV. With letter dated 30 March 2010 the respondent (patent proprietor) maintained its main request, dismissal of the appeal i.e. maintenance of the patent as granted,

but further submitted 5 sets of claims according to first to fifth auxiliary requests in combination with arguments concerning the allowability of the amendments made therein.

V. Oral proceedings before the Board were held on 30 April 2010. At first the issue of the admissibility of the newly filed documents D4 and D5 was discussed and both were admitted into the proceedings. The respondent then withdrew its request for a remittal of the case to the department of first instance. Thereafter inventive step in respect of the subject-matter of claim 1 of the main request was discussed with respect to combinations of the teachings of D1 and D4 or D1 and D5. The allowability of the amendments presented with the five auxiliary requests together with the issue of inventive step was then discussed in view of a combination of the teachings of D1 and D5. In view of this discussion the respondent filed a further, sixth, auxiliary request of which the allowability was then discussed.

- (a) The appellant requested that the decision under appeal be set aside and that the patent be revoked.
- (b) The respondent requested that the appeal be dismissed, i.e. that the patent be maintained as granted or, in the alternative that the decision under appeal be set aside and the patent be maintained in amended form on the basis of one of the first to fifth auxiliary requests, filed with letter dated 30 March 2010, or on the basis of the sixth auxiliary request, filed during the oral proceedings.

At the end of the oral proceedings the Board announced its decision.

VI. Claim 1 of the patent as granted according to the main request reads as follows:

"1. Container for the storage and/or transportation of liquids and powders, in particular inflammables, suitable for preventing the formation of electrostatic charge, comprising a tank (1) supported by a pallet (3), housed in a metallic cage (2) and having an outer surface in contact with said metallic cage (2), characterized in that said tank (1) comprises:

- a base layer (13) of plastic material comprising on the outside a surface layer (14) modified through plasma treatment in order to improve the wettability on surface of the base layer (13) and
- a layer (15) of metallic material associated in superposition with said surface layer (14) through deposition with vacuum PVD (Physical Vapor Deposition) technique, said layer (15) of metallic material being in contact with said metallic cage (2) to make the cage and the outer surface of the tank equipotential."

VII. The subject-matter of product claim 1 of the first auxiliary request differs from that of the main request in that the additional feature "**said base layer (13) of plastic material comprising high density polyethylene,**" has been inserted between the expressions "... to improve the wettability on surface of the base layer (13)," and "- a layer (15) of metallic material ...".

VIII. The subject-matter of product claim 1 of the second auxiliary request differs from that of the first

auxiliary request in that the applied plasma treatment is specified to be a "**cold** plasma treatment".

- IX. The subject-matter of product claim 1 of the third auxiliary request differs from that of the second auxiliary request in that the applied cold plasma treatment is further specified by subsequently adding the feature "**, in a temperature range of 30 to 80°C,**".
- X. Claim 1 of the fourth auxiliary request reads as follows (amendments made with respect to product claim 1 of the main request are in bold; emphasis added by the Board):

"1. Container for the storage and/or transportation of liquids and powders, in particular inflammables, suitable for preventing the formation of electrostatic charge, comprising a tank (1) supported by a pallet (3), housed in a metallic cage (2) and having an outer surface in contact with said metallic cage (2), **said tank (1) being provided with one opening (8) for loading and one opening (9) for unloading the material,** characterized in that said tank (1) comprises:

- a base layer (13) of plastic material comprising on the outside a surface layer (14) modified through plasma treatment in order to improve the wettability on surface of the base layer (13) and
- a layer (15) of metallic material associated in superposition with said surface layer (14) through deposition with vacuum PVD (Physical Vapor Deposition) technique **and closing one of said one opening (8) for loading and one opening (9) for unloading the material by means suitable for allowing the passage of air from inside the tank and preventing the entry of metal**

vapors inside the tank, said layer (15) of metallic material being in contact with said metallic cage (2) to make the cage and the outer surface of the tank equipotential."

