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Datasheet for the decision of 21 October 2014

Case Number: T 1560/11 - 3.3.03

Application Number: 06748405.5

Publication Number: 1716190

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Language of the proceedings: EN

Title of invention:
ETHYLENE/ ALPHA-OLEFINS BLOCK INTERPOLYMERS

Patent Proprietor:
Dow Global Technologies LLC

Opponent:
ExxonMobil Chemical Patents Inc.

Headword:

Relevant legal provisions:
EPC Art. 83

Keyword:
Sufficiency of disclosure - (no)

Decisions cited:

Catchword:

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Case Number: T 1560/11 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 21 October 2014

Appellant: (Patent Proprietor)	Dow Global Technologies LLC 2040 Dow Center Midland, MI 48674 (US)
Representative:	Marsman, Hermanus Antonius M. V.O. Johan de Wittlaan 7 2517 JR Den Haag (NL)
Respondent: (Opponent)	ExxonMobil Chemical Patents Inc. 5200 Bayway Drive Baytwon TX 77520-5200 (US)
Representative:	UEXKÜLL & STOLBERG Patentanwälte Beselerstrasse 4 22607 Hamburg (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 27 May 2011 revoking European patent No. 1716190 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman B. ter Laan
Members: M. C. Gordon
R. Cramer

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division posted on 27 May 2011 revoking European patent number 1 716 190 (granted on European patent application number 06 748 405.5, derived from international application number PCT/US2006/009500, published under the number WO2006/101966).

II. The patent was granted with a set of 23 claims, of which claims 1 and 12 were independent. Claim 1 read as follows:

"1. An ethylene/α-olefin interpolymer comprising polymerized units of ethylene and α-olefin, wherein the average block index is in the range from 0.1 to 0.3 and a molecular weight distribution M_w/M_n greater than 1.3."

III. The patent was opposed on the grounds pursuant to Art. 100(a) EPC (lack of novelty, lack of inventive step), Art. 100(b) EPC and Art. 100(c) EPC. In the course of the opposition proceedings the following document was *inter alia* cited by the parties:

D15: Li Pi Shan, C. and Hazlitt, L. G. "Block Index for Characterizing Olefin Block Copolymers", Makromol. Symp 2007, 257, pp 80-93.

IV. The decision of the opposition division was based on the claims of the patent as granted as the main request and a set of 22 claims as auxiliary request.

The patent was considered to provide sufficient information to enable the conditions employed in example 20 of the patent - the sole example that fell within the scope of the claims - to be deduced. However

the claims of the auxiliary request did not meet the requirements of Art. 83 EPC because the determination of the average block index (ABI) was not adequately disclosed.

Accordingly the patent was revoked.

V. On 12 July 2011 the patent proprietor lodged an appeal against the decision, the prescribed fee being paid on the same date.

The statement of grounds of appeal was submitted on 6 October 2011, accompanied by amended main and first auxiliary requests the wording of which is not relevant for the present decision. A further written submission was made with a letter dated 17 October 2012.

VI. The opponent - now the respondent - replied to the appeal with a letter dated 20 April 2012.

VII. The Board issued a summons to attend oral proceedings and a a communication setting out its preliminary assessment of the case.

VIII. The respondent/opponent filed two further written submissions

IX. The appellant/patent proprietor also made two further written submissions. Sets of claims forming a second and third auxiliary request were submitted, the wordings of which are not relevant to the present decision.

X. At the oral proceedings before the Board the appellant/ patent proprietor submitted a new main request consisting of a single claim corresponding to claim 1

of the patent as granted. The respondent did not object to the admissibility of the new request to the proceedings. Following announcement by the Board of its decision to admit the new request to the proceedings the appellant/patent proprietor withdrew the remaining requests (auxiliary requests 1-3).

XI. The arguments of the appellant can be summarised as follows:

Art. 83 EPC - obtaining polymers with specified Average Block Index

Example 20 was the only example with an ABI within the claimed range. Paragraph [0227] of the patent taught that polymer examples 20-23 were made using similar conditions "as described in the above". From the quantities and feed rates disclosed in Table 8c (relating to examples 20-23) and comparison thereof with the flow rates reported in Table 8A for examples 19A-19J the skilled person would unambiguously understand that the reactor configuration of Example 19J rather than that of Examples 19A-19I had been employed in example 20. This would in turn reveal the employed ethylene flow rate. Although there was a discrepancy between the flow rate reported for example 19J in paragraph [0226] and that reported in Table 8A (2.70 lb/hour and 7.46 lb/hour respectively) it would be a simple matter for the skilled person to carry out two experiments - one at each flow rate - to establish which was correct by comparison of the properties of the polymers obtained with the results reported in the patent.

