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**Datasheet for the decision
of 6 November 2019**

Case Number: T 2405/16 - 3.3.03

Application Number: 09770243.5

Publication Number: 2292667

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C08L15/00, C08K5/14

Language of the proceedings: EN

Title of invention:

NITRILE GROUP-CONTAINING HIGHLY SATURATED COPOLYMER RUBBER

Patent Proprietor:

Zeon Corporation

Opponent:

ARLANXEO Deutschland GmbH

Relevant legal provisions:

RPBA Art. 13(1), 13(3)

EPC Art. 54, 56

Keyword:

Late-filed document - admitted (no)

Novelty - (yes: all requests)

Inventive step - (no: all requests)



Beschwerdekammern

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Case Number: T 2405/16 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 6 November 2019

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 22 August 2016
revoking European patent No. 2292667 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman D. Semino
Members: O. Dury
C. Brandt

Summary of Facts and Submissions

I. The appeal by the patent proprietor lies against the decision of the opposition division posted on 22 August 2016 revoking European patent No. 2 292 667.

II. Claims 1 and 7 of the granted patent read as follows:

"1. A nitrile group-containing highly saturated copolymer rubber having α,β -ethylenically unsaturated nitrile monomer units (a) and conjugated diene monomer units (b) and having at least part of said conjugated diene monomer units (b) hydrogenated, wherein

a content of said α,β -ethylenically unsaturated nitrile monomer units (a) is 37 to 45 wt%,

a total of said α,β -ethylenically unsaturated nitrile monomer units (a) and said conjugated diene monomer units (b) is 93 wt% or more,

an iodine value as determined according to the method as described in the description is 9 or less, and

a half value width of a peak of a loss tangent ($\tan\delta$) in the viscoelastic properties when made into a cross-linked product is 5 to 20°C in range."

"7. A method of production of the nitrile group-containing highly saturated copolymer rubber as set forth in claim 1 or 2 comprising the step of:

starting copolymerization by using 90 to 99 wt% of the total amount of the monomers when making the total amount of the monomers used for copolymerization as 100 wt%,

additionally adding the balance of the total amount of the monomers used for copolymerization, when a polymerization conversion rate reaches 40 to 90%, to obtain the copolymer, and then

selectively hydrogenating the copolymer."

III. A notice of opposition against the patent was filed, in which the revocation of the patent in its entirety was requested.

IV. The contested decision was based on the patent in suit as main request and on the first to fourth auxiliary requests, all filed with letter of 3 June 2016.

Claim 1 of the first auxiliary request differed from claim 1 of the main request in that the range of monomer units (a) was limited to "38 to 42 wt%" (instead of 37 to 45 wt%).

Claim 1 of the second auxiliary request was identical to granted claim 1 (only granted claim 7 was amended in that request).

Claim 1 of the third auxiliary request differed from granted claim 1 in that the following features were added at the end of the claim:

"wherein the nitrile group-containing highly saturated copolymer rubber is produced by the step of:

starting copolymerization by using 90 to 99 wt% of the total amount of the monomers when making the total amount of the monomers used for copolymerization as 100 wt%,

additionally adding the balance of the total amount of the monomers used for copolymerization, when a polymerization conversion rate reaches 40 to 90%, to obtain the copolymer, wherein the additionally added monomer is the conjugated diene monomer; and then selectively hydrogenating the copolymer".

Claim 1 of the fourth auxiliary request corresponded to granted claim 1, modified by incorporating the amendments made in claim 1 of both the first and the third auxiliary requests.

V. In the contested decision, the opposition division *inter alia* held that:

- the main request (patent in suit) was sufficiently disclosed but lacked novelty over example II of each of D1 (EP 0 704 480) and D2 (EP 0 704 459);
- the first auxiliary request was novel over both D1 and D2 but not inventive starting from example II of D2 as closest prior art;
- the second and third auxiliary requests lacked novelty over example II of each of D1 and D2;
- the fourth auxiliary request was novel over both D1 and D2 but not inventive starting from example II of D2 as closest prior art.

VI. The patent proprietor (appellant) appealed the above decision. With the statement setting out the grounds of appeal the appellant requested that the decision be set aside and the opposition be rejected (**main request**) or,

alternatively, that the patent be maintained in amended form according to any of the first or second auxiliary requests filed therewith.

Claim 1 of the **first auxiliary request** was identical to claim 1 of the first auxiliary request filed with letter of 3 June 2016.

Claim 1 of the **second auxiliary request** was identical to claim 1 of the fourth auxiliary request filed with letter of 3 June 2016.

