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**Datasheet for the decision  
of 27 January 2023**

**Case Number:** T 0524/18 - 3.3.03

**Application Number:** 10792948.1

**Publication Number:** 2516559

**IPC:** C09D5/16, C09D7/12, C09D183/04

**Language of the proceedings:** EN

**Title of invention:**  
NOVEL FOULING CONTROL COATING COMPOSITIONS

**Patent Proprietor:**  
Hempel A/S

**Opponent:**  
Jotun A/S

**Relevant legal provisions:**  
RPBA 2020 Art. 13(1)  
RPBA Art. 12(4)  
EPC Art. 56

**Keyword:**  
Admittance of claim requests submitted on appeal (yes)  
Admittance of experimental reports and documents  
Inventive step (no) - obvious improvement

**Decisions cited:**

T 0035/85, T 0551/89



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Case Number: T 0524/18 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 27 January 2023**

**Appellant:** Hempel A/S  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 6 December 2017  
revoking European patent No. 2516559 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman** D. Semino  
**Members:** F. Rousseau  
R. Cramer

## **Summary of Facts and Submissions**

- I. The appeal by the patent proprietor lies from the decision of the opposition division revoking European patent No. 2 516 559.
- II. The decision was based on the patent as granted as the main request, auxiliary requests 1 to 3 filed during the oral proceedings on 26 October 2017 and auxiliary requests 1 to 8 filed with letter of 24 August 2017, renumbered as auxiliary requests 4 to 12.
- III. The opposition proceedings were based among others on the following items of evidence:
- D2: US 6,291,549 B1  
D4: EP 2 103 655 A1  
D5a: Shin Etsu, technical brochure, Reactive & Non-Reactive Modified Silicone Fluid, 2006 and excerpt thereof (D5)  
D6: "Fouling control coatings using low surface energy, foul release technology", R.L. Townsin et al., pages 693-708, excerpt from "Advances in marine antifouling coatings and technologies", C. Hellio et al., CRC Press  
D6b: Milne & Callow (1985), Non-biocidal antifouling processes, Trans I Mar E (C) Vol. 97, Conf. 2, Paper 37, pages 229-233  
D7: Experimental report based on the data submitted during examination with letter of 27 November 2013  
D8: Experimental report submitted by the patentee with letter of 24 August 2017  
D12: Experimental report submitted by the opponent with letter of 25 August 2017.

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

- (a) Documents D5a and D6b, as well as experimental reports D8 and D12 were admitted into the proceedings.
- (b) The antifouling coating composition described in example 5 of D4 could be used as starting point for assessing inventive step of the coating of granted claim 1. The latter differed from the composition of example 5 of D4 in that it further comprised a biocide, the ratio between the hydrophilic-modified polysiloxane and the biocide being selected to be in the range 1:0.2 to 1:6.

A comparison of examples A to C of the patent in suit with reference example E, as well as additional comparisons provided in experimental reports D7 and D8 demonstrated that the additional use of a biocide in amounts leading to a weight ratio of hydrophilic polysiloxane to biocide in the range of 1:0.2 to 1:6 resulted in an improvement of the antifouling performance of the coating composition. D12, however, showed that the same effect was not obtained when the total amount of hydrophilic-modified polysiloxane and biocide was low.

The objective problem solved by the subject-matter of claim 1 resided therefore in the provision of a further coating composition having good anti-fouling properties.

- (c) The skilled person would have been prompted in the light of D4 itself to use biocides in order to

improve the anti-fouling properties of the coatings disclosed therein, the amounts described in D4 leading to a ratio as defined in claim 1. The subject-matter of claim 1 therefore lacked an inventive step in view of D4 alone.

(d) Whereas the amendments contained in auxiliary requests 1 and 3 did not overcome the lack of inventive step in view of D4, auxiliary requests 2 and 4 to 12 extended beyond the content of the application as filed.

(e) The patent was therefore revoked.

V. An appeal against that decision was lodged by the patent proprietor (appellant). The appellant provided at various stages of the appeal proceedings written submissions to which the following items of evidence were attached:

With the statement of grounds of appeal (letter of 13 April 2018)

D13: Experimental report "Antifouling performance of compositions O and P over time (weeks) in Spain"

With letter of 11 January 2019:

D20: WO 2018/134291 A1

D21: ASTM D 6990 - 05

With letter of 9 April 2019:

D13a: corrected version of D13

With letter of 27 December 2019:

D22: Experimental report signed by Blake Hollis and attached explanations - model paint no. 7

D23: Experimental reports signed by Blake Hollis and attached explanations - Compositions O and P.

VI. With the statement of grounds of appeal the appellant requested maintenance of the patent as granted and submitted auxiliary requests A to to E. An additional auxiliary request B1 was filed with letter of 24 April 2019.

VII. The opponent (respondent) submitted with their rejoinder (letter of 28 August 2018) among others the following items of evidence:

D12a: Experimental report signed by Felix Fernandez and attached explanations - model paints 1 and 2

D12b: Experimental report signed by Felix Fernandez and attached explanations - model paints 3 to 7

D17a: Product information about Sea-Nine<sup>TM</sup> 211N, Marine Antifouling Agent, Rohm and Haas Company, 2006

D17b: Product information about PYRION<sup>TM</sup>, Janssen PMP

D17c: Product information about Econeal<sup>®</sup> 028, 2005

D19: US 3,953,212.

VIII. A communication conveying the Board's provisional analysis of the case was sent in preparation of the oral proceedings.

IX. With letter of 18 January 2023, the appellant maintained auxiliary request B1 as their main request and auxiliary request E. The other claim requests were withdrawn.

