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Datasheet for the decision of 27 September 2024

Case Number: T 1417/22 - 3.3.03

Application Number: 17180894.2

Publication Number: 3342816

IPC: C08L23/12, C08L23/14, H01B3/44, H01B3/28

Language of the proceedings: EN

Title of invention:
POWER CABLE COMPRISING A POLYPROPYLENE RESIN IN AN INSULATION LAYER

Patent Proprietor:
Hanwha Total Petrochemical Co., Ltd.

Opponent:
Borealis AG

Relevant legal provisions:
EPC Art. 100(b)

Keyword:
Sufficiency of disclosure - weak presumption (yes) - undue burden (yes)

Decisions cited:
T 0063/06

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Case Number: T 1417/22 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 27 September 2024

Appellant: (Opponent)	Borealis AG Trabrennstrasse 6-8 1020 Vienna (AT)
Representative:	Kador & Partner Part mbB Corneliusstraße 15 80469 München (DE)
Respondent: (Patent Proprietor)	Hanwha Total Petrochemical Co., Ltd. 103 Dokgot 2-ro Daesan-eup Seosan-si, Chungcheongnam-do 31900 (KR)
Representative:	Schwarz & Partner Patentanwälte GmbH Patentanwälte Wipplingerstraße 30 1010 Wien (AT)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 14 April 2022 rejecting the opposition filed against European patent No. 3342816 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	D. Semino
Members:	M. Barrère
	L. Basterreix

Summary of Facts and Submissions

I. The appeal of the opponent lies against the decision of the opposition division rejecting the opposition against European Patent No. 3 342 816.

II. Claim 1 as granted read as follows:

> "1. A power cable comprising a polypropylene resin in an insulating layer, which resin is an ethylene-propylene block copolymer prepared by polymerization of (a) propylene homopolymer or ethylene-propylene random copolymer, and (b) propylene rubber copolymer, wherein a difference (Tm-Tc) between a melting temperature (Tm) of the ethylene-propylene block copolymer and a crystallization temperature (Tc) is 45°C or less, the size of the rubber copolymer in a dispersed phase is 0.5 μm or less, and the ethylene-propylene rubber copolymer (b) is contained in an amount of 30~50 wt% based on the total weight of the ethylene-propylene block copolymer."

The remaining granted claims are not relevant to the present decision.

III. The following documents were *inter alia* cited in the decision of the opposition division:

> D2: EP 1 619 217 A1
> D7: "Polypropylene Handbook" edited by Edward P. Moore, Jr., Hanser Publishers, Carl Hanser Verlag 1996, pages 149 to 151 and 245 to 248

D8: R.J. Kersting, "Developments of UNIPOL™ PP High Melt Flow Propylene Impact Copolymers with Improved Impact Stiffness Balance", Polyolefins 2000, The International Conference on Polyolefins, Houston TX, 2000, pages 109 to 124
D9: Ch. Grein *et al.*, "Melt viscosity effects in ethylene-propylene copolymers", Rheol. Acta, 46, 2007, pages 1083 to 1089
D10: "A Guidebook to Particle Size Analysis", HORIBA Instruments, Inc., 2012
D19: Fu, Zhi-sheng *et al.*, "Structure and morphology of polypropylene/poly(ethylene-co-propylene) in situ blends synthesized by spherical Ziegler-Natta catalyst", European Polymer Journal, 39, 2003, pages 795 to 804
D20: Cai, Hongjun *et al.*, "Structure and Properties of Impact Copolymer Polypropylene. II. Phase Structure and Crystalline Morphology", Journal of Applied Polymer Science, Vol. 71, 1999, pages 103 to 113
D21: Snooppy, George *et al.*, "Blends of isotactic polypropylene and nitrile rubber: morphology, mechanical properties and compatibilization", Polymer, Vol. 36, No. 23, 1995, pages 4405 to 4416
D23: EP 3 744 744 A1

IV. In that decision the opposition division held, among others, that the claimed invention was disclosed in a manner sufficiently clear and complete for it to be carried out by the skilled person over the whole scope of granted claim 1.