In addition, the appellant submitted an experimental report (KW1).

VII. In its reply to the statement of grounds of appeal the opponent (respondent) requested that the appeal be dismissed.

VIII. With letter dated 21 February 2018, the appellant submitted a new experimental report (KW2) as well as an additional third auxiliary request.

Claim 1 of the **third auxiliary request** differed from claim 1 of the second auxiliary request in that the feature "starting copolymerization by using 90 to 99 wt% of the total amount of the monomers" was modified to "starting copolymerization by using **92 to 98 wt%** of the total amount of the monomers " (emphasis by the Board).

IX. The parties were summoned to oral proceedings. Issues to be discussed at the oral proceedings were then specified by the Board in a communication dated 14 February 2019.

- X. With letter dated 30 September 2019 the respondent made further submissions, in particular concerning sufficiency of disclosure.
- XI. With letter dated 4 October 2019 the appellant submitted an additional experimental report (KW3).
- XII. Oral proceedings were held on 6 November 2019 in the presence of both parties.
- XIII. The appellant's arguments, insofar as relevant to the decision, may be summarised as follows:

Main request

Admittance of the new objection of lack of sufficiency

- (a) The new objection regarding an alleged lack of sufficiency of disclosure submitted by the respondent with letter of 30 September 2019 should not be admitted into the proceedings.

Admittance of KW3

- (b) Experimental report KW3 was filed in reply to the Board's preliminary opinion, in which the issue of the (un)fairness of the comparisons of the subject-matter being claimed and the closest prior art made in KW1 and KW2 in respect of the issue of inventive step was raised for the first time. KW3 merely constituted a slight modification of KW2. Therefore, KW3 should be admitted into the proceedings.

Novelty

- (c) There was no evidence that the nitrile group-containing highly saturated copolymer rubber prepared in example II of either D1 and D2 satisfied the requirement that the "half value width of a peak of a loss tangent ... is 5 to 20°C in range" (hereinafter "**HVW**") as defined in granted claim 1. The processes used in example II of either D1 and D2 differed from the one carried out in the examples of the patent in suit in the nature of the monomer added in the mid-course of polymerisation (butadiene in the patent in suit; acrylonitrile in D1 and D2) and in the nature as well as the manner of addition of the molecular weight modifier. In that respect, comparative example 5 of KW2 showed that when acrylonitrile was added in the mid-course of polymerisation, the HVW feature was not mandatorily satisfied. For these reasons, the subject-matter of granted claim 1 was novel over example II of each of D1 and D2.

Inventive step

- (d) The subject-matter of granted claim 1 differed from the polymer prepared in example II of D2, which was the closest prior art, in the requirement in terms of HVW, which was not disclosed in D2.
- (e) The problem effectively solved was argued in writing to reside in the provision of a nitrile group-containing highly saturated copolymer rubber able to give a crosslinked product excellent in so-called ordinary properties (tensile strength; 100% tensile strength) and superior in either heat resistance or oil resistance and cold resistance.

At the oral proceedings before the Board, the problem effectively solved was seen as residing in the provision of a nitrile group-containing highly saturated copolymer rubber able to give a crosslinked product having an improved balance of properties in terms of oil resistance, cold resistance, heat resistance and ordinary properties.

- (f) The modification of example II of D2 contemplated by the respondent in order to arrive at the subject-matter of granted claim 1, in particular regarding the exchange of molecular weight modifier and the addition of butadiene instead of acrylonitrile in the mid-course of polymerisation, was based on hindsight. In fact, there was no necessity to adapt example II of D2, which was already satisfactory. In particular, there was no hint in D2 and/or D1 how to modify example II of D2 in order to prepare a nitrile group-containing highly saturated copolymer rubber able to give a crosslinked product having the improved properties or balance of properties shown for the subject-matter of granted claim 1.
- (g) For these reasons, the subject-matter of granted claim 1 was inventive.

Auxiliary requests

Inventive step

- (h) The subject-matter of claim 1 of the first auxiliary request additionally differed from the rubber prepared in example II of D2 in terms of the

amount of monomer (a) (corresponding to acrylonitrile in example II of D2) in the rubber.

It was derivable from the examples of D2 that decreasing the amount of acrylonitrile was detrimental in terms of oil resistance, which was the important problem addressed in the patent in suit. Therefore, the skilled person would expect that decreasing the amount of acrylonitrile in the rubber prepared in example II of D2 would lower the oil resistance, which was not wanted. Under these circumstances, modifying the closest prior art according to operative claim 1 was not obvious.

