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**Datasheet for the decision  
of 7 May 2024**

**Case Number:** T 1434/21 - 3.3.03

**Application Number:** 10010731.7

**Publication Number:** 2292668

**IPC:** C08F2/38, C08F293/00,  
C10M145/14, C08L53/00,  
C10M177/00

**Language of the proceedings:** EN

**Title of invention:**

Process for preparing polymers and compositions thereof

**Patent Proprietor:**

The Lubrizol Corporation

**Opponent:**

New Market Services Corporation

**Relevant legal provisions:**

EPC Art. 123(2), 56

RPBA 2020 Art. 12(4), 12(3)

**Keyword:**

Amendments - Main request, first and second auxiliary requests  
- allowable (no) - Third auxiliary request - allowable (yes)  
Inventive step - Main request (yes) - Third auxiliary request  
(yes)  
Amendment to case - Third auxiliary request (admitted)

**Decisions cited:**

T 0313/09, T 2084/11, T 1666/14, T 1890/15, T 1870/16,  
T 0169/18, T 1266/19, T 1270/20



**Beschwerdekammern**

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Case Number: T 1434/21 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 7 May 2024**

**Appellant:** New Market Services Corporation  
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**Respondent:** The Lubrizol Corporation  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 8 July 2021  
rejecting the opposition filed against European  
patent No. 2292668 pursuant to Article 101(2)  
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 rejecting the opposition against European patent No. 2 292 668.
- II. The decision under appeal was based *inter alia* on the following documents:
- D2: US 2006/0189490 A1  
D3: Tailored polymers by free radical processes, Rizzardo, Ezio et al., Macromolecular Symposia, Vol. 143, pages 291-307 (1999).  
D4: US 6,369,162 B1  
D5: US 4,077,893  
D8: EP 0 425 027 A2  
D11: Letter of 4 November 2013 of the patent proprietor submitted in examination proceedings  
D18: Experimental evidence concerning D4 filed on 2 June 2020  
D19: Declaration of Dr. Renee A. Eveland dated 26 March 2018  
D21: Second declaration of Dr. Renee A. Eveland dated 19 November 2018  
D22: WO 2004/087850 A1
- III. Granted claims 1, 6, 7 and 8 read as follows:
- "1. A process for preparing a lubricating composition comprising preparing a polymer by a process comprising the steps of (1), (2), optionally (3), and (4):
- (1) contacting:
- (i) a free radical initiator;

- (ii) a chain transfer agent containing a thiocarbonyl thio group and a free radical leaving group; and
- (iii) a radically polymerisable monomer, to form a polymer chain;

wherein the process of step (1) is a controlled radical polymerisation process with living characteristics; and at least 50 % of the polymer chains from step (1) contain a reactive end group capable of reacting with a polyvalent coupling agent; and

(2) contacting the polymer prepared by step (1) with a polyvalent coupling agent to form a star-polymer, wherein the star polymer is a block-arm star polymer, wherein the block-arm star polymer contains a polymer arm derived from two or more monomers where the monomers are on the same arm, and wherein the star polymer is derived from at least two monomers comprising:

- (a) at least 50 wt% of a C12 to C15 alkyl substituted (meth)acrylate monomer; and
- (b) less than 50 wt% of an alkyl (meth)acrylate monomer containing 1 to 30 carbon atoms other than the C12 to C15 alkyl (meth)acrylate monomer; and
- (c) optionally containing less than 20 wt% styrene; and
- (d) optionally containing less than 10 wt% alkyl methacrylamide;

(3) optionally contacting the polymer prepared by step (1) or step (2) with a polymerisation inhibitor; and

(4) mixing the polymer prepared by step (2) or step (3) with an oil of lubricating viscosity to form a lubricating composition".

"6. The process of claim 1, wherein the star polymer contains 7 or more arms".

"7. The process of claim 1, wherein in step (2) the polyvalent coupling agent is a crosslinking (meth) acrylic monomer or a crosslinking divinyl non-acrylic monomer".

"8. A lubricating composition obtainable by the process of any one of claims 1 to 7 comprising:

- (a) a star polymer; and
- (b) an oil of lubricating viscosity".

IV. According to the reasons for the contested decision which are pertinent for the appeal proceedings:

(a) Auxiliary requests 1 to 11 were admitted into the proceedings.

(b) Granted claims 1 and 6 to 8 found a basis in the application as originally filed.

