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**Datasheet for the decision  
of 13 September 2011**

**Case Number:** T 0075/09 - 3.3.03  
**Application Number:** 03771970.5  
**Publication Number:** 1525255  
**IPC:** C08K 3/04, A47J 36/02  
**Language of the proceedings:** EN

**Title of invention:**  
Ovenware for microwave oven

**Applicant:**  
E.I. DU PONT DE NEMOURS AND COMPANY

**Opponent:**  
-

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 83, 84, 123(2)

**Relevant legal provisions (EPC 1973):**  
-

**Keyword:**  
"Insufficiency of disclosure - Main and First Auxiliary Requests (yes)"  
"Amendments - added subject-matter (Second Auxiliary Request (yes))"  
"Examination procedure - requirements of the European patent application to be dealt with prior to the question of patentability"

**Decisions cited:**  
G 0009/91, T 0301/87, T 0172/99, T 0690/00, T 0133/03

**Catchword:**

Where - as in the present case - there are multiple requests and a feature common to all requests is held not to meet the requirements of Article 84 EPC, as a consequence of which higher ranking requests are refused, all lower ranking requests retaining this feature have to be refused for the same reason.

The fact that in a lower ranking request the offending feature no longer has to be relied upon to establish a distinction over the prior art does not overcome the defect pursuant to Article 84 EPC. Nor does it give the deciding body the discretion to disregard the deficiency.

In particular it has to be borne in mind that the significance of a feature may become apparent only at a later stage in the life of a patent, eg in opposition or revocation proceedings (cf. Nos. 2.7 to 2.9 of the reasons).



Case Number: T 0075/09 - 3.3.03

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.03  
of 13 September 2011

**Appellant:**  
(Applicant)

E.I. DU PONT DE NEMOURS AND COMPANY  
1007 Market Street  
Wilmington, DE 19898 (US)

**Representative:**

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**Decision under appeal:**

**Decision of the Examining Division of the  
European Patent Office posted 1 August 2008  
refusing European patent application  
No. 03771970.5 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman:** M. C. Gordon  
**Members:** A. Däweritz  
C.-P. Brandt

## Summary of Facts and Submissions

- I. The appeal lies against the decision of the Examining Division dated 1 August 2008 refusing the European Patent Application No. 03 771 970.5.
- II. In Oral proceedings held before the Examining Division on 31 January 2008, the Main Request and first to fourth Auxiliary Requests as filed on 29 January 2008 and further a fifth and a sixth Auxiliary Request as submitted at the hearing were discussed (the main and the auxiliary requests were referred to by the Examining Division as "**MR**" and "**AR1**" to "**AR6**").

(1) The Main Request ("**MR**") contained 26 claims, including two independent claims reading as follows:

1. *A piece of ovenware, comprising a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is 250°C or more or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor, provided that said composition has a thermal conductivity of 0.70 W/m·K or more when measured through a plane of said composition.*

16. *A process for cooking in a microwave oven, comprising:*  
- *contacting an item to be cooked with a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is 250°C or more or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor, provided that said composition has a thermal conductivity of 0.70 W/m·K or more when measured through a plane of said composition, and*  
- *exposing food in contact with said composition to microwave radiation.*

Dependent Claims 2 to 15 related to the features of the above ovenware essentially as contained in Claims 4, 7 to 9, 11 to 16, as originally filed. Dependent Claims 17 to 26 concerned the features of the above process essentially as filed in original Claims 19 to 26.

(2) The first Auxiliary Request ("**AR1**") differed from the Main Request only by the addition of the feature

", *measured according to ASTM Method D5930*" at the end of Claim 1, above, and by the insertion of the same feature between "*composition*" and ", *and*" at the end of the first bulleted paragraph of Claim 16, as shown above.

(3) The second Auxiliary Request ("**AR2**") differed from the Main Request, in that the definition of the microwave susceptor in Claims 1 and 16 was limited by the following insertion: "*selected from aluminum, carbon, barium titanate, zinc oxide and iron oxides*".

The third Auxiliary Request ("**AR3**") differed from the second Auxiliary Request by the additional replacement of "*0.70 W/m·K*" by "*2.0 W/m·K*".

In the fourth Auxiliary Request ("**AR4**") both independent claims were further amended - compared to AR3 - by replacement of "*or a thermoset polymer whose softening point is 250°C or more*" by ", *said polymer being a liquid crystalline polymer*" ("LCP").

In the fifth Auxiliary Request ("**AR5**") the passage "*a heating effective amount of a microwave susceptor*" in Claims 1 and 16 of the Main Request had been replaced by "*5-65 % by weight of the composition of a microwave susceptor selected from aluminum, carbon and zinc oxide*".

(4) The independent claims of the sixth Auxiliary Request ("**AR6**"), which at the end of the hearing, were considered to be allowable by the Examining Division, read as follows (in amended claims quoted in this decision, the additions with respect to the above Main Request are underlined, the deletions [between brackets] are struck through):

1. A piece of ovenware, comprising a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is 250°C or more which

is a liquid crystalline polymer, and 5-65 % by weight of the composition of a microwave susceptor selected from aluminum powder, aluminum dust and zinc oxide [or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor], provided that said composition has a thermal conductivity of  $\underline{2}$  [0.70] W/m·K or more when measured through a plane of said composition according to ASTM D5930.

11. A process for cooking in a microwave oven, comprising:
- contacting an item to be cooked with a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is 250°C or more which is a liquid crystalline polymer, and 5-65 % by weight of the composition of a microwave susceptor selected from aluminum powder, aluminum dust and zinc oxide [or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor], provided that said composition has a thermal conductivity of  $\underline{2}$  [0.70] W/m·K or more when measured through a plane of said composition according to ASTM D5930, and
  - exposing food in contact with said composition to microwave radiation.

