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**Datasheet for the decision
of 8 November 2018**

Case Number: T 1845/14 - 3.3.03

Application Number: 03785862.8

Publication Number: 1572755

IPC: C08F4/642, C08F210/16,
C08L23/08

Language of the proceedings: EN

Title of invention:

COPOLYMERS OF ETHYLENE WITH ALPHA-OLEFINS

Patent Proprietor:

Basell Polyolefine GmbH

Opponents:

Univation Technologies, LLC
Borealis AG

Relevant legal provisions:

EPC Art. 100(b)
EPC R. 43(1)

Keyword:

Lack of sufficiency of disclosure arising from ambiguous
parameter (all requests)

Decisions cited:

G 0002/98, G 0001/03, G 0003/14, T 0409/91, T 0435/91,
T 0939/92, T 0172/99, T 0518/00, T 0063/06, T 0608/07,
T 0815/07, T 0593/09, T 1727/12

Catchword:

In case of an unclear parameter defined in a claim whose values required in the claim are indicated in the specification to be essential to solving the problem underlying the patent at issue, the ability of the skilled person to solve that problem by reproducing what is claimed is not a suitable criterion for assessing sufficiency of disclosure when the problem or an effect derivable from it are not explicitly or implicitly part of the definition of the claimed subject-matter (point 9.8 of the Reasons).



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Case Number: T 1845/14 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 8 November 2018

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 9 July 2014**

revoking European patent No. 1572755 pursuant to
Article 101(3) (b) EPC.

Composition of the Board:

Chairman	D. Semino
Members:	F. Rousseau
	C. Brandt

Summary of Facts and Submissions

I. The appeal by the patent proprietor lies from the decision of the opposition division revoking European patent No. 1 572 755. That decision was based on a main request, submitted by letter of 17 August 2012, and auxiliary requests 1 to 3 submitted by letter of 24 April 2014.

II. Claim 1 of the main request and of auxiliary request 1, corresponding to claim 1 of the granted patent, reads as follows:

"1. A copolymer of ethylene with α -olefins which has a molar mass distribution M_w/M_n of from 1 to 8, a density of from 0.85 to 0.94 g/cm³, a molar mass M_n of from 10 000 g/mol to 4 000 000 g/mol and a CDBI of less than 50%, the copolymer having an at least bimodal short chain branching distribution and wherein the side chain branching of the maxima of the individual peaks of the short chain branching distribution, as determined by crystallization analysis fractionation (CRYSTAF®), is in each case greater than 5 CH₃/1 000 carbon atoms."

Claim 1 of auxiliary requests 2 and 3 corresponded to claim 1 of the main request in that the upper limit of the molar mass M_n had been defined to be 400 000 g/mol.

III. The following items of evidence were cited, *inter alia*, in the contested decision:

E1: WO 93/03093 A1

E2: Document submitted by the patent proprietor by letter of 30 March 2009 containing a declaration by Mr. Mihan before the USPTO, ATREF curves and CDBI calculation

- E7: Encyclopedia of Polymer Science and Technology, Volume 10, Wiley-Interscience, pages 91-97 (2004)
- E9: C. Li Pi Shan, C. et al., "Mechanical Properties of ethylene/1-hexene copolymers with tailored short chain branching distributions", Polymer, Volume 43, pages 767-773 (2002)
- E10: C. Li Pi Shan, "Approaches to Tailoring the Structure and Properties of polyethylene", PhD thesis, University of Waterloo, Ontario, Canada Abstract and Chapter 4 (2002)
- E16: J. Soares et al., "Crystallisation Analysis Fractionation", Journal of Polymer Science: Part B: Polymer Physics, Volume 43, pages 1557-1570 (2005)
- E17: B. Monrabal, "Crystallisation Analysis Fractionation: A New Technique for the Analysis of Branching Distribution in Polyolefins", Journal of Applied Polymer Science, Vol. 52, pages 491-499 (1994)

- IV. According to the reasons of the decision, the claims of the main request did not extend beyond the content of the application as filed, but its claim 1 did not meet the requirement of sufficiency of disclosure. It was held that it would have been an undue burden for the skilled person to ascertain, through measurements, whether copolymers meeting the parametric definition of claim 1 had indeed been produced when trying to prepare the claimed copolymers over the whole scope of claim 1. This was because the information in the specification about the CRYSTAF® method used to measure the short chain branching distribution (SCBD) was confusing and adequate common general knowledge was not available. The same held for auxiliary requests 1 to 3.
- V. With the statement setting out the grounds of appeal (letter of 7 November 2014), the appellant submitted a main request and a first auxiliary request

corresponding, respectively, to the main request and auxiliary request 2 underlying the contested decision.

- VI. The rejoinders of opponent 1 and opponent 2 ("respondent 1" and "respondent 2", respectively) were filed by letters of 17 February 2015 and 24 March 2015, respectively.
- VII. By letter of 6 October 2017, the appellant submitted a second and third auxiliary requests, whose claims, apart from the deletions of process claims 7 and 11, were the same as those of the main and first auxiliary requests, respectively.
- VIII. A communication of the Board dated 20 October 2017 sent in preparation for oral proceedings was issued.
- IX. Oral proceedings took place on 9 November 2017. After deliberation by the Board, the parties were informed that the decision would be given in writing.
- X. Although being, in principle, in a position to make a decision in light of the written and oral submissions made, the Board reopened the debate to give the parties the opportunity to take positions on additional points which had not been specifically addressed in relation to the issue of sufficiency of disclosure. Accordingly, second oral proceedings were convened. A communication of the Board, dated 10 July 2018 and attached as an annex to the summons to attend second oral proceedings, was sent to the parties. In this communication, the preliminary view of the Board on the issue of sufficiency of disclosure was explained. It also highlighted specific points of the Board's reasoning on which the parties were given the opportunity to respond.

XI. Following the Board's communication, additional submissions were made by the appellant by letters of 5 October 2018 and 24 October 2018 and by respondent 1 by letter of 8 October 2018. Respondent 2 announced by letter of 9 October 2018 that it would not be attending the second oral proceedings. Oral proceedings were held on 8 November 2018 in the announced absence of respondent 2 (Rule 115(2) EPC and Article 15(3) RPBA).

XII. The submissions of the appellant, as far as they are relevant for the decision, can be summarised as follows:

Short chain branching distribution (SCBD)

(a) Although the CRYSTAF® analysis method was not as consolidated as the TREF method at the filing date of the opposed patent, CRYSTAF® calibration for determining the branching content and its distribution had been clearly described in published literature, in particular, in E17. These two analytical methods were based on the same principle. The only difference was that the experimental data came in the form of crystallisation temperatures instead of elution temperatures. E16 referring to E17 showed that CRYSTAF® went back to 1994, had been further developed since and had become one of the most important characterisation techniques in the industry of polyolefins. E9 also demonstrated that the skilled person was familiar with the CRYSTAF® method before the priority date. The necessary calibration for CRYSTAF® measurements to translate the measured crystallisation temperatures into a content of CH₃/1000 carbon atoms was also well known in the art as reported in E9 (using ¹³C NMR,

page 768, point 2.2, and page 770, Table 1, footnote c)) and E17 (using fractions prepared by preparative TREF - page 495 "Calibration", Table 1, and page 496, Figure 5). E7 substantially confirmed what was already explained in E17, namely the importance of using calibration standards with a microstructure similar to the polymers being analysed.

- (b) Measuring the SCBD by the CRYSTAF® method was, as such, straightforward, and its principle was well known in the art. Despite the misleading information given in the specification in relation to the SCBD, the skilled person would have therefore been in a position, ignoring the misleading information and using general knowledge available before the filing date, to obtain the SCBD by the CRYSTAF® method without any undue burden. Thus, no lack of sufficiency arose in this respect.