(c) Granted claim 1 was inventive over either D2, D4 or D8 chosen as document representing the closest prior art and considering the experimental results shown in D11.

V. The opponent (appellant) lodged an appeal against the decision of the opposition division.

VI. The patent proprietor (respondent) filed 17 sets of claims as first to seventeenth auxiliary requests with their rejoinder to the statement of grounds of appeal as well as documents D27 (T 0169/18), D28 (T 0948/02) and D29 (H.L. Hsieh, R.P. Quirk, Anionic

Polymerization, Principles and practical applications, 1996, Marcel Dekker Inc., Chapter 13, pages 333-335, 366-368).

VII. Oral proceedings before the Board were held on 7 May 2024 in the absence of the respondent, as announced in their letter of 18 April 2024.

VIII. The final requests of the parties were as follows:

- The appellant requested that the decision under appeal be set aside and that the patent be revoked. The appellant further requested that auxiliary requests 3, 5, 9, 11, 15 and 17 and documents D27, D28 and D29 not be admitted into the proceedings.
- The respondent requested in writing that the appeal be dismissed (main request) or that the patent be maintained on the basis of the claims of one of the first to the seventeenth auxiliary requests filed with the reply to the statement of grounds of appeal.

IX. Claims 1, 6 and 8 of the first auxiliary request corresponded to claims 1, 6 and 8 of the main request. Claim 7 of the first auxiliary request corresponded to claim 7 of the main request in which the word "crosslinking" was replaced by "polyvalent".

Claims 1 and 7 of the second auxiliary request corresponded to claims 1 and 8 of the main request. Claim 6 of the second auxiliary request corresponded to claim 7 of the first auxiliary request.

Claims 1 and 6 of the third auxiliary request corresponded to claims 1 and 8 of the main request. The

claims of the third auxiliary request correspond to the granted claims with the deletion of claims 6 and 7 and the renumbering of claim 8 as claim 6.

- X. 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 support in the application as originally filed of the subject matter of granted claims 1, 6, 7 and 8, of claims 1, 6, 7 and 8 of the first auxiliary request, of claims 1, 6 and 7 of the second auxiliary request and of claims 1 and 6 of the third auxiliary request, the admittance of the third auxiliary request and the question of inventive step in view of D2 or D4 as the document representing the closest prior art for all requests.

## **Reasons for the Decision**

Main request (claims as granted)

### 1. *Res Judicata*

- 1.1 The respondent referred to a *res judicata* effect of decision T 169/18, which was taken on the patent deriving from the parent application, with regard to the question of added subject-matter and inventive step. In the respondent's view the present Board would be prevented from autonomously deciding on these questions in the appeal proceedings at stake. For the purposes of the present case the Board notes that the question whether subject-matter on which a final decision is taken by a board in a given application or patent (here the parent patent) becomes *res judicata* and could not be pursued in another application or



patent (here the divisional patent) presupposes at least identity of facts, particularly of claimed subject-matter and of parties involved (see Case Law, II.F.2.4.3 b), e.g. T 1870/16, Reasons 4.2. and T 1270/20, Reasons 3.8).

- 1.2 In view of the differences between the claims decided upon in T 169/18 and present claim 1 as granted, the Board considers the facts of the cases to be different so that no *res judicata* exists and the Board is empowered to autonomously decide on the questions of added subject-matter and inventive step.
- 1.3 Thus, even if after a decision on the claims of the parent patent the principle of *res judicata* applied to the claims of the present divisional patent, i.e. in "cross procedural proceedings", which the present Board doubts (see also T 2084/11, Reasons 1.3, T 1666/14, Reasons 2 and T 1266/19, Reasons 3.4), it would not apply here.
2. Amendments
  - 2.1 Section 4 of the decision under appeal deals with the objection of added subject matter raised under Article 100(c) in combination with Article 123(2) EPC. The opposition division came to the conclusion that granted claims 1 and 6 to 8 found a basis in the application as originally filed. The appellant contested that decision in their statement of grounds of appeal (Section I).
  - 2.2 It is apparent from the statement of grounds of appeal that the appellant based their argumentation under Article 123(2) EPC on an alleged lack of support of granted claims 1, 6, 7 and 8 in the parent application as filed and not in the present divisional application

as filed. Although the divisional application as filed contains the whole description of the parent application as filed, the parent and divisional application as originally filed have different claims. That, however, does not affect the argumentation of the appellant, since the claims of the parent application as filed are also present in the description of the divisional application as filed (referred to as "paras" in the preferred features and embodiments on pages 38 to 44), meaning that the whole of the parent application as filed (description and claims) is to be found in the description of the divisional application as filed. The support referring to the claims of the parent application as filed is therefore to be found in the corresponding "paras" on pages 38 to 44 of the divisional application as filed. Since both the appellant and the respondent referred to the basis of the present granted claims in the parent application as originally filed throughout the appeal proceedings and since it does not change the reasoning and the conclusion under Article 123(2) EPC in view of the analysis above, the Board will refer to the support of the granted claims in the parent application as originally filed below.