- XI. The subject-matter of product claim 1 of the fifth auxiliary request differs from that of the third auxiliary request in that the two additional features of the tank concerning the openings (8) and (9) of the fourth auxiliary request have been incorporated in an identical manner (see point X above).
- XII. Claim 1 of the sixth auxiliary request differs from that of the fourth auxiliary request in that
- a) the expression "**at least**" is inserted between the features "said tank (1) being provided with" and "one opening (8) for ...",
 - b) that the feature "**only on the outer surface**" has been inserted between the features "a layer (15) of metallic material associated in superposition" and "with said surface layer (14)", and
 - c) that the feature "**and closing one of said one opening (8) ... of metal vapors inside the tank**" has been deleted.
- XIII. The appellant argued essentially as follows:

The documents D4 and D5 are *prima facie* highly relevant and should therefore be admitted into the appeal proceedings.

D4 discloses a process for producing metallic coatings on polymeric substrates using PVD for the depositing step (see column 3, lines 9 to 19). The resulting

temperature of the substrate is important and needs to be considered by the skilled person (see column 2, lines 9 to 11). The moulded components have good surface properties and a high wear resistance (see column 1, lines 20 and 21). According to D4 the substrate is initially conditioned and then a plasma pre-treatment of the substrate surface is carried out in an electrical alternating field in order to improve the wettability of the surface layer of the substrate (see column 4, lines 2 to 16). Thus the process of D4 is close to that for making the container of claim 1 and its teaching can be applied in the process of D1 to solve the problem of improving the adhesion of the metal layer.

The object of D5 is to produce a metal coating with good adherence characteristics on polymeric substrates, achieved with a low-pressure plasma pre-treatment of the polymeric substrate which is subsequently metallised by thermal evaporation (see page 2, lines 10 to 15 and lines 37 to 40; examples).

The recyclability of the polymeric material as mentioned by the respondent has not been described in the patent specification and thus should not be considered for inventive step. The quoted paragraph [0035] concerns only the production advantages when carrying out the described technology, namely no waste and no by-products. There is also nowhere else a hint with respect to said recycling problem.

With respect to inventive step and the distinguishing features between the subject-matter of claim 1 as granted and D1 it appears that there are fewer

differences than those mentioned by the Board in its annex to the summons. According to D1 the pre-treatment of the polymeric substrate can be carried out in a separate step followed by the application step of the conductive metal particles, or it can be carried out simultaneously (see column 3, lines 31 to 35). The first alternative of D1 with separate steps results in a product as claimed in claim 1 of the patent as granted which does not necessarily require that the tank surface is entirely enveloped by said metal layer; the layer can be in localized patches of non-embedded particles, thus "in superposition". Therefore the only difference is the application of the metal layer by a PVD process. The problem is thus defined as the provision of a coating process which produces less thermal stress for the polymeric substrate. According to D1 the deterioration of the plastic substrate has to be avoided (see column 2, lines 18 to 20). The temperature resistance of the polymeric substrate is an important issue of D4 (see column 2, lines 6 to 11; column 4, lines 2 to 6 and lines 7 to 16) where the plasma pre-treatment is followed by PVD deposition of the coating (see column 3, lines 9 to 19; examples). It belongs to the common general knowledge of the person skilled in the art to adapt the maximum process temperature to one which matches with the substrate properties of the polymeric substrate to be treated.

The person skilled in the art would likewise combine the teachings of D1 and D5, the latter disclosing the PVD deposition of metal layers on polymeric substrates after a low pressure plasma pre-treatment with a maximum temperature of 200°C (see page 2, lines 37 to

42). The substrate temperature is thus normally much lower than 200°C.

Claim 1 of the first auxiliary request lacks likewise an inventive step since the known method is only applied to HDPE as the substrate.

Claim 1 of the second auxiliary request lacks an inventive step since the process according to D5 is described as a low temperature plasma process, i.e. a cold plasma process (see page 2, lines 37 to 40). Furthermore, the claimed feature "cold plasma" is only disclosed in the context of the subsequent metallization, not for the pre-treatment, so that this amendment appears to contravene Article 123(2) EPC.

