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Datasheet for the decision of 4 May 2015

Case Number: T 1393/09 - 3.2.05

Application Number: 03747430.1

Publication Number: 1549872

IPC: F16L15/06

Language of the proceedings: EN

Title of invention:
Threaded pipe joint

Patent Proprietor:
Tenaris Connections Ltd.

Opponent:
Vallourec Oil and Gas France

Headword:

Relevant legal provisions:
EPC 1973 Art. 54(2), 56
EPC Art. 123(2)
RPBA Art. 13(1), 13(3)

Keyword:
Novelty (yes)
Inventive step (no)
Amendments - added subject-matter - auxiliary request 1 (yes)
Late-filed requests -
auxiliary requests 2 and 3 (not admitted)
Late-filed requests -
auxiliary requests 4, 5 and 6 (admitted)

Decisions cited:
G 0001/03, G 0002/10

Catchword:

Europäisches Patentamt
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Case Number: T 1393/09 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 4 May 2015

Appellant II: (Patent Proprietor)	Tenaris Connections Ltd. 112 Bonadie Street Kingstown (VC)
Representative:	Bruno Cinquantini Notarbartolo & Gervasi S.p.A. Corso di Porta Vittoria 9 20122 Milano (IT)
Appellant I: (Opponent)	Vallourec Oil and Gas France 54, rue Anatole France 59620 Aulnoye-Aymeries (FR)
Representative:	Charlotte Julio Vallourec & Mannesman Tubes Division Propriété Industrielle 27 Avenue du Général Leclerc 92100 Boulogne-Billancourt (FR)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 24 April 2009 concerning maintenance of the European Patent No. 1549872 in amended form.**

Composition of the Board:

Chairman	M. Poock
Members:	P. Lanz
	G. Weiss

Summary of Facts and Submissions

I. The appeals by appellants I (opponent) and II (patent proprietor) are against the interlocutory decision of the opposition division, posted on 24 April 2009, holding that the opposed patent No. EP-B-1 549 872 met the requirements of the European Patent Convention on the basis of the first auxiliary request.

II. During the opposition proceedings, the grounds for opposition according to Article 100(a) EPC 1973 (lack of novelty and lack of inventive step) were raised.

III. Oral proceedings were held before the board of appeal on 4 May 2015.

IV. Appellant I requests that the decision under appeal be set aside and that the European patent be revoked.

Appellant II requests that the decision under appeal be set aside and that the patent be maintained as granted (main request) or, in the alternative, that a patent be maintained in amended form on the basis of the documents filed with letter of 3 April 2015 as auxiliary requests 1 to 3 or submitted at the oral proceedings as auxiliary requests 4 to 6.

V. The documents referred to in the appeal proceedings included the following:

D2: API (American Petroleum Institute) Standard 5B, 1996;

D4: EP 0 703 396 A1;

D7: US 4 830 411;

D8: WO 00/66928;

D11: WO 01/98620 A1;

D13: Excerpts from the "VAM® catalog No. 940", July 1994;

D18: Brochure by Mannesmann Röhrenwerke "Mannesmann Gastight Premium Connections", 1984.

VI. The independent claim of the main request reads as follows:

"1. A threaded joint for pipes defining an axis (21), comprising a coaxial male member (1) consisting of a pipe provided with a threading on a portion of its outer surface in proximity of at least one of its ends (13) and a female coaxial member (2), consisting of a pipe or sleeve provided with threading on a portion of its inner surface in proximity of at least one of its ends (14), wherein the male member (1) is provided with a cylindrical portion, intermediate between its ends having walls of a constant thickness and wherein the the male member is provided at said at least one of its ends (14) with an annular abutment surface (9) and wherein a corresponding annular abutment surface (10) is formed on the inside of the female member (2), said threadings being adapted to screw on reciprocally and reversibly to produce a contact between said annular abutment surfaces (9, 10), said threadings being complementary and wherein the thread profile, in a section along a plane containing the axis (21), defines a load flank (4, 3) forming a first angle (α) with respect to a plane perpendicular to the axis (21) and defines a lead-in flank (6, 5) forming a second angle

(β) with respect to a plane perpendicular to the axis (21), characterised in that said second angle (β) has a value comprised between 10 and 25°, and in that when the joint is assembled and the contact between said annular abutment surfaces (9, 10) is achieved, in absence of axial loads, there is provided, between the lead-in flank (6) of the threading formed on the male member and that (5) of the thread made on the female member, a backlash of a size between 0.01 and 0.12 mm, measured along a direction parallel to the axis (21) of the joint, and in that the internal diameter D3 and external diameter D4 of the cylindrical length of said male member (1), the internal diameter D1 and external diameter D2 of the abutment surface of the female member being linked by the relationship $(D2^2-D1^2)/(D4^2-D3^2) \geq 0,5$."

VII. Compared with the main request, the subject-matter of claim 1 of auxiliary request 1 contains the following additional feature:

"in that it comprises a sealing surface (11) of a spherical shape at the end (13) of the male member."

VIII. Compared with auxiliary request 1, the subject-matter of claim 1 of auxiliary request 2 comprises the following additional feature:

"in that the portions with a threading have a taper of value comprised between 6% and 15%."

IX. The subject-matter of claim 1 of auxiliary request 3 differs from the subject-matter of claim 1 of auxiliary request 2 in the following additional feature:

"wherein the thread has from 3 to 5 turns per 2.54 cm (inch)."

X. Claim 1 of auxiliary request 4 reads as follows:

"1. A threaded joint for pipes defining an axis (21), comprising a coaxial male member (1) consisting of a pipe provided with a threading on a portion of its outer surface in proximity of at least one of its ends (13) and a female coaxial member (2), consisting of a pipe or sleeve provided with threading on a portion of its inner surface in proximity of at least one of its ends (14), wherein the male member (1) is provided with a cylindrical portion, intermediate between its ends having walls of a constant thickness and wherein the the male member is provided at said at least one of its ends (13) with a sealing surface (11) and an annular abutment surface (9), and wherein a corresponding annular abutment surface (10) is formed on the inside of the female member (2), said threadings being adapted to screw on reciprocally and reversibly to produce a contact between said annular abutment surfaces (9, 10), said threadings being complementary and wherein the thread profile, in a section along a plane containing the axis (21), defines a load flank (4, 3) forming a first angle (α) with respect to a plane perpendicular to the axis (21) and defines a lead-in flank (6, 5) forming a second angle (β) with respect to a plane perpendicular to the axis (21), characterised in that said second angle (β) has a value comprised between 10 and 25°, and in that when the joint is assembled and the contact between said annular abutment surfaces (9, 10) is achieved, in absence of axial loads, there is provided, between the lead-in flank (6) of the threading formed on the male member and that (5) of the thread made on the female member, a backlash of a size

between 0,01 and 0,12 mm, measured along a direction parallel to the axis (21) of the joint, and in that the internal diameter D3 and external diameter D4 of the cylindrical length of said male member (1), the internal diameter D1 and external diameter D2 of the abutment surface of the female member being linked by the relationship $(D2^2-D1^2)/(D4^2-D3^2) \geq 0,5$, and in that said sealing surface (11) is of a spherical shape."

XI. Compared with auxiliary request 4, the subject-matter of claim 1 of auxiliary request 5 comprises the following additional feature:

"and in that the portions with a threading have a taper of value comprised between 6% and 15%."

XII. The subject-matter of claim 1 of auxiliary request 6 differs from the subject-matter of claim 1 of auxiliary request 5 in the following additional feature:

"wherein the thread has from 3 to 5 turns per 2.54 cm (inch)."

XIII. The arguments presented by appellant I in writing and during the oral proceedings are essentially as follows:

The subject-matter of claim 1 according to the main request was not novel over document D11, which explicitly disclosed the preamble of the claim. Reference was made also to the tube diameters and wall thickness of example A3 disclosed in tables 2 and 3 on pages 17 and 18, based on which the ratio of $(D2^2-D1^2)/(D4^2-D3^2)$ could be calculated and gave a result of 0.544. Moreover, document D11 explicitly stated that a joint of the type VAM ACE as specified in the VAM catalog No. 940 of July 1994, cited as document D13 in

the present proceedings, was used in example A3. According to the detail figure labelled "Thread form" on page 10 of document D13, the VAM ACE joint had a second angle (β) of 10°. This figure generally also indicated the presence of a backlash in the black area around the outer contour of the thread, though without giving its exact size. Due to the explicit reference on page 17 of document D11 and the fact that tubes with VAM ACE joints were known and commercially available, all the characteristics of this joint as specified in catalog D13 formed part of the disclosure of example A3 in document D11. Thus, the only element not disclosed in document D11 was the size of the backlash. A skilled person in the field of petroleum exploitation would necessarily be aware of and apply the standards for threads of pipe joints as specified by the American Petroleum Institute (API) in document D2. Based on the API standard 5B (cf. D2, page 9, Figures 6 and 7), a backlash of 0.025 to 0.178 mm could be calculated for the tubes used in example A3 of document D11. The fact that the claimed backlash size was also used for the joints of documents D4, D7 and D8 confirmed that it was a standard design. As the backlash could not be measured in the made-up joint, it was common practice in the technical field to define the backlash based on the nominal geometry of the joint before its assembly. Moreover, in view of the large overlap between the known and the presently claimed ranges of the backlash, the subject-matter of claim 1 could not be regarded as an inventive solution to the problem of providing a joint that had high resistance and seal performance even under high compression loads. In summary, document D11 as understood by a skilled person disclosed or at least rendered obvious the combination of features according to claim 1 of the main request.

Regarding claim 1 of auxiliary request 1, the wording of the additional feature of the joint comprising a sealing surface of a spherical shape at the end of the male member was an unallowable generalisation of the embodiment on page 6 of the application as filed. It covered the possibility of providing the spherical shape on the annular abutment surface, which went beyond the content of the original application. The same deficiency was present in late-filed auxiliary requests 2 and 3, which should thus not be admitted.

The subject-matter of the independent claims according to auxiliary requests 4, 5 and 6 was not based on an inventive step when starting from example A3 of document D11 as the closest prior art. This example used a VAM ACE type joint of 9 5/8" and anticipated the additional features of the threaded portions having a taper of 1:16 (corresponding to 6.25%) and of the thread having a pitch of 4 TPI (equivalent to 4 turns per 2.54 cm), as specified in document D13, page 10. Thus, the subject-matter of the independent claims of auxiliary requests 4, 5 and 6 differed from the closest prior art only in the features of the backlash size of 0.01 to 0.12 mm and of the sealing surface being of a spherical shape. The problem to be solved was to provide a joint that had a high resistance and seal performance even under high compression loads. The solution was obvious, since document D18 disclosed in the lower half of page 4 a threaded joint having not only the claimed taper and TPI values, but also the backlash size and the spherically shaped sealing surface. Document D18 also mentioned on page 3, right column, first paragraph that its joint design produced only elastic deformations upon tightening, which was advantageous for ensuring gas-tight connections. Moreover, the feature combinations of the independent

claims did not produce any synergies going beyond the effects of the features when considered individually. The comparative examples filed by appellant II with letter of 3 April 2015 were of no assistance in that respect since it was not clear which joint geometries were compared under which loads and what were the absolute values for the resulting stress. In summary, a combination of documents D11 and D18 would render obvious the subject-matter claimed in the auxiliary requests 4, 5 and 6.

XIV. Appellant II's arguments presented in writing and during the oral proceedings can be summarised as follows:

It was not contested that document D11 represented the closest prior art. It disclosed the preamble, but not the characterising features of claim 1 according to the main request. More particularly, the surface ratio $(D2^2-D1^2)/(D4^2-D3^2)$ was not presented as a clear teaching to the skilled person but was hidden information which could only be indirectly established by a calculation. Moreover, document D11 presented example A3 as a disadvantageous prior art solution leading to plastic deformation in the joint, which should be avoided. Example A3 would therefore obviously not be taken into account by a skilled person. Even if the calculated results for the surface ratio for example A3 were within the claimed range, they fell outside the claim for other examples. Also for this reason document D11 failed to establish a clear teaching regarding the surface ratio. Additionally, it was important to note that following decisions G 2/10 and G 1/03 the requirements for a disclosure were the same under Articles 54 and 123(2) EPC. Thus, the criteria for allowing the introduction of features from a cross-

referenced document under Article 123(2) EPC set out in the Guidelines for Examination in the European Patent Office, Part H-IV, 2.3.1 should also apply for establishing what was disclosed in the prior art. According to the Guidelines, an amendment based on a referenced document would not contravene Article 123(2) EPC if the description of the invention as originally filed left no doubt to a skilled reader that:

(i) protection was or could be sought for such features;
(ii) such features contributed to solving the technical problem underlying the invention;
(iii) such features at least implicitly clearly belonged to the description of the invention contained in the application as filed and thus to the content of the application as filed; and
(iv) such features were precisely defined and identifiable within the disclosure of the reference document.