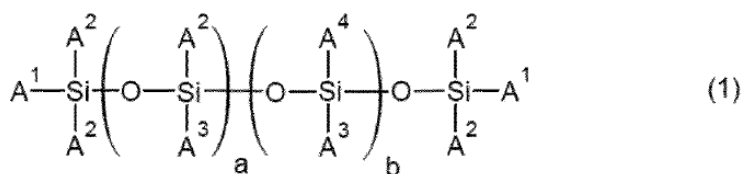
X. Oral proceedings were held on 27 January 2023.

XI. Claim 1 of auxiliary request B1 read as follows :

"1. A fouling control coating composition comprising a polysiloxane-based binder system, 2-7% by dry weight of one or more hydrophilic-modified polysiloxanes, and one or more biocides,

wherein the polysiloxane-based binder system comprises (i) a binder and (ii) a cross-linking agent,

wherein the binder (i) constitutes 20-90 % by dry weight of the coating composition, and is a curable diorganopolysiloxane represented by general formula (1):



wherein

each A<sup>1</sup> is independently selected from a hydroxyl group and a hydrolysable group;

each A<sup>2</sup> is independently selected from alkyl, aryl, alkenyl and a hydrolysable group;

each A<sup>3</sup> and A<sup>4</sup> is independently selected from alkyl, aryl and alkenyl; and

a = 1-25,000, b = 1-2,500 and a+b is at least 30;

wherein the weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides is in the range 1:0.2 to 1:6, and wherein the one or more hydrophilic modified polysiloxanes do not contain groups that can react with the binder or any crosslinker."



Claim 1 of request B1 differed from claim 1 of auxiliary request B submitted with the statement of grounds of appeal in that the amount of one or more hydrophilic-modified polysiloxanes was 2-7 % by dry weight instead of 0.01-20 by dry weight.

XII. Claim 1 of auxiliary request E differed from claim 1 of auxiliary request B1 in that the weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides is in the range 1:0.2 to 1:4 instead of 1:0.2 to 1:6.

XIII. The appellant requested that the decision of the opposition division be set aside and that the patent be maintained on the basis of the claims of auxiliary request B1 filed with letter of 24 April 2019 or, in the alternative, on the basis of the claims of auxiliary request E submitted with the statement of grounds of appeal.

XIV. The respondent requested that the appeal be dismissed. The respondent also requested that auxiliary requests B1 and E not be admitted into the proceedings.

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

(a) The request for non-admittance of auxiliary request B1 should be rejected.

(b) Auxiliary request B1 and auxiliary request E should be admitted into the proceedings.

(c) D9, D12a, D12b, D17a to D17c and D19 should not be admitted into the proceedings.

(d) The subject-matter of auxiliary request B1 and auxiliary request E involved an inventive step over the coating composition of example 5 of D4.

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

(a) Auxiliary request B1 and auxiliary request E should not be admitted into the proceedings.

(b) D13 and D13a should only be admitted if D12a and D12b were admitted.

(c) Experimental reports D22 and D23 should not be admitted into the proceedings.

(d) The subject-matter of auxiliary request B1 and auxiliary request E lacked an inventive step starting from the coating composition of example 5 of D4 as the closest prior art.

### **Reasons for the Decision**

#### *Admittance of auxiliary request B1 (main request) and auxiliary request E*

1. The appellant requested at the oral proceedings that the request for non-admittance of auxiliary request B1 be rejected, as that request had been made only with letter of 17 January 2023 after issuance of the summons to attend the oral proceedings.

Auxiliary request B1 had been announced in the penultimate paragraph on page 4 of the appellant's letter of 11 January 2019, which paragraph read "We therefore enclose an additional Auxiliary Request B1 which is based on the Request B, with the amendment in claim 1 being from claim 4 as granted: that the amount in dry weight of the hydrophilic-modified polysiloxane is 2-7%. "Use" claim 32 is deleted".

That auxiliary request B1 was however not attached to the appellant's submissions of 11 January 2019, but only physically filed with letter of 24 April 2019, in response to the respondent's indication in their letter of 5 April 2019 that an auxiliary request B1 had not been submitted (page 5, first sentence of section "New Request").

Although the request for non admittance of auxiliary request B1 could have been made earlier, i.e. in direct response to its physical filing with letter of 24 April 2019, such request for non-admittance could not come as a surprise for the appellant and be seen as already be implicitly made in a preventive way considering the remarks in the letter of the respondent of 5 April 2019, in which it was noted that this request would be obviously late filed, if it were actually filed (page 5, section "New Request", last sentence of the first paragraph).

In any case, whether or not the respondent had requested non-admittance and if so when is irrelevant as the Board has to decide on admittance of the request on the basis of the provisions of the RPBA, and such decision is not dependent on any request from the parties. Here the request was filed after the statement of grounds of appeal and before notification of the

summons to oral proceedings, so the admittance has to be judged on the basis of the criteria in Article 13(1) RPBA 2020.

2. According to Article 13(1) RPBA 2020, the Board's discretion shall be exercised in view of, *inter alia*, the complexity of the new subject-matter submitted, the current state of the proceedings, the need for procedural economy and whether the party has demonstrated that any such amendment, *prima facie*, overcomes the issues raised by another party in the appeal proceedings or by the Board and does not give rise to new objections.

In line with the indication in the appellant's letter of 11 January 2019 in the section "Additional Requests" at the bottom of page 4, in which auxiliary request B1 was described, but not physically filed, the actual auxiliary request B1 differs from auxiliary request B filed with the statement setting out the grounds of appeal in that the amount by dry weight of the one or more hydrophilic-modified polysiloxanes is specified to be 2-7% instead of 0.01-20% by dry weight, and the use claim has been deleted.