Bimodal short chain branching distribution

- (c) The concept of bimodality was self explanatory and even known in the art in relation to SCBD at the priority date as shown in E9 (pages 768-769, point 3, Figure 1).

Composition distribution breath index (CDBI)

- (d) The patent taught, in paragraph [0003], that the CDBI was to be determined using the TREF technique, whose analytical method was well known in the art. It would provide accurate measures such that no lack of sufficiency arose from the analytical method needed to determine the CDBI. The only

difficulty resided in the two possible definitions of the CDBI, i.e. either the percent by weight of the copolymer molecules having a comonomer content of $\pm 25\%$ of the mean molar total comonomer content, as explicitly defined in paragraph [0003], or $\pm 50\%$ of the median molar total comonomer content, as defined in WO 93/03093 (E1 in the appeal proceedings), to which the patent also referred. The definition in paragraph [0003] represented an attempt to define what was explained in E1, but it was incorrect. As the TREF required cumulative data, "mean" used in paragraph [0003] of the patent had to be understood as "median". E2 was not relevant since the material tested in it was not in accordance with the present invention.

Clarity vs. sufficiency

- (e) The two possible CDBI definitions provided in the patent in suit were not contradictory. They just defined, respectively, (i) a narrower composition distribution, when the CDBI was less than 50% in the $\pm 25\%$ interval, which allowed more than 50% of the copolymer molecules to be comprised in the $\pm 50\%$ interval, and (ii) a broader composition distribution, when the CDBI was less than 50% in the $\pm 50\%$ interval. This was typical of a feature which could be interpreted in a narrower or broader sense, consequently resulting in a narrower or broader scope of the claims, which was generally recognised to be a clarity issue not affecting sufficiency.
- (f) There was no evidence on file that the general teaching of the patent would have been insufficient

for producing both polymers having the narrower or broader CDBI.

- (g) The difference between "mean" and "median" was not critical because the measurement method described in E1 explained how to determine the CDBI in practice: by taking the composition at the point where the cumulative integral equalled 0.5 (page 19, line 5). Thus, any formal ambiguity was immediately resolved by following the clear teaching provided in that document. Moreover, even from a statistical point of view, "mean" and "median" were alternative ways of determining an average value. They could even coincide when the curve was symmetrical and in practice could be seen as equivalents within a limited range of approximation. This was a matter of claim scope, thus not of sufficiency of disclosure.
- (h) Decision T 0593/09 with reference to decision T 1062/98 reported that whether the skilled person would be able to determine whether a certain feature fell under a feature according to a claim was not a matter of sufficiency of disclosure. In fact, determining the scope of the claim related to the question whether the claims properly defined the matter for which protection was sought, which were requirements of Article 84 EPC and Rule 29(1) EPC and which did not form grounds of opposition. The crucial point was whether, despite the ambiguity of the meaning of CDBI, the skilled person would have been able to reproduce the invention, i.e. the underlying motivation for the inventor to define the subject-matter claimed.

- (i) According to T 1886/06, doubts as to the reproducibility of the claims over their entire scope had to be substantiated by verifiable facts. Mere conjecture that their scope might extend to undisclosed variants was not enough.

Teaching of the patent

- (j) Sufficiency of disclosure related to the reproduction of the invention. The patent taught the necessary catalysts defined in process claim 6, which would have enabled the skilled person to reproduce the invention and the necessary polymerisation conditions indicated in paragraphs [0123] and [0124]. The examples and the comparative example of the patent showed that a catalyst different from those defined in claim 6 did not lead to a copolymer which exhibited at the same time a bimodal SCBD and a CDBI of less than 50%.
- (k) The opponents, who carried the burden of proof in this respect, had not shown that the examples of the patent in suit could not be repeated. In particular, under the temperature and pressure conditions used in the examples, the ethylene concentration was determined by the ethylene solubility in toluene and the ethylene feed was set to ensure that the ethylene concentration remained constant during polymerisation. It was furthermore implicit that hexene had been dropped at a constant rate. The examples were therefore sufficiently disclosed and reproducible. Paragraph [0141] specified that the CDBI was determined as described in E1.

(l) Therefore, the skilled person could have relied on the examples to experimentally identify which definition of CDBI preferably defined the invention. This would not have required undue burden.

(m) Accordingly, the main request did not lack sufficiency of disclosure. The same arguments applied to the auxiliary requests.

XIII. The submissions of the opponents (respondents), as far as they are relevant for the decision, can be summarised as follows:

Short chain branching distribution (SCBD)

(a) The CRYSTAF® analytical technique for determining the SCBD had been at the filing date recently developed and therefore was not well known in the art. This technique was based on the crystallisation behaviour of a polymer sample in a solvent and therefore depended on many factors, including the type of solvent, the nature of the polymer, and, in particular, the nature of any comonomer present and the rate at which the polymer solution was cooled.

(b) E7 was an extract from a well-known reference work representing the common general knowledge of the skilled person at the date of filing of the patent, from which it could have been gleaned that results obtained from CRYSTAF® measurements depended entirely on calibration curves. However, as indicated on page 92 of E7, there were no universal calibration curves or calibration standards available for CRYSTAF® measurements. Such standards

had to be prepared, the patent in suit containing no guidance in this respect.

- (c) The patent in suit taught, in paragraph [0020], to convert the elution temperatures to the number of $\text{CH}_3/1000$ carbon by means of a reference table but did not provide such a table. Furthermore, paragraph [0142] taught to use the curve shown in Figure 2 for that purpose. However, this Figure did not refer to the CRYSTAF® crystallisation temperature but, inexplicably, to a weight-average temperature. The patent also taught that the degree of short branching $\text{CH}_3/1000$ carbon could be calculated on the basis of the formula indicated in paragraph [0142], but this formula did not fit the curve in Figure 2. Accordingly, the level of disparity between the equation given in paragraph [0142] and Figure 2 meant that the skilled person would have been unable to make any sense of the CRYSTAF® method as described in the patent in suit.
- (d) In addition, the temperature-time profile used for the CRYSTAF® method was indicated in paragraph [0142] to be that shown in Figure 1, which could not be correct since it was indicated in paragraph [0157] that the maxima were obtained at 12°C and 33°C , one of those maxima being outside the temperature range indicated for the measurement. However, it was essential to know the range of temperature to be covered since it would influence the number of peaks or the modality of the curve obtained. In addition, the error margin of the CRYSTAF® method was large compared to the value of $\text{CH}_3/1000$ carbon, as illustrated by Figure 2.

- (e) Moreover, it was clear from paragraph [0029] of the specification that the comonomers used in the claimed copolymer could have more than one methyl group per monomer, for example, 4-methyl-1-pentene. The patent, however, gave no guidance on how such monomers were to be treated with respect to the limit of 5 CH₃/1000 carbon atoms set out in claim 1.
- (f) Accordingly, the parametric feature defining the SCBD as determined by CRYSTAF® was insufficiently disclosed. As a result the skilled person would have had no means to determine whether they were working within the scope of the claims.

Bimodal short chain branching distribution

- (g) It was unclear whether the bimodal short chain branching distribution was to be determined by TREF, CRYSTAF® or some other method. Furthermore, in paragraph [0018], it was stated that a bimodal short chain branching distribution was one that had at least two points of inflection on the flank of the maximum. However, a single peak contained two points of inflection, meaning that this definition could be met by a monomodal distribution. It was also unclear what the "flank of a maximum" was. Moreover, whether a bimodal distribution was obtained depended on the type of spline function used. The examples of the patent in suit also did not allow to determine what constituted a bimodal SCBD. Accordingly, the meaning and description of an at least bimodal SCBD was insufficient, leaving no way of determining what had to be measured and whether a copolymer was within claim 1.