2.3 In their statement of grounds of appeal the appellant addressed a list of features present in granted claim 1 in the context of Article 123(2) EPC (Section 2, page 3 of the statement of grounds of appeal) alleging that their combination was not disclosed in the original application, namely:

- (a) the definition of step (2) as a mandatory step in claim 1 (only optional in claim 1 as filed);
- (b) the star polymer being a block-arm star polymer;

(c) the block-arm star polymer containing a polymer arm derived from two or more monomers where the monomers are on the same arm, and wherein the star polymer is derived from at least two monomers comprising monomers (a) to (d).

- 2.4 It is noted in this context that the amendment related to the formulation of the process as a process for preparing a lubricating oil composition was listed but not objected to by the appellant (Section 3 on pages 3 and 4 of the statement of grounds of appeal).
- 2.5 Feature (b) defining the star polymer as a block-arm star polymer is found in claim 8 as well as in paragraphs 24 of the description of the parent application as filed, paragraph 25 specifying that the block-arm star polymer contains a polymer arm derived from two or more monomers where the monomers are on the same arm (first part of feature (c)). From the wording of paragraph 25 ("The" block-arm star polymer) it is concluded that paragraphs 24 and 25 must be read together. Since block-arm star polymers are not the only star polymers defined in claim 8 and paragraph 24, the Board finds that the introduction in granted claim 1 of a star polymer being a block-arm polymer (feature (b)) containing a polymer arm derived from two or more monomers where the monomers are on the same arm (first part of feature (c)) is a single selection that has to be made within the disclosure of claim 8 and paragraphs 24 and 25.
- 2.6 Step (2) (feature (a)) sets out that the polymer prepared in step (1) is contacted with a polyvalent coupling agent to form a star-polymer. That step was already present in the definition of the process of claim 1 of the parent application as filed, albeit as

one of two optional steps (steps (2) or (3)). It follows that claim 1 of the parent application as filed already explicitly disclosed processes based on the combinations of steps (1)+(2) and (1)+(3) alongside one another. In particular, the compulsory presence of step (2) is the only option of original claim 1 which results in star polymers, coherently with the limitation in features (b) and (c), with respect to which it cannot be considered as an independent selection. In this respect, the argument of the appellant that a further selection had to be made with regard to the optional presence of steps (2) or (3) in claim 1 as filed in order to arrive at granted claim 1 relying on decisions T 313/09 (reasons 2.2.3) and T 1890/15 (reasons 3.5) (statement of grounds of appeal, page 5) is not convincing. In this respect, these decisions are not relevant to the present situation as they both deal with a lack of support of combinations of multiple selections made in description of the application as originally filed while the present situation is one in which step (2) was already present in the formulation of claim 1 of the parent application as filed and is coherent with the further selection. It is in particular apparent from T 313/09 (reasons 2.2.3 and 2.2.4) that the Board rejected operative claim 1 in that case on the grounds that multiple choices had to be made in the application as filed, namely the combination of a preferred embodiment relating to the components of the claimed composition and two optional features relating to additives. The argument of the appellant that the Board in T 313/09 had rejected claim 1 on the grounds that an optional feature in claim 1 as filed had been made compulsory in operative claim 1 is therefore not convincing.

- 2.7 As to the second part of feature (c), paragraph 79 of the application as filed is specifically about star polymers used in lubricating compositions and mentions star polymers derived from at least two monomers comprising the monomers (a), (b), optionally (c) and optionally (d) as mentioned in granted claim 1. The Board finds that that disclosure refers to all star polymers of the application as filed including the block-arm star polymers of paragraphs 24 and 25 and that therefore the introduction of the definition of the monomers in granted claim 1 is a mere limitation of its subject matter, which is directly and unambiguously derivable from the parent application as filed, and not an additional independent selection.
- 2.8 The Board therefore concludes that granted claim 1 finds a support in claims 1 and 8 and the description of the parent application as originally filed. The same conclusion is reached as to the requirements of Article 123(2) EPC considering the corresponding passages of the description of the divisional application as originally filed.
- 2.9 Granted claim 6 is dependent on granted claim 1. Claim 6 sets out that the star polymer contains 7 or more arms. The description of the parent application as filed discloses that feature in paragraph 78 in a list of star polymers comprising 7, 8, 10, 12 or 16 or more arms. It is therefore apparent that a selection must be made in the number of arms in that passage to arrive at granted claim 6. The Board does not find a basis in the application as filed for the combination of the two independent selections relating to the presence of block-arms and the number of arms that is defined in granted claim 6.

- 2.10 The respondent considered that claim 25 could be seen as a "pointer" that could provide a support for granted claim 6. Claim 25 is dependent on claim 24 which only concerns a star polymer and makes no reference to the presence of block-arms nor to the process that is the subject matter of granted claim 1. The Board therefore finds that granted claim 6 does not find a basis in the parent application as filed. As no further basis in the divisional application as filed was provided by the respondent, the Board concludes that granted claim 6 does not meet the requirements of Article 123(2) EPC.
- 2.11 Granted claim 7 is dependent on granted claim 1. Claim 7 sets out that the polyvalent coupling agent is a "crosslinking (meth) acrylic monomer or a crosslinking divinyl non-acrylic monomer". The respondent finds a support in paragraph 62 of the parent application as filed. These coupling agents are, however, only cited as examples of polyvalent coupling agents in that paragraph so that it is apparent that the definition of the polyvalent coupling agent in granted claim 7 is the result of a further selection within the definition given in paragraph 62. The Board finds no support for that selection in combination with the selection of the block-arms star polymers that is part of the definition of granted claim 7. As no further basis in the divisional application as filed was provided by the respondent, the Board concludes that granted claim 7 does not meet the requirements of Article 123(2) EPC.
- 2.12 Granted claim 8 pertains to a lubricating composition obtainable by the process of any one of claims 1 to 7 comprising: (a) a star polymer; and (b) an oil of lubricating viscosity. The respondent provided a support for that claim in the general passage of the first paragraph ("Field of the invention") on page 1 of

the parent application as filed which refers the disclosed invention as relating to compositions containing the polymer obtained from the general process disclosed in the parent application as filed. Considering that clear passage and the previous conclusion of the Board with regard to the process of claim 1, the Board finds that the lubricating composition of granted claim 8, to the extent that it refers to process claims which meet the requirements of Article 123(2) EPC, also meets the requirements of that Article.

3. Inventive step

3.1 Objections of lack of inventive step were dealt with starting from either D2, D4 or D8 as the document representing the closest prior art in the decision under appeal. The appellant only pursued the objections based on D2 and D4 in their statement of grounds of appeal (item II starting on page 9).

3.2 D2 as the closest prior art

3.2.1 D2 is US patent document whose publication date (24 August 2006) is after the priority date of the divisional application as filed (25 October 2004). The opposition division indicated that D22 published on 14 October 2004 was from the same patent family as D2. D22 was therefore a relevant document for the assessment of inventive step. The references relevant to the closest prior art made in the decision under appeal were, however, made relative to D2 under the assumption that the contents of D2 and D22 were identical. That was agreed upon by the parties and the Board has no reason to take a different position. Since both parties to the appeal proceedings also mentioned D2 in place of D22,

the assessment of inventive step by the Board will also be made by reference to D2.

3.2.2 The appellant saw the differences between granted claim 1 and examples 1 to 4 of D2 as being i) the presence of step (2) using polyvalent coupling agent and ii) the preparation of a star polymer instead of a linear polymer.

3.2.3 It is apparent that D2 generally concerns the preparation of lubricating compositions (claim 1). There is therefore no doubt that the compositions of examples 1 to 4 of D2 pertain to lubricating compositions. In the process of these examples (paragraph 155 and following) i) tert-butyl peroctoate (a free radical initiator), ii) cumyl dithiobenzoate (a chain transfer agent according to granted claim 1) and iii) LIMA, a mixture of long-chain methacrylates which was obtained from the reaction of methyl methacrylate with  $\text{LIAL 125}$  from Sasol ( $\text{C}_{12}$  to  $\text{C}_{15}$  fatty alcohol) as radically polymerizable monomers are made to react according to a RAFT (Reversible Addition Fragmentation chain Transfer) polymerisation process from which it can be inferred that the polymerisation is a controlled radical polymerisation process with living characteristics leading to linear copolymers. It is not disputed that the LIMA mixture is according to the monomer mixture (a) and (b) defined in granted claim 1. The copolymers obtained in examples 1 to 4 of D2 are also disclosed to be block copolymers in Table 1 of that document.

3.2.4 Granted claim 1 requires a step (2) defined as contacting the polymer prepared by step (1) with a polyvalent coupling agent to form a star-polymer, wherein the star polymer is a block-arm star polymer,



wherein the block-arm star polymer contains a polymer arm derived from two or more monomers where the monomers are on the same arm, and wherein the star polymer is derived from at least two monomers. From this analysis and following the argumentation of the parties, the difference can be seen as the presence of step (2) with a polyvalent coupling agent to provide a star polymer instead of the linear polymers of D2 (statement of grounds of appeal, page 20, paragraph 4 and rejoinder, items 70 and 71).

- 3.2.5 The opposition division found that the examples of the patent in suit did not show an effect over D2. That conclusion was not contested by the respondent in appeal. The opposition division, however, found in D11 evidence of an effect over D2 (page 13 of the decision). Annex A of D11 showed the preparation of star polymers with a RAFT process using Trigonox 21 as a free radical initiator, Butyl 2-(dodecylthiocarbonothioylthio)-2-methylpropanoate as the chain transfer agent and a mixture of 2-ethylhexyl methacrylate and C<sub>12-15</sub> alkyl methacrylate as radically polymerisable monomers falling under the definitions of granted claim 1. While linear polymers were formed in comparative example 1, star polymers were formed in examples 1-3 by reaction of the linear polymer with 1,6-hexanediol dimethacrylate (examples 1 and 3) or ethylene glycol dimethacrylate (example 2) as polyvalent coupling agents. The table on page 6 of D11 showed that the star polymers displayed, by comparison to the linear polymer, an improved balance of thickening efficiency, viscosity index and shear stability. On that basis, the opposition division formulated the problem in view of the supplementary evidence provided in D11 as the provision of a process for preparing a lubricating composition having an

improved balance of properties between thickening efficiency, viscosity index and shear stability (page 13 of the decision, third paragraph). Although it was acknowledged that the linear and star polymers of D11 were not block-arms copolymers, the opposition division came to the conclusion that it was credible that the effect shown in D11 would also be present in the case of block-arm polymers as defined in granted claim 1.

3.2.6 The appellant contested the problem formulated by the opposition division and argued that the improvement of the rheological properties of lubricating compositions comprising star polymers in place of linear polymers shown in D11 relied on the use of random copolymers and that it had not been established that the effect would be observed with block-arm copolymers (statement of grounds of appeal, page 20, bridging paragraph to page 21, and page 21, first full paragraphs). The Board indicated in their preliminary opinion (point 8.2.7) that the argument of the appellant lacked support as there was no apparent reason as to why the effect linked to the distinguishing feature over examples 1-4 of D2 as shown in D11 (the use of star polymers instead of linear polymers) would depend on the nature of the copolymer used. The appellant addressed that point at the oral proceedings before the Board (see page 3, fifth paragraph, of the minutes) and relied for the first time in appeal on evidence provided in D19, specifically on experiments (ii) and (iii).

3.2.7 D19 is a declaration of Dr Renee A. Eveland that contains additional experimental evidence based on examples 4A and 4B of D4. Experiments (ii) and (iii) of D19 show the preparation of star polymers from the same monomer mixtures (C<sub>12-15</sub> methacrylate (86%) and styrene (14%)) using the same RAFT polymerization process. The

arms of the star polymers have the same monomer content but the arms produced are random copolymers in experiment (ii) and block copolymers in experiment (iii). Table 2 of D19 shows the oil blend viscosity at 100°C (OBV KV100) and the thickening efficiency (T.E.) of lubricating compositions comprising the star polymers produced in experiments (ii) (OBV KV100: 9.082 cSt; T.E.: 7.98) and (iii) (OBV KV100: 8.331 cSt; T.E.: 6.48). The corresponding properties of the linear copolymers (random or block) are, however, not provided in D19.

3.2.8 Thus, while Table 2 of D19 shows that the oil blend viscosity at 100°C (OBV KV100) and the thickening efficiency (T.E.) of the star polymer of experiment (ii) (random copolymer arms) are arguably a bit better than for the star polymer of experiment (iii) (block copolymer arms), these differences alone do not support the argument of the appellant since D19 does not disclose the oil blend viscosity and the thickening efficiency of the linear random and block copolymers. In this respect, it cannot be inferred from D19 that any improvement of the rheological properties seen in random copolymers would not be observed for block copolymers. It follows that D19 cited by the appellant does not raise doubts that would lead the Board to depart from the conclusion of the opposition division regarding the presence of an effect over D2 (decision under appeal, page 13, second paragraph).

3.2.9 The Board therefore finds that there is no reason to amend the problem formulated by the opposition division, namely the provision of a process for preparing a lubricating composition which has an improved balance of properties between thickening efficiency, viscosity index and shear stability

(decision, page 13, third paragraph).

- 3.2.10 D2 is primarily concerned with linear copolymers, as is apparent from the examples which all relate to linear copolymers. There is in the examples of D2 no motivation to produce star-polymers from these linear polymers. The appellant mentioned paragraph 93 of D2 which discloses that "In addition, the block copolymers may also be present as comb polymers or as star polymers". That passage lists several polymeric structures that can be envisaged alongside diblock copolymers such as multiblock copolymers, combination polymers or star polymers but there is no incentive to use star polymers to provide an improved balance of properties involving the thickening efficiency, viscosity index and shear stability in D2. In this respect, D2 does not lead to the subject matter of granted claim 1.
- 3.2.11 The argumentation of the appellant as to the obviousness of the solution starting from D2 as the closest prior art also relied on the combination with document D5.
- 3.2.12 D5 concerns oil-soluble additives having both dispersant and viscosity index (VI) improving properties (column 1, lines 30-56) obtained from star polymers prepared in an arms first fashion using a polyalkenyl coupling agent (column 2, lines 27/28). The polymer arms are living polymers obtained by polymerizing one or more conjugated dienes (column 2, lines 54-58).
- 3.2.13 The dispersant viscosity index improvers of D5 are said to possess excellent viscosity improving properties, oxidative stability, mechanical shear stability, and

dispersancy (column 1, lines 62-65). With regard to their properties, the respondent cited the passage in column 6, lines 19-26 which teaches that the greater number of arms of the star polymer employed in the invention of D5 significantly improved the thickening efficiency and the shear stability of the polymer since it was then possible to prepare a viscosity index improver having a high molecular weight (resulting in increased thickening efficiency) without the necessity of excessively long arms (resulting in improved shear stability).

- 3.2.14 It is, however, apparent that the teaching relating to the improvement of properties resulting from a greater number of arms of the star polymer is made in the context of the invention of D5 (see "in the instant invention" in the cited paragraph), which concerns lubricants produced by anionic polymerization of conjugated dienes. It cannot be derived from D5 that the teaching in column 6, lines 19-26 would equally apply to other star polymers derived from methacrylates and obtained by a RAFT polymerization process as disclosed in the closest prior art D2 (paragraph 127) and the patent in suit (paragraph 17). There would therefore be no motivation starting from D2 concerning methacrylate linear polymers to first consult D5 relating to a different type of polymers and polymer process and then to use its teaching made in the context of these polymers in the process of D2. Starting from the examples 1-4 of D2 as the closest prior art and also taking into consideration document D5 the Board concludes that the skilled person would not have arrived at the subject-matter of operative claim 1 in order to solve the problem posed. Operative claim 1 therefore involves an inventive step starting

from D2 as closest prior art.

3.3 D4 as the closest prior art

3.3.1 D4 was also considered as an alternative document to represent the closest prior art in the decision under appeal (section 5.2.2). Examples 4A and 4B of that document were found to be particularly relevant. The differences between granted claim 1 and D4 were found to be that the polymer produced with the process according to granted claim 1 was a block-arm star polymer, and that the polymerization technique was RAFT (NMP polymerization was used in examples 4A and 4B of D4). That conclusion was not disputed by the appellant in appeal.

3.3.2 The opposition division considered that the experimental evidence contained in D18 and D21 showed an effect of the use of a RAFT process over the process used in examples 4A and 4B of D4. Although D18 and D21 did not disclose block-arm star polymers, the opposition division found that it was credible that the effects shown for random copolymers in these documents would also be observed in the case of block-arm star polymers. The problem was formulated as the provision of an improved process for the preparation of a lubricating composition.

3.3.3 Starting from examples 4A and 4B of D4, the appellant argued that the use star polymer having arms made of block copolymers was not associated with an effect (statement of grounds of appeal, page 27, third paragraph). As discussed in point 3.2.7 above, Table 2 of D19 shows that the thickening properties (oil blend viscosity at 100°C and thickening efficiency) of star polymers having random copolymer arms (experiment (ii))

according to D4 are even a bit better than for star polymers having block copolymer arms (experiment (iii)). On that basis the Board finds that the use of star polymers having arms made of block copolymers does not have an effect over the use of random copolymers as they are disclosed in examples 4A and 4B of D4.

- 3.3.4 Considering the second distinguishing feature (the preparation of the star polymers with the RAFT polymerisation technique), and referring to the same evidence (D18 and D21) used by the opposition division to acknowledge an effect (see point 3.3.2, above), the appellant argued in appeal that the problem was merely the provision of an alternative route to prepare star polymers (statement of grounds of appeal, page 28, first full paragraph).
- 3.3.5 With respect to the discussion of D18 and D21, however, the appellant merely referred to arguments made in writing during the opposition proceedings (statement of grounds of appeal, page 27, last paragraph) without providing further details on these arguments in appeal. The general reference to arguments made during the opposition proceedings as such, especially if not put in the context of the decision under appeal, cannot show why the opposition division was incorrect in formulating the problem solved over D4 and does not allow the Board to find the reasons why the appellant requests that the decision under appeal must be reversed on that point. Such sweeping references are thus not a substitute for appropriate substantiation in the appeal proceedings, contrary to the requirements of Article 12(3) RPBA (see Case Law of the Boards of Appeal, 10th edition, 2022, V.A. 4.3.5.(b)).

3.3.6 D21 in particular contains a rework of examples 4A and 4B of D4 using an NMP polymerization (experiment (i)) to prepare polymer arms from a monomer composition based on styrene and lauryl methacrylate wherein the polymer arms are further reacted to form a star polymer. In experiment (ii) of D21 a RAFT polymerization of an identical monomer composition was used to prepare the polymer arms of a star polymer with a process analogous to that of operative claim 1. Table 1 of D21 shows that the star polymers produced from the polymer arms prepared in experiment (i) (NMP polymerization) and in experiment (ii) (RAFT polymerization) differ in their thickening properties. The star-polymer produced from the RAFT polymerization (experiment (ii)) has a much higher increase in thickening efficiency relative to the linear polymers (69.30%) than the star-polymer issued from the NMP polymerization according to D4 (17.10%). Under these circumstances, the Board finds that D21 offers sufficient evidence to support a comparison with the use of an NMP polymerization according to the closest prior art D4.

3.3.7 The Board therefore does not see a basis for amending the problem over D4 as formulated in the decision under appeal, namely the provision of an improved process for the preparation of a lubricating composition.

3.3.8 D4 does not suggest the preparation of polymer arms with a RAFT polymerization performed with a chain transfer agent containing a thiocarbonyl thio group and a free radical leaving group. While the process according to claim 1 of D4 is generally directed to free radical polymerization processes for the preparation of the polymer arms, which include RAFT polymerization, D4 does not mention RAFT polymerization



specifically nor a chain transfer agent containing a thiocarbonyl thio group and a free radical leaving group according to operative claim 1. Also, the preparation of the polymer arms in all the examples of D4 involves a different chain transfer agent, TEMPO (2,2,6,6-tetramethyl-1-piperidinyloxy), which implies that an NMP polymerization was used. The skilled person therefore would have had no motivation on the basis of D4 alone to consider the use of a thiocarbonyl thio group and a free radical leaving group according to operative claim 1 in order to solve the posed problem.

- 3.3.9 Relying on the combination of D4 with D3 the appellant argued that granted claim 1 was not inventive even if an effect associated with the change of the polymerization from NMP to RAFT was acknowledged (statement of grounds of appeal, page 28, second full paragraph and following reasoning). According to the appellant, D3 taught that the NMP process was a usable polymerization technique, but appeared "to have less utility for the living polymerization of other monomer systems" than homopolymers and block copolymers of styrene and styrene derivatives (D3, page 293, second paragraph). ATRP was discussed as a more versatile alternative in their opinion and D3 also provided a motivation for the use of a RAFT polymerization as a versatile controlled radical polymerization technique in "the preparation of narrow polydispersity homo and block copolymers" (D3: page 293/294 bridging paragraph). The versatility of RAFT polymerization in particular with acrylate monomers (page 300, Table 2 and 3) and in the formation of block co-polymers (including block copolymers containing acrylates) was demonstrated in table 5 (page 303 of D3), so the appellant.

- 3.3.10 D3 concerns the preparation of polymers from methacrylate monomers by free radical processes and in particular by a RAFT polymerization involving a thiocarbonylthio compound as chain transfer agent (pages 293/294). The mechanism of the RAFT polymerization is described as an effective way of polymerizing methacrylates homo and copolymers (pages 295-298). While D3 suggests that the RAFT polymerization is a versatile polymerization, it does not specifically address the advantages of the RAFT polymerization over the NMP polymerization and it does not contain a teaching that would have motivated the skilled person to replace the NMP polymerization used to prepare polymer arms in D4 by a RAFT polymerization in order to solve the posed problem, all the more as D17 does not concern lubricating compositions.
- 3.3.11 In that regard, the mention on page 293 that NMP processes had less utility does not constitute a motivation to change the nature of the whole process used in example 4A/4B of D4, which is performed on a specific mixture of monomers, by a RAFT process which was not shown to be workable with the same monomer mixture straight away. Also, the indication that star polymers can be obtained by the RAFT process shown in D3 only concerns the core first method (page 302) in which the arms of the star polymer are formed from a core and does not mention the arms first method followed in the patent in suit in which the arms are formed and then linked by a coupling agent.
- 3.3.12 In view of that, the Board does not find that the teaching of D3 would have rendered obvious the object of granted claim 1 when aiming at solving the posed problem. Granted claim 1 therefore involves an inventive step starting from D4 as the closest prior

art also when taking into consideration the teaching of D3.

#### First and second auxiliary requests

#### 4. Amendments

4.1 Claim 6 of the first auxiliary request is identical to granted claim 6 which was found not to meet the requirements of Article 123(2) EPC and shares therefore the same fate.

4.2 Claim 7 of the first auxiliary request corresponds to granted claim 7 in which the term "crosslinking" was amended in "polyvalent". That amendment in claim 7 does not change the fact that the coupling agents defined in claim 7 (polyvalent (meth) acrylic monomer or polyvalent divinyl non-acrylic monomer) are only cited as examples of polyvalent coupling agents in paragraph 62 of the parent application as originally filed. On that basis, claim 7 of the first auxiliary request does not meet the requirements of Article 123(2) EPC for the same reasons as outlined for granted claim 7.

4.3 Claim 6 of the second auxiliary request is identical to claim 7 of the first auxiliary request and does not meet the requirements of Article 123(2) EPC for the same reasons as given above.

#### Third auxiliary request

#### 5. Admittance

5.1 The third auxiliary request was filed by the respondent with the rejoinder to the statement of grounds of appeal for the first time. The third auxiliary request

corresponds to the main request (granted claims) from which claims 6 and 7 have been deleted and claim 8 renumbered as claim 6. It is therefore apparent that the third auxiliary request was filed to overcome objections of added subject matter against granted claims 6 and 7.

5.2 While it is correct that objections of added subject matter against granted claims 6 and 7 had already been presented in the notice of opposition, it is immediately clear from the nature of the amendments made in the third auxiliary request that these amendments solve all the issues against the granted claims without creating new ones in appeal, therefore not necessitating any further discussion by the parties, nor any further analysis by the Board. In view of this, the Board finds it appropriate to exercise its discretion under Article 12(4) RPBA and admit the third auxiliary request into the appeal proceedings.

## 6. Amendments

6.1 The claims of the third auxiliary request correspond to the granted claims (main request) from which claims 6 and 7 have been deleted and granted claim 8 renumbered as claim 6. Since granted claims 1 and 8 were found to meet the requirements of Article 123(2) EPC, the Board finds that the claims of the third auxiliary request also meet the requirements of Article 123(2) EPC.

## 7. Inventive step

7.1 Claim 1 of the third auxiliary request is identical to granted claim 1 which was found to involve an inventive step in view of D2 or D4 chosen as the document representing the closest prior art. It follows that the

subject-matter of claim 1 of the third auxiliary request meets the requirements of Article 56 EPC for the same reasons as those given for granted claim 1 above.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form on the basis of the claims of the third auxiliary request filed with the reply to the statement of grounds of appeal after any necessary consequential amendment of the description.

The Registrar:

The Chairman:



D. Hampe

D. Semino

Decision electronically authenticated