As mentioned by the appellant in their letter of 11 January 2019 the purpose of this amendment is to exclude examples 1, 2, 4 and 5 of experimental reports D12, D12a and D12b from the scope of the claims. This exclusion is the mere result of the higher minimum amount of hydrophilic-modified polysiloxane now set out in order to counter the respondent's argument in sections 62 to 69 and 71 to 74 of the rejoinder that the critical feature of the claimed invention is not the weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides,

but the amount of the modified polysiloxane(s) and the amount of biocide(s) defined through said ratio.

An increase of the minimum amount of both the hydrophilic-modified polysiloxane(s) and the biocide(s) in accordance with the amendment included in claim 1 of auxiliary request B1 can be seen as an adequate response to the filing of D12 two months before the oral proceedings before the opposition division, on the basis of which the opposition division concluded that an improvement of the antifouling properties was not proven for a low total amount of hydrophilic-modified polysiloxane and biocide. The filing of auxiliary request B1 is also a legitimate and timely reaction to the filing of experimental reports D12a and D12b with the rejoinder, which experimental reports comprise new data in order to strength the respondent's position based on the data of D12.

Auxiliary request E submitted with the statement of grounds of appeal already contained said limitation concerning the amount by dry weight of the one or more hydrophilic-modified polysiloxanes in the range of 2 to 7%, but in combination with a restriction of the relative weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides of 1:0.25 to 1:4. Each of these restrictions already served the same purpose as in auxiliary request B1 and can be seen as an adequate response to the filing of D12 as outlined in the preceding paragraph.

In addition, the amendment concerning the minimum amount of the one or more hydrophilic-modified polysiloxanes and the consequential minimum amount of one or more biocides does not change the nature of the inventive step assessment and its essential point, i.e.

wether an improved anti-fouling effect can be acknowledged over the whole scope claimed or in other words whether the scope of the claim is aligned with the data alleged to demonstrate the purported effect.

For these reasons, the Board finds it appropriate to make use of its discretion by admitting into the proceedings auxiliary request B1 pursuant to Article 13(1) RPBA 2020 and sees no reason not to hold auxiliary request E inadmissible pursuant to Article 12(4) RPBA 2007 (which applies in view of Article 25(2) RPBA 2020).

*Admittance of items of evidence*

*Documents D12a, D12b, D13, D13a and D21 to D23*

3. Experimental report D8 was submitted by the appellant one day before the final date fixed pursuant to Rule 116(1) EPC for making written submissions in preparation for the oral proceedings. Experimental report D12 was filed by the respondent on that final date. D8 and D12 were admitted into the proceedings and taken into account by the opposition division for their assessment of inventive step starting from example 5 of D4 as the closest prior art.

Those data aimed at demonstrating whether or not the claimed coating compositions exhibited an improved antifouling behaviour compared to the coating of the closest prior art.

There is no doubt that the parties could not within the two months before the oral proceedings provide additional experiments in order to rebut the

submissions of the other party based on those experimental data.

- 3.1 The admittance of D13 submitted with the statement of grounds of appeal and that of D12a and D12b submitted with the reply of the respondent is to be decided on the basis of Article 12(4) RPBA 2007 (in view of Article 25(2) RPBA 2020). All these documents are additional experimental reports also relevant to the question as to whether the claimed coating compositions can be considered to have an improved antifouling effect in comparison to the coating composition of the closest prior art.
- 3.2 D21 was submitted by the appellant with letter of 11 January 2019, i.e. after the reply of the respondent. Its admittance which is therefore subject to the provisions of Article 13(1) RPBA 2020 is not disputed by the respondent. D21 is a norm for evaluating biofouling resistance of marine coating systems. D21 is undisputedly relevant for evaluating the experimental tests submitted by both parties, as is apparent from the appellant's submissions (letter of 11 January 2019, passage starting with the two last lines on page 3 and ending with the section "Additional Requests") and those of the respondent (letter of 5 April 2019, paragraph bridging pages 4 and 5 and following paragraph).
- 3.3 The admittance of D13a submitted with letter of 9 April 2019 of the appellant is also subject to the provisions of Article 13(1) RPBA 2020. D13a is a new version of D13 aimed at correcting an error made with respect to the data for Singapore. The correction, however, does not change the appellant's reasoning which is based on D13.

3.4 D22 and D23 are additional experimental data submitted by the appellant with letter of 27 December 2019 (therefore also subject to the provisions of Article 13(1) RPBA 2020). The tests which lasted 39 weeks (last table on the first page of each document) were started on 29 January 2019 (first paragraph of each document), i.e. 5 months after the submissions of D12a and D12b. These experimental reports like all the other experimental reports previously relied upon in the appeal proceedings aim at determining whether the specific weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides defined in granted claim 1 has an impact on the anti-fouling effect of the claimed coating composition.

3.5 Under these circumstances, considering:

(i) the filing of experimental reports D8 and D12 two months before the oral proceedings in front of the opposition division,

(ii) that all the above mentioned test reports submitted on appeal concern like D8 and D12 the question of the impact of the specific weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides on the anti-fouling effect of the claimed coating composition,

(iii) the long duration necessitated by such tests and

(iv) the undisputed fact that natural testing conditions comprise a large number of factors impacting the fouling growth and which therefore cannot be exactly repeated (e.g. submissions of the respondent in



letter of 20 February 2020, page 2, 5th to 7th full paragraphs and of the appellant in letter of 11 January 2019, top of page 4, passages concerning sections 1.2 and 5.2 of D21),

the successive filing of these test reports (and D21 relevant to their interpretation) constitute in each case a legitimate and timely reaction to the submissions of the other party on the issue of determining the problem successfully solved over the composition of example 5 of D4.