III. In the Communication under Rule 71(3) EPC dated 3 March 2008, the applicant was informed by the Examining Division of the text intended for grant which was based on the sixth Auxiliary Request and, furthermore, in an Annex (hereinafter: "the Annex") of the reasons why the Main Request and the first to fifth Auxiliary Requests were deemed not to be allowable.

(1) More particularly, the Examining Division held that document D1 had disclosed all features of Claim 1 of the Main Request except for explicitly mentioning a value for the thermal conductivity. Therefore, the only distinguishing feature between the subject-matter of Claim 1 of the Main Request and D1 would have resided in the parameter "*thermal conductivity*", the definition of which at the end of Claim 1 will be denoted herein as "through plane thermal conductivity".

(2) According to the Examining Division, Article 84 EPC required that the claims be clear in themselves when

being read with the normal skills. This meant according to the Communication that, for the unambiguous characterisation in a claim of a product by a parameter, the parameter had to be clearly and reliably determined, and that the knowledge of the method and conditions of determination of the parameter was therefore necessary for the unambiguous definition of the parameter. However, these requirements were deemed not to be met in the Main and the first to fifth Auxiliary Requests.

(3) According to the description, the method of ASTM D 5930 had been used to measure this parameter. This standard method required, however, several parameters (ie the measuring conditions), which influenced to some extent the overall value of the measurement of the thermal conductivity, in particular the temperature, to be reported.

(4) Moreover, reference was made in the application in suit to two different temperatures for this measurement, firstly in the context of the fillers, a temperature of 273 K and, secondly with reference to a comparative composition, a temperature of 100°C.

(5) The Examining Division additionally commented on ASTM D 618, which was referred to in ASTM D 5930. It described in item 8 several different standard procedures of measurement carried out under different measuring conditions, some of which deviated from the temperature of 23°C. Therefore the Examining Division took the view that there was absolutely no evidence that the standard conditions defined in ASTM D 618 were those which the skilled person would inevitably use in the determination of the thermal conductivity of the thermoplastic polymer composition. On the contrary, ASTM D 5930 mentioned a temperature range of -40 to

400°C, and did not indicate that a standard temperature of 23°C had to be used.

(6) Consequently, the Examining Division came to the conclusion that (i) there was lack of information with respect to the exact conditions under which the thermal conductivity in Claim 1 of the Main Request was to be determined, (ii) this lack of information caused uncertainty as to the definition of the parameter "*thermal conductivity*", so that this parameter could not limit the subject-matter of Claim 1 in any clear way. Therefore, Claim 1 of the Main Request was not clear as required by Article 84 EPC (Annex: No. 1.16).

(7) In the Annex (Nos. 1.17 to 1.22), this finding was also held to be valid for the first to fifth Auxiliary Requests, irrespective of the other modifications in their claims.

- IV. By letter dated 7 July 2008, the applicant did not approve the text for grant (based on the sixth Auxiliary Request), but maintained its request that a patent be granted on the basis of the Main Request or first Auxiliary Request as filed on 29 January 2008.
- V. Consequently, the Examining Division set aside the communication under Rule 71(3) EPC in a communication dated 21 July 2008. Furthermore, it refused the Main Request and the first Auxiliary Request in the decision issued on 1 August 2008, because the respective Claim 1 of the above main and first auxiliary requests did not fulfil the requirements of Article 84 EPC. The reasons were those already communicated to the applicant in the Communication under Rule 71(3) EPC, referred to above.
- VI. On 1 October 2008, the Applicant lodged an appeal against this refusal of the application with



simultaneous payment of the appeal fee and requested that the decision be set aside and the patent be granted based on the claims of the Main Request as annexed to the decision.

In its Statement of Grounds of Appeal, received on 4 December 2008, the Appellant submitted a new Main Request and a new first auxiliary request, each containing Claims 1 to 26. The independent claims of this new Main Request read as follows:

1. *A piece of ovenware, comprising a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is 250°C or more or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor, provided that said composition has a thermal conductivity of 0.70 W/m·K or more when measured through a plane of said composition, measured according to ASTM Method D5930.*

16. *A process for cooking in a microwave oven, comprising:*  
- *contacting an item to be cooked with a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is 250°C or more or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor, provided that said composition has a thermal conductivity of 0.70 W/m·K or more when measured through a plane of said composition, measured according to ASTM Method D5930, and*  
- *exposing food in contact with said composition to microwave radiation.*

The independent claims of the Auxiliary Request read as follows:

1. *A piece of ovenware, comprising a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is 250°C or more or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor selected from aluminum, carbon, barium titanate, zinc oxide and iron oxides, provided that said composition has a thermal conductivity of 0.70 W/m·K or more when measured through a plane of said composition in accordance with ASTM Method D5930.*

16. *A process for cooking in a microwave oven, comprising:*  
- *contacting an item to be cooked with a composition which comprises a mixture of a thermoplastic polymer whose melting point and/or glass transition point is*

*250°C or more or a thermoset polymer whose softening point is 250°C or more, and a heating effective amount of a microwave susceptor selected from aluminum, carbon, barium titanate, zinc oxide and iron oxides, provided that said composition has a thermal conductivity of 0.70 W/m·K or more when measured through a plane of said composition in accordance with ASTM Method D5930, and*

- *exposing food in contact with said composition to microwave radiation.*

VII. In a Communication dated 17 February 2011, the Board referred to the finding in the decision under appeal that the subject-matter of the claims according to the Main Request or of the first Auxiliary Request had not met the requirements of Article 84 EPC due to the - in the Examining Division's view - unclear definition of the feature "*thermal conductivity ... when measured through a plane of said composition*" (cf. the above versions of Claim 1 and No. 3.1 of the reasons for the decision under appeal), and that this lack of clarity had arisen as a result of the absence of a definition of the measuring temperature in the application in suit (decision under appeal: Nos. 3.13 to 3.17 of the reasons, cf. item 5.4 of the communication).