Average Block Index (ABI)

The ABI was a new parameter which had been developed in order to describe the unique structure of the polymers of the patent. This was explained in the patent itself and in D15. The calculation of the ABI was discussed in detail in the patent and exemplified in example 5 with respect to the calibration plot of figure 8. The skilled person would have no problem applying this teaching to the polymer prepared according to example 20. Evidence of the opponent confirmed that, by using the calibration plot of figure 8, it was possible to determine the ABI. From the discussion in paragraph [0227] the skilled person would understand that the same calibration plot had been used in example 20 as in example 5. Consequently it would be possible to verify that example 20 had been correctly repeated.

Calibration copolymer

The polymer to be used for calibration should be a random copolymer e.g. a homogeneously branched random ethylene/α-olefin polymer, the "randomness" being that defined by Flory, i.e. an idealised theoretical situation. Further it was necessary that the polymer or polymer fractions employed for calibration had a weight average molecular weight of at least 100,000 Daltons and a polydispersity of no greater than 2.5.

XII. The arguments of the respondent can be summarised as follows.

Sufficiency of disclosure - Average Block Index

Compared to the application as originally filed the patent defined a restricted range for the ABI. The

general teaching of the patent was directed to the broader range, but did not contain any teaching about how to control the ABI to lie in the restricted range. Only example 20 related to a polymer having an ABI within the restricted range, and consequently only this example could potentially provide any teaching of how to carry out the subject-matter now being claimed.

Regarding the repeatability of example 20, paragraph [0227] referred to "similar procedures" and to Tables 8A-8C. However Example 20 lacked two pieces of information - the ethylene flow and the resulting Mw/Mn. Even if the skilled person were to conclude that the general method of example 19J was to be used, the information in the patent relating to the ethylene flow was inconsistent and hence could not be determined.

Feasibility of determining the Average Block Index to confirm correct replication of example 20

The patent did not state which polymer had been employed to carry out the calibration in example 20. Even if it were accepted that the calibration plot of figure 8 had been employed, this would not be sufficient. As followed from the teaching of the patent itself as well as from the post-published D15, calibration of a given TREF instrument was unique, meaning that results for different polymers determined on different instruments could not be correlated with each other.

Due to the absence of any information about the polymer fractions employed to generate the plot of figure 8 it would furthermore not be possible for the skilled person to generate a corresponding calibration plot for a given - different - TREF instrument.

It was also not possible to rely on the general information in the patent in respect of the calibration polymer. To the extent that the patent did provide a teaching as to the nature of the calibration polymer ("random"), statements of the appellant demonstrated that this information was incomplete (minimum molecular weight and maximum molecular weight distribution were not disclosed - see above). Furthermore it was not elucidated what was meant by the term "random". On the contrary, this appeared to define an idealised, theoretical state rather than a specific polymer. Although the patent did disclose a number of "random polymers", all reported as having an ABI of 0, studies carried out by the respondent based in part on data contained in the patent itself (Tables 10 and 11) had shown that different "random" polymers resulted in calibration plots which differed from each other and hence gave rise to different values of the ABI.

XIII. The appellant requested that the decision under appeal be set aside and that the case be remitted to the department of first instance for further prosecution on the basis of the claim of the new main request filed during the oral proceedings.

XIV. The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible

2. *Main request*

2.1 Admissibility

The main request consists of claim 1 of the patent as granted. That request was filed at the start of the oral proceedings. The respondent did not raise any objections to the admissibility of the new request to the proceedings. The new request does not give rise to any new aspects or to any procedural or substantive complexities. On the contrary, it results in a simplification of the procedure since only one claim is to be dealt with.

Consequently the Board decided that the newly filed request was admitted to the proceedings.

2.2 *Art. 83 EPC*

2.2.1 As originally filed, the application specified a range of ABI of "greater than zero and up to about 1.0". It was explicitly acknowledged by the respondent that the application and the patent provided sufficient disclosure for this subject-matter. The Board is satisfied that this is indeed the case.

