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**Datasheet for the decision  
of 20 November 2024**

**Case Number:** T 2091/22 - 3.3.03

**Application Number:** 17870116.5

**Publication Number:** 3415560

**IPC:** C08L23/06, C08K5/14, C08K5/25,  
C08K5/00, C08K5/37, C08K5/08,  
C08K5/01, C08K5/06, C08F10/02,  
C08J3/24, C08K5/053

**Language of the proceedings:** EN

**Title of invention:**  
CROSSLINKED POLYETHYLENE COMPOSITION

**Patent Proprietor:**  
LG Chem, Ltd.

**Opponent:**  
Borealis AG

**Relevant legal provisions:**  
RPBA 2020 Art. 12(2), 13(2)  
EPC Art. 83

**Keyword:**

Primary object of appeal proceedings to review decision -  
appeal case directed to evidence on which decision was based  
(yes)

Sufficiency of disclosure - enabling disclosure (no)

**Decisions cited:**

G 0007/93



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

Boards of Appeal of the  
European Patent Office  
Richard-Reitzner-Allee 8  
85540 Haar  
GERMANY  
Tel. +49 (0)89 2399-0

Case Number: T 2091/22 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 20 November 2024**

**Appellant:**  
(Patent Proprietor)

LG Chem, Ltd.  
128, Yeoui-daero  
Yeongdeungpo-gu  
Seoul 07336 (KR)

**Representative:**

Hoffmann Eitle  
Patent- und Rechtsanwälte PartmbB  
Arabellastraße 30  
81925 München (DE)

**Respondent:**  
(Opponent)

Borealis AG  
Trabrennstrasse 6-8  
1020 Vienna (AT)

**Representative:**

Dehns  
10 Old Bailey  
London EC4M 7NG (GB)

**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted on 1 July 2022  
revoking European patent No. 3415560 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman** D. Semino  
**Members:** D. Marquis  
A. Bacchin

## Summary of Facts and Submissions

- I. The appeal lies against the decision of the opposition division revoking European patent No. 3 415 560 pursuant to Article 101(3) (b) EPC.
- II. The decision under appeal was based on the claims of the main request, auxiliary request 1 and auxiliary request 2 all filed with letter of 26 July 2021.
- III. Claim 1 had the same wording in the main request and in auxiliary request 1 and read as follows:

"1. A crosslinked polyethylene composition consisting of:

100 parts by weight of low density polyethylene (LDPE) having an oil extraction content of 300 ppm or less,

0.1 to 10 parts by weight of a crosslinking agent, selected from the group consisting of dicumyl peroxide, benzoyl peroxide, lauryl peroxide, t-butylcumyl peroxide, di(t-butylperoxyisopropyl)benzene, 2,5-dimethyl-2,5-di(t-butylperoxy)hexane, and di-t-butyl peroxide, and

0.1 to 1.0 parts by weight of an antioxidant, selected from the group consisting of 4,4'-thiobis(2-t-butyl-5-methylphenol), 4,6-bis(octylthiomethyl)-o-cresol, 2,2'-thio diethyl bis-[3-(3,5-di-t-butyl-4-hydroxyphenyl)-propionate], pentaerythrityl-tetrakis-[3-(3,5-di-t-butyl-4-hydroxyphenyl)-propionate], 4,4'-thiobis(2-methyl-6-t-butylphenol), 2,2'-thiobis(6-t-butyl-4-methylphenol), octadecyl-[3-(3,5-di-t-butyl-4-hydroxyphenyl)-propionate], triethyleneglycolbis-[3-(3-

t-butyl-4-hydroxy-5-methylphenol)propionate],  
thiodiethylene bis[3-(3,5-di-t-butyl-4-hydroxyphenyl)propionate], 6,6'-di-t-butyl-2,2'-thiodi-p-cresol,  
1,3,5-tris(4-t-butyl-3-hydroxy-2,6-xyllyl)methyl-1,3,5-triazine2,4,6-(1H,3H,5H)-trione and dioctadecyl 3,3'-thiodipropionate, and

wherein the oil extraction content is measured and calculated by dividing the mass of the components extracted for 4 hours after putting 500 g of the LDPE in 2L of water of 100°C, by 500 g".