In other words, the subsequent filing of all these documents is the result of normal developments in the opposition appeal proceedings. On that basis, the Board sees no reason not to hold documents D12a, D12b and D13 inadmissible pursuant to Article 12(4) RPBA 2007, and admits documents D13a and D21 to D23 pursuant to Article 13(1) RPBA 2020.

*Documents D17a to D17c*

4. The admittance of D17a to D17c submitted in reply to the statement of grounds of appeal is to be decided on the basis of Article 12(4) RPBA 2007. Those documents concern antifouling agents Sea-Nine<sup>TM</sup> 211N (4,5-dichloro-2-n-octyl-4-isothiazoline-3-one), Zinc Pyrion<sup>TM</sup> (zinc pyrithione) and Econeal<sup>®</sup> 028 (4-bromo-2-(4-chlorophenyl)-5-(trifluoromethyl)-1H-pyrrole-3-carbonitrile), whose use is recommended in the patent in suit (paragraph [0051], [0053] and [0058]) and, as far as the first and second compounds are concerned, also in D4 (paragraph [0085], lines 34 and 36). The documents have been submitted as evidence for the amount of biocide which would be used by the skilled person for these compounds (rejoinder, items 79). They

are therefore relevant to the issue of obviousness of the features identified by all parties as distinguishing the claimed compositions from the closest prior art without bringing a change in the subject of the proceedings. On that basis, the Board has no reason to make use of its discretionary power under Article 12(4) RPBA 2007 and to hold those documents inadmissible.

*Document D19*

5. The admittance of D19 also submitted with the reply to the statement of grounds of appeal is to be decided on the basis of Article 12(4) RPBA 2007. D19 has been filed to establish a structure for the commercial product KE-44RTV available from Shin-etsu Chemical Industries Co. (rejoinder, items 117 to 120 of the rejoinder), which product is the curable silicone resin used in the composition of example 5 of D4 which constitutes according to both parties' submissions the closest state of the art for analysing inventive step. The relevant information is contained in column 5, lines 36 to 54 and column 6, lines 39-51 of that document. D19 indicates not only that this compound has oximine end groups, but also that these end groups are eliminated upon hydrolysis (column 6, lines 10 to 51).

Accordingly, even if D19 could have already been filed before the opposition division, its submission at the outset of the appeal proceedings which aimed at challenging the restriction in claim 1 of auxiliary requests B and E of the definition of the polysiloxane-based binder system to comprise a curable diorganopolysiloxane of formula (1) which can comprise hydrolysable groups, said restriction being also now present in auxiliary requests B1, is not unreasonable

in the sense that it does not result in a change of the subject of the proceedings.

Therefore the Board sees no reason to hold D19 inadmissible pursuant to Article 12(4) RPBA 2007 (Article 25(2) RPBA 2020).

*Document D20*

6. The admittance of D20 submitted by the appellant with letter of 11 January 2019, i.e. after the reply of the respondent, is subject to the provisions of Article 13(1) RPBA 2020. According to this article, the Board shall exercise its discretion in view of, inter alia, the suitability of the amendment to resolve the issues which were admissibly raised by another party in the appeal proceedings or which were raised by the Board.

D20 is a PCT application of the respondent in which the PCT application WO 2011/076856 from which the patent in suit originates is cited on the last paragraph of page 3 as background art. The mere indication in this paragraph bridging pages 3 and 4 and the subsequent paragraph that the teaching of the contested patent is to combine the use of PDMS oils and biocides does not bring any information beyond the one already contained in the specification of the contested patent. Neither does it constitute any indication by the authors of D20 concerning their opinion about the inventive character of using said combination of PDMS oils and biocides, which in any event has to be assessed having regard to the prior art cited in the present proceedings. Under these circumstances, D20 has not been shown to be relevant to the issue of inventive step over D4. For these reasons, the Board made use of its discretion

pursuant to Article 13(1) RPBA 2020 not to admit D20 into the proceedings.

*Auxiliary request B1 - inventive step*

*Closest prior art and distinguishing features*

7. According to paragraph [0002] of the patent in suit, silicone anti-fouling coating formulations traditionally rely on physical means, mainly modulus of elasticity and surface tension to create a low fouling surface. These coatings, however, have shown difficulty in resisting slime fouling over time, thus decreasing the advantage of drag reduction (paragraph [0002]). There was therefore a need for fouling control polysiloxane-based coating compositions combining the benefits of conventional polysiloxane-based fouling-release coating compositions with the benefits of biocide-based antifouling coating compositions (paragraph [0003]).

The parties are in agreement that the coating composition of example 5 of D4 described in table 1 on pages 20 and 21 of that document which embodies such a traditional silicone anti-fouling coating formulation is a suitable starting point for assessing inventive step of the subject-matter of operative claim 1. The Board has no reason to have a different opinion.

8. The fouling control coating composition of example 5 of D4 which represents an embodiment of claim 1 of that document comprises:

- 50 wt% of a curable silicone rubber KE-44RTV manufactured by Shin-Etsu Chemical Co., Ltd. in

accordance with the general teaching in paragraphs [0035] to [0038] of D4 and feature (A) of its claim 1,

- 20 wt% of an organopolysiloxane mixture X-31-2396 manufactured by Shin-Etsu Chemical Co., Ltd. corresponding to feature (B) of claim 1 of D4 obtained by reacting two specific organopolysiloxanes (B1) and (B2), in line with the general teaching given in paragraphs [0039] to [0041], [0043], [0044], [0047], [0048] and [0055] to [0057], and whose synthesis is explained in paragraphs [0121] to [0130],

- 5 wt% of a silicone oil (C) KF-6011 (manufactured by Shin-Etsu Chemical Co., Ltd.) which is a polyether modified silicone oil, in accordance with the teaching provided in paragraphs [0065] to [0067] and [0076] of that document and its claim 4.