Moreover, the Board drew the Appellant's attention to the fact that what is disclosed in the application in suit appeared to be incompatible with what is specified in ASTM D 5930 and that this gave rise to an objection under Article 83 EPC, which according to the preliminary provision view of the Board could hardly be overcome without violating the requirements of Article 123(2) EPC (items 6 to 6.9 of the communication).

Thus, whilst in the application reference was made to a measurement "*through a plane (thinnest cross section) of a test part or piece oven ovenware, using ASTM Method D5930*", "*through a plane of said composition*" or "*through the plane*

*of a test piece"*, ASTM D 5930 required *"A line source of heat is located at the center of the specimen being tested."* Moreover, the method of ASTM D 5930 put emphasis on the loading of the samples into the specific apparatus to be used for the measurement. Nor was the method of ASTM D 5930 to be used as a referee test method in case of dispute.

VIII. The Appellant replied to this communication in a letter dated 18 April 2011 and submitted a further set of 26 claims forming a second Auxiliary Request therewith.

This additional second Auxiliary Request differed from the wording of the above first Auxiliary Request only by the deletion of *"when measured through a plane of said composition"* from its independent Claims 1 and 16.

IX. On 1 July 2011, the Board issued a summons to attend oral proceedings.

X. Together with a letter dated 11 August 2011 the Appellant presented further comments on the aspects of thermal conductivity and referred to Decision T 133/03 of 19 September 2005 (not published in OJ EPO).

XI. The oral proceedings were held on 13 September 2011.

XII. The written and oral arguments of the Appellant insofar as they are relevant for this decision can be summarised as follows:

(1) The ASTM D 5930 contained a clear reference to ASTM D 618 defining a *"Standard Laboratory Atmosphere"* of 23°C and a relative humidity of 50%. *"According to that standard, the physical and electrical properties of plastics were to be measured by a temperature of 23°C 'unless otherwise specified'"*. The application in suit did not specify a temperature for the measurement. Therefore, the

skilled reader of the application in suit would have understood to use a temperature of 23°C for the determination of the thermal conductivity of the composition in Claim 1.

(2) Moreover, the thermal conductivity of the polymers *per se* as comprised in the claimed ovenware would be a material constant of the polymer and would not therefore change much between room temperature and the melting point. Therefore, a measurement at 23°C would also be representative for higher temperatures, so that it would be reasonable to measure the thermal conductivity of ovenware at 23°C. In support of this argument the Appellant referred to (i) a hard copy from the internet to show that nylon had a thermal conductivity of  $<0.1 \text{ W/m}\cdot\text{K}$  at temperatures of between 233 and 473 K and to two published articles referring (ii) to a poly(ether ether ketone) having a thermal conductivity of  $<0.2 \text{ W/m}\cdot\text{K}$  at between 100 and 400 K and (iii) to an LCP having a thermal conductivity of only about  $0.1 \text{ W/m}\cdot\text{K}$  at from 50 to 275°C. Moreover, temperatures other than 23°C would be used only in two of the procedures A to F described in ASTM D618: Procedure B would be used for thermosetting polymers, procedure C for the determination of specific effects of exposure to severe atmospheric moisture.

(3) The Appellant further explained in its letter dated 18 April 2011 (page 2, paragraph 2) that

*"There are many ways to determine the 'thermal conductivity' of a material. One easy way ... is the so called 'line-source technique' detailed in ASTM D 5930. This is a 'transient method for determining thermal conductivity' (see section 4.1 of ASTM D 5930) ... The term transient indicates that the line-source technique is a non-invasive measurement method which does not adversely affect the test sample during measurement."*

ASTM D 5930 was in the Appellant's view applicable for the claimed subject-matter, because its results were independent from the size and shape of the sample material (page 3, paragraph 3) and because it was not necessary to determine the thermal conductivity at highest precision, but

*"it is completely sufficient for the test method to provide an estimate or close approximate of a single material's thermal conductivity, in order to then choose the most appropriate substance for the cookware described in the application."* (paragraph bridging pages 3 and 4).

*"Generally, it is to be noted that the parameter 'thermal conductivity' as used in the present description is identical to the definition given in section 3.2.2 of ASTM D 5930, namely the time rate of steady heat transfer through unit thickness of a homogeneous material in a direction perpendicular to the surface induced by a unit temperature difference. As the thermal conductivity is measured in a direction perpendicular to the surface (i.e. through the plane) of a given sample, this term is simultaneously used with the term 'through plane thermal conductivity.'" (page 4, paragraph 2).*

(4) At the hearing, the Appellant saw no incompatibility between the statement in ASTM D 5930 (7.1) that the line-source probe be imbedded in the sample and the description of the method in the patent application.

With regard to the debate whether the descriptions of how the thermal conductivity measurement was to be carried out in the ASTM method D 5930 and in the application in suit were compatible, the Appellant assumed that the author of the application had been led by the reference in section 3.2.2 of the norm to *"in a direction perpendicular to the surface"* to use the expression *"through a plane (thinnest cross section) of a test part or piece of ovenware, using ASTM Method D5930"*.