V. The opponent (appellant) filed an appeal against said decision.

VI. Following an exchange of letters and a communication from the Board, oral proceedings were held on 27 September 2024.

VII. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The patent proprietor (respondent) requested dismissal of the appeal and maintenance of the patent as granted.

VIII. The appellant's submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They were essentially as follows:

The claimed invention was not disclosed in a manner sufficiently clear and complete for it to be carried out by the skilled person over the whole scope of granted claim 1.

IX. The respondent's submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They were essentially as follows:

The claimed invention was disclosed in a manner sufficiently clear and complete for it to be carried out by the skilled person over the whole scope of granted claim 1.

Reasons for the Decision

Patent as granted (main request of the respondent)

1. Sufficiency of disclosure

1.1 Claim 1 is directed to a power cable comprising an ethylene-propylene block copolymer prepared by polymerisation of (a) propylene homopolymer or ethylene-propylene random copolymer, and (b) propylene rubber copolymer, wherein, *inter alia*,

> the size of the rubber copolymer in a dispersed phase is 0.5 µm or less (emphases here and below added by the Board)

1.2 In the decision under appeal, the opposition division found that the term "size" in claim 1 referred to the average size of the rubber copolymer. While they agreed with the opponent that a precise replication of the examples in the patent was not possible, the opposition division held that the patent provided sufficient information on the polymerisation process, the amount of rubber, and the amount of ethylene in the rubber to allow the skilled person in combination with common general knowledge to obtain a cable meeting the requirements of granted claim 1 (decision under appeal, page 4, point 3.3 to page 7, point 3.7).

1.3 The appellant contested these findings and argued that the opposed patent lacked sufficient disclosure, making it impossible for a skilled person to put the claimed invention into practice without undue burden (statement

of grounds of appeal, page 4, point 3.1 to page 19, point 3.45 and letter dated 31 July 2023, page 2, point 3.1 to page 8, point 3.21). They based their argument on the following central points:

1.3.1 "Size" as essential feature of the claim invention: it could be derived from the opposed patent that the "size of the dispersed rubber copolymer" was a key parameter to obtain a cable with improved mechanical and insulating properties.

1.3.2 Ambiguity of "size": the term "size" in claim 1, referring to the "size of the rubber copolymer in a dispersed phase", was excessively vague and lacked a clear definition within the patent. This ambiguity extended beyond mere clarity issues and impacted the sufficiency of disclosure. The patent failed to specify how this "size" should be measured or what it meant in terms of dimension (diameter, larger/smaller dimension) or rubber phase morphology. While the respondent argued that "size" referred to the average particle size determined by scanning electron microscopy (SEM) analysis, the patent did not explicitly mentioned the terms "average" or "particles" in that context. Furthermore, the range of rubber content in claim 1 (30 to 50 wt.%) could result in co-continuous phases, where defining a "size" became meaningless.

Moreover, even if the "size" was interpreted as "average particle size", the patent did not specify the averaging method or how the central value was determined. In that respect reference was made to figure 13 of D10 showing different average sizes depending to the distribution considered (number, volume or area) and the method to calculate the average value (mean, median or mode). The patent only briefly

mentioned SEM analysis without providing the necessary details on sample preparation, measurement parameters or data interpretation. The cited documents D19 to D21, which the respondent used to support the sufficiency of the SEM description, actually demonstrated that the SEM method was not exclusively used for determining average particle sizes.

1.3.3 Lack of essential process parameters: relevant information was missing in the examples regarding the preparation of the "ethylene-propylene block copolymer". Essential details were absent, such as the specific Ziegler-Natta catalyst used, the exact amount of hydrogen used to control the melt index, and the processing conditions employed to obtain the resin in the claimed form as an insulation layer of a power cable. The lack of these parameters, particularly the viscosity ratio between the polypropylene (PP) phase and ethylene-propylene rubber (EPR) phases, prevented a skilled person from reproducing the claimed resin and its morphology.