With respect to the product-by-process claim 1 of the third auxiliary request it is doubtful whether the claimed product can be distinguished from one obtained at a temperature of e.g. 85°C. Said temperature range of 30-80°C similarly appears to be only disclosed in the context of the metallisation (see paragraphs [0040] and [0041]), not the pre-treatment. Therefore the third auxiliary request should not be allowed.

With respect to the fourth and fifth auxiliary requests no remarks are made in addition to the objections raised by the Board as concerns the amending feature of closing one of the two openings in the container during the metallization so as to prevent the entry of metal vapours.

The special features mentioned in paragraphs [0090] to [0092] of the patent in suit result in that "the outer

surface is coated", which does not imply that "only the outer surface is coated", and claim 1 does not specify the necessary elements of the claimed container necessary for obtaining this desired result. Thus claim 1 of the sixth auxiliary request contravenes Article 123(2) EPC.

XIV. The respondent argued essentially as follows:

Both documents D4 and D5 are not *prima facie* highly relevant because contrary to D4 or D5 claim 1 of the patent as granted concerns a tank container for inflammable liquids, and should thus not be admitted. This tank is produced by a process including a plasma pre-treatment and a PVD deposited metal layer. The PVD technique allows to reduce the thickness of the metal layer so that the recycling of the plastic material is now possible which was not the case with the thick coating according to D1 (see patent, paragraphs [0028] and [0035]). The aim of D4 is the hardness/wear resistance of the outer surface of machine components and aircraft parts. The wear resistance is not so important for the metal layer of a tank. D5 is even less relevant than D4 and likewise does not address the problem of the patent in suit, namely to prevent the formation of electrostatic charge.

The container of claim 1 of the patent as granted is distinguished from the container of D1 by the features mentioned in the Board's communication. According to D1 the surface is "broken up" so that the deposited metal is not in superposition to the pre-treated polymeric surface. The conductivity of the plastic material is neither mentioned in D4 nor D5. The coated parts of D4

or D5 are also not used in connection with storing inflammable liquid or particulate material. Thus neither the problem nor its solution is mentioned in D4 or D5.

The moulded plastic substrates of D4 resist high temperatures. The process of D4 cannot be applied onto the blow moulded material of the container of D1 which is further not specified. The passages of D4 (column 2, lines 6 to 11 and column 4, lines 7 to 16) quoted by the appellant concern the transfer of the coating process for metal substrates to polymeric substrates while the temperature range of 80-120°C concerns a thermal treatment **before** the plasma pre-treatment. The examples of D4 are made with and without any pre-treatment (example 3).

The plastic substrates of D5 are similar high temperature resistant materials, e.g. a reflector made of polycarbonate (see page 3, lines 9 to 11). The passage at page 3, lines 18 to 20 of D5 concerns the deposition of amorphous carbon and not a pre-treatment of polyethylene (PE) for a subsequent metallisation.

The subject-matter of claim 1 of the first auxiliary request involves an inventive step since high density polyethylene (HDPE) is a different material than the polycarbonate according to D5. It is neither disclosed in D1 nor in D5. The person skilled in the art has no reasonable expectation of success that the method of D5 would work with HDPE, which is a non-polar material compared to the polar polycarbonate of D5. Thus it is doubtful whether it would work with HDPE. The use of HDPE is relevant for the recycling of said tanks since

ordinary PE cannot be recycled. It is, however, admitted that PE was the common substrate material at that time. It is also admitted that no document is at hand which would lend support to a technical prejudice existing in this field.

The subject-matter of claim 1 of the second auxiliary request has been worded as a product-by-process claim (use of cold plasma) to clarify that only the surface of the polymeric substrate material is modified but not the characteristics of the base layer. Therefore only the wettability of the surface layer is modified. The basis of this amendment is paragraph [0040] of the patent and these conditions also apply to the pre-treatment.