Moreover, it was submitted (at the oral proceedings) that *"through a plane"* did not mean that the measurement was actually carried out through the plane of the

article. According to section 9.5 of ASTM D 5930 relating to solid thermoplastics these materials were ground/cut up to permit placing this material into a cylindrical sample tube and embedding a line source into the sample. Thus the material to be used was to be taken from (cut out of) the thinnest part of the ovenware. Hence it was less the case that the conductivity measurement was carried out on the object itself but on the contrary that the material had to be taken from the thinnest cross section of the object. In contrast to the situation in the U.S., the skilled person in Europe would also be aware of other standards how to carry out the measurement without employing a cylindrical sample of the material to be tested. Since thermal conductivity depended on the material itself, not on the shape or size of the sample, the Appellant did not see any irreconcilable contradiction between the application text and the ASTM Method D 5930, but maintained the gist of its conclusion on page 5 of the letter dated 18 April 2011 (page 5, lines 7/8) that this norm disclosed "*an appropriate measurement technique for determining the 'thermal conductivity' of the polymer materials of the present invention.*" Of course, the measuring conditions would have to be adapted to the polymeric compositions to be tested.

(5) The range of measurements of 0.08 to 2.0 W/M·K was, according to the Appellant, defined in ASTM D 5930 so that the normal thermal conductivity of commodity plastics of, in general,  $\ll 1$  W/m·K would be encompassed.

(6) According to ASTM D 5930 (see Fig. 1), the slope of the straight part of the curve in a temperature/time diagram gave the thermal conductivity. Thus, a steeper slope of the linear part of the measured curve meant a

higher thermal conductivity of the polymer, the value of which might be less exact in the range above 2.0 W/m·K (the maximum mentioned in the norm). Nevertheless, measurements such as the examples of the application in suit of from 2.65 to 3.6 W/m·K could still be regarded as being reasonably meaningful results although being >2.0 W/m·K.

(7) With regard to the first Auxiliary Request, the Appellant again referred to the measurements in the examples (Table 1 on page 19 of the application) and pointed out that they were greatly affected by the thermal conductivity of the specific susceptors/fillers required in Claims 1 and 16 of this request. In Table 1, these susceptors would even constitute the major portion of the compositions.

The additional limitation would introduce a further feature into Claim 1 which would delimit it from the prior art, so that the importance of the measurement of the thermal conductivity for the claimed subject-matter with regard to Article 83 EPC would be reduced.

(8) The deletion of "*when measured through a plane of said composition*" from the independent Claims 1 and 16 of the second Auxiliary Request was justified by the Appellant as having been made superfluous by the reference to ASTM D 5930. With regard to section 3.2.2 of the norm, it would be evident that this statement would even be misleading. Moreover, in view of the description on page 10, lines 5 to 9 relating to the minimum value of the thermal conductivity of the compositions, in general, this deletion would not contravene Article 123(2) EPC.

XIII. When the Appellant indicated that it did not wish to make further submissions and before closing the debate on the questions of Articles 83 and 84 EPC, the Board established again the Appellant's requests.

The Appellant requested that a patent be granted on the basis of the set of 26 claims according to the Main Request as filed with the Statement of Grounds of Appeal.

Alternatively grant of a patent on the basis of the set of 26 claims forming the first Auxiliary Request, also filed with the Statement of Grounds of Appeal,

further auxiliarily grant of a patent on the basis of the set of 26 claims forming the second Auxiliary Request submitted with the letter dated 18 April 2011 was requested.

XIV. Moreover, the Appellant was informed that, if the Board came to the conclusion that the appeal was allowable, it would remit the case to the first instance for further prosecution.

Then the oral proceedings were interrupted for deliberation of the Board. After resuming the hearing, the Board informed the Appellant that the decision would be issued in writing.

### **Reasons for the Decision**

1. The appeal is admissible.

#### *General observations*

2. In view of the course of the examination proceedings before the Examining Division, and in particular the



different conclusions drawn by the Examining Division with regard to the different requests of the Applicant, but also the Appellant's argument referred to in section XII(7), second paragraph, above, the Board deems it appropriate to add some more general observations concerning the examination of a case like this, before turning to the Appellant's individual requests.

2.1 As set out in point 7 in the Minutes of the oral proceedings before the Examining Division on 31 January 2008 and in point 1.22 of the Annex to the Communication under Rule 71(3) EPC (hereinafter "the Annex"), the Examining Division had taken the view that all requests higher ranking than the sixth Auxiliary Request filed at the oral proceedings could not be allowed for the reason of lack of clarity. In the decision under appeal (Nos. 3.18 and 4), this view was again confirmed with regard to the Main Request and first Auxiliary Request (ie the two requests maintained by the Applicant in its letter of disapproval dated 7 July 2008).

2.2 The reason for this finding was explained with regard to Claim 1 of the Main Request in Nos. 3.15 and 3.16 of the decision now under appeal (as before in Nos. 1.15 and 1.16 of the Annex):

*3.15 Since the determination of the "thermal conductivity" is significantly dependent on the measurement conditions used, the indication of the measurement conditions is part of the clear definition of the parameter "thermal conductivity", and hence of the clear definition of the claimed product in accordance with Art. 84 EPC.*

*3.16 This lack of information results in uncertainty as to the definition of the parameter "thermal conductivity", and therefore said parameter cannot limit the subject-matter of claim 1 of the **MR** in any clear way. In other words, claim 1 is not clear as required by Art. 84 EPC.*

Despite the identification of the measurement "*according to ASTM Method D5930*" in its Claim 1, the same conclusion had been drawn with respect to the first Auxiliary Request in No. 1.17 of the Annex and confirmed in No. 3.17 of the decision under appeal (see the last four lines of the paragraph), because the measuring temperature had not been defined in its Claim 1. Furthermore, this conclusion had also been drawn with regard to Claim 1 of the third Auxiliary Request (see No. 1.19 of the Annex). Consequently, the Examining Division had held that neither Auxiliary Request complied with Article 84 EPC.

2.3 Moreover, based on the statement "*the parameter 'thermal conductivity' would remain the only distinguishing feature and thus this claim would remain unclear*" or in similar words (cf. the Minutes of 31 January 2008: page 4, lines 2/3 and Nos. 1.18, 1.20 and 1.21 of the Annex), the Examining Division had come to the same conclusion with regard to each of the second, fourth and fifth Auxiliary Requests.