- (i) Questioned by the Chairman of the Board, it was acknowledged during the oral proceedings that there was no evidence on file that the product-by-process features added in claim 1 of either the second or the third auxiliary requests implied any changes on the product itself as compared to the product according to the first auxiliary request. Therefore, it was admitted that, in respect of inventive step, the same conclusion had to be reached for the second and third auxiliary requests as for the first auxiliary request.

XIV. The respondent's arguments, insofar as relevant to the decision, may be summarised as follows:

Main request

Admittance of the new objection of lack of sufficiency

- (a) The objection regarding lack of sufficiency of disclosure submitted by the respondent with letter of 30 September 2019 should be admitted into the

proceedings.

Admittance of KW3

- (b) Experimental report KW3 was late-filed and should only be admitted if the objection of lack of sufficiency of disclosure submitted by the respondent with letter of 30 September 2019 was admitted. The Board's preliminary opinion contained no surprising element which could justify the late filing of KW3.

Novelty

- (c) Example II of either D1 or D2 was carried out according to the teaching of the patent in suit and/or according to granted claim 7. In particular, the differences in the processes identified by the appellant (nature and manner of addition of the molecular weight modifier; nature of the monomer added in the mid-course of the polymerisation) were encompassed by the teaching of the patent in suit. Therefore, example II of D1 and D2 implicitly satisfied the requirement in terms of HVW according to granted claim 1.
- (d) Since the HVW feature was an unusual parameter, the burden of proof that said feature was not satisfied in example II of D1 and D2 lay on the patent proprietor, here the appellant. Since the appellant had not shown that the HVW of the rubber prepared in example II of D1 and D2 was not in the range according to granted claim 1, novelty was not given.

Inventive step

- (e) The subject-matter of granted claim 1 differed from the polymer prepared in example II of D2, which was the closest prior art, at most in the requirement in terms of HVW, which was not explicitly disclosed in D2.

- (f) In the absence of any fair comparison between the subject-matter being claimed and the closest prior art, the problem effectively solved resided in the provision of a further nitrile group-containing highly saturated copolymer rubber having good oil resistance, cold resistance, heat resistance and so-called ordinary properties (tensile strength; 100% tensile strength) in alternative to the one of example II of D2.

- (g) The nitrile group-containing highly saturated copolymer rubber of D2 had the same type of properties than those of the patent in suit. In addition, D2 explicitly taught that any of the monomers used to prepare these rubbers (i.e. either butadiene or acrylonitrile in the case of example II of D2) could be added in the mid-course of polymerisation. Therefore, it was obvious to solve the above problem by carrying out the process of example II of D2, in which butadiene (instead of acrylonitrile) was added in the mid-course of polymerisation. Although the molecular weight modifier used in example II of D2 was not the same as the one used in the examples of the patent in suit, it was a mercaptan according to the general teaching of the patent in suit. Also, the timing of addition of the molecular weight modifier according to D2 was not excluded from the teaching of the

patent in suit. Under these circumstances, there was no reason to consider that it was not possible that the rubbers prepared according to D2 could satisfy the HVW requirement according to granted claim 1. Therefore, it was obvious to solve the above problem by modifying the process of example II of D2 by adding butadiene instead of acrylonitrile in the mid-course of the polymerisation so as to obtain the claimed product.

- (h) In view of the above, the subject-matter of granted claim 1 was not inventive.

Auxiliary requests

Novelty of the first auxiliary request

- (i) The subject-matter of claim 1 of auxiliary request 1 was not novel in view of the description of D1 and D2, in which all the features of said claim 1 were disclosed. In addition, the range of 38-42 wt.% for monomer (a) did not satisfy the three requirements of a "selection invention" in the sense of the case law of the EPO.

Inventive step of the auxiliary requests

- (j) In the absence of any effect related to the amendment made in claim 1 of the first auxiliary request, the problem effectively solved remained the same as for the main request. Considering that D2 taught amounts of bound acrylonitrile in the range now specified in claim 1 of the first auxiliary request, the same conclusion in respect of inventive step as for the main request had to be

reached.

(k) Since the product-by-process features added in claim 1 of the second and third auxiliary requests had not been shown to affect the product itself (as compared to the product according to claim 1 of the first auxiliary request), the second and third auxiliary requests were not inventive for the same reasons as the first auxiliary request.