The respondent’s contention that the skilled person could readily adjust the parameters to achieve the desired results based on the information provided in the patent was untenable. The respondent had not offered any evidence to support their argument and had failed to address the appellant's specific concerns about missing information. In this respect, the burden of proof was on the patent proprietor to show that the invention could be carried out over the whole scope of granted claim 1.

1.4 The respondent asserted that the opposed patent offered sufficient information to enable a skilled person to carry out the invention over the whole scope of granted

claim 1 (rejoinder to the statement of grounds of appeal, page 3 to page 7, antepenultimate paragraph). The appellant's concerns regarding clarity and reproducibility stemmed from a misinterpretation of the claims and a misunderstanding of the common general knowledge in the field. The respondent based their argument on the following central points:

1.4.1 Combined effect of features: the appellant incorrectly focused on the "size of the rubber copolymer in a dispersed phase" as the sole key parameter for the properties of the power cable. Instead, the invention relied on the combined effect of multiple features, all of which were essential for achieving the desired properties. Therefore, the appellant, by singling out the "size" feature, distorted the overall teaching of the patent.

1.4.2 "Size" as average particle size: the term "size" in claim 1 was not vague or ambiguous. It was clear to a skilled person that "size" referred to the average particle size of the rubber particles, as commonly determined by SEM analysis. This interpretation aligned with the common understanding of the term in the field and was further supported by the appellant's own use of "size" as equivalent to "average size" in document D2. Documents D19 to D21, filed during the opposition proceedings, which described the determination of rubber polymer size in a dispersed phase using SEM analysis, provided supporting evidence of the widespread understanding and application of this method.

The description of the opposed patent, including figures 1 and 2, was sufficient for a skilled person to carry out the measurement. Ample literature existed

(D19, D20, and D21) that offered guidance on the appropriate conditions for determining particle size using SEM. Furthermore, the figures of the patent clearly depicted the difference in dispersed phase size between an EPR phase according to the invention (figure 1) and one outside the invention (figure 2), providing a visual guide for the skilled person.

1.4.3 Co-continuous phase formation unproven: the appellant's concern that higher rubber contents could lead to co-continuous phases, making the definition of the "size" meaningless, was a mere hypothesis unsupported by evidence. The appellant had failed to provide such evidence and their assertion about the formation of co-continuous phases was purely speculative.

1.4.4 Examples provide sufficient guidance: the examples of the opposed patent provided adequate information for the skilled person to produce a PP resin as defined in claim 1. Paragraph [0028], in conjunction with table 1, offered a clear guidance on how to obtain the claimed product, and paragraph [0017] explained how to achieve the dispersed rubber copolymer size of 0.5 µm or less, as demonstrated in the examples. While it was true that the precise catalyst and hydrogen amounts used in the examples were not specified, these missing details did not hinder the skilled person from practising the invention. Indeed it was common knowledge in the field to adjust such parameters based on the desired melt index and other properties, and the skilled person could readily select a suitable Ziegler-Natta catalyst containing a phthalate-based internal electron donor based on their general knowledge.

1.4.5 Viscosity ratio not essential for reproducibility: the lack of information on the viscosity ratio between the

PP and EPR phases did not hinder reproducibility. Even if the viscosity ratio influenced the phase structure, this information was not essential for reworking the examples of the patent. Moreover, the appellant had failed to provide evidence that the examples could not be reproduced due to the missing information on the viscosity ratio.

1.5 With regard to the question of sufficiency of disclosure, the appellant's objections raise the following main questions:

(i) What is the "size of the rubber copolymer in a dispersed phase"?

(ii) How a power cable comprising a resin characterised by the defined "size" should be obtained?

The Board addresses these two questions separately below (respectively under points 1.6 and 1.7).

1.6 As regards the first question (interpretation of the "size of the rubber copolymer in a dispersed phase"), it is first noted that claim 1 does not provide any information about the nature of the "size" or the method to measure this characteristic. In that respect, it is not disputed that multiple options exist which inevitably lead to different results, thus contributing to the ambiguity of this feature (see D10, page 9, figure 13). However, the Board does not consider that the claimed invention is insufficiently disclosed for that reason.