Composition distribution breath index (CDBI)

(h) The definition of CDBI in paragraph [0003] of the specification by reference to E1 was completely different to the definition given in that document in the paragraph bridging pages 14 and 15 or the paragraph bridging pages 18 and 19, in reference to Figure 17. Those two definitions gave very different values. This contradiction could not be resolved by the examples of the patent in suit, which merely referred in paragraph [0141] to E1. It was not possible to tell from the examples of the patent which method was used as there was no specific values with which to compare. All that was indicated was whether the value measured was above or below 50%. Accordingly, the definitions in E1 and the patent in suit defined two very different groups of polymers. Nowhere in the patent was there any further guidance for the skilled person as to which definition of CDBI should be applied. Thus, the patent in suit would have given the skilled person an unsolvable conundrum. The argument that the skilled person would have understood that the CDBI was based on the median value since TREF required cumulative data was contradicted by the appellant's declaration E2. In fact, both definitions would have been possible for the skilled person, but each led to substantially different results in the context of a multimodal, asymmetrical, distribution, giving rise to two distinct populations of copolymers. The CDBI parameter was therefore insufficiently described.

Teaching of the patent

- (i) It was doubtful whether the examples of the patent could be repeated as the amount of ethylene and hexane were not adequately defined, the flow of ethylene being varied and the drop rate of the hexane not being indicated, which possibly influenced the modality of the SCBD. Most importantly, the examples did not provide any SCBD distribution curve and the maxima of the individual peaks expressed in $\text{CH}_3/1000$ carbon atoms were not indicated. In addition, Example 1 was not in accordance with the present invention since the density of the copolymer obtained was outside the claimed range. The density of the copolymers of Examples 2 and 3 had not be determined. Thus, it had not been shown that the patent in suit contained a single example in accordance with the present invention. This put an undue burden on the opponents trying to repeat the examples of the patent in suit.

Failure to solve the problem underlying the patent

- (j) The objection in respect of the CDBI and SCDB parameters was not only an issue of clarity. Where unfamiliar parameters were used to define the solution to a technical problem, the patentee was under particular obligation to disclose all the information necessary to reliably determine the new parameter, in accordance with T 0172/99, T 0815/07, and T 0593/09. What was decisive was whether the parameter was so-ill defined that the skilled person would not have been able, on the basis of the disclosure as a whole and using common general knowledge, to identify without undue burden the

technical measures necessary to solve the problem underlying the patent at issue. In the present case, the disclosure of the patent with respect to the definition of the CDBI, the short chain branching distribution and the interpretation of the CRYSTAF® results was so garbled and contradictory that it would have been impossible for the skilled person to select the correct polymers exhibiting the alleged advantage of good dart drop impact strength mentioned in paragraph [0011] of the specification, i.e. the problem indicated in the patent in suit to be solved by the subject-matter of claim 1 as granted. On this basis claim 1 of main request lacked sufficiency of disclosure.

- (k) The arguments submitted for the main request also applied to the auxiliary requests since the amendments they contained did not relate to the parameters of the main request from which insufficiency of disclosure arose.

XIV. The appellant requested that the decision under appeal be set aside, that it be decided that the main request, or, in the alternative, the first auxiliary request, both requests filed with the statement setting out the grounds of appeal, or either the second or third auxiliary request, both filed with letter dated 6 October 2017, be found to comply with the requirement of sufficiency of disclosure and not to extend beyond the content of the application as filed and that the case be remitted to the department of first instance for further prosecution on the basis of these requests.

XV. Respondents 1 and 2 requested that the appeal be dismissed.

Reasons for the Decision

Main Request

1. The present case concerns whether the undisputed ambiguities in respect of two parametric features in claim 1, identical to claim 1 as granted, which ambiguities therefore are not open to objections under Article 84 EPC in accordance with the ruling of G 3/14 (OJ EPO 2015, A102), result in a lack of sufficiency of disclosure as alleged by the opponents (respondents).

2. Claim 1 defines a copolymer of ethylene with α -olefins. The two parametric features in question express the statistical distribution of the comonomer(s) of α -olefins incorporated in the copolymer chains, i.e. the short chain branching distribution (referred to as SCBD), and a composition distribution breadth index (referred to as CDBI).

The objections raised by the respondents were in essence that the meaning of the SCDB and CDBI parameters was so ambiguous having regard to the whole patent documents and that the method for determining the SCDB was inadequately described such that the skilled person would have been unable to produce polymers as claimed and to select the polymers giving the benefits described in the specification. To address the issue of sufficiency of disclosure, it is necessary first to analyse the meaning of the parameters SCBD and CDBI and the methods for their determination in the light of the information provided in the patent in suit and the common general knowledge that would have been

available to the person skilled in the art, which issues were at the core of the parties' submissions.

Short chain branching distribution (SCBD)

3. The measurement method for determining the SCBD is defined in claim 1 to be crystallisation analysis fractionation (CRYSTAF®). The respondents essentially argued that the skilled person would not have known how to apply this method to the specific copolymers of claim 1 since the information provided in this respect in the specification was deficient and the technique was too recent to have been part of the common general knowledge. The respondents highlighted the difficulty entailed in preparing the necessary calibration curves.

3.1 According to paragraph [0003] of the patent, it was known that the SCBD could be determined by "analytical temperature rising elution fractionation technique" (TREF). With this technique, the polymer to be tested is slowly crystallised from a polymer solution onto an inert support material by cooling and subsequent elution at various temperatures. This leads, after the necessary calibration, to a distribution of the short chain branching, the number of the side chains being reported as methyl groups per 1000 carbon atoms of the polymer chain (CH₃/1000 C). According to paragraph [0004], CRYSTAF® (the method defined in operative claim 1) uses the same principle as TREF for determining the SCBD but directly records the amount of polymer chains crystallising instead of those being eluted. This enables, by subtraction, obtaining a short chain branching distribution similar to that obtained in the well-known TREF method.

Knowledge in the art in relation to CRYSTAF®

- 3.2 Paragraph [0004] of the patent refers to document E17 for its description of CRYSTAF®. E17 is also referred to as the first citation in document E16, the latter being a review article about CRYSTAF® measurements which was received on 8 July 2004 and accepted on 16 February 2005, i.e. about two years after the earliest priority date claimed. E16 indicates in its abstract that CRYSTAF® has not only become - after nearly a decade since it was developed - one of the most important characterisation techniques in polyolefin characterisation laboratories, but also that it has been established as an indispensable tool for product development and product quality monitoring in the polyolefin industry.
- 3.3 The calibration of the CRYSTAF® curve or its derivative to transpose the crystallisation (elution) temperature in a CH₃/1000 C number scale is described in E17, starting on page 495. Reference is made to preparative TREF and to Table I showing the correspondence between the elution temperatures (CRYSTAF® peaks) and CH₃/1000 C numbers. In addition to the calibration method using preparative TREF, E16 describes (page 1562) a further method using standards synthesised with single-site catalysts. It makes reference to E17 (reference 1) and further documents (references 9-12) published between 1999 and 2001, i.e. before the priority date of the patent in suit. E10, which is a thesis having a copyright of 2002, and E9, a scientific article from 2002 accepted in 2001, also confirm that CRYSTAF® measurements and the necessary calibration were known to the skilled person before the priority date of the patent in suit (E9, page 768, point 2.2, and E10, page 33). A further indication that CRYSTAF®

was a well-known characterisation technique in the art at the priority date of the patent in suit is provided in E7, which is an excerpt of an encyclopaedia of polymer science and technology extensively dealing with that technique. E7 has a copyright of 2004 and was accordingly published two years after the priority date of the patent in suit. However, this document can be considered corroborating evidence that the CRYSTAF® technique was sufficiently known in the art at the priority date of the patent in suit as to be already part of the common general knowledge given the time necessary for such information to be reflected in an encyclopaedia.