2.4 By contrast, the Examining Division had indicated in the Communication under Rule 71(3) EPC that it deemed the sixth Auxiliary Request to be in compliance with the requirements of the EPC.

2.4.1 A closer look at Claim 1 of this request shows that it contained a combination of features which had as such also been incorporated in those higher-ranking auxiliary requests and which had been considered there as not being suitable for overcoming the objection under Article 84 EPC against those requests (Annex: page 5, lines 1 to 8):

Additional features in Claim 1 of the sixth Auxiliary Request	Auxiliary Request(s) in which a given feature had already been referred to
Measurement according to ASTM D 5930 Particular microwave susceptors Thermal conductivity of $\geq 2$ W/m·K Polymer being an LCP 5-65 wt.% of particular microwave susceptors; thermoset polymer being excluded	1 <sup>st</sup> 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> and 5 <sup>th</sup> 3 <sup>rd</sup> and 4 <sup>th</sup> ( $\geq 2.0$ W/m·K) 4 <sup>th</sup> 5 <sup>th</sup>

2.4.2 In view of the reasoning for the refusal of the Main and the first Auxiliary Request in the decision under appeal and additionally for the second to fifth Auxiliary Requests in the Annex, the Board can only conclude that the Examining Division had apparently taken the view as regards the sixth Auxiliary Request

- that the above objection of lack of clarity in respect of the definition of the thermal conductivity could be left aside/disregarded, because the *"thermal conductivity" did not "remain(s) the only distinguishing feature"* (with respect to the prior art) and
- that, therefore, a patent could nevertheless be granted despite this lack of clarity in both independent claims of this request.

2.5 However, such an approach is not, in the Board's opinion, in accordance with the requirements of the EPC.

2.5.1 Article 18(1) EPC states that *"The Examining Divisions shall be responsible for the examination of European patent applications"*, ie in all its aspects.

2.5.2 The articles of the EPC relevant to the examination proceedings as a whole are organised in different Parts and Chapters of the Convention. Thus, Part III *"THE*

*EUROPEAN PATENT APPLICATION*", Chapter I "*Filing and requirements of the European patent application*" contains Articles 75 to 86 EPC, whilst Articles 52 to 57 concerning the grant of a patent, in general, and novelty, inventive step and industrial application, in particular, are found in Part II "*SUBSTANTIVE PATENT LAW*" Chapter I "*Patentability*".

2.6 In view of this structure of the EPC, the Board takes the view that articles in one chapter of the EPC concern requirements different from those defined in articles of the other chapter of the EPC and that, consequently these different requirements have to be treated separately and independently from one another.

2.7 It follows that the assessment of the substantive requirements for grant, ie novelty, inventive step and industrial application, can only be brought to a meaningful and appropriate end, in particular can only result in the grant of a patent, after any problems concerning (i) the "*Filing and requirements of the European patent application*" as such and (ii) the "*Common provisions governing procedure*" (Part VII Chapter I of the EPC), namely those laid down in Article 123(2) EPC, have positively been solved.

This implies, in the Board's opinion, that any problems concerning the requirements of Article 83 EPC (sufficiency of disclosure) and of Article 84 EPC (requiring the claims to be clear and concise and supported by the description - without making in this respect any distinction between independent and dependent claims) and, in the case of amendment, those of Article 123(2) EPC have to be dealt with independently from and prior to the question of patentability.

2.8 Moreover, it should be kept in mind that a feature in an (independent or dependent) claim, which *prima facie* does not appear to be relevant for the decision on patentability at any time during or at the end of the examination procedure, may at a later stage in the life of the granted patent, eg in opposition proceedings under Article 99 EPC before the EPO or in revocation proceedings before a court under Article 138 EPC, become highly relevant or even decisive for the validity of the European patent.

However, a deficiency concerning the requirements of Article 84 EPC is neither a ground for opposition before the EPO under Article 100 EPC nor a ground for revocation under Article 138(1) EPC. Consequently, such a deficiency cannot be dealt with, let alone remedied in either proceedings.

Reference can be made in this respect to established jurisdiction, namely to the Decision of the Enlarged Board of Appeal G 9/91, (OJ EPO 1993, 408, No. 19 of the reasons) and eg Decisions T 301/87 (OJ EPO 1990, 335, No. 3.8 of the reasons) and T 690/00 of 20 February 2002 (No. 4.1 of the reasons; not published in OJ EPO, cf. also Chapter VII.D.4.2 in the Case Law of the Boards of Appeal of the EPO, 6<sup>th</sup> edition, 2010).

2.9 In other words, where - as in the present case - there are multiple requests and a feature common to all requests is held not to meet the requirements of Article 84 EPC, as a consequence of which higher ranking requests are refused, all lower ranking requests retaining this feature have to be refused for the same reason.

The fact that in a lower ranking request the offending feature no longer has to be relied upon to establish a

distinction over the prior art does not overcome the defect pursuant to Article 84 EPC. Nor does it give the deciding body the discretion to disregard the deficiency.

In particular it has to be borne in mind that the significance of a feature may become apparent only at a later stage in the life of a patent, eg in opposition or revocation proceedings.