1.6.1 It is pointed out that sufficiency of disclosure within the meaning of Article 83 EPC must be assessed on the basis of the application as a whole – including the

description and the figures – and not of the claims alone (Case Law of the Boards of Appeal, 10th edition 2022, in the following "Case Law", II.C.3.1).

1.6.2 While claim 1 is silent about the meaning of the term "size", it can be derived from the examples of the patent that the dispersed phase size was measured by scanning electron microscopy (SEM) (paragraph [0031] of the opposed patent). Furthermore, figure 1 shows an SEM image of the resin of example 2, image which was used to determine the "size" of the dispersed phase (paragraph [0010] of the opposed patent). In combination with that figure, the opposed patent reports a single value (0.1 µm) for the "size" of the resin of example 2 which implies that this value is an average value (table 1 of the opposed patent).

1.6.3 Although it is acknowledged that the opposed patent lacks explicit details on the calculation method for deriving the average value from SEM images, the Board finds no basis to doubt the capability of the skilled person in determining an average domain size. Moreover, even if alternative calculation methods based on SEM images were conceivable, the appellant has not demonstrated any potential conflicts in the resulting data beyond mere clarity concerns.

1.6.4 In conclusion, the Board considers that the opposed patent provides sufficient information to determine the "size" of the dispersed rubber. In particular, paragraphs [0031], in conjunction with Figures 1 and 2, furnish at least one method enabling the skilled person to distinguish between conforming and non-conforming resins. However, this finding does not imply that the "size" limitation in granted claim 1 meets the clarity requirement. As the opposed patent fails to comply with

the requirement of sufficiency of disclosure on other grounds and clarity is not a ground of opposition, the Board did not have to address this clarity issue any further in the present decision.

1.7 With regard to the second question (whether the opposed patent provides sufficient information to obtain a resin as defined in granted claim 1), the following is noted:

1.7.1 According to established case law, the legislative purpose of the requirements of sufficiency of disclosure is to ensure that the skilled person can reproduce the invention without his/her own research or undue experimentation (Case Law, II.C.6.6.7).

In the present case, it should therefore be assessed whether the skilled person using common general knowledge and wishing to provide a power cable as set out in claim 1 (comprising a resin with the desired size of the rubber domains) is faced with an undue burden on the basis of the information available in the opposed patent.

1.7.2 As noted above, the appellant argued that even in the examples, the opposed patent did not disclose essential information, such as the exact nature of the catalyst or the amount of hydrogen, which would enable the skilled person to obtain a resin with the required rubber domain size. The respondent countered that the appellant had not shown that the polypropylene resin as defined in claim 1 could not be obtained with the information provided in the opposed patent and with the common general knowledge of the art. In the absence of any evidence, the appellant's objection was speculative.

1.7.3 As regards the legal approach for assessing sufficiency of disclosure, an objection of lack of sufficiency of disclosure presupposes that there are serious doubts, substantiated by verifiable facts (Case Law, III.G. 5.1.2 c)). It is however also to be taken into account that the weight of the submissions required to rebut the legal presumption that the patent meets the requirement of sufficiency of disclosure depends on the strength of said presumption and therefore on the teaching provided in the patent in suit (Case Law, II.C.9.1, in particular T 0063/06, point 3.3.1 of the reasons). A strong presumption requires more substantial submissions than a weak one. Applied to the present case, this means that the answer to the question whether the appellant's arguments in relation to sufficiency of disclosure are no more than assertions without any firm basis (as alleged by the respondent) depends on the teaching provided in the patent in suit and the relevant common general knowledge.