- 3.4 Accordingly, based on the documentary evidence on file, it is concluded that the skilled person in the present field would have been familiar with the meaning of SCBD at the priority date of the patent in suit. Furthermore, it would have been routine for them to determine a SCBD using the CRYSTAF® technique.

Would the information contained in the specification have prevented the skilled person from determining the SCBD defined in claim 1?

- 3.5 It is undisputed that the specification contains additional information in relation to CRYSTAF® or regarding the definition of the modality of the SCBD to be obtained which at first glance casts doubt on the methodology to be applied to determine the SCBD defined in claim 1.

- 3.6 Claim 1 states that the short chain branching distribution is determined by CRYSTAF®. Thus, the skilled person would have understood that the "*at least bimodal short chain branching distribution*" defined in

claim 1 is a distribution observed when analysing the claimed copolymer using this technique. This is confirmed in paragraph [0142] where it is stated that the "differential Crystaf® curve shows the modality of the short chain branching distribution", which is in line with E17 (to which the patent in suit refers in paragraph [0004]), which shows in Figure 1 on page 493 the modality of the derivative of the cumulative fraction. The respondents' argument that it was unclear whether that distribution is to be determined by TREF, CRYSTAF® or some other method cannot, therefore, be accepted.

- 3.7 Paragraph [0018] of the patent in suit defines that a monomodal short chain branching distribution determined by the Crystaf® method displays a single maximum, whereas a bimodal short chain branching distribution means that the short chain branching distribution determined by the same method has at least two points of inflection on a flank of a maximum. The definition of a bimodal distribution given in paragraph [0018] would have been seen by the skilled person, in light of the standard meaning of a bimodal definition and the implicit indication in claim 1 that the short chain branching distribution exhibits at least two peaks corresponding to at least 5 CH₃/1000 C atoms, as an attempt to define that the two points of inflection on a flank of a maximum are those in addition to the point of inflection already present on said flank of a maximum. Whether in accordance with that definition a SCBD will be considered bimodal obviously depends on a number of variables, such as the number of measurements made in the range of temperature selected and the spline function used, which are not indicated in the patent in suit. It is furthermore shown by E9 (pages 768-769, point 3, Figure 1) that the concept of a

unimodal or bimodal SCBD was already used in the art at the priority date of the patent. However, the uncertainty resulting from this missing information relates to the clarity of the definition of the copolymers claimed. Namely, whether the skilled person would have considered them to exhibit a unimodal or at least a bimodal distribution of the SCBD, i.e. to be within or outside the scope of claim 1. It does not relate to whether the skilled person could have produced specific copolymers.

- 3.8 Concerning copolymers of ethylene with monomers having more than one methyl group per monomer, such as 4-methyl-1-pentene mentioned in paragraph [0029] of the patent in suit, there is no reason to believe that the CRYSTAF® technique, including the preparation of a calibration table using preparative TREF and analysing the fraction obtained with conventional technique such as ¹³C NMR spectroscopy, would have presented any difficulty for the skilled person. The argument of the respondents that the patent in suit does not give any guidance on how such monomers are to be treated with respect to the limit of 5 CH₃/1000 C atoms defined in claim 1 rather boils down to a clarity issue as it is implicitly argued that the meaning of that limit in respect of monomers containing two CH₃ groups would have been ambiguous. However, the meaning of that limit must be understood in the present context, which is the measuring of the distribution of the short chain branches resulting from the incorporation of the comonomers in the polyethylene chain. In other words, this limit relates not to the number of CH₃ groups incorporated in the polyethylene chain but unambiguously to the number of short chains per 1000 carbon atoms.

3.9 The respondents also argued that the skilled person, given the confusing information provided in the specification, would not have known the lowest crystallisation temperature to use when carrying out the CRYSTAF® measurements and how to convert the crystallisation temperatures in CH₃/1000 C numbers.

Claim 1 puts no limitation on the conditions for the CRYSTAF® method, including the range of temperature to be used. Thus, these conditions must be understood to be any that the skilled person would have considered conventional in the art, taking also into consideration any information provided in the specification. Thus, it is apparent that the position of the peaks as defined in paragraph [0024] of the specification (one peak is indicated to be in the range of 5 to 40°C or preferably in the range of 8 to 30°C) provides a clear indication that the reference in paragraph [0142] to the temperature-time profile indicated in Figure 1 is in error and cannot be based on a minimum temperature of about 30°C.

Independent of whether Example 3 of the patent in suit represents an embodiment of the present invention (because there is no indication whether the copolymer obtained meets the density required in claim 1), Example 3 shows two peaks at 12°C and 33°C. Obviously, as argued by the respondents, these two peaks cannot be observed in the cooling range (temperature-time profile) shown in Figure 1 of the patent in suit. This merely confirms that Figure 1 does not show the temperature-time profile to be used in the patent in suit. Accordingly, the skilled person having in mind to explore the existence of peaks which might be located as low as 5°C would have sought to carry out the present invention using temperatures which go at least

slightly below that value. In the context of CRYSTAF® measurements, such low temperatures would have been necessary for chains with high CH₃/1000 C numbers, which would have been expected when large amounts of monomers were incorporated in the polyethylene chains, as is also demonstrated by Figure 7 on page 1565 of E16.

Consequently, the argument of the respondents that the patent in suit does not provide any indication of the type of temperature-time profile which would have been needed to observe the at least bimodal short chain branching distribution fails to convince.

3.10 Paragraph [0142] of the specification also indicates that the conversion of the CRYSTAF® curves obtained in CH₃/1000 carbon atoms is obtained using Figure 2, depending on the type of comonomer employed, but the x-axis in Figure 2 is defined to be the weight-average temperature T-w, not the actual CRYSTAF® crystallisation temperature. That weight-average temperature T-w corresponds, according to paragraph [0142], to the sum over all proportions by weight m-i multiplied by the temperature T-i, divided by the sum over all proportions by weight m-i, i.e.

$$T-w = \frac{\sum (m-i \cdot T-i)}{\sum m-i}$$

Accordingly, T-w is not a specific crystallisation temperature corresponding to a specific part of the polyethylene composition measured but rather a mathematical average of some unspecified temperatures.

The allegation of the respondents that those weight-average temperatures would have been obtained for each fraction used for calibration is not supported by any evidence and lacks credibility as the fractions used for calibration have a narrow composition (see E17,

page 495, Figure 4). It is furthermore undisputed that the additional information provided in paragraph [0142], according to which the straight line corresponding to the least square fit of the data in Figure 2 is represented by the formula $(\text{CH}_3/1000 \text{ C}) = -0.582 T-w (\text{°C}) + 60.46$, is also in error because this formula does not fit with the straight line shown in Figure 2. In addition, contrary to the indication in paragraph [0142], Figure 2 does not provide any indication of the nature of the copolymers corresponding to the data points shown in the graph. Moreover, the range of temperature corresponding to the straight line shown in Figure 2 varies from 40 to 85 °C, which does not fit with both the positions of the preferred peak values defined in the specification or the range of temperature in Figure 1.