The claims of auxiliary request 2 are not relevant for the present decision.

IV. The following documents were *inter alia* submitted during the opposition proceedings:

D1: WO 2011/057927 A1

D2: WO 2011/057925 A1

D8: WO 2016/066619 A1

V. The decision under appeal, as far as it is relevant to the present appeal, can be summarized as follows:

- Document D8 was admitted into the proceedings,
- the subject-matter of claim 1 of the main request and of auxiliary request 1 was sufficiently disclosed, but it was not novel over the disclosure of document D1.
- auxiliary request 2 did not comply with the requirements of Article 123 EPC.

- VI. The patent proprietor lodged an appeal against the decision of the opposition division.
- VII. Oral proceedings before the Board were held on 20 November 2024.
- VIII. The final requests of the parties were as follows:
- The appellant (patent proprietor) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims of the main request or of auxiliary request 1 filed with letter of 26 July 2021.
  - The respondent (opponent) requested that the appeal be dismissed.
- IX. The parties' submissions, in so far as they are pertinent, may be derived from the reasons for the decision below. The disputed points concerned the admittance of document D8 into the proceedings and the question of sufficiency of disclosure of the subject-matter of claim 1 of the main request and of auxiliary request 1.

### **Reasons for the Decision**

Main request (claims 1-3 filed with letter of 26 July 2021)

#### 1. Admittance

- 1.1 The appellant requested *inter alia* that document D8 not be admitted into the appeal proceedings (statement of grounds of appeal, section 2.1).

- 1.2 D8 was submitted during the opposition proceedings by the opponent after the nine months period for opposition and within the time limit under Rule 116(1) EPC, given for submissions before the oral proceedings. The admittance of D8, as well as of other documents, was addressed by the opposition division during the oral proceedings and the opposition division decided to use their discretion in admitting D8 into the proceedings because D8 was found to be *prima facie* relevant to the question of novelty (reasons for the decision, section 4.1).
- 1.3 The criterion of *prima facie* relevance is a correct criterion to be applied before a first instance department (Case Law of the Boards of Appeal, 10th Edition 2022, in the following "Case Law" IV.C.4.5.1). It implies that new facts and evidence are admitted into the proceedings if, *prima facie*, there are reasons to suspect that such late-filed documents prejudice the maintenance of the European patent in suit. The opposition division provided a sufficient reasoning explaining why D8 was found to meet the criterion of *prima facie* relevance (contested decision, section 4.1). The appellant does not contend in appeal that the opposition division applied the wrong criterion or applied it in an unreasonable manner when assessing the admittance of D8. Instead, the arguments of the appellant for not admitting D8 into the proceedings (statement of grounds of appeal, sections 2.2-2.4) relied on an alleged lack of relevance of this document.
- 1.4 A board of appeal should only overrule the way in which a department of first instance has exercised its discretion when deciding on a particular case if it concludes that it has done so according to the wrong

principles, or without taking into account the right principles, or in an unreasonable way, and has thus exceeded the proper limits of its discretion (see G 7/93, Reasons 2.6 and established jurisprudence cited in Case Law, IV.C.4.5.2).

1.5 Since the opposition division did not use their discretion improperly with regard to the admittance of D8, the Board does not see any reason to reverse the decision of the opposition division on its admittance. There is no legal basis in the EPC or in the Rules of procedures of the Boards of Appeal for retroactively excluding evidence that has been correctly admitted into the proceedings and forms the basis of a decision of an opposition division (cf. Article 12(2) RPBA and Case Law of the Boards of Appeal, 10th Edition 2022, V.A.3.4.4). Document D8 is therefore part of the appeal proceedings.