*Main Request*

3. As addressed in the communication of the Board dated 17 February 2011, the crucial question for the allowability of the Main Request, which is identical to the first Auxiliary Request underlying the decision under appeal, concerns the sufficiency of the disclosure. In other words, it has to be decided whether the skilled reader has been provided in the application text as originally filed in a clear and complete manner, ie in the form of a coherent, convergent and, hence, consistent teaching with all the information necessary for him/her to carry out the invention (Article 83 EPC).
- 3.1 In both independent claims of the Main Request, ie Claims 1 and 16, the compositions comprised in the ovenware are defined by (i) the presence of completely different types of polymers, ie either a thermoplastic polymer "TP" having a melting point and/or a glass transition temperature of  $\geq 250^{\circ}\text{C}$  or a thermoset polymer "TSP" having a softening point of  $\geq 250^{\circ}\text{C}$ , and (ii) a "heating effective amount" of a microwave susceptor. Moreover, the subject-matter of each claim requires its compositions to have "a thermal conductivity of  $0.70 \text{ W/m}\cdot\text{K}$  or more when measured through a plane of said composition, measured according to ASTM Method D5930", herein below referred to as "through plane thermal conductivity".

- 3.1.1 The description of the useful polymeric components recommends that these polymers should be suitable for high temperature use, namely they should not melt or soften when used, and includes a broad range of different generic types of polymers (page 6, line 29 to page 7, line 27). A preferred polymer is an LCP, ie an anisotropic polymer (page 7, lines 9/10).
- 3.1.2 Due to the purely functional definitions of the above mandatory components and the optional presence of any further components (such as fillers and other additives, page 16, first complete paragraph of the application: "*These additives may somewhat affect the thermal conductivity, and any thermal conductivity limitations must still be met.*"), it is, in the Board's view, necessary for the skilled reader to test each composition individually in order to determine whether or not it falls within the scope of the claims, ie he/she must be provided with clear information how to establish whether a given composition has the required "through plane thermal conductivity".
- 3.1.3 The only additional guidance given to the skilled reader as to the determination of the "through plane thermal conductivity" can be found on page 10, lines 18 to 21, according to which "*The thermal conductivity is measured through a plane (thinnest cross section) of a test part or piece of ovenware, using ASTM Method D5930*" and on page 19, lines 2 to 9 and Table 1, within the context of the particular formulations used in the examples. After melt mixing an LCP with carbon fibres and, in Examples 3 and 4, additionally with glass fibres in a twin screw extruder and by chopping the resulting strand, the pellets thus obtained had been injection moulded into plaques and test pieces. According to the

text accompanying the examples, "*thermal conductivity (through the plane of the test piece) was measured by ASTM method D5930.*" (page 18, last paragraph).

3.2 In view of this very short description, the skilled reader has to derive any details and marginal conditions necessary for reliably measuring the thermal conductivity from ASTM D 5930.

3.2.1 As already set out in the Board's communication of 17 February 2011, ASTM D 5930 defines thermal conductivity as:

*the time rate of steady heat flow/unit area through unit thickness of a homogeneous material in a direction perpendicular to the surface induced by a unit temperature difference (section 3.2.2).*

Moreover, according to section 3.2.2.2 "Discussion", *Thermal conductivity must be associated with the conditions under which it is measured, such as temperature and pressure, as well as the compositional variation of the material. Thermal conductivity may vary with direction and orientation of the specimen since some materials are not isotropic with respect to thermal conductivity.*

Further statements concern some particulars to be observed in carrying out the measurement according to ASTM D 5930 and the reliability of the measurements:

*A line source of heat is located at the center of the specimen being tested. The apparatus is at a constant initial temperature (section 4.1).*

*The apparatus consists of a line-source probe imbedded in a specimen contained in a constant-temperature environment. (section 7.1)*

*Solid Thermoplastics--Load the sample in the same manner as in 9.4. The following precautionary steps are needed to account for shrinkage of the specimen as it solidifies. The probe shall be fitted with a dynamic sealing system permitting it to move with the shrinking specimen. Static loads can then be placed on the probe to help maintain contact as the plastic shrinks. These loads optimally will apply a pressure of 1 to 7 MPa on the specimen (section 9.5).*

*Thermosets and Rubber--Preheat the sample cell to a loading temperature, above the glass transition, where the specimen is fluid enough to be molded but will not undergo signifi-*



cant reaction (6) ... Charge or pour the uncured specimen in the same manner as in 9.4. ... (section 9.6).

Section 9.4 reads as follows:

*Thermoplastics in the Melt--Preheat the sample cell to the lowest processing temperature of the thermoplastic. Loading specimens at a low temperature is desirable to ensure an air-free specimen. Pour a charge of the specimen, typically in pellet or powder form, into the cell and compress into a homogeneous specimen. Several charges, tamped well, may be needed to fill the sample cell. When the specimen is well molten, insert the probe so as to be near the axial center of the specimen. Sealing systems may be employed to contain the specimen. For thermally unstable materials, follow material manufacturers' recommendations on temperature exposure limits.*

*Because this test method does not contain a numerical precision and bias statement, it shall not be used as a referee test method in case of dispute (section 5.1).*

This statement can even be found twice in the ASTM:

*Attempts to develop a full precision and bias statement for this test method have not been successful. Because this test method does not contain round-robin based precision data, it shall not be used as a referee test method in case of dispute (section 14.2).*

3.2.2 Furthermore, according to section 1.1 of the norm,

*This test method covers the determination of the thermal conductivity of plastics over a temperature range from -40 to 400°C. The thermal conductivity of materials in the range from 0.08 to 2.0 W/m·K can be measured covering thermoplastics, thermosets, and rubbers, filled and reinforced.*

and in section 8 "Conditioning":

*8.1 Many thermoplastic materials need to be dried because moisture can affect the properties. Moisture causes molten polymer samples to foam, which will affect the measured thermal conductivity. If conditioning is necessary, see the applicable material specification or Practice D 618.*

3.3 Moreover, it is stated in section 6.1.1 of the norm that

*In the solid state, a contact resistance can develop due to the interface between the specimen and the measuring device.*

3.3.1 Whilst the Appellant argued at the oral proceedings that thermal conductivity would be a property inherent to each polymer, even a material constant, it is evident not only from the various sections in ASTM D 5930, but also from page 8, lines 7 to 10 and page 16,

paragraph 2 of the application text, that many variables (eg the temperature and the contact between solid composition and measuring device, the marginal conditions mentioned in section 3.2.2.2 of the norm or the exact composition to be measured) will affect the result. This influence has not been deemed to be neglectable by the authors of ASTM D 5930.

3.3.2 Furthermore the "scope" of the test method as defined in section 1.1 of the norm, ie being applicable to thermal conductivity in the range of 0.08 to 2.0 W/m·K, gives rise to the question of whether this method is even suitable for reliably determining whether the thermal conductivity of compositions referred to in the description does, in fact, comply with the requirement in the independent claims, ie whether it is  $\geq 0.70$  W/m·K. This question arises, in particular, with regard to the minimum values referred to on page 10, first complete paragraph of the application of *"more preferably about 2.0 W/m°K or more, very preferably about 3.0 W/m°K or more, and especially preferably about 5.0 W/m°K or more"*.

3.4 However, it does not emerge from the information given in the standard how the method described, ie involving a probe embedded into the centre of a specimen of the material to be investigated, can be employed to measure thermal conductivity through the plane, ie thinnest cross section of *"test part"* or *"test piece"* of oven-ware as is described in the application (page 10, lines 18 to 21) or of those injection moulded plaques and test pieces apparently used in its Examples 1 to 4 for which, furthermore, measuring results have been reported in Table 1 significantly above the range for which ASTM D 5930 is suitable (cf. its section 1.1).

- 3.5 On the contrary, there is an evident incompatibility between the measurement protocol set out in standard ASTM D 5930 and the statements in the application relating to the measurement, notably with regard to the use of fundamentally different samples for the measurement. In other words, the Board cannot see a coherent and convergent teaching in the application, which would provide the person skilled in the art with the specific information necessary for him/her to reliably arrive, in a directed manner, at products as claimed in Claim 1.
- 3.6 The determination of the "through plane thermal conductivity" is however not described in the application beyond the reference to ASTM D 5930 either explicitly or by reference to any other literature.
- 3.6.1 The other standard ASTM D 618 referred to by the Appellant for solving the problem caused by the missing measuring temperature, which had been objected to in the decision under appeal, does not, in the Board's opinion, provide the missing particulars for the determination of this parameter or remove the inconsistency between the statements in the application text and in ASTM D 5930.
- 3.6.2 ASTM D 618 is mentioned twice in ASTM D 5930, on the one hand, as one within a list of ASTM Standards including norms concerning other test methods (such as C 177, C 518, C 1113 or E 1225) unrelated to the transient measurement method according to ASTM D 5930 and, on the other hand, in the strictly limited context of section 8 of ASTM D 5930 dealing with an - under some circumstances - necessary conditioning of molten thermoplastic polymer samples before starting the measurements.

3.6.3 Hence, the reference to ASTM D 618 cannot even remedy the deficiency of missing marginal conditions for the measurement, which formed the basis for the decision of the Examining Division in the decision under appeal to refuse the application under Article 84 EPC.

3.7 This leads to the conclusion that ASTM D 5930 cannot supplement the short explanation of the parameter "*thermal conductivity*" as provided in the application in suit in a clear and unambiguous manner, but it leads to a new and unfamiliar definition of the thermal conductivity which even lacks clarity.

3.8 As held in T 172/99 (7 March 2002, not published in the OJ EPO) section 4.5.6 of the reasons, in the case of claimed subject-matter relying on a newly formulated, and thus unfamiliar parameter to define the solution to a technical problem by which a relevant effect is achieved the applicant is (in view of complying with the requirements of Art 83 EPC) under a particular obligation to disclose all the information necessary reliably to define the new parameter such that its values can be obtained by a person skilled in the art without undue burden. Moreover, as held in section 4.5.9 of T 172/99, the question of "*whether there is a valid ground for opposition according to Article 100(b) EPC, respectively, can only be answered on the basis of the content of the application as originally filed. Further information cannot be relied upon to heal any deficiencies in the original disclosure (see T 10/86 of 1 September 1988, point 4 of the reasons).*"

3.9 As reported in sections XII(1) to XII(6), above, the Appellant submitted a number of arguments in support of sufficiency. The Board however does not find any of these convincing:

3.9.1 The question of whether the standard ASTM D 5930 was a "standard measurement" is immaterial in the context of the definitions employed in the application in suit. What is significant is that regardless of the status of this standard, no reference can be found therein clearly related to a feature as referred to above by using the term "through plane thermal conductivity". Nor has it been convincingly demonstrated that it is possible to derive an understanding of this term as used in the application in suit from what is disclosed in the application in suit and in the ASTM D 5930.

Consequently the appellant has failed to demonstrate that this standard would furnish the skilled person with an understanding of what is meant by this term.

3.9.2 The question of the existence of two (or more) standards for determining thermal conductivity (in section 2.1 of ASTM D 5930) is of no importance insofar as the application explicitly refers to only one particular standard. Nor can any significance be attached to the - unsupported - submission of the appellant that there is no ASTM standard for measuring "through plane thermal conductivity". On the contrary the application in suit is explicit in identifying specifically a particular standard as the means by which this property is to be determined. Even if the skilled person were to conclude that the standard does not in fact measure this property, there is no indication or guidance in the application as to which other standard should in fact be employed to determine this property.

3.9.3 It is equally immaterial that the term "thermal conductivity" or "perpendicular thermal conductivity"

might have been used in the patent literature or a decision of a Board of appeal. The application in suit, requiring a specific limiting value of that property to be achieved, contains no references to any such documents. Further the Board notes that in the patent underlying Decision T 133/03 (above) invoked by the Appellant the term "*perpendicular thermal conductivity*" had been employed in a purely qualitative manner (Claim 1: "... *carbon material having high thermal conductivity ...*") and was used in the decision only to refer to relative improvements obtained in the examples in comparison with comparative examples of the same patent.