The basis for the temperature range of the cold plasma is taken from paragraph [0041] of the patent. It prevents the softening of the base material, not the melting. The temperature range of 30-80°C is clear.

Claim 1 of the fourth auxiliary request also contains process features since it was not clear whether there exists a clear basis for a feature claiming the metallisation of only the outer surface. One opening of the tank is closed during the metallisation through a membrane while the other is closed by the pliers. D5 does not disclose the treatment of any hollow bodies. The appellant chose the now claimed means but it is admitted that this product feature could be defined in a different manner. The amendment is based on claim 4 as granted and paragraphs [0069], [0091] and [0092] of the patent.

The sixth auxiliary request emerged from the discussion in the oral proceedings on the allowability of the amendments proposed with the third to fifth auxiliary requests. The amendments are based on paragraphs [0090] to [0092] of the patent and should thus be allowable.

Reasons for the Decision

1. *Admissibility of the documents D4 and D5*

The Board considers that documents D4 and D5 were cited by the appellant as a response to the impugned decision. Furthermore, they were submitted in the appeal proceedings as early as possible, i.e. together with the grounds of appeal.

- 1.1 D4 discloses a process for producing moulded components having good surface properties (i.e. having good adhesion of the top coating and being hard, wear resistant and chemical-resistant) and having good temperature stability of the composite body which process avoids the disadvantages of the prior art (see abstract; column 1, lines 1 to 16 and column 2, lines 12 to 21; column 4, lines 34 to 53). The polymeric matrix of the base body can consist of a thermoplastic material or a thermosetting material (= Duroplast), preferred are fibre reinforced hardened resins, and the base body can be produced by the generally used processes (see column 2, lines 37 to 58). According to said process a top coating on the basis of a metal or a ceramic metal compound is applied onto said base body by physical or chemical vapour deposition (see claim 1 and column 2, lines 22 to 36), preferably plasma

processes such as cathodic sputtering, ion plating, arc-plating and plasma-polymerisation, particularly cathodic sputtering (see column 3, lines 9 to 19). Said top coating layer can be a metal or a ceramic metal compound (see column 3, lines 1 to 8). The temperature of the substrate during the process should be below 250°C, preferably below 200°C, in order not to deteriorate the same (see column 4, lines 2 to 6). The base body can be first conditioned through a thermal heat treatment, e.g. by heating to 80-120°C for a period of 0,5 to 3 hours and then plasma pre-treated in an electrical alternating field (e.g. 13,56 MHz) or directly plasma pre-treated. These pre-treatments result in a considerably improved adhesion and stress of said coating layer (see column 4, lines 7 to 19; examples 1-3).

- 1.2 The object of D5 is to provide a process for the surface treatment of plastic parts which improves the adhesion of a subsequently applied coating layer (see page 2, lines 31 and 32). D5 discloses that the surface treatment of plastic materials, and particularly the coating of plastic parts with metallic material such as aluminium, involves the problem that generally a defective adhesion between the metallic layer and the plastic part is obtained. In order to improve this adhesion it is known to carry out a plasma pre-treatment of said plastic parts (see page 2, lines 10 to 15). The low pressure plasma pre-treatment process of D5 uses SF₆ as process gas at a pressure of from 1,0 to 50 Pa for 0,5 to 5 minutes and can be applied to all kinds of plastic parts (see claim 1 and page 2, lines 43 to 50). It is applicable to mouldings of any kind and dimension (see page 3, lines 1 to 4). The metallic

coating, preferably aluminium, is applied in a thickness of from 1 to 100000 nm, preferably 10 to 10000 nm (see page 2, lines 56 to 58). Suitable deposition processes are known to the skilled person and include vapour deposition, sputtering, ion plating, and plasma CVD (see page 2, line 58 to page 3, line 1). According to the examples polycarbonate substrates were pre-treated in a Leybold Heraeus vapour deposition apparatus with a low-pressure plasma at a pressure of 7 Pa of SF₆ and at a voltage of -475 V with an operating level of 3,8 W for 2 minutes and then PVD coated with aluminium by using an electron gun for its thermal evaporation; according to one of the comparative examples no pre-treatment was carried out (see examples 1 and 4). D5 mentions a maximum temperature of up to 200°C for the low pressure and low temperature plasma pre-treatment (see page 2, lines 37 to 40).