XV. The appellant requested that the decision under appeal be set aside and that the opposition be rejected (main request) or, alternatively, that the patent be maintained in amended form according to either the first or the second auxiliary requests filed with the statement of grounds of appeal, or according to the third auxiliary request filed with letter of 21 February 2018.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

Main request (patent in suit)

1. Admittance of the new objection of lack of sufficiency

During the oral proceedings, the Board decided not to admit the new objection of lack of sufficiency of disclosure raised by the respondent for the first time in its last written submission dated 30 September 2019. However, in view of the negative decision reached by the Board in respect of inventive step for all pending

requests, there is no need to substantiate in the present decision how that conclusion was reached.

2. Admittance of KW3

2.1 Since experimental report KW3 was filed after the summons to oral proceedings and the Board's communication were sent out, its admittance into the proceedings undergoes the stipulations of Article 13(1) and (3) RPBA.

2.2 The appellant justified the late filing of KW3 by the fact that the issue of the (un)fairness of the comparisons made in experimental reports KW1 and KW2 was raised for the first time in the Board's communication.

2.3 However, according to the case law, it is a matter for each party to submit all facts, evidence, arguments and requests relevant for the enforcement or defence of his rights as early and completely as possible, in particular in *inter partes* proceedings in order to act fairly towards the other party and, more generally, to ensure due and swift conduct of the proceedings (Case Law of the Boards of Appeal of the EPO, 9th edition, 2019, V.A.4.2.1 and V.A.4.4.2.b).

2.4 In the present case, the Board's communication was sent more than seventh months before experimental report KW3 was filed. During that period of time, the appellant did not inform the other party and the Board that they intended to carry out such experiments. In that respect, the issue of the (un)fairness of the comparisons made between the subject-matter being claimed and the closest prior art, is part of the usual procedure which has to be carried out in order to

assess whether an inventive step relying on a claimed improvement over the closest prior art, as constantly argued by the respondent throughout the proceedings (see contested decision: section 2.4, first paragraph; statement of grounds of appeal: section 1.3), can be acknowledged. Therefore, the appellant should have filed all the evidence in support of their line of defense as early as possible in the proceedings and they cannot have been surprised that the possible relevance of that issue was addressed in the Board's communication. However, by filing experimental report KW3 only one month before the date scheduled for the oral proceedings, the respondent effectively left little time to the respondent to evaluate the content of KW3 and, if needed, to run counter experiments. Under such circumstances, admitting KW3 into the proceedings would run counter to the economy of the proceedings (Article 13(1) RPBA) and could have necessitated an adjournment of the oral proceedings, which is contrary to the stipulations of Article 13(3) RPBA.

In view of the above, the Board finds it appropriate to make use of its discretion pursuant to Article 13(1) RPBA and of its power pursuant to Article 13(3) RPBA by not admitting experimental report KW3 into the proceedings.

3. Article 100(a) and 54 EPC

3.1 The appellant contests the opposition division's finding according to which the subject-matter of claim 1 as granted was not novel over example II of each of D1 and D2 (reasons of the contested decision: section 1.2).

- 3.2 In that respect, the opposition division's view that the data concerning said example II indicated in the tables of D1 and D2 contained an error in respect of the acrylonitrile content and that said value should read "51 pbw" instead of "5 pbw" (decision: page, 6, third paragraph) was not contested any more in appeal.
- 3.3 Example II of D2 (page 14, line 49 to page 15, line 16; Table 3) deals with the preparation of a nitrile group-containing highly saturated copolymer rubber which is a product obtained by hydrogenating the conjugated diene portion of an unsaturated nitrile-conjugated diene copolymer, which comprises 56 wt.% butadiene (monomer (b) according to granted claim 1) and 44 wt.% acrylonitrile (monomer (a) according to granted claim 1) and having an iodine value of 5 (D2: Table 3). Said rubber is prepared by:
- starting the copolymerization by using 40 parts butadiene, 51 parts acrylonitrile and 0.28 parts of a specific molecular weight modifier (see component "PMHT" indicated in the footnote of Table 3 of D2);
 - adding 0.17 parts molecular weight modifier (PMHT), when the polymerization conversion rate reaches 50% and
 - adding 9 parts acrylonitrile (thus forming the balance of the total amount of the monomers used for copolymerization) when the polymerization conversion rate reaches 60%.
- 3.4 Example II of D1 is identical to example II of D2, as acknowledged by the parties at the oral proceedings before the Board.