Accordingly, the skilled reader of the specification whose common general knowledge would have included, as shown in points 3.2 to 3.4 above, how to measure the SCBD using the CRYSTAF® technique, would have immediately recognised that the additional information provided in paragraph [0142] was without any doubt irrelevant to the measurement of the SCBD and accordingly must be disregarded. Instead, the skilled person would have understood, as illustrated in Table I, page 495 of E17, that a reference table providing the number of $\text{CH}_3/1000 \text{ C}$ atoms as a function of the elution crystallisation temperature was used for this purpose as was meant to be indicated in paragraph [0020] of the specification by the sentence "*The elution temperatures obtained in this way*" (reference being made to the CRYSTAF® method) "*are converted by means of the reference table into the number of CH_3 groups per 1 000 carbon atoms.*"

3.11 Consequently, since at the priority date of the patent in suit determining a SCBD using the CRYSTAF® technique would have been routine for the skilled person in the present field, the skilled person would have been able to do so for copolymers of ethylene with α -olefins, in particular, those prepared in accordance with the synthesis taught in the patent, ignoring, in view of their knowledge, the misleading passages of the specification which are manifestly in error or unrelated to the determination of the SCBD.

CDBI (composition distribution breath index)

4. As regards the CDBI, it was not shown, let alone argued, that the CDBI parameter had at the priority date or filing date a well-recognised meaning in the art concerned, i.e. a meaning that an experienced person in the field in question would have been expected to know or at least be aware of to the extent that they would know where they could look it up. Accordingly, the meaning of that parameter can only be interpreted on the basis of the sole passages of the specification providing an indication in this respect, i.e. paragraphs [0003] and [0141].

4.1 CDBI is defined on page 2, lines 33-34 to be an acronym standing for "composition distribution breadth index", which is a measure of the breadth of the distribution of the composition that can be determined from a TREF measurement. This is indicated in the same paragraph to be described in WO 93/03093 (E1 in the present appeal proceedings). It is further stated that the "CDBI is defined as the percent by weight of the copolymer molecules having a comonomer content of $\pm 25\%$ of the mean molar total comonomer content". Paragraph [0141] merely indicates that the CDBI was determined as

described in E1. However, it is undisputed that E1 provides in the paragraph bridging pages 14 and 15, in line with the passage in the paragraph bridging pages 18 and 19 and Figure 17, a definition of CDBI in contradiction with that given in paragraph [0003] of the patent in suit, namely, "the weight percent of the ethylene copolymer molecules having a comonomer content within 50% of the median total molar comonomer content".

4.2 As illustrated by the respondents, in light of Figure 17 of E1, the two above possible definitions of CDBI can lead to significantly different values for that parameter, which is even more the case in the context of copolymers having an at least bimodal short chain distribution which is not narrow, as is implicit from the definition in claim 1 of a CDBI which is less than 50% and can even be as low as 5%, according to paragraph [0028] of the specification. The appellant argued that the definition provided in paragraph [0003] was an attempt to explain the meaning of CDBI as given in E1. The point, however, is whether the skilled reader would have recognised that the definition given in paragraph [0003] was not deliberate and a mere error of language when acknowledging the prior art E1 in the specification. There is no evidence that this is the case.

4.3 The argument of the appellant that "mean" would have to be understood as "median" since the TREF method used cumulative data is not supported by any evidence and even contradicted by E2, a document submitted by the appellant during the opposition proceedings. E2 contains a declaration of one of the present inventors before the USPTO in relation to a different family patent and TREF curves on the basis of which the

measurements indicated in that declaration were made. The TREF curves in E2 show that it was not uncommon, at least for the patent proprietor, to calculate CDBI values based on the average, i.e. mean, value of TREF measurements. In addition, it is also questionable whether the interval of $\pm 25\%$ on each side of this value can also be considered a mere error.

4.4 Moreover, it remains ambiguous whether the wording in paragraph [0141] means that the CDBI was determined as exactly described in E1 or as measured in E1 with the meaning of CDBI indicated in paragraph [0003] of the patent in suit. The exact value of the CDBI obtained in the experimental part of the patent in suit is not indicated. It is merely stated whether the value is above or below 50%. It was also not shown that the information provided in the experimental part of the patent in suit, even if an exact repetition of the exemplified embodiments were possible, as was alleged by the appellant, would have allowed experimentally identifying which definition of CDBI was intended in the patent in suit. There is no evidence that one of the two definitions of CDBI would lead to a value which is not $< 50\%$ as required by claim 1. In any case, the appellant decided not to repeat these examples and show what the result of the repetition would have been.

4.5 Thus, it cannot be said that the skilled person would have immediately recognised with sufficient certainty which meaning of CDBI was meant in the specification when repeating the synthesis described in the examples of the patent in suit and measuring the CDBI with the two methods apparently proposed in the patent in suit.

4.6 Accordingly, due to the absence of common general knowledge concerning CDBI and any explicit or implicit

indication in the patent in suit as to its true intended meaning, it was not shown that the person skilled in the art would have identified with a sufficient degree of certainty which definition of CDBI was meant in the patent in suit. Accordingly, the ambiguity concerning the definition of CDBI cannot be resolved.

- 4.7 However, it is undisputed that the CDBI, in accordance with either of the two definitions, can be determined from a TREF measurement, which measurement would have been routine for the skilled person in the present field.

Sufficiency of disclosure

5. According to Article 100(b) EPC, an opposition may be filed on the ground that the European patent does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. According to the established case law of the Boards of Appeal of the EPO, a European patent complies with the requirements of sufficiency of disclosure if the skilled person, on the basis of the information provided in the patent specification and, if necessary, using common general knowledge, would be able to carry out the invention as claimed in the whole range claimed without undue burden, i.e. with reasonable effort (Case Law of the Boards of Appeal, 8th Edition, 2016, II.C, introduction).

Ability of the skilled person to measure the SCBD and CDBI

6. There is no indication, let alone any argument, that the patent in suit indicates a set of measures which necessarily and immediately lead to copolymers meeting

the parametric requirements of claim 1 when trying to produce copolymers over the whole scope of that claim. It therefore would have been necessary for the skilled person trying to produce the copolymers of claim 1 over its whole scope based on the teaching of the patent in suit, common general knowledge and a reasonable amount of experimental work, including necessary adjustments, to verify whether the copolymers initially prepared meet the parametric requirements of claim 1, in particular, the SCBD and CDBI defined in that claim.

Thus, the skilled person would have needed suitable measuring methods for determining the SCBD and CDBI to reproduce the invention. Such methods were available to the skilled person at the priority date of the patent in suit (the ambiguity concerning the definition of CDBI notwithstanding), as is indicated in points 3.11 and 4.7 above. The objection of the respondents that the skilled person at the priority date would have had insufficient knowledge for measuring the SCBD of a copolymer of ethylene with α -olefins by the CRYSTAF® method is incorrect. Thus, their objection of a lack of sufficiency of disclosure of the subject-matter of claim 1 on that basis fails to convince.

Ability of the skilled person to solve the problem underlying the patent

7. The respondents had a separate line of argument in support of their objection of a lack of sufficiency of disclosure. They argued that the meanings of the SCDB and CDBI parameters were so ambiguous that the skilled person would have been unable to select the copolymers which allegedly provided the benefits of the invention described in paragraph [0011] of the specification, namely, a good dart drop impact strength.

8. The respondents relied in support of their case on decisions T 0593/09 of 20 December 2011, T 0815/07 of 15 July 2008 and T 0172/99 of 7 March 2002, the rationale of which needs first to be addressed.