- 1.3 Thus it is evident that D4 and D5 are *prima facie* highly relevant as they relate to a process including the PVD metal coating of thermoplastic parts with a plasma pre-treatment of the surface to be coated, in order to improve the adhesion of the thin metallic layer to be applied and thus with respect to the problem to be solved and the type of process used in the coating of the container of claim 1 of the patent as granted.

- 1.4 The respondent's arguments to the contrary cannot hold since they ignore the problem-solution approach to be applied for the issue of inventive step. It is thus not important whether or not D4 and/or D5 mention the problem of preventing the formation of electrostatic charge on plastic tanks used for transporting flammable

liquids or particulate materials having high risk of explosion as mentioned in the patent in suit. That would be the case when D4 or D5 were to figure as the closest prior art, which is not the case. It is only relevant that both documents relate to processes for improving the adhesion of metal layers to be deposited on polymeric substrates.

1.5 Taking account of the above the Board admits both documents D4 and D5 into the appeal proceedings.

2. *Novelty (Article 54 EPC)*

Novelty of the subject-matter of claim 1 as granted has not been disputed by the appellant. The Board sees also no reason to deviate from the Opposition Division's conclusion with respect to novelty (compare points 2.1 to 2.3 of the grounds of the impugned decision).

The same applies to the subject-matter of the more restricted claims 1 of the first to sixth auxiliary requests (see points VII to XII, above).

3. *Inventive step (Article 56 EPC)*

Main request

3.1 In accordance with the appealed decision document D1 is considered as the closest prior art, as it discloses a container for storage and/or transportation of inflammable liquids or powders. Said container comprises a tank housed in a wire grid cage supported by a pallet and the tank is made from a blow-moulded thermoplastic material which on its outer surface has a

coating of a conductive powder, such as copper or zinc, being in contact with said cage to prevent the formation of electrostatic charge (see claims 1, 5 and 6; column 1, line 43 to column 2, line 20; column 3, lines 20 to 30; figures 4 and 5). According to the process of D1 the surface of the blow moulded thermoplastic container is initially "broken open" ("aufgebrochen") by treating the outer surface with a plasma beam, a flame or a corona discharge. A corona discharge is a particular case of a plasma discharge at atmospheric pressure in air which generates polar molecules at the surface improving the adhesion of a subsequently applied coating. Thereafter said conductive powder is applied with the aid of a plasma jet, or the conductive powder is at the same time jetted onto the surface by the said flame, the corona discharge or the plasma beam (see claim 1 and column 3, lines 31 to 45). Said "breaking open" of the surface according to D1 improves the adhesion of the conductive powder (see column 4, lines 27 to 33).

- 3.2 The parties disagreed as regards the question whether a metallic layer applied as in D1 using a plasma jet will be in superposition to the pre-treated layer, or not. This question can be left undecided, as will be explained hereafter. For the sake of argumentation it is assumed in favour of the respondent that in the two-step process of D1 the resulting metallic layer will not be in superposition with the surface layer modified by the pre-treatment.
- 3.3 The described pre-treatment according to D1 serves - similarly as the plasma pre-treatment described in the patent in suit (see paragraphs [0043] and [0096]),

which is stated to improve the wettability and adhesion - to improve the adhesion of the subsequently plasma-sprayed metal powder.

- 3.4 The subject-matter of claim 1 differs from the container of D1 in that
- i) the metallic layer is associated in superposition with the surface layer, which has been modified through a plasma treatment to improve the wettability on the surface of the base layer, and
 - ii) the metallic layer has been deposited by a vacuum PVD technique.