However in the course of the examination proceedings the claim had been progressively restricted to the ABI range "from 0.1 to 0.3", as disclosed in originally filed claim 3, which is the range specified in the operative claim.

The patent however does not contain any discussion or teaching directed to obtaining polymers with ABI in the restricted range of 0.1-0.3. There is furthermore only a single example that is reported to have an ABI within this range, namely example 20. Consequently, in the absence of any general guidance the only conceivable routes available to the skilled person to gain an understanding of how to carry out the claimed invention is either to attempt to replicate example 20 or alternatively to ascertain the differences between the procedure of example 20 and those of the examples leading to products falling outside the claimed scope in order to determine how the processes of the latter examples were to be modified so as to arrive at a polymer within the scope of the claims.

2.2.2 The patent however does not provide a complete disclosure of the process of example 20 because neither the reaction scale nor the ethylene flow rate employed are disclosed.

In favour of the appellant it could be accepted that by comparing those reaction parameters which are disclosed, in particular the flow rate of comonomer, it would be possible to conclude that example 20 had been carried out on the same scale as example 19J (3.8 L autoclave) rather than on the larger scale of Examples 19A-19I (27 gallon reactor). However even if this assumption were made, it would not reveal one of the reaction parameters, namely the ethylene flow rate.

Even if it were to be assumed, again in favour of the appellant, that the skilled person would infer from the absence of an explicit disclosure of the ethylene flow rate of example 20 that the same flow rate as in example 19J had been employed, the skilled person would

then be confronted with a further obstacle to reproducing Example 20.

This further obstacle arises from the fact that the patent contains two different and inconsistent disclosures concerning the ethylene flow employed for example 19J. According to Table 8A of the patent, in example 19J a flow rate of 7.46 lb/hour was employed. However paragraph [0226] reports a different flow rate, namely 2.70 lb/hour.

The skilled person in attempting to replicate example 20 and obtain a polymer according to the claims would therefore have to ascertain the correct ethylene flow rate to employ. This would require carrying out two experiments, one with each ethylene flow rate and subsequently determining the properties of the resulting polymers.

One property that would have to be determined is the ABI.

The question thus has to be addressed whether the patent provides a complete disclosure of the determination of the ABI.

2.2.3 *Determining the Average Block Index*

The determination of the ABI as carried out for example 20 is not fully reported in the patent because it is not stated which random polymer was employed as the calibration standard. The appellant submitted that the same calibration was carried out as for example 5, the only example for which the calculation of the ABI is fully explained, based on the calibration plot of figure 8, as reported in paragraph [0232] of the

patent.

There is however no explicit statement to this effect in the patent and the position of the appellant regarding the calibration plot employed is inconsistent with the further teachings of the patent.

2.2.4 In paragraph [0040] of the patent it is stated that for the calibration it is necessary to create an appropriate calibration plot with the polymer composition of interest using appropriate molecular weight ranges and comonomer type. This passage indicates that the calibration polymer has to be selected taking account of the properties of the polymer to be measured.

However from the values reported in the patent it is apparent that the polymers of example 5 and example 20 differ in their density (0.8786 and 0.8841 g/cm^3 respectively) and also in their melt flow properties (I_2 being 1.5 and 1.0 g/10 min respectively). In view of these differences in the polymer properties and the teaching of paragraph [0040] of the patent, the question has to be raised whether the same calibration plot would be valid for the two polymers of example 5 and example 20.

2.2.5 In view of these considerations, paragraph [0227], invoked by the appellant (see section XI, above) cannot be interpreted as disclosing that the same calibration polymer had been used for Example 20 as for Example 5. On the contrary, paragraph [0227] states that examples 20-23 had been made using "similar procedures as described in the above", and that "Table 9C shows the block indices for various polymers measured and calculated according to the methodology described

above". Example 5 is however not listed in Table 9C.

2.2.6 There is no indication - express or implied - in paragraph [0227] regarding which calibration polymers had been used to determine the ABI of the polymers of Table 9C. Furthermore the term "methodology" indicates that the same general type of method had been employed "as above", not necessarily the same method itself in every detail. Consequently this wording cannot be seen as denoting the use of the same calibration polymers as in the examples "above".

2.2.7 Accepting, again for the sake of argument and in favour of the appellant, that the calibration as set out in figure 8 was indeed appropriate and had been employed for example 20, this still would not suffice to place the skilled person in a position to verify whether the teaching of example 20 had been successfully replicated.