8.1 In T 0593/09, the criterion applied for assessing sufficiency of disclosure was whether the unclear parameter of the claim was so ill-defined that the skilled person would not have been able, on the basis of the disclosure as a whole and using their common general knowledge, to identify (without undue burden) the technical measures (e.g. selection of suitable compounds) necessary to solve the problem underlying the patent at issue (point 4.1.4 of the reasons, emphasis by the present Board). The subject-matter claimed was a polyethylene terephthalate resin covered metal sheet characterised inter alia by a polyethylene terephthalate having a low temperature crystallisation (LTC) temperature ranging from 130 to 165°C. The LTC temperature was highly dependent on the conditions for its determination which were not specified in the patent. A LTC temperature in the range defined in the claim was crucial in order to solve the problem addressed in the description. That problem was not part of the definition of the subject-matter claimed. According to T 0593/09 (point 4.1.5 of the reasons), the rationale of this test underlay decisions T 0608/07 of 27 April 2009 (reference being made to point 2.5.2 of the reasons for the decision), T 0815/07 (reference being made to the headnote) and the decision in *Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd* [2004] UKHL 46 of the United Kingdom House of Lords, reference being made to paragraph 126 of the latter.

- 8.2 According to section 2.5.2 of the reasons for the decision of T 0608/07 *"for an insufficiency arising out of ambiguity it is not enough to show that an ambiguity exists, eg at the edges of the claims. It will normally be necessary to show that the ambiguity deprives the person skilled in the art of the promise of the invention"* (passage underlined by the present Board). The same section also indicates the necessity to investigate *"the effect of this ambiguity over the whole scope of the claim, in particular as to whether it is only significant at the edges or permeates the whole claim"*, reference being made at the end of the section to the decision of the High Court of England and Wales, *Zipher Ltd v. Markem Systems Ltd* [2008] EWHC 1379 (*"Zipher Ltd v. Markem Systems Ltd"*).
- 8.3 The concept of promise of the invention is not defined in T 0608/07 but appears in *Zipher Ltd v. Markem Systems Ltd*, in which three types of objection of sufficiency of disclosure are described.
- 8.3.1 The first type is the *"so-called classical insufficiency, is where following the express teaching of the patent does not enable the skilled addressee to perform the invention. This type of insufficiency requires an assessment by the court of the steps which it would be necessary for the skilled reader or team to take in following the teaching of the specification and in order to arrive within the claim. Plainly the steps should not include inventive ones. But a patent can also be insufficient if the steps can be characterised as prolonged research, enquiry or experiment"* (point 363 of the reasons). According to point 365, in reference to this type of objection, it is stated *"Two points need to be emphasised in this case. The first is that it is the claimed invention which must be enabled.*

If the skilled team would not be able to make something within the claim, insufficiency will be established. But what if the skilled team would be able to make something falling within the claim, but which is not as good as the patent promises? In my judgment that will not be insufficiency, although it may help in some cases (for the purposes of the separate objection of lack of inventive step) in showing that the technical advance made by the claim is less great than contended for by the description."

Hence, although the expression "promise of the invention" in light of *Zipher Ltd v. Markem Systems Ltd* could be understood to correspond to the indication in the description of the patent of the technical benefits provided by the claimed subject-matter, this decision makes clear that not fulfilling the "promise of the invention" is rather an issue of inventive step.

8.3.2 The second type of objection, the "so-called *Biogen* insufficiency" dealt with in points 367 to 373 of *Zipher Ltd v. Markem Systems Ltd*, is not part of the established case law of the Boards of Appeal of the EPO as indicated in T 1727/12 of 1 February 2016 (point 1.2 for the reasons), and is not relevant to the present case.

8.3.3 The third type of objection of insufficiency mentioned in point 374 of *Zipher Ltd v. Markem Systems Ltd* is "that which arises through ambiguity. If the skilled person cannot tell whether he is working the invention or not, the specification is insufficient. It is not, however, enough to establish this type of insufficiency to show that there may be a puzzle at the edge of the claims. It will normally be necessary for the problem to permeate the whole claim. An example of an

insufficiency of this type is the molecular weight test in Kirin Amgen at [121] which made it impossible to tell whether there was infringement or not". This type of objection is based on the same criterion as used in decision T 0608/07 (see point 8.2 above).

- 8.4 The *Kirin Amgen* decision underlying the third type of objection of insufficiency mentioned in point 374 of *Zipher Ltd v. Markem Systems Ltd* is *Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd* [2004] UKHL 46 of the United Kingdom House of Lords ("*Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd*"), of which paragraph 126 was also referred to in section 4.1.5 of T 0593/09 (see point 8.1 above). Points 103 to 109 of *Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd*, in particular, points 103, 104 and 109 quoted below, show that in the context of the third type of objection mentioned in point 374 of *Zipher Ltd v. Markem Systems Ltd*, the term "invention" does not refer to the combination of features defined by the terms of the claim under consideration but apparently rather to the inventive idea or concept the inventor had in mind that led the patentee to seek protection for what is claimed:

"Whether the specification is sufficient or not is highly sensitive to the nature of the invention. The first step is to identify the invention and decide what it claims to enable the skilled man to do. Then one can ask whether the specification enables him to do it" (point 103)

"It seems to me that a good deal of the argument in this case about sufficiency, like the argument about infringement, really turns on a dispute over exactly what the invention is: whether it is the discovery of the DNA sequence which codes for EPO, or a way of

making EPO, or a new artificial form of EPO. And the confusion is compounded by the fact that claims 19 and 26 are both in essence product-by-process claims, even though, in the case of claim 19, the product is distinguished from prior art by an artificial condition about molecular weight. All this creates ambiguity about the nature of the invention. But in order to decide whether the invention has been fully enabled, you first have to decide what the invention is."
(point 104)

"Before considering any of the four objections, it is, as I indicated earlier, necessary to decide the nature of the invention which the specification had to enable." (emphasis by the present Board) "In my opinion, it was a way of making EPO. For the reasons which I gave when discussing infringement, it was not and could not be the DNA sequence. It could only be a way (however broadly expressed) of making EPO by the use of that information. It could not be EPO itself because that was not new. Nor was it the discovery that a product had a useful quality. The useful qualities of EPO were well known. Even in the case of claims 19 and 26, although they are nominally product claims, the essence of the invention lies in the process. If one keeps in mind that the invention is a way of making EPO, a good deal of the difficulty about sufficiency resolves itself." (point 109)

In Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd claim 19 of the patent was directed to a recombinant EPO (rEPO) being characterised by, inter alia, a higher molecular weight by SDS-PAGE from erythropoietin isolated from urinary sources (uEPO), SDS-PAGE being a method for ascertaining the apparent molecular weight of a protein. Having regard to points 124, 126 and 129

of *Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd*, it appears that insufficiency of the rEPO defined in claim 19 was concluded not because the skilled person would not have been able to carry out the rEPO defined by the terms of that claim (it did not depend on the choice of the uEPO used for the molecular weight test) but rather because it was not clear which uEPO the patentee had in mind for the test when defining the claimed rEPO.

- 8.5 According to the headnote of T 0815/07 cited by the respondents and in T 0593/09 "*The purpose of a parameter contained in a claim is to define an essential technical feature of the invention. Its significance is that the presence of this technical feature contributes to the solution of the technical problem underlying the invention. The method specified for determining the parameter should therefore be such as to produce consistent values, so that the skilled person will know when he carries out the invention whether what he produces will solve the problem or not*". In T 0815/07, the problem indicated in the specification to be solved by the invention was not implied by the wording of the claims.
- 8.6 In decision T 0172/99, also cited by the respondents it was held that "*In the case of claimed subject-matter relying on a newly formulated and, hence, unfamiliar parameter to define the solution of a technical problem by which a relevant effect is achieved, the applicant or patentee, who has the duty of making a full and fair disclosure of his invention to the public (Article 83 EPC), is under a particular obligation to disclose all the information necessary reliably to define the new parameter not only (i) in a formally correct and complete manner such that its values can be obtained by*

a person skilled in the art without undue burden, but also (ii) in a manner which reliably retains the validity of the parameter for the solution of the technical problem for the application or patent in suit as a whole in the sense that the values routinely obtained will not be such that the claimed subject-matter covers variants incapable of providing the relevant effect or, therefore, of solving the associated technical problem" (catchword). In T 0172/99, the relevant effect or problem solved was the achievement of *"a good balance between impact strength and gloss"* (see point 4.4 of the reasons for the decision), although such an effect was not part of the definition of the subject-matter claimed. It was held that the absence, from the disclosure of the patent in suit, of an essential piece of information regarding the conditions for measuring the parameter meant that the ranges routinely obtained for the latter would be such that the claimed subject-matter inevitably covered variants which would be incapable of providing the promised effect of combined gloss and high impact strength or, therefore, of solving the relevant technical problem (see point 4.5.8 of the reasons for the decision).