In the present case, the introduction of features from document D13 into the disclosure of example A3 of document D11 did not meet all the above criteria (i) to (iv). Consequently, the claimed aspect of the second angle did not form part of example A3 in document D11, if this example were to be considered at all. As to the backlash, the claimed values related to the assembled joint and could be established by a computer simulation, while the backlash calculated by appellant I was based on the nominal dimensions before the assembly of a different joint type having no abutment portion as shown for example in Figure 5 of document D2, which represented a generally accepted standard in the petroleum industry. In view of the above, the claimed backlash of the assembled joint was not

anticipated by the cited prior art. Finally, it had to be generally noted that the characterising features were all defined as parameter ranges, which were, as such, not known from the cited documents, even if some individual data falling within the claimed ranges were anticipated. Moreover, the claimed choice of parameters and their values were the result of a careful selection in order to improve the capacity to carry high compression loads by distributing the loads between the thread and the abutment shoulder. The combination of the characterising features contributed synergistically to this improved load distribution. In summary, the subject-matter of claim 1 according to the main request was novel and inventive over the prior art.

Regarding the independent claims of auxiliary request 1, the wording of the additional feature of the joint comprising a sealing surface of a spherical shape at the end of the male member was clearly and unambiguously disclosed on page 6 of the application as filed. A skilled person would immediately realise that there was only one sealing surface disclosed in the original application documents and that it was that surface which was of a spherical shape. The possibility of providing the annular abutment surface with a sealing surface of spherical shape was not covered by the claim. Hence, auxiliary request 1 met the requirements of Article 123(2) EPC. Additionally, this provision did not present an obstacle to the admission of auxiliary requests 2 and 3 into the proceedings.

Auxiliary requests 4 to 6 were filed as an appropriate and straightforward attempt to overcome the deficiencies set out in the board's preliminary opinion and appellant I's written submission. The late-filed requests should thus be admitted into the proceedings.

As to their substance, the additional feature of auxiliary request 4 related to the sealing surface being of a spherical shape. The skilled person had two options for designing the sealing surface: either conical or spherical. However, until then the choice was only based on the sealing properties of these shapes. By contrast, the patent in suit proposed the spherical shape of the sealing surface in order to avoid plastic deformation and, in cooperation with the other features of the characterising portion, to improve the load-bearing capabilities of the joint, as demonstrated by the comparative tests filed with letter of 3 April 2015. The additional features claimed in auxiliary requests 5 and 6, specifically the taper and the pitch of the threading, were known to influence the assembly of joints of certain diameters, but not known to contribute to the load-bearing capabilities of the made-up joint of any diameter. Moreover, the combination of parameters as presently claimed provided a synergistic effect resulting from a careful selection, which went beyond a conventional design exercise. There was no suggestion in the prior art pointing the skilled person to the claimed solution. Hence, the subject-matter of the independent claims of auxiliary requests 4 to 6 was based on an inventive step.

Reasons for the Decision

1. MAIN REQUEST

1.1 Novelty

1.1.1 Both parties are in agreement that document D11 represents the most relevant state of the art for the patent in suit and that it discloses the preamble of

independent claim 1. However, it remains controversial whether document D11 in combination also divulges the characterising features of that claim. In particular, appellant II argues that the skilled person would not take into account example A3 when assessing document D11, since that example related to a disadvantageous prior art solution. Even if it were considered, example A3 did not directly disclose any of the characterising features.

1.1.2 In the judgement of the board, the description of the joint of example A3 in document D11 constitutes a self-contained disclosure forming part of the state of the art as defined in Article 54(2) EPC 1973. The fact that it is presented in document D11 as a less advantageous prior art design has no bearing on the status of the joint of example A3 as belonging to the state of the art.

According to the established case law of the boards of appeal, a prior art document anticipates subject-matter directly and unambiguously derivable from that document, including features which for the skilled person are implicit in what is explicitly disclosed (cf. Case Law of the Boards of Appeal of the European Patent Office, 7th edition, 2013, I.C.3.3.).

1.1.3 In the case of document D11, it is uncontested that in example A3 tube joints with diameters and wall thicknesses as specified in tables 2 and 3 on pages 17 and 18 were used. While the diameters D1 and D4 (in the terminology of the contested patent) as well as the wall thickness of the tubes are explicitly disclosed, the further diameters D2 and D3, again in the terminology of the contested patent, can be directly and unambiguously derived from this explicitly given

information, thus allowing the calculation of a surface ratio of $(D2^2-D1^2)/(D4^2-D3^2)$. For the joint of example A3 a(n undisputed) result of 0.544 was established, thereby anticipating the value of ≥ 0.5 as required by claim 1. It is thus beyond doubt that the claimed surface ratio does not reflect a structural difference between the threaded joint of claim 1 and the prior art joint, even if the latter can only be inferred from example A3 of document D11.

1.1.4 As to the feature of the second angle (β), it is noted that document D11 explicitly states that a joint of the type VAM ACE as specified in the VAM catalog No. 940 of July 1994, cited as document D13 in the present proceedings, was used in example A3 (cf. D11, page 17, lines 4 and 5 in combination with page 15, lines 9 to 11). The skilled reader is thus taught that document D13, which can be clearly identified and which was made available to the public more than 7 years before the publication of document D11, provided more detailed information on the joint used for example A3. This further information is to be regarded as incorporated into the teaching of document D11. Since document D13, in particular the detail figure labelled "Thread form" on page 10, reveals that the VAM ACE joint used for example A3 has a second angle (β) of 10°, this feature can equally not distinguish the threaded joint of claim 1 structurally from the prior art joint of example A3 in document D11.

In that respect appellant II argues that the requirements for a disclosure were the same under Articles 54 and 123(2) EPC. Thus, the following criteria set out in the Guidelines for Examination in the European Patent Office of November 2014, Part H-IV, 2.3.1 for allowing the introduction of features from a

cross-referenced document under Article 123(2) EPC should also apply for establishing what was disclosed in the prior art:

(i) protection was or could be sought for such features (from a cross-referenced document);
(ii) such features contributed to solving the technical problem underlying the invention;
(iii) such features at least implicitly clearly belonged to the description of the invention contained in the application as filed and thus to the content of the application as filed; and
(iv) such features were precisely defined and identifiable within the disclosure of the reference document.

The board agrees that the concept of disclosure is to be applied in a uniform way for the purposes of Articles 54, 87 and 123 EPC, cf. decision G 2/10, OJ EPO 2012, 376, point 4.6 of the Reasons, citing decision G 1/03, OJ EPO 2004, 413, point 2.2.2 of the Reasons. Following the Enlarged Board of Appeal, the test to be applied is whether, for a skilled person using common general knowledge, certain subject-matter is directly and unambiguously disclosed, be it explicitly or implicitly ("gold standard"). For the reasons stated above, the board judges that the disclosure of the second angle (β) in document D11 meets these requirements established by the Enlarged Board. As to the above mentioned criteria (i) to (iv), it is important to note that they are specifically directed to the examination of added subject-matter where a feature only described in a cross-referenced document is inserted into a claim. While they can be of assistance for assessing whether such a specific amendment meets the "gold standard", they are *per se*

not suitable for applying that standard when determining the content of a prior art document during the examination of novelty, as can be immediately deduced from the wording of criteria (i), (ii) and (iii).

1.1.5 Turning to the feature of the backlash, it is not disputed that neither document D11, nor the referenced document D13 contain an explicit disclosure of the size of the backlash. Rather, appellant I puts forward that a skilled person in the field of petroleum exploitation would necessarily be aware of and apply the standards for threads of pipe joints as specified by the American Petroleum Institute (API) in document D2. Based on the API standard 5B (cf. D2, page 9, Figures 6 and 7), a backlash of 0.025 to 0.178 mm could be calculated for the tubes used in example A3 of document D11, thereby anticipating the backlash values as presently claimed.

The board notes that document D11 does not mention the API standard 5B or any backlash, clearance or dimensional tolerances of the threads of example A3. The same is true for the general introduction in document D13 and for the section specifically relating to the VAM ACE thread used for example A3 in document D11. In the absence of such a reference, even when account is taken of information which is implicit for the skilled person, there is no basis for unequivocally concluding that example A3 according to document D11 provides a direct and unambiguous disclosure of a specific backlash size.

For these reasons, the board concludes that the subject-matter of claim 1 differs from the disclosure of document D11 in that a backlash of the size of between 0.01 and 0.12 mm is foreseen between the lead-

in flank of the threading formed on the male member and that of the thread made on the female member. It is thus new, Article 54(1) and (2) EPC 1973.

1.2 Inventive step

1.2.1 Based on the structural difference between the subject-matter of claim 1 and the disclosure of document D11 as established above, the objective technical problem to be solved is to provide a joint with high resistance and seal performance even under high compression loads (cf. patent in suit, paragraph [0019]).