- 3.5 The only point of dispute between the parties was whether or not the HVW parameter specified in granted claim 1, which is not explicitly disclosed in D1 and D2 (in particular not in respect of example II thereof), is - implicitly - satisfied, as was concluded by the opposition division, in particular because "the Proprietor did not provide any convincing facts that the effect of the mid-course addition of a molecular weight modifier when additionally adding the monomer would affect half value width of a peak of a loss tangent ($\tan\delta$)" (reasons: section 1.2, see in particular page 7, second paragraph).
- 3.6 According to the Boards' established case law, a prior art document anticipates the novelty of a claimed subject matter if the latter is directly and unambiguously derivable from that document, including any features implicit to a person skilled in the art. In that respect, an alleged disclosure can only be considered "implicit" if it is immediately apparent to the skilled person that nothing other than the alleged implicit feature forms part of the subject matter disclosed (Case Law of the Boards of Appeal, *supra*, I.C.4.3).
- 3.7 In the present case, no evidence (e.g. experimental data) has been advanced by the parties in order to show whether or not the HVW feature according to granted claim 1 was satisfied when carrying out example II of each of D1 and D2.
- 3.8 The respondent argued, as done by the opposition division, that the rubbers prepared in example II of D1 and D2 had the same characteristics (nitrile and butadiene content; iodine value) in the non-crosslinked state as the rubbers prepared in the examples of the

patent in suit and were prepared by a process carried out using also the mid-course addition of a monomer (reasons: page 7, first paragraph) according to the teaching of the patent specification. In particular, the respondent put forward that the process steps used in example II of D1 and D2 were not excluded from the teaching of the patent specification. Therefore, according to the respondent, the feature HVW had also to be satisfied in example II of each of D1 and D2.

3.8.1 However, it was not disputed that example II of D1 and D2 differ from the specific processes used in the examples of the patent in suit illustrating the subject-matter being claimed at least in that acrylonitrile (monomer (a) according to granted claim 1) is added in the mid-course of the polymerisation in example II of D1 and D2, whereas butadiene (monomer (b) according to granted claim 1) is added at that stage in the examples of the patent in suit. In that respect, the appellant argued that since butadiene and acrylonitrile had different reactivity, adding either the one or the other in the middle of the polymerisation process influenced the properties of the polymer thus prepared, in particular in terms of HVW, which is credible and was not contested by the respondent.

3.8.2 In addition, comparative example 5 of experimental report KW2, which was carried out according to the general teaching of the patent specification whereby, similarly to D1 and D2, acrylonitrile (and not butadiene) was added during the polymerisation process (and using the same molecular weight adjuster as in the examples of the patent in suit, namely tert-dodecylmercaptan, which is different from the molecular weight adjuster PMHT used in example II of D1

and D2), led to a rubber having a HVW outside the range indicated in granted claim 1, which was not the case when butadiene was added in the mid-course of the polymerisation, under otherwise the same process conditions (example 3 of the patent in suit).

Therefore, comparative example 5 of KW2 shows that the mere fact that there is no contradiction between the process steps carried out in example II of D1 and D2 and the general teaching of the patent specification is not sufficient to conclude that the feature HVW is mandatorily satisfied in example II of each of D1 and D2. In that respect, it is stressed that comparative example 5 of KW2 is not held to show that example II of D1 or example II of D2 cannot satisfy the HVW feature of granted claim 1, but it rather allows the Board to conclude that a process such as the one used in example II of D1 or example II of D2 does not mandatorily lead to a component satisfying the HVW feature according to granted claim 1. Under these circumstances, comparative example 5 of KW2 shows that it cannot be concluded that the HVW feature according to granted claim 1 is implicitly satisfied in either example II of D1 or example II of D2, contrary to the respondent's view.

- 3.8.3 Considering that the preparation process of comparative example 5 of KW2 also comprises, as does the process of example II of D1 and D2, all the steps of granted claim 7, that example also shows that the fact that a rubber is prepared according to the process of granted claim 7 is not sufficient to demonstrate that said rubber mandatorily satisfies the HVW requirement indicated in granted claim 1. Therefore, the respondent's argument in that respect fails to convince.