8.7 Thus, all the decisions cited above (i.e. the decisions cited by the respondents and the decisions cited in those decisions) relating to a parameter mentioned in a claim whose definition is ambiguous are based on a definition of the term "invention" which does not refer to the combination of features defined by the terms of the claim under consideration but rather to the inventive idea or concept the inventor had in mind that led the patentee to seek protection for what is claimed.

Decisions T 0593/09, T 0815/07 and T 0172/99 in particular use the same criterion for assessing sufficiency of disclosure: the ability of the skilled person, seeking to reproduce what is claimed, to solve the problem underlying the patent at issue which was mentioned in the specification but was not part of the definition of the subject-matter claimed.

9. For the reasons given below, the present Board is, however, convinced that the ability of the skilled person to solve the problem underlying the patent in suit, when seeking to carry out the invention, is not an appropriate criterion for assessing sufficiency of disclosure where the problem is not part of the definition of the subject-matter claimed.

9.1 In landmark decision T 435/91 (OJ EPO 1995, 188), the Board, in the context of a functional definition of a component included in a claim, based its decision on the general legal principle *"that the protection conferred by a patent should correspond to the technical contribution to the art made by the disclosure of the invention described therein, which excludes the patent monopoly from being extended to subject-matter which, after reading the patent specification, would still not be at the disposal of the skilled person"*. The Board added that *"the available information must enable the skilled person to achieve the envisaged result within the whole ambit of the claim containing the respective "functional" definition without undue difficulty, and that therefore the description with or without the relevant common general knowledge must provide a fully self-sufficient technical concept as to how this result is to be achieved"* (point 2.2.1 of the reasons, fourth and fifth paragraphs). It is also settled case law that the same

principle applies when the claim contains a parametric definition because the subject-matter cannot be expressed only in terms of structural features. What is relevant here is that the enablement of the claimed subject-matter including the functional or parametric definition present in the claim is required, not the ability to solve a problem underlying the patent in issue not present in the claim.

9.2 In accordance with another landmark decision, T 939/92 (OJ EPO 1996, 309), the same general legal principle (i.e. that the extent of the patent monopoly should correspond to and be justified by the technical contribution to the art) also governs the decision that must be made under Article 56 EPC because everything falling within a valid claim (i.e. all embodiments claimed) has to be inventive (point 2.4.2 of the reasons). If this is not the case, the claim must be amended to exclude obvious subject-matter to justify the monopoly. As further explained in point 2.4.3 of T 939/92: *"For this reason, the boards of appeal consistently decide the issue of obviousness on the basis of an objective assessment of the technical results achieved by the claimed subject-matter, compared with the results obtained according to the state of the art. It is then assumed that the inventor did in fact seek to achieve these results and, therefore, these results are taken to be the basis for defining the technical problem (or, in other words, the objective) of the claimed invention (which problem may, as already stated above, be to provide a further - or alternative - process or physical entity, here a group of chemical compounds)."*

9.3 In accordance with this approach for assessing inventive step consistently adopted by the boards of

appeal, a claimed invention should not be precluded from patentability on the mere ground that the problem indicated in the patent as underlying the claimed invention in suit is subsequent to a necessary objective assessment not considered solved over the whole scope, for example, because evidence or arguments submitted in this respect were not found to be convincing or because the closest prior art determined when assessing inventive step was not the starting point for the invention indicated in the patent in suit. A reformulation of the problem, even in terms of providing a further process or product, does not prevent the acknowledgement of an inventive step if the solution defined in the claim under consideration was not obvious in view of the state of the art. In other words, a subject-matter which does not solve the problem indicated in the patent in suit but is still considered inventive after the necessary reformulation of the problem can be considered to provide a contribution to the art justifying the extent of the patent monopoly.

9.4 Accordingly, to acknowledge a contribution to the art justifying the patent monopoly, it is required by the case law that the information brought to the knowledge of the public through the filing of the patent is sufficient to allow the skilled person, if necessary using common general knowledge, to carry out the invention as claimed in its whole extent with reasonable effort, which claimed invention must correspond to an unobvious solution of a particular technical problem, which is not necessarily that indicated in the application as filed or the patent in suit, but might have been reformulated in the course of the proceedings before the EPO, provided that the conditions required by case law are met (Case Law, see

above, I.D.4.4.1). Accordingly, provided that the problem indicated in the patent in suit is not implied by the wording of the claims in terms of, for example, an effect or a functional definition, there is no apparent justification to deny a contribution to the art justifying a patent monopoly for the mere fact that the claimed subject-matter cannot be considered to solve a problem initially indicated in the specification.

9.5 Furthermore, as highlighted in T 0409/91 (OJ 1994, 653, point 3.3 of the reasons), the extent of the patent monopoly which should correspond to the technical contribution to the art for it to be justified is defined by the claims. This is in accordance with Article 84 EPC, which inter alia stipulates that the claims shall define the matter for which protection is sought and Rule 43(1) EPC stipulating that the claims shall define the matter for which protection is sought in terms of the technical features of the invention.

9.6 The term "invention" corresponds, in accordance with Rule 43(1) EPC, to the specific combination of features in the claim, as was reminded in Opinion G 2/98 of the Enlarged Board of Appeal (OJ 2001, 413; point 2 of the Reasons), whose definition is used when issues of priority ("*in respect of the same invention*" (Article 87(4) EPC), novelty ("*An invention shall be considered to be new if*" (Article 54(1) EPC) and inventive step ("*An invention shall be considered as involving an inventive step if*" (Article 56 EPC)) are considered.

The Board does not see any reason to consider a different meaning of the term "invention" in relation to the issue of sufficiency of disclosure. There is no reason to define the invention on the basis of an

effect alleged in the patent to be achieved by the claimed subject-matter or on the basis of specific conditions for measuring a parameter when the wording of the claim does not require this. This would amount to considering sufficiency of disclosure on the basis of a restricted reading of the claim. This is not done when assessing other patentability requirements, such as novelty and inventive step, and there is no apparent reason why sufficiency of disclosure should be assessed on a different basis.

There is, therefore, no reason to base the assessment of sufficiency of disclosure on the ability to find out which definition of a parameter in a claim or which conditions for its measurement are necessary or the patentee had in mind when drafting the patent in cases when this definition or these conditions are held to be necessary to ensure that the problem underlying the patent is effectively solved, but the problem itself or an effect derivable from it is not defined in the claims. The invention is defined by the terms of the claims, which should be given their broadest technical sensible meaning in the context they appear.

- 9.7 The position of the Board is also supported by G 1/03 (OJ 2004, 413) in which, concerning non-working embodiments (point 2.5.2, third paragraph of the reasons), it was pointed out that if "*there is lack of reproducibility of the claimed invention, this may become relevant under the requirements of inventive step or sufficiency of disclosure. If an effect is expressed in a claim, there is lack of sufficient disclosure. Otherwise, i.e. if the effect is not expressed in a claim but is part of the problem to be solved, there is a problem of inventive step (T 939/92, OJ EPO 1996, 309)*".

- 9.8 Therefore, in view of the reasons given above in points 9.1 to 9.7, it is concluded that in case of an unclear parameter defined in a claim whose values required in the claim are indicated in the specification to be essential to solving the problem underlying the patent at issue, the ability of the skilled person to solve that problem by reproducing what is claimed is not a suitable criterion for assessing sufficiency of disclosure when the problem or an effect derivable from it are not explicitly or implicitly part of the definition of the claimed subject-matter.
- 9.9 The view expressed above could be perceived as a deviation from the above cited decisions or other decisions of the Boards of Appeal in which a criterion for assessing sufficiency of disclosure was whether the ambiguity of a parametric definition deprived the person skilled in the art of the promise of the invention. However, there is no need to refer a question to the Enlarged Board of Appeal as the diverging views arise from a different approach regarding the meaning of the term "invention" in relation to the issue of sufficiency of disclosure and the approach taken in the present decision is supported by the decisions of the Enlarged Board of Appeal G 2/98 (see above) and G 1/03 (see above).
10. Consequently, the respondents' argument that the skilled person would not have understood how to determine the CDBI and SCBD parameters to be able to select the correct polymers for obtaining the alleged advantage of good dart drop impact strength indicated in paragraph [0011] of the specification cannot in itself lead to the conclusion that the invention lacks sufficiency of disclosure.

Breadth of the claim arising from lack of clarity and sufficiency

11. However, the above conclusion does not necessarily mean that the ambiguity concerning the definition that the CDBI is less than 50% in present claim 1 is merely an issue of clarity since the invention for which sufficiency of disclosure has to be assessed is defined by the terms of the claims, whose meaning has to be construed in view of the ambiguous definition of CDBI. Following the normal rule of claim construction, terms used in a claim, such as parametric definitions, should be given their broadest technical sensible meaning in the context in which they appear and having regard to the common general knowledge. This includes for parameters the conditions for their measurement which can be considered standard for the skilled person in the art concerned if those are missing in the claim.
- 11.1 The SCBD must be understood as the distribution measured using the CRYSTAF® method under any condition that the skilled person would have found reasonable based on the information provided in the patent in suit or the common general knowledge indicated in point 3.3 above.
- 11.2 Concerning the CDBI, there is no evidence that it had a recognised meaning in the art at the priority or filing date of the patent in suit and the contradiction between the two definitions of it provided in the specification cannot be resolved (see sections 4.1 and 4.6 above). Thus, this wording must be broadly construed to cover both definitions provided in the specification, namely, both (i) the percent by weight of the copolymer molecules having a comonomer content of ±25% of the mean molar total comonomer content and

(ii) the weight percent of the ethylene copolymer molecules having a comonomer content within 50% of the median total molar comonomer content.

As a result, claim 1 must be construed broadly to cover the two groups of copolymers corresponding to the two definitions of CDBI given in the patent in suit. These two groups of copolymers do not overlap to a substantial extent given the presumption established in point 4.2 above that these two definitions of the parameter lead to substantial variations of the CDBI value and therefore to two groups of copolymers which do not overlap to a non negligible extent.

11.3 The ambiguous definition of a parameter in a claim may result in the scope of the claim to be broader than the patentee might have intended. In such a case the question arises whether the teaching of the patent in suit, which was directed to the claimed subject-matter having regard to a specific meaning of that parameter (which, however, was omitted), would nevertheless have enabled the skilled person to carry out the invention outside of the scope intended by the patentee, using common general knowledge and a reasonable amount of experimentation.

11.4 It is undisputed that the whole teaching provided in the specification for preparing the copolymers in accordance with claim 1, in particular, the use of particular chromium catalysts (see paragraphs [0011] and [0013]), relates to only one (unknown) group of these two groups of copolymers corresponding to one definition of CDBI provided in the specification. According to paragraph [0028] of the specification, CDBI values ranging from 5 to 45% are to be obtained, which can only mean that CDBI is not only meant to have

a value of less than 50%. Rather, it is meant to have any value between 5 and up to but less than 50%. Thus, the presumption is established that the teaching indicated in the specification for preparing the copolymers in accordance with one definition of the CDBI given in the specification is not sufficient for preparing the copolymers in accordance with the second definition of the CDBI outside of the zone of overlap between these two groups of copolymers covered by the wording of claim 1. This is particularly critical not only because, for the only two examples present, the definition of CDBI used and the values obtained are not known, but because, especially for values as low as 5%, the condition given in the claim is very strict for both definitions.

11.5 Even accepting that the teaching is sufficient for one of the two definitions, the patent proprietor did not indicate how the skilled person, based on their common general knowledge, would have been in a position to complement the teaching contained in the patent in suit to prepare with reasonable effort the copolymers in accordance with the second definition of the CDBI which do not belong to the group of polymers in accordance with the first definition of CDBI. Thus, there is no reason to expect that a skilled person, on the basis of the information provided in the patent specification and, if necessary, using common general knowledge, would have been able, without undue burden, to carry out the invention as defined by the terms of claim 1 over its whole scope.

11.6 The Board agrees with the appellant that an objection of insufficient disclosure presupposes that there are serious doubts substantiated by verifiable facts, mere conjecture not being enough. The Board also agrees that

the burden of proof is primarily on the opponents (here the appellants) since after the grant of the patent, i.e. after the end of the examination proceedings, a legal presumption exists that the patent meets the requirements of the EPC. However, this presumption can be rebutted on the basis of the grounds for opposition mentioned in Article 100 EPC (T 0063/06 of 24 June 2008, point 3.3.1 of the reasons). This rebuttal requiring substantial arguments and evidence from the opponents.

- 11.7 In light of the submissions of the opponents (here the respondents) the deficient character of the technical information contained in the patent in suit sheds serious doubt on the reproducibility of the subject-matter of granted claim 1 over its whole scope. Accordingly, the legal presumption of the validity of the granted patent has been rebutted. Thus, it is instead the task of the appellant/patent proprietor to present convincing arguments as to why the subject-matter of granted claim 1 can be carried out over its whole scope despite the deficient technical teaching provided in the patent in suit. Who bears the burden of proof may be determined by the legal cases which the respective parties are trying to make. Whether it is discharged is assessed by the Board based on all the relevant evidence put before it (see T 0518/10 of 9 April 2013, point 7.10.1 of the reasons). In the present case, in spite of the deficient and ambiguous technical information, the appellant decided not to provide further evidence showing that the skilled person could resolve the contradiction between the two definitions of CDBI provided in the patent in suit, in particular, showing which values would have been obtained according to the two definitions if the

teaching of the patent were followed and the examples reproduced.

- 11.8 Thus, the subject-matter of claim 1 has not been shown to be enabled in the whole range claimed, and the main request must be refused on the basis of the grounds under Article 100(b) EPC.

Auxiliary requests

12. Claim 1 of the second auxiliary request is identical to claim 1 of the main auxiliary request. Claims 1 of the first and third auxiliary requests are identical and differ from claim 1 of the main request solely in that the upper limit of the molar mass M_n is 400 000 g/mol. It was undisputed that this amendment was not related to the above addressed issue of sufficiency disclosure and that the arguments and the conclusion in respect of the main request would equally apply to the first to third auxiliary requests. Consequently, the objection under Article 100(b) EPC holds also against the first to third auxiliary requests and those requests also have to be refused.

Order

For these reasons it is decided that:

1. The appeal is dismissed

The Registrar:

The Chairman:



S. Lichtenvort

D. Semino

Decision electronically authenticated