These two differences i) and ii) allow that a thinner, better adherent and uniform conductive metal layer can be applied onto the thermoplastic material (which can have better surface hardness, chemical stability and resistance to corrosion; see patent in suit, paragraphs [0028], [0036] and [0037]) without producing waste and by-products in an efficient and cost-efficient manner (see patent in suit, paragraphs [0027], [0029] and [0035]).

- 3.5 Therefore the objective technical problem starting from the container of D1, which is one comprising a thermoplastic tank for the storage and/or transportation of liquids or powders, particularly inflammables and which is suitable for preventing the formation of electrostatic charge by its metallic coating, is to improve the thickness, uniformity and adherence of this metal layer without producing waste and by-products, in an efficient and cost-efficient manner (see patent, paragraph [0029]).

3.6 This problem is solved by the container as defined in claim 1 of the patent as granted. The subject-matter of this claim is, however, rendered obvious for the following reasons:

3.7 The skilled person knows from D5 that the **adhesion** of a thin metal layer deposited by a PVD process can be improved by applying a low pressure plasma pre-treatment in an atmosphere containing SF₆ before the metal deposition (see point 1.2 above).

3.7.1 Starting from D1 the person skilled in the art has only to replace the pre-treatment (which operates with a plasma beam, a flame or a corona discharge) and the metal deposition by the plasma jet of D1 with the low pressure plasma pre-treatment and the preferred (see page 4, lines 6 to 8 and page 2, line 58 to page 3, line 1) subsequent PVD metal deposition by thermal evaporation according to the teaching of D5, to improve the adhesion.

3.7.2 In this context the Board remarks that it belongs to the common general knowledge of the person skilled in the art that the adhesion of subsequently applied metal layers on polymeric substrates can be increased by a low pressure plasma pre-treatment, as evidenced by the passage in the description of D5 relating to the prior art (see page 2, lines 10 to 18).

According to D5 the metallised plastic parts are preferably reflectors made of polycarbonate (see page 3, lines 9 to 11). This intended use of these parts implies an excellent **uniformity** of the applied thin

metal coating, which is another incentive to apply the teaching of D5.

Furthermore, it needs to be considered that the process according to D5 is not restricted to any specific polymeric substrate. Although polycarbonate represents the preferred substrate material it can be concluded from the disclosure of D5 that many other materials can be treated (see page 2, line 51 and claims 1 and 4) in the same manner. This is due to the reference to polymeric parts such as device casings or foils for packaging or decorative purposes (see page 3, lines 1 to 4), the latter directly implying other common polymeric materials, such as e.g. polyethylene, which is standard for packaging. In this context the Board further considers that - as is likewise stated in the part relating to the prior art of D5 (see page 2, lines 18 to 20) - it was already known that polycarbonate, polyethylene or polypropylene can be treated with a gas plasma containing argon for the deposition of amorphous carbon.

Therefore the person skilled in the art knows that these polymeric materials are suitable and sufficiently heat-resistant to be treated with low pressure plasma and consequently are also suitable to be treated with the process of D5, which is stated to be a low temperature plasma process (see page 2, lines 37 to 40).

3.7.3 Thereby the person skilled in the art arrives at the subject-matter of claim 1 of the patent as granted without any inventive skill.

3.7.4 When asked by the Board during the oral proceedings to comment to the above line of arguments as presented by the Board, or to that already presented in points 5.1 to 5.4 of the Board's communication annexed to the summons, the respondent had no further comments.

3.8 The Board therefore concludes that the subject-matter of claim 1 of the patent as granted according to the main request lacks an inventive step over a combination of the teachings of D1 and D5. This claim 1 thus does not meet the requirement of Article 56 EPC. The main request is therefore not allowable.

First auxiliary request

4. *Allowability of the first auxiliary request
(Article 123(2) EPC)*

Claim 1 of the first auxiliary request represents a combination of claims 1 and 5 of the patent as granted (see point VII above), corresponding to claims 1 and 5 of the application as originally filed. Hence claim 1 of the first auxiliary request meets the requirements of Article 123(2) EPC.