- 3.8.4 Under such circumstances, it cannot be concluded in view of the comparison of the processes disclosed in the patent in suit and in both D1 and D2 that the rubbers prepared in example II of D1 and D2 mandatorily satisfy the HVW feature specified in granted claim 1.
- 3.9 It may further be agreed with the opposition division's finding according to which feature HVW is an unusual parameter (decision: last paragraph on page 3), which in particular varies as a function of the experimental conditions used to measure it (decision: last but one sentence of the first paragraph on page 5). However, in the Board's view, this conclusion is not a sufficient reason to reverse the burden of proof, which in opposition proceedings primarily lies on the opponent, here the respondent, who should provide convincing arguments to show that the HVW feature is directly and unambiguously satisfied in example II of D1 and D2. Rather, the consequence of the opposition division's finding is that the claim should be read in its broadest scope, i.e. it encompasses any polymer satisfying the HVW requirement indicated in granted claim 1, without any limitation in terms of the determination method.
- 3.10 Regarding the novelty objection based on the description of either D1 or D2 put forward by the respondent in respect of the operative first auxiliary request (see above section XIV.i and the rejoinder to the statement of grounds of appeal: section V.1), which is potentially valid also for the main request, it is agreed with the opposition division (reasons of the contested decision: section 2.3, bottom of page 8) that at least a double selection within the ambit of D1 and D2 is necessary in order to arrive at the subject-matter of granted claim 1, namely in terms of the

iodine value (D1: page 3, lines 17-18; D2: page 3, lines 46-47; the examples of D1/D2 show that iodine values above 9 are contemplated) and of the amount of monomer (a) according to granted claim 1 (D1: page 4: line 17; D2: page 3, line 57; page 4, lines 45-47; both D1 and D2 disclose the range of 10-60 pbw for monomer (a)).

In addition, the rubbers prepared according to the general teaching of D1 and D2 may further comprise a further comonomer, in addition to monomers (a) and (b) as defined in granted claim 1, in an amount of up to 80 wt.% (D1: page 4, lines 5-14; D2: page 4, lines 35-44). Therefore, in order to arrive at a copolymer rubber according to granted claim 1, which is a.o. defined by the requirement that monomers (a) and (b) are present in an amount of 93 wt.% or more, a further selection within the ambit of D1 and D2 has to be made, namely in respect of the amount of the optional additional comonomer.

In that respect, the arguments put forward by the respondent were also related to the concept of "selection inventions" (Case Law *supra*, I.C.6.3) in case of the selection of a sub-range of numerical values from a broader range, which, in view of the above, is not an issue at stake in the present case, in which various selections within the ambit of D1 or D2 are necessary in order to arrive at the subject-matter of granted claim 1.

Therefore, the respondent's objections based on the description of either D1 or D2 are not convincing.

3.11 In view of the above, the novelty objections put forward by the respondent in view of each of D1 and D2 are rejected.

4. Article 100(a) and 56 EPC

4.1 Closest prior art

The parties agreed with the opposition division's conclusion according to which example II of D2 constitutes the closest prior art for granted claim 1. There is no reason for the Board to deviate from that view.

4.2 Distinguishing feature(s)

It follows from the assessment of novelty that the subject-matter of granted claim 1 differs from the polymer prepared in example II of D2 in the requirement in terms of HVW, which is not disclosed in D2.

4.3 Problem effectively solved

4.3.1 The appellant argued (see above section XIII.e) that the problem solved resided in the provision of a nitrile group-containing highly saturated copolymer rubber able to give a crosslinked product having either improved properties or an improved balance of properties in terms of oil resistance, cold resistance, heat resistance, and/or so-called ordinary properties (tensile strength; 100% tensile strength).

4.3.2 However, there is no evidence on file related to a comparison between a rubber according to granted claim 1 and the one obtained in example II of D2 and illustrating the above identified distinguishing

feature.

- 4.3.3 The sole examples of the patent in suit illustrating the above identified distinguishing feature are example 3 and comparative example 3. However, no data is given in the patent in suit in respect of the property "cold resistance", in particular not in the experimental part. Besides, since the polymer prepared in comparative example 3 does not reflect the teaching of the closest prior art (e.g. in comparative example 3 of the patent in suit, no monomer was added in the mid-course of the polymerisation, contrary to what is done in example II of D2), the comparison of example 3 and comparative example 3 cannot show that the problem formulated by the appellant is effectively solved over the closest prior art.
- 4.3.4 The examples listed in the table on page 3 of KW1 do not illustrate the above identified distinguishing feature (all example satisfy the HVW feature according to granted claim 1).
- 4.3.5 The sole examples of KW2 illustrating the above identified distinguishing feature are example 3 (taken from the patent in suit) and comparative example 5 (illustrated therein). However, comparative example 5 was not carried out according to the teaching of example II of D2 since different amounts of each of the monomers were added at the start and the mid-course of the polymerisation. In addition, the rubber according to example II of D2 is prepared by using a specific molecular weight modifier (PMHT), which is added both at the start and in the middle of the polymerisation, which is not the case for comparative example 5 (wherein use is made of tert-dodecylmercaptan (TDM) as molecular weight modifier, which is only added at the