3.9.4 The submission that the method of ASTM D 5930 is a "transient" and hence "non invasive" method for determining thermal conductivity is in direct contradiction to the further submission, made at the oral proceedings before the Board that what was in fact to be understood was that material to be subjected to the test according to ASTM D 5930 was to be taken from (cut out of) the thinnest part of the article of ovenware or test piece, and this excised material subjected to testing.

3.9.5 On the contrary, it appears that the test method of ASTM D 5930 mandatorily requires partial destruction of the sample article (see passages of ASTM D 5930 cited in section 3.2.1, above).

3.9.6 Similarly the Board cannot reconcile this submission mentioned above in section 3.9.4 with the further submissions that the measurement of ASTM D 5930 could be carried out on a sample of the material of any given shape, as long as "*a plane (thinnest cross section) of a test part or piece of ovenware*" was selected as the location for carrying out the measurement on the sample.

- 3.9.7 The further submission, that according to ASTM D 5930 it was immaterial whether the measurement was carried out "through a plane" or on a cylinder of material, is inconsistent with the specification of the standard which requires preparation of a sample of specified minimum radius into which is inserted the probe for carrying out the measurement (sections 7 and 9, in particular 9.1, of standard ASTM D 5930).
- 3.10 The Board can therefore come to no conclusion other than that ASTM D 5930 does not provide a means to measure "*thermal conductivity measured through a plane*" of an ovenware item as set out in the application in suit.
- 3.11 Further the application provides no indication how this parameter can be determined employing the method of this standard, or indeed by any other method.
- 3.11.1 The consequence of this is that the application does not provide a full and fair disclosure of the invention since the skilled person, even after reading the description and the standard referred to is not in a position to reproduce the invention, i.e. to obtain in a reliable manner polymer compositions or articles of ovenware having the necessary effect, i.e. the stipulated "*thermal conductivity when measured through a plane of said composition*". Consequently the main request does not meet the requirements of Art. 83 EPC.
- 3.12 The Main Request is therefore refused.

*First Auxiliary Request*

4. In substance, the first Auxiliary Request differs from the Main Request only by the limitation of the generic class of microwave susceptors in the independent Claims 1 and 16 to a particular group of specified inorganic elements and compounds.

4.1 For the same reasons as set out above in the general observations (in particular, in sections 2.4.2 and 2.7 to 2.9, above), the Board takes the view that this limitation does not solve the problems concerning the questions of Article 83 EPC dealt with above with regard to the Main Request. Rather, the reasons given above with regard to the Main Request are also valid for this Auxiliary Request.

4.2 It follows that the first Auxiliary Request cannot be allowed for the same reasons as those set out with respect to the Main Request. It is therefore refused.

*Second Auxiliary Request*

5. Claim 1 of this request differs from Claim 1 of the first Auxiliary Request by the deletion of the feature "*when measured through a plane of said composition*". Furthermore, Claim 16 has been amended in the same way. This amendment could, in the Board's opinion, only be considered as an allowable correction under Rule 139 EPC, if it fulfilled the requirement of the second sentence in this Rule "*that it is immediately evident that nothing else would have been intended than what is offered as the correction*".

5.1 The Appellant argued that the deleted statement would in view of the wording in section 3.2.2 of ASTM D 5930 be superfluous ("*eigentlich überflüssig*") or, even, misleading ("*irreführend*").

According to another argument of the Appellant, this deletion would have its basis on page 10, lines 5 to 9, of the application because the minimum thermal conductivity would have been disclosed there as such without reference to any determination method.



5.2 Neither argument is convincing. The relevant passages in the application text dealing with the measurement of the thermal conductivity are:

- (a) In Claims 1 and 18, as originally filed, this deleted feature had been mandatory.
- (b) This finding has, moreover, been confirmed by the Summary of the invention on page 3, lines 10 to 20 ("*the composition has a thermal conductivity of about 0.70 W/m<sup>o</sup>K or more when measured through a plane of the composition*") and by the statements
- (c) on page 10, lines 18 to 21 as originally filed ("*The thermal conductivity of the composition is measured through a plane (thinnest cross section) of a test part or piece of ovenware, using ASTM Method D5930.*") and
- (d) on page 18, last paragraph, describing the methods used for determining the different physical parameters reported in Table 1 on page 19: "... *and thermal conductivity (through the plane of the test piece) was measured by ASTM Method D5930*".
- (e) Moreover, page 19, lines 7 to 9 reads: "... *The pellets were injection molded into plaques and test pieces ...*" (emphasis added)

5.3 The above passage on page 10, lines 18 to 21 belongs to the same paragraph, ie the same context, as those lines 5 to 9 referred to in the Appellant's above second argument.

In view of the general statement "*The thermal conductivity ... is measured ...*" at line 19 of this paragraph which clearly differs from the wording used on page 6, lines 16/17 with regard to the measurement of the

melting point or glass transition temperature of a TP:  
"Such measurements can be done following ASTM method D3418";  
(emphasis added to both quotations by the Board), the Board takes the view that the first sentence of this paragraph on page 10 cannot be interpreted without reference to the whole of its context in the paragraph.

Nor is it, in the sense of Rule 139 EPC, evident from the application text as filed that nothing else would have been intended than what has been offered by the Appellant, in particular in view of the wording in both higher-ranking requests.

5.4 Consequently, the Board has come to the conclusion that the second Auxiliary Request violates Article 123(2) EPC. It is therefore refused.

6. Due to the fact that none of the Appellant's requests can be allowed, the appeal cannot be successful.

## **Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

M. C. Gordon