5. *Inventive step (Article 56 EPC)*

5.1 The subject-matter of claim 1 of the first auxiliary request differs from that of claim 1 as granted in that the material of the base layer is defined as comprising high density polyethylene (HDPE).

The respondent's arguments that the selection of HDPE for the tank material involves an inventive step, however, cannot hold for the following reasons.

5.1.1 First of all, in the patent in suit itself it is acknowledged that it is known to make such tanks of HDPE (see paragraph [0013]).

Secondly, even if it were not identified in the patent in suit as known then the selection of HDPE is considered to be obvious. Even if not explicitly mentioned in D1 - which only mentions a thermoplastic material - the skilled person would start from the most common plastic material used for making such tanks. In view of the fact that polyethylene (PE) was the most common polymeric material used for making such tanks, as admitted by the respondent during the oral proceedings, the skilled person would start with PE as the substrate material according to D1. Since HDPE has the same chemical-physical characteristics as PE except of having a greater strength (see patent, paragraph [0064]), it is, however, considered obvious by the Board that the person skilled in the art would select HDPE in order to improve the strength of the plastic tank to be made, particularly in view of the size of such tanks, being Intermediate Bulk Containers with a capacity between 450 and 3000 litres (see patent, paragraph [0007]).

5.1.2 Furthermore, as already considered, the process of D5 is not restricted to polycarbonate substrates (see point 3.7.2, above) and a technical prejudice to apply the plasma pre-treatment process to HDPE has not been proven by the respondent, who at the oral proceedings

could not produce further evidence which would support the existence of such a prejudice (see Case Law of the Boards of Appeal of the European Patent Office, 5th edition 2006, section I.D.9.2).

5.1.3 In any case, if the person skilled in the art really would have doubts that the method of D5 would work with HDPE in spite of the aforementioned description of the prior art in D5 relating to PE, then he can be expected to carry out routine experiments and thereby will learn that the process can effectively be applied to HDPE, which in its relevant behaviour under plasma treatment will not be different from PE, both being non-polar following the respondent's arguments.

5.1.4 The respondent's arguments concerning the recycling advantages of said tanks comprising or made of HDPE cannot be accepted since the patent in suit is silent on the aspect of recyclability, let alone in connection with HDPE. As submitted by the appellant, paragraph [0035] of the patent, cited by the respondent, is only concerned with the production of the container, not with its possible further recycling.

5.1.5 The Board therefore concludes that the subject-matter of claim 1 of the first auxiliary request lacks an inventive step (Article 56 EPC). The first auxiliary request is thus not allowable.

6. *Allowability of the second to sixth auxiliary requests (Article 123(2) EPC)*

Second auxiliary request

6.1 Claim 1 of the second auxiliary request comprises, compared to claim 1 of the first auxiliary request, the additional feature "... modified through **cold** plasma treatment ..." (see point VIII above) which according to the respondent is taken from paragraph [0040] of the patent in suit, which has a corresponding paragraph in the application as originally filed, page 8, line 25 to page 9, line 5.

6.1.1 Paragraph [0040] in fact mentions the preferred "cold plasma" but **not** necessarily in combination with said HDPE, which finds its only (separate) mention in connection with the invention in paragraphs [0031] and [0032] of the patent corresponding to page 7, lines 8 to 16; and page 8, line 25 to page 9, line 5 of the application as originally filed. There exists not necessarily a connection between said "cold plasma" and the preferred HDPE as substrate material, because the cold plasma is only mentioned in connection with the vacuum condition allowing the performance in a temperature range of 30-80°C. This range could just as well relate only to the other material - pure ordinary PE (see paragraph [0033] corresponding to page 7, lines 17 to 21 of the application as originally filed) - which has a lower melting point than said HDPE, thus excluding HDPE from the application of a cold plasma. Therefore this amendment is considered to represent an intermediate generalisation of the original disclosure, contrary to Article 123(2) EPC.