start of the polymerisation). In that respect, D2 teaches explicitly that the use of a specific molecular weight modifier such as PMHT and its addition in lots (i.e. both at the start and in the course of polymerisation) has an impact on the structure and properties of the (crosslinked) rubber (D2: page 5, lines 7-10 and 37-59 and page 18, lines 10-15, whereby the impact of using separate additions of a molecular weight modifier such as PMHT instead of the "conventional" molecular weight modifier TDM is explicitly indicated). In such circumstances, the appellant's argument according to which the nature of the molecular weight modifier and the timing of its addition has (normally) no impact (letter of 4 October 2019: page 5, last full paragraph), does not mandatorily apply to the teaching of D2, in particular its example II. Therefore, in view of this, it is concluded that comparative example 5 of KW2 does not reflect the closest prior art and the comparison made by the appellant between comparative example 5 of KW2 and example 3 of the patent in suit is not held to illustrate an effect obtained as compared to the closest prior art and related to the above identified distinguishing feature. Also, from the evidence on file (in particular in the absence of any data related to the HVW feature of example II of D2), it is not possible to conclude that the rubber prepared in comparative example 5 of KW2 is an embodiment lying closer to the subject-matter being claimed than the rubber of the closest prior art prepared according to example II of D2.

- 4.3.6 In view of the above, the problem effectively solved is seen as residing in the provision of a further nitrile group-containing highly saturated copolymer rubber, which is able to give a crosslinked product having good

oil resistance, cold resistance, heat resistance and so-called ordinary properties (tensile strength; 100% tensile strength) in alternative to the one of example II of D2 (see page 17, line 56 to page 18, line 15 and Table 4 of D2, in which all these properties are reported as being satisfactory).

4.4 Obviousness

4.4.1 The question remains to be answered if the skilled person, desiring to solve the problem identified in section 4.3.6 above, would, in view of the closest prior art, possibly in combination with other prior art or with common general knowledge, have modified the disclosure of the closest prior art in such a way as to arrive at the claimed subject matter.

4.4.2 In that respect, D2 teaches that the monomers used to prepare the nitrile group-containing highly saturated copolymer rubber may be partly added in the course of polymerisation when the polymerisation conversion reaches a certain level (e.g. 20 to 70%, or 60 % in example II), whereby either of the monomers (i.e. butadiene or acrylonitrile in the case of example II) may be added in the mid-course of the polymerisation (D2: page 6, lines 1-11). It is further noted that the kind and amount of monomers added in lots can be varied depending on the targeted rubber, whereby the addition of either acrylonitrile or butadiene monomers is exemplified (page 6: lines 6-10; the addition of butadiene in the middle of the polymerisation is further illustrated in example V of D2).

Regarding said addition of the monomers in the middle of the polymerisation, it is clearly indicated in paragraphs 40 (last sentence) and 41 (last sentence) of

the patent in suit, that the HVW feature according to operative claim 1 is obtained by controlling the ratio of the monomers used at the time of the start of copolymerisation and the monomers added in the middle of the copolymerisation. In addition, during the appeal proceedings, the appellant constantly argued in that respect that it was decisive for the obtention of an HVW in the range according to granted claim 1 that butadiene and not acrylonitrile be added in the middle of the polymerisation, as shown by the examples of the patent in suit and in KW2. Under these circumstances, the Board is persuaded that by varying the monomer added, in particular butadiene, while remaining within the teaching of D2, values of HVW within the range indicated in granted claim 1 will necessarily be obtained.

- 4.4.3 The appellant put forward that the process of example II of D2 had to be modified in respect of the nature of the molecular weight modifier used since the process according to example II of D2 differed from the process carried out in the examples of the patent in suit in that it was carried using a different molecular weight modifier, which was added both at the start and in the mid-course of the polymerisation (whereas it was only added at the start of the polymerisation in the examples of the patent in suit).

However, although the specific molecular weight modifier according to example II of D2 is not explicitly disclosed in the patent in suit (see PMHT compound indicated in the footnote of Table 3 of D2 and paragraph 37 of the patent in suit), it falls under the general term "mercaptan" indicated in the patent in suit (page 5, line 43). Besides, although the addition of the molecular weight modifier in the mid-course of

the polymerisation is not explicitly taught in the patent specification, it is also not specifically excluded. Under these circumstances and in the absence of any evidence or even arguments from the appellant that the process of D2 cannot lead to rubbers having a HVW according to granted claim 1, it cannot be concluded that the modifications identified by the appellant have to be made in example II of D2 in order to obtain a rubber satisfying the HVW requirement according to granted claim 1. Therefore, the appellant's arguments did not convince.