1.6 While the Board decided at the oral proceedings on the admittance of further documents, there is no need to provide a justification, since the further documents are not relevant to the present decision.

2. Sufficiency of disclosure

2.1 The respondent maintained their objection of lack of sufficiency of disclosure against claim 1 of the main request in view of a lack of guidance with respect to the preparation of a low density polyethylene (LDPE) with a defined oil extraction content (rejoinder, pages 6-11, items 30-56). In particular, the respondent argued that the patent in suit did not contain any guidance as to how to obtain an LDPE having an oil extraction content of less than 300 ppm.



- 2.2 The appellant contended that the patent in suit provided sufficient guidance for the provision of LDPE with an oil extraction content of 300 ppm or less, in particular in paragraphs 19 and 25 which disclosed relevant process parameters influencing that content (letter of 18 October 2024, page 4, items III to IV).
- 2.3 The oil extraction content of an LDPE is not defined in claim 1 of the main request but the patent in suit provides some indications of what is meant by that parameter. Paragraph 22 teaches that the oil extraction content means the content of oil included in low density polyethylene, and repeats as an example the extraction conditions in claim 1. That passage specifies that the oil content is made of a complex mixture of components as although "the oils are not necessarily limited hereto, they include non-reacted material according to the preparation of low density polyethylene, solvents, oligomer, etc". In addition, the parties were in agreement (as confirmed at the oral proceedings before the Board) that compressor oil used in the preparation of the LDPE is part of that complex mixture, as clearly derivable from the last sentence of paragraph 25 of the patent in suit referring to the influence of compressor oil on the oil content. The oil content of the LDPE is therefore presented in the patent in suit as the result of the preparation of the LDPE including its operational set-up (compressor) and reaction conditions. The question of sufficiency of disclosure is therefore whether the patent in suit, supplemented if necessary by common general knowledge, contains sufficient guidance to provide an LDPE with an oil extraction content of that complex mixture of less than 300 ppm, which the patent presents as a critical and stringent requirement. In this respect, while the upper limit was 1000 ppm in claim 1 of the application

as filed and 700 ppm in claim 1 of the patent as granted, it is down to 300 ppm in claim 1 of the operative request. As mentioned above, the appellant cited paragraphs 19 and 25 of the patent as relevant passages to answer this question.

2.4 Paragraph 19 discloses that the "low density polyethylene may be, for example, ethylene homopolymer polymerized by a free radical initiation reaction in a high pressure tubular or autoclave, or ethylene copolymer prepared using a Ziegler Natta catalyst or metallocene catalyst under low pressure of 100 bars or less". That passage provides some non exhaustive ("for example") indications which suggest that the LDPE can be obtained by a polymerization process using high pressure, thereby implying the use of a compressor. Besides the broad reference to generally known preparation processes of LDPEs there is no mention of the type and amount of compression oil, nor of the oil extraction content of the produced LDPE and its adjustment so that it is 300 ppm or less as required in claim 1 of the main request.

2.5 Paragraph 25 of the patent in suit provides some very general information citing a non exhaustive list of parameters ("for example, reaction catalyst, reaction time, reaction temperature, reaction solvents at the time of preparation of the low density polyethylene"), which are said to be relevant to control the oil content. However, there is no further teaching on how these parameters of the polymerization process or the compressor oil should be chosen or according to which specific common general knowledge these parameters should be adjusted in order to obtain an LDPE with an oil extraction content of less than 300 ppm.

2.6 The examples of the patent in suit show the preparations of crosslinked polyethylene compositions comprising LDPEs having oil extraction contents of 240 ppmw (example 1, according to claim 1 of the main request) as well as 600, 820 and 920 ppmw (examples 2-5 and comparative examples 1 and 2, outside the range in claim 1 of the main request). These examples seem to suggest that the type of oil used in the preparation of the LDPE may have an influence on the oil content, as example 1 uses a synthetic oil and examples 2 and 3 use a mineral oil, but there is no further guidance in the examples from which it could be concluded that the choice of the type of oil (which is in any case not limited in claim 1) would be sufficient to obtain LDPEs with an oil extraction content of less than 300 ppm. In particular, none of the parameters and process conditions indicated as relevant in paragraph 25 is provided for these examples, nor any information is given on the compression conditions, including in particular the amount of compression oil needed.