6.1.2 Consequently, claim 1 of the second auxiliary request contravenes Article 123(2) EPC. The second auxiliary request is therefore not allowable.

Third and fifth auxiliary request

6.2 Since claims 1 of the third and fifth auxiliary requests comprise the identical features "cold plasma" and "HDPE" (see points IX and XI above) the conclusion of above point 6.1.2 concerning Article 123(2) EPC applies *mutatis mutandis* to claims 1 of the third and fifth auxiliary requests.

The third and fifth auxiliary requests are therefore not allowable under Article 123(2) EPC.

Fourth auxiliary request

6.3 The respondent stated that the amendments of claim 1 of the fourth auxiliary request are based on claims 1 and 4 of the patent as granted in combination with paragraphs [0069], [0091] and [0092] of the patent (the latter two corresponding to page 19, lines 13 to 25 of the application as originally filed).

6.3.1 The passages in the description quoted with respect to the incorporation of the feature "and closing one of said one opening (8) ...", however, refers to the preferred embodiment according to figures 4 and 5 of the patent in suit. According to this specific embodiment the plastic tank has two openings, the first one 10 having the pliers 31 inserted to hold and support the tank 50 while the second one 11 is closed with means suitable for allowing the passage of the gas

and not of metallic molecules (see paragraph [0091]; and figures 4 and 5).

6.3.2 Thus according to this specific embodiment the second opening of the tank cooperates with said pliers 31, apparently in order to metallise the outer surface of the tank (compare paragraph [0090] of the patent). Consequently it is evident that the amendment "and closing one of said one opening (8) ..." made in claim 1 of the fourth auxiliary request represents an intermediate generalisation which is contrary to Article 123(2) EPC since the above mentioned other features of said embodiment have been omitted.

6.3.3 Claim 1 of the fourth auxiliary request therefore contravenes Article 123(2) EPC. The fourth auxiliary request is therefore not allowable, either.

Sixth auxiliary request

6.4 Claim 1 of the sixth auxiliary request comprises the added feature "... a layer of metallic material ... **only** on the outer surface" (emphasis added by the Board) which was stated to have a basis or be derivable from paragraphs [0090] to [0092] of the patent (corresponding to page 19, lines 10 to 25 of the application as originally filed).

6.4.1 As mentioned in paragraph [0090]: "The metallization of **the outer surface** of the tank 50 is carried out in the chamber 20 by performing the steps listed thereafter." (emphasis added by the Board). The subsequent paragraphs [0091] and [0092] of the patent then disclose amongst others that the pliers 31 are inserted

in the loading pipe union 10 while the unloading pipe union 11 is closed with means, such as a membrane, suitable for allowing the passage of gas but not of metallic molecules or metal vapours inside the tank.

6.4.2 As already considered in point 6.3.2 above, the second opening of the tank cooperates with the pliers 31 (see also figures 4 and 5) but it is nowhere described in the application as originally filed that said second opening is fully closed so that no metallic molecules or metal vapours can enter into the tank. Consequently, the description of the specific embodiment allows to metallise the outer surface of the tank but gives no guarantee that the inside, e.g. in the region of said second opening and pliers remains totally uncoated. Consequently, there exists no direct and unambiguous basis for the feature of claim 1 "a layer of metallic material ... **only** on the outer surface".

6.4.3 In this context the Board notes that at the oral proceedings, during the discussion of the fourth auxiliary request, the respondent stated that the process features had been added into the subject-matter of product claim 1 in order to define that only the outer surface is metallised since it was not clear whether there existed a clear basis for metallisation of only the outer surface in the application as originally filed.

6.4.4 Consequently, claim 1 of the sixth auxiliary request extends beyond the content of the application as originally filed, contrary to the requirements of Article 123(2) EPC. The sixth auxiliary request is thus also not allowable.

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. Nachtigall

H. Meinders