4.4.4 It was not argued by the respondent that when modifying the nature of the monomer added in the mid-course of polymerisation in the process of example II of D2, the skilled person would have any difficulty in obtaining a product satisfying the iodine value feature specified in operative claim 1 and the Board sees no reason to put that in doubt, in particular in view of examples II to IV of D2 (all carried out under similar conditions and leading to rubbers only differing in terms of the iodine value).

4.4.5 Under these circumstance, it is concluded in view of the evidence on file and of the arguments put forward by the parties that it is obvious to solve the above technical problem (which resides in the mere provision of further nitrile group-containing highly saturated copolymer rubbers in alternative to the one of example II of D2) by modifying the process of example II of D2 according to the teaching of D2 itself (page 6, lines 1-10), namely by adding a similar amount of butadiene instead of acrylonitrile in the mid-course of the polymerisation, thereby obtaining a value of HVW in the range according to granted claim 1.

4.4.6 Therefore, the subject-matter of granted claim 1 is not inventive and the main request is not allowable.

Auxiliary requests

5. First auxiliary request

5.1 As compared to granted claim 1, claim 1 of the first auxiliary request was amended so as to limit the amount of monomer (a) in the rubber being claimed to 38-42 wt.% (instead of 37-45 wt.%).

5.2 As compared to the main request, the rubber now claimed differs from the one prepared in example II of D2 additionally in that it contains an amount of acrylonitrile (corresponding to monomer (a) of operative claim 1) of 44 % (see Table 3 of D2), which is outside the range defined in operative claim 1.

5.3 However, in the absence of any evidence supporting a technical effect related to the range of 38-42 wt.% of monomer (a) in the rubber, there is no reason to deviate from the formulation of the problem effectively solved considered above for the main request (provision of an alternative to the closest prior art).

5.4 It is further noted that it is taught in D2 that the rubbers according to D2 may comprise an amount of monomer (a) between 10 and 60 wt.%, preferably 20-50 wt.% (D2: page 3, lines 57-58). In addition, although the comparison of examples I, III and V of D2 appears to show that oil resistance is correlated to the amount of acrylonitrile, as argued by the appellant, it is explicitly stated in D2 that the oil resistance of the rubber prepared in example I and containing the lowest amount of monomer (a) (namely

34 wt.% acrylonitrile) is still satisfactory (D2: example I, Tables 3 and 4; page 18, lines 8-9). Therefore, the appellant's argument according to which the skilled person would not consider preparing rubbers according to D2 and containing an amount of acrylonitrile in the range of monomer (a) according to claim 1 of the first auxiliary request is, in view of the formulation of the problem effectively solved as residing in the provision of a mere alternative to the closest prior art, rejected.

5.5 In view of the above and of the reasons given for the main request, the subject-matter of claim 1 of the first auxiliary request is not inventive.

6. Second auxiliary request

6.1 As compared to claim 1 of the first auxiliary request, claim 1 of the second auxiliary request was amended by further defining the rubber using a product-by-process formulation, whereby it is specifically indicated that monomer (b) is added in the course of polymerisation.

6.2 However, it was neither shown nor argued by the appellant that the product-by-process feature added to the definition of the subject-matter being claimed implies any changes on the product itself as compared to the product defined in claim 1 of the first auxiliary request. In other words, the added product-by-process features may only be seen as corresponding to the preparation conditions of the rubber, which have been argued by the appellant to be necessary in order to obtain the HVW feature which is already specified in the claim. Under these circumstances, the second auxiliary request can only share the same fate as the first auxiliary request, i.e. be found not to be

inventive.

7. Third auxiliary request

7.1 As compared to claim 1 of the second auxiliary request, claim 1 of the third auxiliary request was amended by limiting, in the product-by-process features, the total amount of monomers added at the start of the polymerisation to 92-98 wt.% (instead of 90-99 wt.%).

7.2 However, for the same reasons as explained in section 6.2 above, the amendments in the form of the product-by-process features were not shown to distinguish the subject-matter of claim 1 of the third auxiliary request from the one of claim 1 of the first auxiliary request. Here again, it was neither shown, nor argued that the amendment in the process feature has an influence on the product claimed. Therefore, the third auxiliary request is not inventive for the same reasons as outlined above for the first auxiliary request.

8. Since none of the requests of the appellant is allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated