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**Datasheet for the decision
of 19 January 2026**

Case Number: T 0134/24 - 3.2.05

Application Number: 20158202.0

Publication Number: 3699472

IPC: F16L19/00, F16L19/02,
F16L19/028

Language of the proceedings: EN

Title of invention:

Tube fitting, tube equipped with tube fitting, and method for
manufacturing tube fitting

Patent Proprietor:

Sanoh Industrial Co., Ltd.

Opponent:

TI Automotive (Heidelberg) GmbH

Relevant legal provisions:

EPC Art. 100(a), 54, 56, 84, 111(1), 123(2)

EPC R. 80

RPBA 2020 Art. 12(4), 13(2)

Keyword:

Grounds for opposition - lack of patentability (yes)
Amendment to case - reference to overlapping ranges - reasons
for submitting amendment in appeal proceedings (no)
Novelty - main request (yes)
Inventive step - main request (no) - auxiliary requests 1-3
(no) - auxiliary request 4 (yes)
Claims - clarity - auxiliary request 4 (no)
Amendment occasioned by ground for opposition - auxiliary
request 4a (yes)
Amendments - added subject-matter - auxiliary request 4a (no)
Amendment after summons - auxiliary request 4a - exceptional
circumstances (yes)



Beschwerdekammern

Boards of Appeal

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Case Number: T 0134/24 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 19 January 2026

Appellant:

(Opponent)

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(Patent Proprietor)

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 11 December
2023 rejecting the opposition filed against
European patent No. 3699472 pursuant to Article
101(2) EPC.**

Composition of the Board:

Chairman

P. Lanz

Members:

C. Kujat

A. Bacchin

Summary of Facts and Submissions

- I. The appeal lies from the decision of the opposition division of the European Patent Office rejecting the opposition against the European Patent No. 3 699 472 (the patent) pursuant to Article 101(2) EPC.
- II. In the decision under appeal, the opposition division *inter alia* came to the conclusion that the grounds for opposition under Article 100(a) EPC in conjunction with Articles 54 and 56 EPC did not prejudice the maintenance of the patent as granted. The opposition division *inter alia* relied on the following pieces of evidence:

D1 EP 2 706 277 B1
D4 DE 20 2017 104 112 U1
D5 EP 2 136 119 A1
D6 Wikipedia article "Polyethylen"
D7 Wikipedia article "Polytetrafluorethylen"
D8 Wikipedia article "Sulfide"
D9 Wikipedia article "Silicate"

The following further piece of evidence was mentioned in the appellant's (opponent's) letter of 15 January 2025:

D30 Wikipedia article "Festschmierstoff"

- III. In preparation for oral proceedings, the Board issued a communication pursuant to Article 15(1) RPBA dated 4 December 2025 setting out its provisional opinion on the relevant issues. Oral proceedings were duly held in the presence of both parties on 19 January 2026.

IV. The appellant (opponent) requested that the decision under appeal be set aside and that the patent be revoked. They also requested that auxiliary requests 3 to 10 be not admitted and that the case be remitted to the opposition division for further prosecution.

The respondent (patent proprietor) requested that the appeal be dismissed (main request), or, alternatively, that the decision under appeal be set aside and that the patent be maintained as amended on the basis of the claims of one of auxiliary requests 1 to 4 filed with the reply to the appeal, or of auxiliary request 4a filed during the oral proceedings, or of auxiliary requests 5 to 10 filed with their reply to the appeal.

V. Claim versions

Main request

Claim 1 of the main request (patent as granted) reads as follows (the feature references used by the parties are indicated in square brackets):

"**[1.1.]** A tube fitting (1A; 1B) that is capable of coupling a tube (BT) made from metal and provided with an annular portion (16; 26) upon an end portion thereof, to a mating member (MC1; MC2) by being installed upon an external periphery of the tube (BT) and by being fastened to the mating member (MC1; MC2) in a state of contacting the annular portion (16; 26), the annular portion (16; 26) projecting in a radially outward direction from the tube (BT), the tube fitting (1A; 1B) comprising:

[1.2] a threaded portion (12; 22) upon which is formed an external thread (12a; 22a) that engages with an

internal thread (12b; 22b) provided in the mating member (MC1; MC2);

[1.3] a contact portion (14; 24) that is provided at an end portion of the tube fitting in a direction of progression of the external thread (12a; 22a) when the tube fitting is being fastened, and that, when the tube fitting (1A; 1B) is fastened to the mating member (MC1; MC2), contacts the annular portion (16; 26) to press the annular portion (16; 26) against the mating member (MC1; MC2); and

[1.4] a resin coating layer (18; 28) provided over a coated region (R) that includes surfaces (17; 27) of the threaded portion (12; 22) and the contact portion (14; 24);

[1.5] and wherein: a through hole (10; 20) extending in a direction parallel to the direction of progression is pierced through both the threaded portion (12; 22) and the contact portion (14; 24);

[1.6] wherein the tube fitting (1A; 1B) is characterized in that the external thread (12a; 22a) has an outer diameter of 9.53 to 14.0 mm,

[1.7] and the contact portion (14; 24) has an inner diameter of 4.98 to 8.44 mm;

[1.8] the resin coating layer (18; 28) includes a polyethylene based substance, a lubricant, and solid particles;

[1.9] and when mass per unit area w (g/m^2) is defined as being a value obtained by dividing a mass difference between a state with the resin coating layer (18, 28) and a state without the resin coating layer (18; 28) by a surface area of the coated region (R), the mass per unit area w satisfies a relation $0.79 < w < 10.07$."

Auxiliary request 1

Claim 1 of auxiliary request 1 differs from claim 1 of the main request by the following amendments (additions and deletions highlighted by the Board):

"... a through hole (10; 20) extending in a direction parallel to the direction of progression is pierced through both the threaded portion (12; 22) and the contact portion (14; 24);

~~wherein the tube fitting (1A; 1B) is characterized in that~~

the external thread (12a; 22a) has an outer diameter of 9.53 to 14.0 mm, ...

... the mass per unit area w satisfies a relation $0.79 < w < 10.07$;

wherein the tube fitting (1A; 1B) is characterized in that:

when a testing member (TM) corresponding to the mating member (MC1; MC2) and a testing tube (T) having a same outer diameter as the tube (BT) and having a testing annular portion (TR) corresponding to the annular portion (16; 26) are prepared, and

when a fastening test is repeated n times (where $1 < n < 6$), the fastening test including: fastening operation to fasten the tube fitting (1A; 1B) to the testing member (TM) with a predetermined tightening torque, in a state that the contact portion (14; 24) is contacted against the testing annular portion (TR); and release operation to release coupling of the testing tube (T) from the testing member (TM) by loosening a fastening state after the fastening operation, if a maximum axial force generated in a first performance of the fastening test is termed an initial axial force F_1 (kN) and a maximum axial force generated

in an n-th performance of the fastening test is termed an n-th axial force F_n (kN), and if a value obtained by $-(F_n - F_1)/(n-1)$ is defined as being an axial force decrease ratio α (kN/turn), then the axial force decrease ratio α satisfies a relation $0 < \alpha < 1.75$."

Auxiliary request 2

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 by the following amendments (additions and deletions highlighted by the Board):

"...the mass per unit area w satisfies a relation $0.79 < w < 10.07$;

~~wherein the tube fitting (1A; 1B) is characterized in that:~~

when a testing member (TM) corresponding to the mating member (MC1; MC2) and a testing tube (T) having a same outer diameter ... then the axial force decrease ratio α satisfies a relation $0 < \alpha < 1.75$;

wherein the tube fitting (1A; 1B) is characterized in that:

the tube (BT) is a brake tube that is employed as a brake conduit for an automobile, and, when the predetermined tightening torque is in a range of 12.0 to 22.0 Nm, the initial axial force F_1 satisfies a relation $F_1 < 14.0$."

—
Auxiliary request 3

Claim 1 of auxiliary request 3 differs from claim 1 of the main request by the following amendments (additions and deletions highlighted by the Board):

"... a through hole (10; 20) extending in a direction parallel to the direction of progression is pierced

through both the threaded portion (12; 22) and the contact portion (14; 24);
~~wherein the tube fitting (1A; 1B) is characterized in that~~
the external thread (12a; 22a) has an outer diameter of 9.53 to 14.0 mm, ...
... the mass per unit area w satisfies a relation $0.79 < w < 10.07$;
wherein the tube fitting (1A; 1B) is characterized in that:
the mass per unit area w satisfies a relation
 $1.20 < w < 10.07$."

Auxiliary request 4

Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 3 by the following amendments (additions and deletions highlighted by the Board):

"...wherein the tube fitting (1A; 1B) is characterized in that:
the mass per unit area w satisfies a relation ~~1.20~~
 $0.79 < w < \underline{10.079.00}$."

Claim 11 of auxiliary request 4 reads as follows:

"11. A method for manufacturing a tube fitting (1A; 1B) according to any one of claims 1 to 9,
the method comprising:
a preparation step of preparing the tube fitting (1A; 1B); and
a coating step of forming a resin coating layer (18; 28) upon a coated region (R) provided upon the surface of the tube fitting (1A; 1B);
wherein:

the coating step comprises a dipping step of dipping the tube fitting (1A; 1B) into a coating material (C1 to C4) that includes as components a polyethylene based substance, a lubricant, and solid particles and having viscosity within a range of 4.24 to 5.27 mPa·s at 25°C measured using a rotational viscosimeter conforming to the ISO 2555:1990 standard with a rotational speed of a spindle of the rotational viscosimeter set to 60 rpm, and adhering the coating material (C1 to C4) to the coated region (R), and a drying step of, after the dipping step, drying the coating material (C1 to C4) which is adhered to the coated region (R) of the tube fitting (1A; 1B); and

in the dipping step, with mass per unit area w (g/m²) being defined as being a value obtained by dividing a mass difference between a state with the resin coating layer (18; 28) and a state without the resin coating layer (18; 28), the mass per unit area w is controlled within a range $0.79 < w < 10.07$ by dipping the tube fitting (1A; 1B) while regulating a temperature of the coating material (C1 to C4) within a range of 30°C to 40°C."

Auxiliary request 4a

Auxiliary request 4a comprises only one independent claim. It is directed to a tube fitting and differs from claim 1 of the main request by the following amendments (additions and deletions highlighted by the Board):

"... a through hole (10; 20) extending in a direction parallel to the direction of progression is pierced through both the threaded portion (12; 22) and the contact portion (14; 24);
~~wherein the tube fitting (1A; 1B) is characterized in that~~

the external thread (12a; 22a) has an outer diameter of 9.53 to 14.0 mm, and the resin coating layer (18; 28) includes a polyethylene based substance, a lubricant, and solid particles;
characterized in that: ~~and~~ when mass per unit area w (g/m^2) is defined as being a value obtained by dividing a mass difference between a state with the resin coating layer (18, 28) and a state without the resin coating layer (18; 28) by a surface area of the coated region (R), the mass per unit area w satisfies a relation $0.79 < w < \underline{10.079.00}$."

VI. The parties' relevant arguments can be summarised as follows.

Main request - novelty

Appellant (opponent)

In the statement of grounds of appeal, the appellant put forward that it is common ground that document D1 discloses features 1.1 to 1.7 of claim 1 of the main request. The composition according to feature 1.8 is disclosed in paragraph [0029], in particular in column 6, lines 23 to 26, of document D1. With regard to the lower end point of feature 1.9, the mass per unit area of a 1 μm layer of the lightest polyethylene with a minimum density of 0.87 g/cm^3 is 0.87. The minimum mass per unit area of a 1 μm layer of a composition containing the lightest materials in paragraph [0029] is 1.984 g/m^2 . The maximum mass per unit area of a 1 μm layer of a composition containing the heaviest materials in paragraph [0029] is 8.33 g/m^2 . The mass unit area of a 2 μm layer of that composition is 16.66 g/m^2 . Document D1 therefore discloses an overlapping range of mass per unit area. The person

skilled in the art would seriously contemplate applying the technical teaching of document D1 in the range of overlap.

In the letter of 15 January 2025, the appellant argued that paragraph [0016] and claim 5 of document D1 disclose a minimum layer thickness of 1 μm and a maximum layer thickness of 2 μm . The actual thickness of the coating layer must be between these extreme values. Taking into account lutetium-yttrium-oxyorthosilicate (hereafter: LYSO), the maximum mass per unit area of a 2 μm layer of a composition containing the heaviest materials in paragraph [0029] is 16.9 g/m^2 .

During the oral proceedings before the Board, the appellant emphasized that their argumentation concerning the disclosure of an overlapping range of mass per unit area in document D1 relates to a factual element which had already been presented to the opposition division in the letter of 4 August 2023. Paragraph 2.2 of that letter refers to extreme examples outside the claimed range. In the statement of grounds of appeal, only the legal interpretation changes.

Respondent (patent proprietor)

In the reply to the statement of grounds of appeal, the respondent argued that document D1 does not disclose the upper end point of feature 1.9. The appellant's arguments directed to the alleged disclosure of an overlapping range in document D1 should not be admitted into the appeal proceedings under Article 12(4) RPBA. Due to drying, cross-linking and a thermal treatment involving partial destruction, the density of the resin coating layer in document D1 does not correspond to the

result of simply adding up the densities of the different components of the first layer in their proportions. The skilled person would select LYSO as silicate with a maximum density of 7.5 g/cm^3 , but would not select molybdenum disulfide as sulfide.

In the letter of 16 April 2025, the respondent put forward that cross-linking leads to a higher density of the coating layer in document D1.

Main request - inventive step

Appellant

In the statement of grounds of appeal, the appellant put forward that, starting from document D1, the skilled person will choose molybdenum disulfide because it is cheap. A $2 \text{ }\mu\text{m}$ layer containing the heaviest silicate zirconium has a mass per unit area of 8.627 g/m^2 . The common general knowledge therefore renders claim 1 of the main request obvious.

In the letter of 15 January 2025, the appellant underlined that the common general knowledge renders claim 1 of the main request obvious. The objective technical problem starting from document D1 is putting the teaching in paragraph [0029] of that document into practice. Wikipedia article D30 proves that molybdenum disulfide is a solid lubricant well known to the skilled person. A $2 \text{ }\mu\text{m}$ layer containing LYSO as silicate and molybdenum disulfide as sulfide has a mass per unit area of $9,79 \text{ g/m}^2$.

During the oral proceedings before the Board, the appellant emphasized that the argumentation in paragraph 3.1.2.1 of the impugned decision is merely

supplemented by selecting a silicate and calculating the mass per unit area. This is a reaction to the opposition division's remark in paragraph 3.1.2.1 about a missing calculation. The submission in the statement of grounds of appeal therefore constitutes a refinement of their case.

Respondent

The respondent referred to paragraphs [0007] and [0077] of the patent and argued that the objective technical problem underlying feature 1.9 should be formulated as providing a tube fitting that is capable of strongly coupling a tube and a mating member while preventing damage of the tube. In their view, the corrosion preventing coating 22 in document D1 leads the skilled person away from the invention. The calculation of the mass per unit area based on the choice of molybdenum disulfide as sulfide is an amendment to the appellant's case and should not be admitted. Moreover, the use of molybdenum disulfide is not part of the common general knowledge. A correct application of the problem-and-solution approach teaches away from the use of molybdenum disulfide because it decreases the frictional force between the tube fitting and the mating member, thereby increasing the axial force. This is contrary to the desired technical effect of keeping the initial axial force and hence the co-rotation torque low.

Auxiliary requests 1 and 2 - inventive step

Appellant

In the statement of grounds of appeal, the appellant put forward that the additional features in claim 1 of

auxiliary requests 1 and 2 relate to a testing member which is not part of the tube fitting of claim 1 of these requests. The additional features therefore do not have a limiting effect.

In the letter of 15 January 2025, the appellant argued that any tube fitting having the structural features of granted claim 1 of the patent will also have the additional features of granted claims 6 and 7, which are the additional features now included in claim 1 of auxiliary requests 1 and 2.

Respondent

The respondent argued that the additional features from claim 6 of the patent as granted in claim 1 of auxiliary requests 1 and 2 are directed to the axial force decrease ratio. The appellant did not show that this parameter is independent of any physical properties of the claimed tube fitting. Concerning claim 1 of auxiliary request 2, the appellant also did not show that for any tube fitting the additional features in this claim are fulfilled.

Auxiliary requests 3, 4 and 5 to 10 - admittance

Appellant

In the letter of 15 January 2025, the appellant argued that auxiliary requests 3, 4 and 5 to 10 should not be admitted into the appeal proceedings because they do not converge with respect to auxiliary requests 1 and 2.

During the oral proceedings before the Board, the appellant referred to their written submissions.

Respondent

In the letter of 16 April 2025, the respondent put forward that non-convergence of requests, on its own, is not a sufficient reason for non-admittance. All these auxiliary requests were already part of the first-instance proceedings and should therefore be considered in the appeal proceedings.

Auxiliary request 3 - inventive step

Appellant

In the statement of grounds of appeal, the appellant put forward that the skilled person would arrive in the claimed range with some probability. They referred to the arguments submitted on the previous pages of the statement of grounds of appeal ("s. oben", which the Board understands as "see above".)

Respondent

In the reply to the statement of grounds of appeal, the respondent argued that the additional features in claim 1 of auxiliary request 3 prevent loss of corrosion resistance when the flare nut is re-used.

Auxiliary request 4 - remittal - Article 111(1) EPC

Appellant

During the oral proceedings before the Board, the appellant requested to remit the case to the opposition division for further prosecution, as the opposition division did not decide on the subject-matter of the

auxiliary requests and it appeared that additional discussion was required with regard to inventive step of auxiliary request 4.

Respondent

During the oral proceedings before the Board, the respondent objected to remitting the case to the opposition division arguing that the alleged lack of information necessary for discussion was attributable to the appellant.

Auxiliary request 4 - inventive step - Article 56 EPC

Appellant

In the statement of grounds of appeal, the appellant put forward that the skilled person would arrive with a certain probability at a mass per unit area within the smaller range of auxiliary request 4. The argumentation for the main request in section 4.1 of the statement of grounds of appeal also applied to auxiliary request 4.

During the oral proceedings before the Board, the appellant argued that paragraphs [0006] and [0011] of document D1 motivate the skilled person to reduce production costs. The skilled person selects average or mean values for the densities of silicates and sulfides, for their amounts in the coating composition, and for the thickness of the coating in document D1, as discussed in section 3.6 of the statement of grounds of appeal. These arguments were already presented on page 3 of the letter to the opposition division of 4 August 2023.

Respondent

During the oral proceedings before the Board, the respondent argued that a uniform and constant coating thickness of 1.5 μm cannot be achieved in document D1. This had not been argued in the appellant's letter of 4 August 2023, which only referred to average densities. The references to specific amounts of 40% for PTFE and sulfide, to mean densities for these ingredients of the coating composition and to a coating thickness of 1.5 μm in section 3.6 on page 13 of the statement of grounds of appeal, and to production costs constitute amendments to the appellant's case which should not be admitted.

Auxiliary request 4 - clarity - Article 84 EPC

Appellant

During the oral proceedings before the Board, the appellant submitted that the Board is correct in noting that the claims of auxiliary request 4 are unclear because of two different ranges for the mass per unit area in claim 11.

Respondent

During the oral proceedings before the Board, the appellant argued that the claims of auxiliary request 4 are clear because the skilled person realises that the narrower range of the two different ranges for the mass per unit area is relevant.

Auxiliary request 4a - admittance

Appellant

During the oral proceedings before the Board, the appellant had no objections under Article 13(2) RPBA, however objected to admittance under Rule 80 EPC, due to the deletion at line 21 of claim 1 in the marked-up version of "wherein the tube fitting (1A; 1B) is characterised in that" and due to the addition of "characterised in that" in line 26 of claim 1 in the marked-up version.

Respondent

During the oral proceedings before the Board, the respondent argued that the filing of auxiliary request 4a is a direct reaction to the clarity objection against auxiliary request 4, which was raised for the first time during the oral proceedings before the Board. Thus both Article 13(2) RPBA and Rule 80 EPC are satisfied.

Auxiliary request 4a - clarity, amendments

Appellant

During the oral proceedings before the Board, the appellant raised objections under Articles 84 and 123(2) EPC due to the addition in line 26 of claim 1 of the expression "characterised in that". The appellant was satisfied that the clarity objection raised by the Board against auxiliary request 4 was resolved by the amendment of the respondent.

Respondent

During the oral proceedings before the Board, the respondent argued that claim 1 of auxiliary request 4a is clear, and that the amendments therein are disclosed in the application as filed.

Reasons for the Decision

1. Main request - novelty - Articles 100(a) and 54 EPC

The appellant disputes the opposition division's decision finding that the subject-matter of claim 1 of the main request is novel over the disclosure of document D1, see paragraph 2 of the impugned decision. This novelty objection does not convince the Board for the following reasons:

- 1.1 Document D1 discloses a tube fitting according to features 1.1 to 1.8 of claim 1 of the main request. The document shows a tube fitting (figures 1 and 2: *"Rohrschraube 10"*) that is capable of coupling a tube (figure 2: *"Rohrleitung 30"*) made from metal and provided with an annular portion upon an end portion thereof (figure 2: *"Bördelschulter 28"*), to a mating member (paragraph [0027]: *"an einem nicht dargestellten Aggregat eines Bremssystems"*). The tube fitting is installed upon an external periphery of the tube and fastened to the mating member in a state of contacting the annular portion, see figure 2. A resin coating layer is provided over a coated region that includes surfaces of the threaded portion and the contact portion; see the extension of *"reibungsvermindernde Schicht 26"* in figures 1 and 2. The resin coating layer includes a polyethylene based substance (paragraph

[0029]: "5 % bis 20 % Polyethylen"), a lubricant (paragraph [0029]: "5 % bis 60 % Polytetrafluorethylen"), and solid particles (paragraph [0029]: "5 % bis 60 % eingelagerte Sulfide und 3 % bis 20 % Silikate").

- 1.2 According to feature 1.9 of claim 1 of the main request, mass per unit area w (g/m^2) is defined as being a value obtained by dividing a mass difference between a state with the resin coating layer and a state without the resin coating layer by a surface area of the coated region. In that respect, it is common ground that document D1 does neither mention the parameter "mass per unit area" for the resin coating layer 26 nor a specific example for the thickness and composition of this layer. However, this layer must have a mass per unit area, which is the product of its density and its thickness (if both are uniform), or the integral of this product over the surface of the tube fitting (if density and/or thickness have localized variations). The appellant deduced the mass per unit area of resin coating layer 26 by making assumptions about its thickness and its density. The density of resin coating layer 26 was obtained by selecting representatives for the four components mentioned in paragraph [0029] of document D1, i.e. polyethylene, polytetrafluoro-ethylene, silicate and sulfide, by calculating volume fractions of these components from the percentages in paragraph [0029], and by summing the volume fractions, each multiplied by the density of the respective component. For the thickness of resin coating layer 26, the opposition division did not accept that document D1 discloses a mode of realization with 1 μm thickness in the complete layer, see paragraph 2.2.2.1 of the impugned decision, and thus,

did not consider feature 1.9 to be disclosed in that document.

As the appellant challenges this conclusion, the Board must examine whether document D1 also discloses that the mass per unit area w of resin coating layer 26 satisfies a relation $0.79 < w < 10.07$.

- 1.3 With regard to the lower end point of " $0.79 < w$ ", it is undisputed that polyethylene is the lowest density component of resin coating layer 26. The density of polyethylene ranges from 0.87 to 0.97 g/cm³, see the table on page 3 of Wikipedia article D6. As the thickness of the resin coating layer is between 1 μ m and 2 μ m, see claim 5 of document D1, the mass per unit area of the actual resin coating layer must exceed that of a hypothetical layer of polyethylene with a uniform thickness of 1 μ m. Such a hypothetical layer has a mass per unit area of 0.87 - for the lightest polyethylene of a density of 0.87 g/cm³ - which is above the lower end point of 0.79. It is common ground that the densities of the other three components in resin coating layer 26 are higher than that of polyethylene. In fact, according to the evidence submitted with the notice of opposition, the density of polytetrafluoroethylene is 2.2 g/cm³, see page 2 of Wikipedia article D7; the density of a sulfide exceeds that of realgar of 3.6 gm/cm³ according to page 2 of Wikipedia article D8, and the density of a silicate exceeds that of opal of 2.1 g/cm³ according to page 5 of Wikipedia article D9. As the maximum amount of polyethylene in the resin coating layer is 20%, see column 6, line 24 of document D1, the other three components constitute 80% or more of that layer. Due to the higher densities of these components, and due to the layer thickness between 1 μ m and 2 μ m, the actual

resin coating layer 26 must have a mass per unit area which exceeds that of the hypothetical layer, i.e. which is higher than 0.87.

- 1.4 This conclusion is not altered by the respondent's counter-arguments:
 - 1.4.1 The respondent asserts that the density of the resin coating layer cannot be calculated from the densities of the initial components. In the Board's view, the disclosure in paragraph [0029] of document D1 relates to the finished, dried coating layer (column 5, lines 56 to 58: *"Die Beschichtung 20 umfasst ... eine erste Lage 24, die eine reibungsvermindernde Schicht 26 aufweist..."*; column 6, line 23: *"Die Schicht 26..."*). As the components of the resin coating layer are in their solid state, irrespective of the potential influence of a previous drying step, their densities can be obtained from the submitted evidence such as Wikipedia articles D6 to D9.
 - 1.4.2 During oral proceedings before the Board, the respondent argued that the percentages in paragraph [0029] do not relate to volume fractions, but to mass fractions. While this aspect indeed had been left open by the opposition division, see paragraph 2.2.2.3 of the impugned decision, the only calculations in the respondent's reply to the appeal are based on volume fractions, see the page 8 of that reply. In view of this contradiction and since both parties established the values for the mass per unit area of layer 26 of document D1 based on volume fractions, the Board concludes that the percentages in paragraph [0029] of document D1 will be construed by the person skilled in the art as volume percent.

1.4.3 The respondent argues that cross-linking at high temperatures and subsequent thermal treatment involving partial destruction affect density. In their view, the density of the finished resin coating layer does not correspond to the result of simply adding up the densities of the different components of the layer in their proportions (this corresponds to the appellant's method of summing the volume fractions, each multiplied by the density of the respective component, see above), see the third full paragraph on page 7 of the respondent's reply to the appeal, and the bridging paragraph between pages 5 and 6 of their letter of 16 April 2025. These arguments, which also apply to a hypothetical layer of polyethylene, do not convince the Board. The Board concurs with the respondent in that cross-linking increases the density, see the second and the last paragraph on page 6 of their letter of 16 April 2025, and thus, cross-linking increases the minimum mass per unit area of the hypothetical layer beyond 0.87. This is confirmed by the fact that the density of cross-linked polyethylene is in the order of 0.94 g/cm³. Turning to the alleged influence of a thermal treatment involving partial destruction, the respondent did not provide evidence for their allegation that such treatment of the resin coating layer affects its density, see the bridging paragraph between pages 5 and 6 of their letter of 16 April 2025. In the absence of any evidence, the Board is not convinced by the respondent's allegation, and in particular cannot see that such treatment could reduce the density of the resin coating layer.

1.5 For these reasons, the Board concurs with the appellant in that document D1 implicitly discloses that the mass per unit area of resin coating layer 26 is above the lower end point of "0.79<w". However, feature 1.9 can

only be implicitly disclosed in document D1 if any composition of the resin coating layer according to paragraph [0029] in combination with any layer thickness according to claim 5 of that document results in a mass per unit area of the resin coating layer below the upper end point of " $w < 10.07$ " of feature 1.9.

The Board must therefore now examine the appellant's argumentation directed to the the upper end point of " $w < 10.07$ ".

- 1.6 In that respect, see page 12 of their statement of grounds of appeal, the appellant puts forward that the resin coating layer in document D1 can have a mass per unit area of 16.66 g/m^2 for a maximum thickness of $2 \text{ }\mu\text{m}$ and for the heaviest possible case, i.e. the heaviest materials covered by the composition according to paragraph [0029] of document D1. The appellant concedes that such an embodiment lies outside the claimed range of " $0.79 < w < 10.07$ ", but considers the upper end point of " $w < 10.07$ " disclosed in that document because of an overlapping range of the mass per unit area. At the oral proceedings before the board, the appellant submitted that the line of argumentation concerning such an overlapping range constituted a factual element, which had already been presented in opposition, and this was sufficient to justify the changed legal interpretation of feature 1.9 presented in the statement of grounds of appeal.

The Board considers the new line of argument relying on an overlapping range an amendment to the appellant's case, and does not admit it into the appeal proceedings pursuant to Article 12(4) RPBA for the following reasons:

1.6.1 In their notice of opposition, the appellant had referred to claim 5 of document D1. They put forward that the thickness of the resin coating layer is at least 1 μm and at most 2 μm , and argued that a minimum mass per unit area and a maximum mass per unit area of the resin coating layer can be determined for the respective thicknesses, see the bridging paragraph between pages 8 and 9 of the notice of opposition. In the context of novelty, a resin coating layer with a thickness of 1 μm and a minimum mass per unit area was discussed in detail, see pages 9 and 10 of the notice of opposition.

A thickness of 2 μm is discussed for the first time - albeit in the context of inventive step - in the appellant's letter to the opposition division of 4 August 2023. Paragraph 2.2 of this letter does not refer to an overlapping range of the mass per unit area or to a value of 16.66 g/m^2 . The Board does not share the appellant's view that this paragraph of the letter contains a factual element in the form of extreme examples which could form a basis for the argumentation directed to an overlapping range once the legal interpretation is changed. In the context of inventive step, paragraph 2.2 of the letter discusses the toxicity of cinnabarite and galenite as a reason why the skilled person would not choose these sulfides in a resin coating layer with a thickness of 2 μm . For such a 2 μm layer, no maximum mass per unit area is calculated. Instead, the appellant presents a value of 7.3 g/m^2 when bornite is chosen as sulfide. The reference to extreme examples in paragraph 2.2 of the letter is therefore understood by the Board in the sense that the skilled person would not choose heavy and poisonous sulfides, if they can use bornite instead. In the Board's view, this is not a factual

element relating to an overlapping range, because the concept of overlapping ranges is based on the assumption that the skilled person could and would work in that range, i.e. would choose the heavy and poisonous sulfides cinnabarite and galenite in the present case.

As the appellant refers to an overlapping range of mass per unit area, or to the value of 16.66 g/m^2 in the context of novelty for the first time in their statement of grounds of appeal, the admittance of this new line of argument is at the discretion of the Board, Article 12(4) RPBA.

- 1.6.2 Pursuant to Article 12(4) RPBA, the Board shall exercise its discretion in view of, inter alia, the complexity of the amendment, the suitability of the amendment to address the issues which led to the decision under appeal, and the need for procedural economy. In the present case, there was no surprising development of the case before the opposition division. Instead, the opposition division assessed the appellant's references to a thickness between $1 \mu\text{m}$ and $2 \mu\text{m}$ and to minimum and maximum mass per unit area in paragraph 3.4 of the notice of opposition, see paragraphs 2.2.1.5 and 2.2.2.1 of the impugned decision. The opposition division concluded that no worst case scenario in terms of percentages, densities and thicknesses for the highest possible value, i.e. the maximum mass per unit area of the resin coating layer, was presented, see paragraph 2.2.2.4 of the impugned decision (which refers to the mass per unit area as "parameter w"). This should not have come as a surprise to the appellant, because they had already indicated in paragraph 3.4 of the notice of opposition that a maximum mass per unit area can be obtained for

document D1. The fact that the appellant decided not to discuss the maximum mass per unit area in the proceedings leading to the impugned decision is no surprising development of the case. It therefore cannot justify admission of the amendment into the appeal proceedings.

- 1.6.3 In the Board's view, the line of argument in the context of novelty, and relating to a layer thickness of 2 μm of the resin coating layer and to the alleged disclosure of the upper end point " $w < 10.07$ " of feature 1.9 due to an overlapping range of the mass per unit area in document D1 should have been presented against novelty already before the opposition division. Pursuant to Article 12(4) RPBA, they are not admitted into the appeal proceedings.
- 1.7 The appellant's arguments in paragraphs 3.6 and 3.7 of the statement of grounds of appeal shall justify that the skilled person will seriously contemplate applying the technical teachings of document D1 in the range of overlap. These arguments are linked to the allegation that document D1 discloses an overlapping range of the mass per unit area, and thus, may not be considered further novelty objections. Also the appellant's letter of 15 January 2025 does not contain further novelty objections, see pages 6 to 8 of that letter.
- 1.8 Summarizing the above, the Board concludes that the subject-matter of claim 1 of the main request is novel over the disclosure of document D1, Article 100(a) EPC in conjunction with Article 54 EPC.

2. *Main request - inventive step - Articles 100(a) and 56 EPC*

The appellant disputes the opposition division's decision finding that the subject-matter of claim 1 of the main request involves an inventive step starting from document D1, see paragraph 3 of the impugned decision.

2.1 Admittance of the line of argument directed to putting the disclosure of document D1 into practice

2.1.1 In the context of putting the disclosure of document D1 into practice, the appellant had argued before the opposition division that the skilled person would choose molybdenum disulfide. Thereby, they would obtain a coating layer with a mass per unit area within the range claimed by feature 1.9 of claim 1. The opposition division accepted molybdenum disulfide as most straightforward option for a sulfide in the composition according to paragraph [0029] of document D1. However, the opposition division concluded that the appellant had not presented any evidence that a coating layer including molybdenum disulfide as sulfide would yield a value of the parameter w (i.e. the mass per unit area) within the range claimed by feature 1.9, see paragraph, 3.1.2.1 of the impugned decision. With the statement of grounds of appeal, the appellant rebuts this conclusion with calculations for resin coating layers of 1 μm and 2 μm and comprising a light polyethylene (with a density of 0.87 g/cm³), molybdenum disulfide and zirconium (with a density of 4.7 g/cm³), see the bridging paragraph between pages 19 and 20. These layers have respective mass per unit areas of 4.3135 or 8.626 g/m². In the letter of 15 January 2025, the

appellant supplements their calculations by considering a heavy polyethylene (with a density of 0.97 g/cm^3) and lutetium-yttrium-oxyorthosilicate (with a density of 7.4 g/cm^3), which results in a mass per unit area of 9.79 g/m^2 for the $2 \text{ }\mu\text{m}$ resin coating layer.

- 2.1.2 The respondent requests non-admittance into the appeal proceedings, essentially arguing that these arguments were not submitted at first instance and are therefore not part of the appeal proceedings, see the third paragraph on page 12 of their reply to the appeal. The Board does not share the respondent's view, because the unspecific argument that something was not submitted before the opposition division applies to any amendment to a case, and thus, this argument does not address the particularities of the amendment at stake. In the present case, the opposition division states in paragraph 3.1.2.1 of the impugned decision that they were not presented with evidence that a coating layer according to document D1 and comprising molybdenum disulfide would yield a mass per unit area within the range claimed by feature 1.9. The Board understands this passage of the impugned decision in the sense that concrete values of mass per unit area were missing for the suggested layer composition. With regard to mass per unit area of the resin coating layer, it is common ground that the lower end point of " $0.79 < w$ " in claim 1 of the main request refers to the thinnest possible layer, while the upper end point " $w < 10.07$ " concerns the thickest possible layer. The appellant's calculations in appeal cover both ends of the thickness range according to claim 5 of document D1, i.e. $1 \text{ }\mu\text{m}$ and $2 \text{ }\mu\text{m}$, and the heaviest possible silicates. Therefore, these calculations - if accepted by the Board - could prove that a coating layer according to document D1 and comprising molybdenum disulfide yields a mass per unit

area within the range claimed by feature 1.9. While the opposition division considered choosing molybdenum disulfide for the coating layer according to document D1 the most straightforward option, it missed exactly that information on the resulting value for the mass per unit area. The Board therefore considers the addition of this information a legitimate development of the appellant's previous argumentation of putting the disclosure of document D1 into practice, which the appellant had no reasons to file earlier in opposition proceedings. Consequently the board admits it into the appeal proceedings, Article 12(4) RPBA.

- 2.2 With regard to inventive step of the subject-matter of claim 1 of the main request, the respondent defined the objective technical problem based on paragraphs [0007] and [0077] of the patent as providing a tube fitting that is capable of strongly coupling a tube and a mating member while preventing damage of the tube. The Board concurs with the respondent in that the prior art cited in the present proceedings does not mention the criterion of mass per unit area. However, claim 1 of the main request is a product claim, and thus, the claimed tube fitting can only have a single, fixed mass per unit area once the thickness and composition of its resin coating layer are defined. The resin coating layer in the closest prior art D1 implicitly has a mass and covers a defined area of the tube fitting, and thus, the tube fitting according to document D1 will also have a single, fixed mass per unit area once the thickness and composition of its resin coating layer are defined. The tube fitting according to claim 1 of the main request can only be inventive if is distinguishable from and non-obvious over the tube fitting obtained by putting the closest prior art D1 into practice. In the present case, the Board therefore

considers it justified to formulate the alternative objective technical problem of putting the closest prior art tube fitting, i.e. that known from document D1, into practice.

- 2.3 The respondent did not dispute the accuracy of the appellant's calculations of the mass per unit area on the basis of document D1. The Board therefore accepts that a resin coating layer comprising a heavy polyethylene, molybdenum disulfide and lutetium-yttrium-oxyorthosilicate according to the proportions in paragraph [0029] of document D1, and within the thickness range in claim 5 of that document, has a mass per unit area between 4.895 (half the value of the 2 μm layer on page 10 of the appellant's letter of 15 January 2025) and 9.79 g/m^2 . Even though the thickness range of between 1 μm and 2 μm may not be understood in the sense that the layer thickness is uniform, the thickness of the actual resin coating layer must be between these two extremes. As a consequence, the mass per unit area of the actual resin coating layer comprising a heavy polyethylene, molybdenum disulfide and lutetium-yttrium-oxyorthosilicate according to the proportions in paragraph [0029] in document D1 must be between 4.895 and 9.79 g/m^2 .

The decision on inventive step for the main request starting from document D1 therefore hinges on the skilled person's reasons for choosing molybdenum disulfide as the sulfide in the composition according to paragraph [0029] when the tube fitting of document D1 is put into practice.

- 2.4 The respondent essentially argued that there are other possible sulfides, and that document D1 teaches away

from the use of molybdenum disulfide. None of these arguments convince the Board for the following reasons:

- 2.4.1 The Board concurs with the respondent in that there may be alternative sulfides such as tungsten disulfide which are known for their lubrication properties. However, according to Wikipedia article D30, molybdenum disulfide is known for its lubrication properties (first paragraph: "Festschmierstoffe verringern die Reibung aufgrund der Form der Partikel (Plättchen), die leicht aufeinander gleiten. Am bekanntesten sind Graphit und Molybdändisulfid."). It is uncontested that the use of molybdenum disulfide as lubricant belongs to the common general knowledge. The suitability of molybdenum disulfide is also confirmed by the patent, which mentions this material as one of the preferred lubricants (paragraph [0038]: "And, for example, one or any combination of polyethylene wax, molybdenum disulfide, graphite, or boron nitride may be selected for the lubricant."). The respondent's reference to alternative sulfides therefore does not convince the Board that the opposition division made a mistake when they considered the choice of molybdenum disulfide the most straightforward option, see paragraph 3.1.2.1 of the impugned decision.
- 2.4.2 In their reply to the statement of grounds of appeal, the respondent put forward that a corrosion preventive coating 22 in document D1 would lead the skilled person away from the claimed solution. Indeed, a zinc-nickel corrosion prevention layer 22 is applied to the roughened tube fitting of document D1 prior to application of resin coating layer 26, see paragraphs [0016] and [0030] of that document. However, such an intermediate layer may also be present in the patent, see claims 8 and 9 according to which a zinc-based

plated layer is formed upon the surfaces of the tube fitting. Contrary to the respondent's view, the Board does not believe that the corrosion prevention layer in document D1 would teach the skilled person away from the claimed solution.

- 2.4.3 With reference to paragraphs [0074] to [0077] of the patent, the respondent argued that document D1 teaches away from choosing molybdenum disulfide because that material would decrease the frictional force between the tube screw and a corresponding mating member, and thereby increase the axial force. In the respondent's view, this was contrary to the above teaching in the patent according to which the axial force and the co-rotation torque should be kept low. The Board is not convinced by this argument because a teach-away in the context of the problem-and-solution approach does not relate to information in the patent, but to hints in a piece of prior art which would prevent the skilled person from combining it with another piece of prior art.

- 2.5 Summarizing the above, a skilled person will choose molybdenum disulfide in an obvious manner as sulfide when putting the resin coating according to paragraph [0029] of document D1 into practice and thereby arrive at the subject-matter of claim 1 without inventive skill. The ground for opposition under Article 100(a) EPC in conjunction with Article 56 EPC therefore prejudices maintenance of the patent as granted.

3. *Auxiliary requests 1 and 2 - inventive step - Article 56 EPC*

The respondent is of the opinion that the subject-matter of claim 1 of auxiliary requests 1 and 2

involves an inventive step. The Board disagrees for the following reasons:

- 3.1 Concerning auxiliary requests 1 and 2, it is common ground that the additional features in independent claim 1 of auxiliary request 1 spell out the requirements of reference standard "b" according to paragraph [0076] of the patent. This standard defines the upper limit value of the axial force decrease ratio α . It is also common ground that the additional features in independent claim 1 of auxiliary request 2 spell out the requirements of reference standard "a" according to paragraph [0075] of the patent. This standard defines the upper limit value of the initial axial force F_1 .
- 3.2 According to paragraphs [0074] and [0078] of the patent, the range $0.79 < w < 10.07$ in feature 1.9 of claim 1 was obtained from a review of samples according to figures 13A and 13B of the patent. The samples which passed both standards "a" and "b" had a mass per unit area within the range of $0.79 < w < 10.07$. In the Board's view, this underlines that the additional features in claim 1 of auxiliary requests 1 and 2 do not place any further structural limitations on the claimed tube fitting beyond that of feature 1.9. The basis for the problem-and-solution approach therefore does not change with respect to the main request.
- 3.3 As the tube fitting in document D1 renders the main request obvious, this conclusion will also apply to auxiliary requests 1 and 2. The subject-matter of claim 1 of these requests therefore does not meet the requirements of Article 56 EPC.

4. *Auxiliary requests 3, 4 and 5 to 10 - admittance*

Auxiliary requests 3, 4 and 5 to 10 were filed with the statement of grounds of appeal and correspond to auxiliary requests 3 to 10 already submitted to the opposition division. The appellant disputes admittance of these requests into the appeal proceedings. The Board disagrees for the following reasons:

- 4.1 During the oral proceedings before the Board, the appellant referred to their written submissions.
- 4.2 In its communication, the Board was of the preliminary opinion that auxiliary requests 3, 4 and 5 to 10 form part of the appeal proceedings. The Board presented the following preliminary view (see paragraph 5.2 of the communication):

"5.2 The appellant requests non-admission of auxiliary requests 3 to 10 and essentially argues that these requests are not converging. Notwithstanding the respondent's objection that this issue seemingly was not raised before the opposition division and therefore seems to constitute an amendment to the appellant's case, the board is presently not convinced by the objection. Admission of these requests does not seem to be at the discretion of the board. Auxiliary requests 3 to 10 seem to correspond to the auxiliary requests 3 to 10 filed in opposition proceedings on 11 August 2023, which were not decided on in the contested decision (because they were ranked lower than the main request that was deemed allowable) and therefore do not automatically form part of the contested decision (Article 12(2) RPBA). Still, these requests appear to have been admissibly raised and maintained in the

proceedings leading to the decision under appeal in the sense of Article 12(4) RPBA, because they were filed on the final date for making amendments pursuant to Rule 116 EPC, and were also substantiated in the sense that reasons were given as to why the amendments were intended to overcome the lack of inventive step objections. The Board thus provisionally finds that these requests to [sic] form part of the appeal proceedings."

- 4.3 As the appellant refrained from further comment, the Board re-assessed the appellant's written arguments and confirms its provisional opinion that the objection is not convincing. Therefore, auxiliary requests 3, 4 and 5 to 10 form part of the appeal proceedings.

5. *Auxiliary request 3 - inventive step - Article 56 EPC*

The respondent is of the opinion that the subject-matter of claim 1 of auxiliary request 3 involves an inventive step. The Board disagrees for the following reasons:

- 5.1 Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that the lower end point for the range of mass per unit area is increased to 1.20 g/m². With reference to paragraph [0013] of the patent, the respondent argues that it is thereby possible to ensure a corrosion resistance during re-use of the tube fitting that is equivalent to the corrosion resistance upon first use.
- 5.2 In the Board's view, this potentially additional technical effect is immaterial, because the skilled person will arrive in an obvious manner at a resin coating layer with a mass per unit area within the

claimed range of $1.20 < w < 10.07$ when putting the disclosure of document D1 into practice.

- 5.2.1 The heaviest composition comprising a heavy polyethylene, the obvious choice of molybdenum disulfide, and lutetium-yttrium-oxyorthosilicate according to the proportions in paragraph [0029] in document D1 leads to a resin coating layer of 2 μm thickness with a mass per unit area of 9.79 g/m^2 , see paragraph 2.3 of the present decision. This is below the upper end point of " $w < 10.07$ " in claim 1 of auxiliary request 3.
- 5.2.2 Turning to the lightest composition obtainable in document D1, and building on the reasoning already set out above in point 1.3, the lightest polyethylene has a density of 0.87 g/cm^3 , see Wikipedia article D6. It is common ground that the densities of the remaining three components in the composition according to paragraph [0029] of document D1 are higher than that of polyethylene: the density of polytetrafluoroethylene is 2.2 g/cm^3 , see page 2 of Wikipedia article D7; the density of a sulfide exceeds that of realgar of 3.6 gm/cm^3 according to page 2 of Wikipedia article D8, and the density of a silicate exceeds that of opal of 2.1 g/cm^3 according to page 5 of Wikipedia article D9. As the maximum amounts of polyethylene and silicate (opal as the second lightest material) in that composition each are 20%, the maximum amount of polytetrafluoroethylene (the second heaviest component) must be restricted to 55% in order to allow for 5% of the sulfide realgar (the heaviest component). The lightest composition for a hypothetical resin coating layer of 1 μm according to document D1 leads to a mass per unit area of 1.984 g/m^2 , see the first paragraph on page 10 of the statement of grounds of appeal, and thus

exceeds the lower end point of " $1.20 < w$ " in claim 1 of auxiliary request 3.

5.3 For these reasons, the disclosure of document D1 renders obvious a tube fitting having a resin coating layer with a mass per unit area w of $1.20 < w < 10.07$. Therefore, the subject-matter of claim 1 of auxiliary request 3 does not meet the requirements of Article 56 EPC.

6. *Auxiliary request 4 - remittal - Article 111(1) EPC*

6.1 The appellant requested that the case be remitted to the opposition division for further prosecution on the basis of auxiliary requests 4 to 10. As the opposition division did not decide on the subject-matter of the auxiliary requests, additional discussion was required with regard to inventive step of the subject-matter of auxiliary request 4.

6.2 In accordance with Article 111(1), second sentence, EPC, the Board of Appeal may either exercise any power within the competence of the department which was responsible for the decision appealed or remit the case to that department for further prosecution. A board should not normally remit a case if it can decide all the issues without undue burden, see Article 11 RPBA and in particular Case Law of the Boards of Appeal of the European Patent Office, 11th edition 2025, V.A. 9.1.2. In the present case the Board did not see any undue burden in deciding on inventive step of the subject-matter of auxiliary request 4, because claim 1 of that request corresponds to granted claim 3. In addition to that, both parties have extensively expressed themselves on document D1. Also the fact that the opposition division decided on inventive step with

regard to the main request taking account of this document speaks against remittal.

- 6.3 The Board therefore decided to exercise the power within the competence of the opposition division and to examine inventive step of the subject-matter of auxiliary request 4, Article 111(1) EPC. The request for remittal was rejected.

7. *Auxiliary request 4 - inventive step - Article 56 EPC*

Claim 1 of auxiliary request 4 essentially differs from claim 1 of the main request in that the upper end of the mass per unit area range is decreased to 9.00 g/m². The appellant contends that the subject-matter of claims 1 and 11 of auxiliary request 4 does not involve an inventive step starting from document D1. The Board disagrees for the following reasons:

- 7.1 In the appellant's view, document D1 motivates the skilled person to reduce production costs. The appellant referred to paragraphs [0006] and [0011] of that document ([0006]: *"Zudem ist die Herstellung einer derartigen Rohrschraube verhältnismäßig kostenintensiv..."*, which is understood by the Board as a reference to the high production costs of known tube fittings; [0011]: *"... ist das erfindungsgemäße Befestigungselement kostengünstig in der Herstellung"*, which is understood by the Board as a reference to the lower production costs). Also for these reasons, the skilled person would select average or mean values for the densities of silicates and sulfides and an average thickness of 1.5 µm for the coating in document D1.
- 7.2 The Board agrees with the respondent that the references to production costs and to the specific mean

or intermediate values are amendments to the appellant's case, and does not admit them into the appeal proceedings pursuant to Article 12(4) RPBA for the following reasons:

- 7.2.1 The appellant puts forward that these arguments were already presented in opposition proceedings and refers to the submissions made on page 3 of their letter of 4 August 2023. The Board does not agree, because paragraph 2.1 bridging pages 3 and 4 of that letter does not mention production costs at all. In addition to that, the mass per unit area of 4.55 g/m^2 of the coating in that passage is based on a medium density of the sulfide of 6 g/m^2 , a medium density of the silicate of 3.5 g/m^2 , and on a coating thickness of $1 \text{ }\mu\text{m}$. In contrast to that, the respective line of argument in paragraph 3.6 on page 13 of the statement of grounds of appeal concerns a mass per unit area of 6.48 g/m^2 , and it is based on a medium density of the sulfide of 7.3 g/m^2 and on a medium density of the silicate of 4.3 g/m^2 .
- 7.2.2 As the appellant refers to production costs, or to the specific mean or intermediate values for the first time in their statement of grounds of appeal, the admittance of these new lines of argument is at the discretion of the Board, Article 12(4) RPBA. Pursuant to Article 12(4) RPBA, the Board shall exercise its discretion in view of, inter alia, the complexity of the amendment, the suitability of the amendment to address the issues which led to the decision under appeal, and the need for procedural economy. In the present case, there was no surprising development of the case before the opposition division, see above, that could justify admission of the amendments into the appeal proceedings. In the Board's view, the two lines

of argument concerning lack of inventive step of the subject-matter of claim 1 of auxiliary request 4 based on cost considerations and on mean or average values should have been presented already before the opposition division during the discussion on inventive step of the main request. Pursuant to Article 12(4) RPBA, they are not admitted into the appeal proceedings.