As is set out also in paragraph [0040] of the patent the calibration is instrument dependent and has to be carried out separately for each instrument.

The consequence of this instrumental dependency is that, for a valid determination of the ABI, it is necessary to employ the same instrument for generation of the calibration plot and for the analysis of the polymer of interest. This instrumental variability or dependence is emphasised in D15 which is a post-published paper prepared by two of the inventors of the patent in suit, setting out - for the first time in the literature - the ABI methodology. On page 88, right hand column, italicised section, the instrumental dependence of the method is explained and it is stated that the calibration has to be repeated for each ATREF

instrument and that the calibration plot depicted in the paper (Figure 7 - which is identical to figure 8 of the patent) is not intended to be universal, due to variations in instrumentation and methodology.

Although the patent does provide in paragraph [0166] a rather detailed disclosure of the column on which the TREF fractionation had been carried out, the appellant has submitted no evidence to suggest that - contrary to the express teaching of the patent in suit and D15 as discussed above - this information would be sufficient to render valid a determination of ABI in which the polymer of interest was analysed on a different apparatus nevertheless conforming - as far as possible - to the details set out in the patent and if the calibration plot was that of figure 8.

2.2.8 Consequently, in order to determine the ABI, it would be necessary for the skilled person to carry out a calibration and the measurement on one and the same instrument.

However, and again accepting that the calibration of Figure 8 is appropriate for the polymer of example 20, it is not possible for the skilled person to replicate the calibration underlying figure 8 because the polymer fractions employed to generate this calibration plot are not disclosed in the patent.

2.2.9 Therefore, the skilled person would be faced with the task of having to select appropriate polymers for the calibration. In this respect the patent teaches in paragraph [0040] that the calibration is to be carried out using "a number of well characterised preparative TREF fractions of a broad composition random copolymer and/or well characterised random ethylene copolymers

with narrow composition". The nature of the polymer to be employed is not further elucidated in the patent.

The evidence however shows that the nature of the polymer used to carry out the calibration is critical and influences the outcome of the determination of the ABI.

The opponent submitted evidence during the opposition procedure (letter of 13 December 2010, also attached as annexes 1 and 2 to the minutes of the oral proceedings before the opposition division) in which fractionation (TREF) data reported in Tables 10 and 11 of the patent, relating to the commercially available random copolymers "Affinity 4203" and "Affinity PL1880G" (see Table 9C of the patent) were added to figure 8 of the patent. This evidence demonstrated that the resulting calibration plot differed depending on the copolymer employed, notwithstanding that all of the copolymers were "random" and had been determined to have an ABI of 0. This evidence relating to the dependency of the determination of the ABI on the calibration polymer used was not disputed by the appellant/patent proprietor.

Thus it has been demonstrated that employing different random copolymers to generate the calibration plot, even if all of them have an ABI of 0, will result in different outcomes for the determination of the ABI of the polymer of interest.

Further it has been demonstrated by submissions made by the appellant itself that the information relating to the nature of the calibration polymers provided in the patent is incomplete. In the statement of grounds of appeal the appellant submitted that it was necessary

that the polymers employed for calibration have a weight average molecular weight of at least 100,000 Daltons and a polydispersity value of no greater than 2.5. This information is however not contained in the patent. Furthermore with respect to the term "random" it was submitted at the oral proceedings that this denoted an idealised "random" copolymer as defined according to Flory, i.e. in effect an entirely theoretical ideal state. This information, even if such a polymer could in practice be obtained, is not contained in the patent.

2.2.10 Consequently the patent fails to provide a complete disclosure of the determination of the ABI.

2.3 The patent thus provides no general teaching how to obtain polymers having an ABI within the claimed range.

The sole example of the patent that does result in an ABI in the required range cannot be repeated due to deficiencies in the disclosure thereof. The patent furthermore provides no way reliably to verify whether any of a series of experiments carried out to circumvent or eliminate the uncertainties in the disclosure of the example in fact results in the required product since the determination of a key characteristic - the ABI - is itself incompletely disclosed.

As a consequence the skilled person faces an undue burden of considerable experimentation with insufficient guidance having regard both to how to carry out the process and how to determine the properties of the resulting products.

Consequently the patent does not place the skilled person in a position to carry out the claimed invention.

The requirements of Art. 83 EPC are therefore not satisfied.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero B. ter Laan

Decision electronically authenticated