9. Silicone rubber KE-44RTV used as component (A) in example 5 of D4 bears oxime groups, i.e. hydrolyzable groups, reference being made by the respondent to column 6, lines 9 to 40 of D19. The organopolysiloxane mixture (B) of example 5 of D4 whose preparation is shown in synthetic example 1 (paragraphs [0122] to [0130]) is a cross-linking agent bearing several reactive silicon methoxy groups, as shown with formulas (s3) and (s4) (paragraph [0129]). Compounds (A) and (B) of example 5 of D4 correspond therefore to binder (i) and crosslinking agent (ii) of operative claim 1.

A comparison between the properties of the coating compositions of example 1 and comparative example 1 of D4 (tables 2 to 4) demonstrates that compound (B) improves the long-term antifouling effect (lower static friction coefficient, lower sliding angle and less

adhesion after 18, 24, 30 and 36 months), in line with the teaching provided in paragraph [0105] of D4.

It is undisputed that the polyether modified silicone oil (C) KF-6011 used in example 5 of D4 does not contain groups that can react with the binder or any crosslinker, i.e. it is a hydrophilic-modified polysiloxane within the meaning of operative claim 1. Reference can be made in this respect to D5a cited by the respondent (page 7, section Non-Reactive Silicone Fluids, first table, entry KF-6011). It is employed in example 5 of D4 in an amount by dry weight of about 5/75, i.e. 6.7 wt.%, as also noted by the respondent (rejoinder, item 42). For the sake of simplicity, hydrophilic-modified polysiloxanes that do not contain groups that can react with the binder or any crosslinker will be referred to in what follows as hydrophilic-modified polysiloxanes.

10. Consequently, it is undisputed that the composition of operative claim 1 differs from the closest prior art only in that it comprises one or more biocides, wherein the weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides is in the range 1:0.2 to 1:6.

*Problem successfully solved*

11. Having regard to the disclosure of the closest prior art, the appellant and the respondent take differing positions as to which problem can be considered to be successfully solved by the subject-matter of operative claim 1. Relying upon the experimental results described in the patent in suit, D7, D8, D13/D13a, D22 and D23 the appellant submits that the technical problem solved by the subject-matter of claim 1 with

respect to the closest prior art is the provision of a coating composition having improved long-term anti-fouling performance. In view of experimental evidence D12, D12a and D12b, the respondent's contention is that the problem solved by the claimed subject-matter is the provision of a further composition having good anti-fouling properties, i.e. a composition that is capable of limiting algae and/or animal growth whilst providing a reduction in drag resistance.

12. The appellant submits that the invention lies in the realisation that - when both the hydrophilic-modified polysiloxane(s) and biocide(s) are present - they must be present in a certain ratio, otherwise the coating will not provide effective long-term antifouling performance. The respondent disagrees, arguing that the ratio of hydrophilic-modified polysiloxane(s) to biocide(s) is not critical. The antifouling performance is in the respondent's opinion rather resulting from the use of a functional amount of biocide(s) and hydrophilic-modified polysiloxane(s) in the composition, but not of their ratio.

*In the light of the teaching of D4*

13. In order to answer the question whether the critical feature to obtain effective long-lasting antifouling performance is the weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides or rather the amount of biocide(s) and hydrophilic-modified polysiloxane(s) in the composition, it is at this juncture useful to address the teaching of the closest prior art D4, as it also concerns the anti-fouling ingredients whose use is defined in operative claim 1.

In that respect, a comparison of the properties (sliding angle, static friction coefficient, adhesion and anti-fouling performance) reported in tables 2 to 4 on pages 23 and 25 of D4 for the coating compositions tested in D4 (table 1 on pages 20 and 21) shows the anti-fouling effect brought about by a non reactive hydrophilic-modified polysiloxane. It can be referred to a comparison between comparative example 1 and comparative example 3 of D4, the latter containing in addition component KF-6011, i.e. the oil (C) of D4 corresponding to the non reactive hydrophilic-modified polysiloxane of operative claim 1. An anti-fouling effect resulting from the use of said non reactive hydrophilic-modified polysiloxane is shown by lower values obtained for the static friction coefficient, the sliding angle and the amount of adhesion after 18, 24, 30 and 36 months, confirming the teaching provided in paragraphs [0065], [0066], [0067] and [0107] of that document. According to those passages, a non reactive silicone oil gradually bleeding out on the surface of the coating film provides a long lasting antifouling action. The anti-fouling effect of silicone oil (C) which can be the non reactive hydrophilic-modified polysiloxane of operative claim 1 is also explicitly stated in paragraph [0077], from which it can be taken that a minimum amount of that component is needed to achieve adequate antifouling properties, the upper amount for that compound being dictated in certain cases by a resulting reduction of strength of the antifouling coating when an excessive amount thereof is used.

The long term antifouling effect obtained in D4 is explained to result from the ability of water droplets to slide on the coated surface and said surface having



a small adhesion, whereby adhered lives are readily removed (paragraphs [0029] and [0030]).

Having regard to the teaching of D4, it is therefore credible that hydrophilic-modified polysiloxanes whose use is defined in operative claim 1 exert an antifouling effect whose degree is dependent on the amount used.

14. Concerning the use of additional antifouling ingredients, D4 teaches in paragraph [0064] that the curable composition may contain other components (i.e. in addition to (A) and (B) mandatorily required in claim 1 of D4), such as a silicone oil (C) (whose use is addressed in the above section), a curing catalyst, an antifouling agent and a colorant.