- 7.3 As a consequence, the only objection of lack of inventive step against the subject-matter of claim 1 of auxiliary request 4 is the one for the main request starting from document D1. During the oral proceedings before the Board, the appellant acknowledged this and stated that they had no further submissions to make with regard to claims 1 and 11 of auxiliary request 4 beyond those made for the main request.

The parties agree that, compared to the main request, the claimed range for the mass per unit area w in auxiliary request 4 is limited to $0.79 < w < 9.00$. The reasons set out above which led the Board to conclude that the subject-matter of claim 1 of the main request lacks inventive step starting from document D1 cannot therefore be directly applied to the claims of auxiliary request 4. In consideration of this, the Board cannot share the appellant's view that these reasons, as such, also render the subject-matter of claims 1 and 11 of auxiliary request 4 obvious in the sense of Article 56 EPC.

8. *Auxiliary request 4 - clarity - Article 84 EPC*

- 8.1 The final feature in independent claim 1 of auxiliary request 4 stipulates that the mass per unit area w satisfies a relation $1.20 < w < 9.00$. Independent claim 11

of that request is directed to a method of manufacturing a tube fitting according to any of claims 1 to 9, and thereby incorporates the relation $1.20 < w < 9.00$ from claim 1. The final feature in claim 11 of auxiliary request 4 states that the mass per unit area w is controlled within a range $0.79 < w < 10.07$.

- 8.2 In the Board's view, the different end points in the two ranges in claim 11 render the claim unclear because the mass per unit area does not meet both requirements if it is within the ranges of $0.79 < w < 1.20$ or $9.00 < w < 10.07$. Auxiliary request 4 therefore does not meet the requirements of Article 84 EPC.

9. *Auxiliary request 4a - admittance - Rule 80 EPC, Article 13(2) RPBA*

The appellant objected to admittance of auxiliary request 4a under Rule 80 EPC due to the deletion at line 21 of claim 1 of the term *"wherein the tube fitting (1A; 1B) is characterised in that"* and due to the addition of the term *"characterised in that"* in line 26 of claim 1 (in the following, line numbers refer to the annotated version of claim 1 in that request).

- 9.1 Pursuant to Rule 80 EPC, the description, claims and drawings may be amended, provided that the amendments are occasioned by a ground for opposition. In the present case, it is common ground that the replacement of the upper end point 10.07 with 9.00 in the amended relation $0.79 < w < 9.00$ is occasioned by the ground for opposition under Article 100(a) EPC in conjunction with Article 56 EPC. In fact, the subject-matter of independent claim 1 of auxiliary request 3 was found to lack an inventive step in view of the disclosure in

document D1 of a hypothetical resin coating layer of 2 μm thickness with a mass per unit area of 9.79 g/m², see paragraph 5. of the present decision.

9.2 The Board is also of the view that in the present case, in addition to the replacement of the upper end point in the relation $0.79 < w < 9.00$, which was occasioned by a ground for opposition, shifting the term "characterized in that" from line 21 to line 26 is appropriate in view of the appellant's inventive step objection starting from document D1. The Board is therefore satisfied that the amendments in auxiliary request 4a meet the requirements of Rule 80 EPC.

9.3 The clarity objection against auxiliary request 4 was raised by the Board only during oral proceedings. This constitutes exceptional circumstances under Article 13(2) RPBA, which justifies the filing of Auxiliary Request 4a during these oral proceedings. Auxiliary Request 4a is therefore admitted into the appeal proceedings.

10. *Auxiliary request 4a - clarity, amendments - Articles 84 and 123(2) EPC*

The appellant raised objections under Articles 84 and 123(2) EPC against the introduction of the term "characterized in that" in line 26 in claim 1 of Auxiliary Request 4a (in the following, line numbers refer to the annotated version of claim 1 in that request).

10.1 The contested passage of the claim reads:
"characterized in that: when mass per unit area w (g/m²) is defined as being a value obtained by dividing a mass difference between a state with the resin coating

layer (18, 28) and a state without the resin coating layer (18; 28) by a surface area of the coated region (R), the mass per unit area w satisfies a relation $0.79 < w < 9.00$ ".

The appellant essentially argued that the introduction of the term "characterized in that" in line 26 changed the meaning of the term "by a surface area of the coated region" in lines 28 and 29. In their view, the term surface area could refer to only part of the coated surface after the amendment, while it had referred to the entire coated surface before the amendment. The appellant considered this unclear and not disclosed in the application as filed.

- 10.2 In the Board's view, it is a well established principle in claim drafting that a feature is introduced with the indefinite article "a/an" in a claim. Subsequent references to that feature then use the definite article "the". This establishes a bond between these terms which will be considered by the skilled person when they construe the claim. In the present case, the resin coating layer is provided over a coated region (of the tube fitting). This coated region is introduced in lines 15 and 16 of claim 1, according to which it includes surfaces of the threaded portion and the contact portion (of the tube fitting). The subsequent reference to that coated region in lines 28 and 29 uses the definite article, and thus, is in line with the above principle. In the Board's view, the skilled person will therefore understand that the coated region in lines 28 and 29 is the same coated region which was introduced in lines 15 and 16. Due to the conjunction "and" in line 15, this region must include surfaces of both the threaded portion and the contact portion. This also applies to the surface area of that coated region.

The Board therefore does not share the appellant's view that the indefinite article in the term "a surface area of the coated region" in lines 28 and 29 could refer to only part of the coated surface.

- 10.3 The appellant's only objections under Articles 84 and 123(2) EPC were based on this assumption, which the Board does not share for the above reasons. In the absence of further objections, the Board must conclude that claim 1 of auxiliary request 4a fulfils the requirements of Articles 84 and 123(2) EPC.

11. For these reasons, the board finds that
- the subject-matter of claim 1 as granted is novel over document D1, but does not involve an inventive step starting from document D1 in combination with the common general knowledge, Article 100(a) EPC in conjunction with Article 56 EPC,
 - the subject-matter of independent claim 1 of auxiliary requests 1 to 3 does not involve an inventive step over that combination, Article 56 EPC,
 - the subject-matter of claims 1 and 11 of auxiliary request 4 involves an inventive step starting from document D1, Article 56 EPC,
 - the claims of auxiliary request 4 are not clear, Article 84 EPC,
 - claim 1 of auxiliary request 4a meets the requirements of Articles 123(2) and 84 EPC.

Therefore, the patent can be maintained in an amended form on the basis of the claims of auxiliary request 4a pursuant to Article 101(3)(a) EPC, provided that the description and drawings are adapted to the amended claims if needed.

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 on the basis of claims 1 to 9 of auxiliary request 4a filed at the oral proceedings before the Board and a description and drawings to be adapted, if needed.

The Registrar:

The Chairman:



N. Schneider

P. Lanz

Decision electronically authenticated