The examples of the patent in suit therefore do not provide the necessary guidance to obtain an LDPE according to claim 1 of the main request and therefore to prepare the claimed composition. In this respect the patent in suit does not even provide a single reproducible starting point which could guide the skilled person to possible variants thereof in order to obtain compositions within the whole ambit of the claim. It also does not contain any indication on how the listed parameters and process conditions influence the critical feature, nor how they should be selected and, in case of failure, modified to obtain a composition fulfilling the specific requirement.

2.7 The appellant additionally referred to passages in documents D1, D2 and D8 as representing common general knowledge showing how LDPEs with a defined oil extraction content could be obtained. The Board, however, does not find in these passages any teaching relating to the control of the oil content at very low levels, nor in particular to the provision of LDPEs with an oil extraction content of 300 ppm or less. Page 24, lines 18 and 19 of D1, indicated by the appellant as relevant, only suggests that high temperature and high pressure during the polymerization of ethylene generally increase the output in LDPE. The following lines of that passage describe temperature profiles that can be selected to allow control of the structure of the polymer chain, i.e. long chain branching and/or short chain branching, density, branching factor, distribution of comonomers, melt flow rate, viscosity, molecular weight distribution, but there is no information on the use of specific oils in the preparation of LDPEs or on their oil extraction contents in that passage. The passages in page 26, line 30 to page 27, line 5 of document D2 and page 29, line 25 to page 30, line 1 of document D8, also cited by the appellant, concern the recovery process of produced LDPEs and in particular steps for the removal of unreacted monomers and components but they do not contain any indication on how these steps could lead to any specific range of oil extraction content. The additionally cited passage on page 17, lines 27 and 28 of D8 is also vague, it only states that "the precise control of polymerisation conditions can be performed using different types of catalyst and using different comonomer and/or hydrogen feeds" and does not pertain to the oil extraction content of LDPEs.

2.8 On that basis, while it could be accepted that the skilled person would be aware that the process conditions of the compression and of the polymerisation have an influence on the remaining quantities of the components which result in an oil content of the LDPE, no common general knowledge has been provided to guide the skilled person to select these conditions so as to obtain an LDPE with an oil extraction content of less than 300 ppm or to modify these conditions in case of failure.

2.9 The appellant additionally argued in their letter of 18 October 2024 (page 4, point IV), filed after the communication of the Board, and at the oral proceedings before the Board that the oil components (including the compressor oil) are extractable and that the skilled person would know how to extract them from the LDPE in view of their common general knowledge. The respondent objected to the admittance of these late filed submissions under Article 13(2) RPBA. The Board notes that the whole of the patent does not provide any indication of an extraction step, nor of appropriate extraction techniques. Moreover, no evidence has been provided to support the allegation submitted only at a very late stage of the proceedings and in particular to show that by means of well-known and commonly used techniques an oil extraction content of 300 ppm or less can be achieved. On this basis, the allegation of the appellant is rejected.

2.10 The Board therefore does not find in the patent in suit or in the common general knowledge provided by the appellant sufficient guidance for the provision of LDPEs with an oil extraction content of less than 300 ppm. As an LDPE with an oil extraction content of less than 300 ppm is a necessary and stringent feature

of the crosslinked polyethylene composition of claim 1 of the main request, the Board concludes that claim 1 of the main request lacks sufficiency of disclosure. The same conclusion applies to claim 1 of auxiliary request 1 which is identical to claim 1 of the main request.

## Order

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

The appeal is dismissed.

The Registrar:

The Chairman:



D. Hampe

D. Semino

Decision electronically authenticated