There is no dispute that said additional antifouling agents which are described in paragraphs [0080] to [0086] of D4 are known biocides. Those substances are known to operate in a different manner from that of the silicon oil, i.e. by killing or deterring micro-organisms responsible for fouling instead of reducing their adhesion on the coated surface, as is done with component (B) or silicone oil (C), in particular the non-reactive hydrophilic-modified polysiloxanes.

Considering the different mechanisms responsible for the suppression or reduction of fouling for the hydrophilic-modified polysiloxane and the biocide, it is already credible on that basis that the additional use of one or more biocides which act in an independent way from component (B) or the polyether-modified silicone oil (C) (i.e. the non reactive hydrophilic-modified polysiloxane of operative claim 1), reinforces the anti-fouling effect of components (B) and (C).

The absence of a teaching concerning a possible antagonism between (i) components (B) and (C) of D4, in particular a polyether-modified silicone oil whose use is described in claim 4 of D4, and (ii) biocides, is implicitly confirmed by the fact that claim 6 of D4 defining the use of an antifouling agent, the antifouling agents described in paragraphs [0081] to [0086] of D4 being known biocides, refers to any of claims 1 to 5. In addition, having regard to the mechanism by which a biocide contributes to the antifouling activity, the skilled person expects that higher amounts of biocide bring about an increased antifouling effect.

*In the light of the experimental reports*

15. As to the experimental results reported in the patent in suit, D7, D8, D12, D12a, D12b, D13/D13a, D22 and D23, those concern coating compositions which do not contain a component (B) as used in example 5 of D4 which component contributes to the long-term antifouling effect of that composition, as indicated above (section 10, second paragraph). This itself, however, is not decisive, as in accordance with the established case law (Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, I.D. 4.3.2, in particular T 35/85, point 4 of the reasons), the parties may discharge their onus of proof by voluntarily submitting comparative tests with variants of the closest state of the art making identical the features common with the invention in order to have a variant lying closer to the invention so that the advantageous effect attributable to the distinguishing features of the invention is thereby more clearly demonstrated.

16. Moreover, according to the established jurisprudence, if comparative tests are relied upon to demonstrate an inventive step on the basis of an improved effect, the nature of the comparison with the closest state of the art must be such that the alleged advantage or effect is convincingly shown to have its origin in the features distinguishing the invention from the closest state of the art (Case Law, *supra*, I.D.4.3.2). A comparison of test results obtained by immersion of coated panels in a marine environment, like for the above mentioned experimental reports, is only meaningful, as pointed out by both parties, if the coatings one wishes to compare have been tested under identical conditions, reference being made to D21 (sections 1.2 and 5.2). This in the Board's opinion includes the time of the year and the geographical location, since fouling depends on various factors such as population and species of fouling organisms, temperature, nutrient levels, flow rates and the intensity of solar radiation, as was pointed out by the respondent. This means that a comparison of data obtained in two different test reports is only meaningful if it can be ensured that conditions influencing fouling were reasonably comparable.
17. Concerning the alleged criticality of the weight ratio between the one or more hydrophilic-modified polysiloxane(s) and the one or more biocide(s), the appellant referred to two overviews of some of the experimental data addressed above in which the antifouling performance of the coating compositions tested were again indicated, the overview mentioning whether or not the compositions tested are according to the present claims or not. One overview relates to

auxiliary request B1 and the other to auxiliary request E.

18. The level of anti-fouling performance of the coating compositions tested is evaluated for experimental reports D7, D8, D12a, D12b, D13/D13a, D22 and D23 on panels immersed into sea water using the following rating scale defined in the patent in suit:

Level	Description
Excellent	Only slime
Good	Algae + Animals < 10 %
Fair	10 % < Algae + Animals < 25 %
Poor	Algae + Animals > 25 %

Test report D12 solely concerns the area of the test panels covered by soft fouling using five numerical categories corresponding to an area of less than 5% (rating 0), 5-20% (rating 1), 20 to 50% (rating 2), 50-80% (rating 3) and more than 80% (rating 4).

19. As regards the effect of the addition of a biocide to a coating composition comprising a polysiloxane binder and a hydrophilic-modified polysiloxane, whose antifouling performance is insufficient, it is demonstrated by the experimental tests of the patent in suit (top coat compositions A, B and C containing a biocide and top coat E without biocide), that the addition of a certain amount of biocide improves as expected the antifouling performance.

D8 also shows that a coating composition that contains insufficient amounts of hydrophilic-modified polysiloxane(s) and biocide(s) so as to exhibit sufficient antifouling resistance (coating composition

OP1 or OP2) exhibits an improved antifouling resistance if an adequate additional amount of biocide is used (coating composition OP3 to OP7).

The same behaviour is observed in experimental report D12b (comparison between model paints 4 and 5 in table 1).

Model paints 1 and 2 of D12 which solely differ in the amount of biocide used are given the same rating of 4 and 3 after rinse. This, however, does not necessarily contradict the above finding that the addition of biocide improves the antifouling performance, because the scale of rating used in D12 (see above point 18) allows the attribution of the same rating to samples having a different antifouling resistance.