1.7.4 The Board notes that the opposed patent relates to a propylene resin comprising dispersed domains of a rubber copolymer and the use thereof in an insulating layer of a power cable. The size of the domain (0.5 µm or less) is a limiting feature of the claims and, moreover, is an important characteristic for achieving good insulating properties (see opposed patent, paragraph [0013] and table 1). However, it is not disputed that the examples of the patent do not disclose most details of the conditions (type of catalyst, amount of hydrogen, *etc.*) under which the block copolymer is to be obtained or the viscosity and molecular weight of the polypropylene (PP) or the ethylene-propylene rubber (EPR). Similarly, the

processing conditions for obtaining a cable according to claim 1 are not described. This was also recognised by the opposition division, which stated that "an exact reproduction of the examples of the opposed patent is not possible" (contested decision, page 6, penultimate paragraph). The general description of the patent is also silent on the polymerisation and resin processing conditions and does not provide indications on how to obtain a size according to the range in claim 1 and on how to influence such a size. Given these circumstances — specifically the absence of both reproducible examples and general process instructions — the Board concludes that the presumption that the disclosure is sufficient is a weak one. Accordingly, contrary to the respondent's view, the Board holds that the appellant's objection need not be supported by further experimental evidence as the facts of the case suffice to raise serious doubts on the sufficiency of the patent.

1.7.5 Moreover, the appellant provided evidence showing that the size of the rubber domains could be influenced by parameters such as:

the amount of hydrogen at each stage of the production (controlling the molecular weight/ viscosity of the PP and EPR) or

the processing of the resin (statement of grounds of appeal, pages 12 to 16, points 3.27 to 3.37).

It was further shown that the viscosity ratio between the PP and the EPR, as well as the downstream processing of the resin, have a significant influence on the phase structure and therefore the particle size (D8, page 111, last paragraph; D7, page 151, paragraph

3.5.3; D9, page 1083, right-hand column, first full paragraph; D23, page 5, lines 31 to 35).

1.7.6 Even if it were considered common general knowledge that these parameters influence the morphology of the resin, the Board finds it unduly burdensome for a skilled person to determine the conditions (e.g., catalyst, viscosity, processing, etc.) necessary to achieve a resin with the specified rubber phase size. Without a reproducible starting point — whether provided through examples or the general description — defining the conditions to obtain the required polymer morphology is unduly challenging.

1.7.7 Moreover, it should be noted that claim 1 is directed to a power cable comprising a layer of a resin having a specific morphology. This means that, even if one were to assume that the person skilled in the art knew how to prepare a resin as defined in claim 1, a teaching would be needed as to how to process this material in order to maintain the required morphology (statement of grounds of appeal, page 15, points 3.35). Also such a teaching is missing in the patent.

1.7.8 Under these circumstances, the skilled person wishing to carry out the invention over the whole scope of claim 1 has no other choice but to carry out his/her own research in order to identify the conditions (catalyst, hydrogen amount, viscosity/molecular weight of the PP and EPR, processing of the resin) allowing to obtain a cable according to claim 1 (in particular comprising a resin with the EPR size as defined in the opposed patent) or, if the desired size is not obtained, to modify those conditions in order to turn a failure into success.

1.7.9 The respondent contended that the skilled person would know which type of catalyst are typically used and how to control the melt viscosity of the two polymeric phases by adjusting the amount of hydrogen. Also methods to prepare a cable were known in the art, for instance by extrusion.

1.7.10 However, in the Board's view, this line of argument does not address the central issue. The dispute is not about whether a skilled person can separately select a catalyst, adjust the viscosity of the polymers or prepare a cable. Rather, the question is whether they could, without undue experimentation, identify the specific combination of conditions required to produce a resin and a cable meeting the specifications of claim 1 or, in case of failure by using a known catalyst and usual processing conditions, they would have the means to turn such a failure into success. Given the absence of both reproducible examples and comprehensive guidance in the general description, the Board finds that it is not the case.

1.8 For these reasons, the Board concludes that the skilled person cannot carry out the invention over the entire claimed scope without undue burden, contrary to the requirement of sufficiency of disclosure.

2. As the sole request of the respondent is not allowable, there is no need to deal with any other issue and the patent is to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

D. Hampe D. Semino

Decision electronically authenticated