20. On that basis, having regard to the considerations in above points 15 and 20, it can be accepted that a minimum level of biocide, which for a given amount of hydrophilic-modified polysiloxane corresponds to a maximum weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides defined in operative claim 1, brings about a noticeable degree of improvement of the anti-fouling effect. Furthermore, it would go against the expectations of the skilled person that further increasing the amount of biocide which would be accompanied by a corresponding decrease of the weight ratio between the hydrophilic-modified polysiloxane(s) and the biocide(s) when keeping the same amount of hydrophilic-modified polysiloxane(s) would lead at some point to a decrease of the anti-fouling effect. Any evidence to the contrary was not provided by the appellant, who carries the burden of proof for the criticality for an improvement of the anti-fouling

behaviour of the lower limit of the weight ratio between the one or more hydrophilic-modified polysiloxanes and the one or more biocides (Case Law, supra, III.G.5.1.1 and III.G.5.1.2 b)).

21. The appellant seeks to demonstrate the criticality of the lower limit of the weight ratio between the one or more hydrophilic-modified polysiloxane(s) and the one or more biocide(s) using a comparison between example B of the patent in suit in accordance with operative claim 1 (excellent rating for a ratio of 1:1) and example D outside of the scope of that claim (fair rating for a ratio of 0:4.8). Reducing that ratio below the claimed limit would be detrimental to the antifouling effect, so the appellant. That comparison, however, is made while varying in addition to the distinguishing feature (the biocide) another variable of the system impacting the antifouling properties, namely the amount of hydrophilic-modified polysiloxane which is not at all used for comparative example D. Under these circumstances, the comparison relied upon by the appellant is not suitable to demonstrate the criticality of the lower limit of the weight ratio between the one or more hydrophilic-modified polysiloxane(s) and the one or more biocide(s) for the anti-fouling behaviour.

Similarly, a comparison within the results of D8 of reference examples OP8 to OP10 with examples OP4 to OP7 cannot demonstrate the criticality of that lower weight ratio, since the amount of the hydrophilic-modified polysiloxanes was not kept constant, but was drastically reduced.

Likewise, an improvement of antifouling properties when paint P (weight ratio of 1:8.6) is replaced by paint O

(weight ratio of 1:3.7) in experimental reports D7 and D23 cannot be attributed to a decrease of that weight ratio, when both the amount of hydrophilic-modified polysiloxane and the amount of biocide are increased.

22. Applying the logic of the appellant which consists in comparing for some of the above mentioned experiments solely the weight ratios between the hydrophilic-modified polysiloxane(s) and the biocide(s), i.e. irrespective of the absolute amount of hydrophilic-modified polysiloxane(s) or biocide(s) used, which the Board does not accept, would in any event lead to a formulation of the problem successfully solved which is less favourable to the appellant. Comparing in experimental report D12b (i) model paint 7 which is in accordance with operative claim 1 and leads to a poor antifouling performance rating with a weight ratio between the hydrophilic-modified polysiloxane and the biocide of 1:0.25 and (ii) model paints 3 and 6 having both an amount of hydrophilic-modified polysiloxane in accordance with operative claim 1, but a weight ratio between the hydrophilic-modified polysiloxane and the biocide of 1:0.1 and 1:0.14, respectively, and both lead to a fair antifouling performance rating, one could only conclude that the technical effect resulting from the distinguishing feature is at least in some cases a decrease of the antifouling performance.

The appellant submits that D22, which concerns a repetition at the same location of the testing of model paint 7 in D12b and finds a good performance for that paint, while D12b reported a poor performance, puts some doubts on the results reported in D12b (letter of 27 December 2019, page 2). This is not convincing, because it cannot be established that the tests in D22 and D12b were carried out under similar conditions.

Although the two tests were carried out at the same location, the tests were performed one year apart so that it cannot be considered that all factors having an impact on fouling were kept similar for both tests (see above point 17). The appellant's argument that in that case it would not be possible for the appellant to submit counter experiments to D12b is not correct, as the appellant could also have repeated all model paints of D12b so as to provide a complete set of data measured under the same test conditions which would allow a rebuttal of the respondent's submissions based on D12b.

23. While the Board accepts that the addition of a biocide in the weight ratio defined in operative claim 1 leads to an improved anti-fouling performance of the coating composition, the appellant did not submit that the hydrophilic-modified polysiloxane(s) and the biocide(s) when used in combination provide an antifouling effect going beyond the sum of the anti-fouling effects brought about by each of these compounds, i.e. did not submit that those act synergistically. The Board has no reason to have a different view, in particular since the experimental tests submitted are in any event not designed to demonstrate such synergism.
  
24. In view of the above, having regard to the antifouling effect of biocides, the absence of any evidence for the criticality of the range of weight ratios between the one or more hydrophilic-modified polysiloxane(s) and the one or more biocide(s) defined in operative claim 1 and the absence of any synergy between these two compounds, the Board is satisfied that the problem successfully solved by the claimed coating compositions over the closest prior art is to be formulated as the



provision of a coating composition having improved long-term anti-fouling performance.

*Obviousness of the solution*

25. It remains to be decided whether the skilled person desiring to solve the above problem would, in view of the disclosure of D4, possibly in combination with other prior art documents or with common general knowledge, have modified the composition of example 5 or D4 in such a way as to arrive at the composition of operative claim 1. The respondent referred in this respect in particular to D4.

As indicated in above point 15, D4 teaches in claim 6 that the curable composition may contain in addition to components (A) and (B) an antifouling agent, whereby claim 6 referring to any of the preceding claims suggests that an antifouling agent can be used in addition to silicone oil (C) defined in claim 4, which can be either methylphenyl silicone oil and/or polyether-modified silicone oil, i.e. a hydrophilic-modified polysiloxane. Moreover, the antifouling agents listed in the description (paragraph [0081] to [0086]) are all biocides, the amount of antifouling agent in the coating composition being preferably in the range of 0.5 to 10% by weight (paragraph [0087]).

D17a (page 3, section recommended use rates), D17b (page 2, section recommended use levels) and D17c (section antifouling efficacy, third paragraph) confirm that levels of biocides falling within that range are used for marine antifouling coating compositions.

26. The mere indication of the numerical range for the ratio between the hydrophilic-modified polysiloxane(s)

and biocide(s) defined in claim 1 is neither critical nor can it be seen as a purposive choice for solving the problem underlying the patent in suit. On this basis, the additional use of a biocide in an arbitrary amount relative to the amount of hydrophilic-modified polysiloxane which is defined in present claim 1 can only be seen as an obvious measure for the skilled person faced with the problem of providing a coating composition having improved long-term anti-fouling properties.

Having regard to the amount of hydrophilic-modified polysiloxane used in example 5 of D4, i.e. 5 wt%, it can be seen that the preferred amount of antifouling agent preconised in paragraph [0087] of D4 leads to a weight ratio between the one or more hydrophilic-modified polysiloxane(s) and the one or more biocide(s) which falls almost entirely in the range defined in operative in operative claim 1, as stressed by the respondent.

27. The appellant argues additionally that at the date of filing of the patent in suit the skilled person would not have expected that the addition of biocide(s) would improve the antifouling performance of the polysiloxane based coating. Reference was made to experiments of Milne and Callow reported on page 698 of D6 and the indication therein that a non-biocide containing control for a series of room-temperature vulcanising (RTV) silicone rubbers was better than the experimental materials that contained biocides. As shown in section 26.7 on page 707 of D6, information about the work of Milne and Callow addressed in D6 is to be found in D6b. As pointed out by the appellant, the observation that *"the non-biocide-containing control for this series was a better antifouling than the experimental antifouling*

*material containing biocides and that even the slime fouling which the control accumulated was remarkably non-adherent which serendipitously convinced us of the real possibilities of non-toxic antifoulings"* is reported in D6b, on page 229, right-hand column, last full paragraph. The statement refers to experiments carried out in the early 1970s, as can be seen from the first three full paragraphs on page 230 of D6b. The exact nature of the RTV silicone rubbers is not specified.

Based on D6b and D6, the latter being considered by the appellant to represent the common general knowledge, it is the appellant's opinion that the skilled person would rather have expected that the addition of biocide would lead to a decrease of the antifouling performance, therefore teaching the skilled person away from the presently claimed solution.

The appellant's position is however untenable when D4, whose example 5 is taken as the closest prior art, itself unmistakably teaches for its polysiloxane based coating compositions the addition of antifouling agents (paragraphs [0019], [0064] and claim 6) which are biocides (paragraphs [0081] to [0087]). Moreover, D6 does not state that the addition of biocides to silicone rubbers is generally known in the art to decrease their antifouling effect. D6 merely refers to a single document D6b reporting a few experiments with silicone rubbers whose nature is however only vaguely defined.

Moreover, as pointed out by the respondent, the much more recent publications D2 (claim 1, column 1, line 55 to column 2, line 15) and D9 (page 3, lines 1-6; page 14, lines 27-36; page 15, lines 31-36; claim 1)

recommend the combined use of organopolysiloxane(s) and biocide(s), in line with the teaching of D4. The appellant's argument that D2 would concern encapsulated biocide and therefore would not be relevant fails to convince, as the use of such encapsulated biocides falls within the scope of present claim 1, as confirmed by the general teaching of the patent in suit in paragraphs [0056] and [0057] and illustrated by top coat composition M in paragraph [0130].

Referring to the experimental data on file the appellant also argued that the magnitude of the additional antifouling effect resulting from the use of a biocide in the proportions specified in operative claim 1 would be surprising for the skilled person, rendering non obvious the addition of the biocide defined in operative claim 1.

This is also not convincing. Having regard to the suggestion in D4 itself, also in line with the teaching of D2 and D9, addressed in the above paragraph, the skilled person expects an additional antifouling effect brought about by biocide compounds. In such as case, where it is obvious from the state of the art that a certain measure, here the addition of a biocide, will bring about an improvement of a certain property, here antifouling properties, a surprising degree of this improvement cannot make this *per se* obvious measure non-obvious (Case Law, *supra*, I.D.10.8, in particular T 551/89 of 20 March 1990). Moreover, in the present case, the appellant did not even explain, let alone provide evidence for the scale of improvement which would be expected by the skilled person when using biocide(s). On that basis, the appellant's argument based on the alleged surprising magnitude of the

improvement of antifouling properties obtained with the present invention cannot be retained.

*Conclusion*

28. Consequently, starting from the coating composition of example 5 of D4 and faced with the problem of providing a coating composition having improved long-term anti-fouling performance, the skilled person would have found it obvious to add a biocide to that composition in the weight ratio between the one or more hydrophilic-modified polysiloxane(s) and the one or more biocide(s) specified in present claim 1, arriving thereby in an obvious way at coating compositions falling within the ambit of claim 1 of auxiliary request B1.

Auxiliary request B1 is therefore not allowable, as its subject-matter is devoid of an inventive step.

*Auxiliary request E - inventive step*

29. Claim 1 of auxiliary request E differs from that of auxiliary request B1 in that the lower weight ratio between the one or more hydrophilic-modified polysiloxane(s) and the one or more biocide(s) is 1:4 instead of 1:6.

The parties confirmed at the oral proceedings that their arguments in respect of the issue of inventive step of the subject-matter of claim 1 of auxiliary request B1 equally applied to inventive step of the subject-matter of claim 1 of auxiliary request E. On that basis, the above reasoning and resulting conclusion concerning the absence of an inventive step for the subject-matter of claim 1 of auxiliary request

B1 equally applies to the subject-matter of claim 1 of auxiliary request E.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:



D. Hampe

D. Semino

Decision electronically authenticated