In the judgement of the board, the claimed values for the backlash size cannot justify the presence of an inventive step. Although the provision of a backlash being generally necessary for manufacturing and assembling the joint, it is obvious that its size has an influence on the sealing characteristics of the joint, in particular that a reduced backlash will improve the joint's sealing properties. In that respect, there is no evidence on file that the proposed range of values for the backlash (0.01 and 0.12 mm) causes any unexpected effects. Rather, it represents the technologically achievable limits of accuracy when manufacturing the threaded joints. This view is in line with appellant II's explanation given in its reply to the notice of opposition (paragraph bridging pages 2 and 3) and with the information given, for example, in document D8, page 7, lines 17 to 21 (*"In accordance with the teachings of the present invention, with components machined at opposite extremes of the allowed machining tolerances, the clearance x between the walls 37 and 37a and the clearance y between the walls 38 and 38a are 0.00" or 0.004". Thus, the maximum clearance is 0.004" compared to a maximum clearance of 0.014" using*

standard machine tolerances.") and page 9, lines 3 to 6 *("In a typical application of the connection of the present invention, the clearance between the stab flanks will preferably be 0.002-0.004 inch. The clearance or gap between stab flanks in a conventional thread design of the type illustrated in Figures 1-4 is 0.0200".").*

Moreover, the proposed backlash size reflects the recommendation of the API standard 5B (cf. D2, page 9, Figures 6 and 7), from which a backlash of 0.025 to 0.178 mm can be deduced. Neither the relevance of the API standards for the design of pipes for the petroleum industry, nor appellant I's calculation of the backlash size based on API standard 5B are disputed by appellant II. The fact that the claimed backlash size is equally used for the joints of documents D4 (page 2, line 50 to page 3, line 26), D7 (column 5, lines 38 to 63 and Figure 13) and D8 (page 7, lines 11 to 21 and page 9, lines 3 to 10) confirms that it was also a standard thread design feature for joints having an abutment portion.

Thus, the claimed values of the backlash cannot render the subject-matter of claim 1 inventive.

1.2.2 One of the issues disputed between the parties is whether or not a calculation of the backlash based on the nominal dimensions reflects the size of the backlash of the assembled joint. While appellant I justifies its calculation by stating that it was standard practice in the technical field as the backlash could not be measured in the made-up joint, appellant II insists that the backlash of a made-up joint cannot be established based on the joint's nominal values, however, without quantifying the

alleged difference of the results of the two approaches. In this regard, reference is made to appellant II's own statement in its letter of reply to the notice of opposition (last paragraph of page 3), according to which the change of the backlash size during make-up is negligible:

"We submit that this change of dimensions due to the Poisson coefficient has no practical meaning on the overall dimensions of the joint because the strain in the circumferential direction caused by the radial pressure originated from the interference between pin and box during make up is of a negligible order of magnitude (the axial variation is not greater than 0,002mm). Therefore the gap between threads can be considered only with its nominal value. This assertion is supported by figure 1, made by means of Finite Element Analysis, which shows that the nominal gap between threads does not change practically even after the make up torque has reached its nominal magnitude at the end of make up. It can be seen that after the two abutment shoulders have come in contact the gap dimension (0,05962mm) remains close to the aimed one (0,06mm). This small change in dimension is at the 4th decimal digit and of an order of magnitude comparable to the one caused by mismatches produced by interferences and is not noticeable."

In the light of the above, the board is satisfied that, at least for the purposes of the case at hand, the claimed backlash of the assembled joint can indeed be validly established based on the nominal dimensions of the thread.

1.2.3 Concerning the question of inventive step in general, it is submitted by appellant II that the characterising

features were all defined as parameter ranges, which were, as such, not known from the cited documents, even if some individual data falling within the claimed ranges were admitted to be anticipated. In this regard, the board refers to the basic principle that a specific disclosure anticipates a generic feature in a claim. Moreover, there is no evidence on file that any unexpected effects were achieved within or by the combination of the claimed ranges, which could render the claimed subject-matter inventive. Although the characterising features of the second angle, the backlash and the surface ratio obviously all contribute to improving the resistance against high compression loads, there are no synergies apparent which would go beyond the effects of the features when considered individually.

For these reasons, the subject-matter of claim 1 according to the main request is not based on an inventive step within the meaning of Article 56 EPC 1973.

2. AUXILIARY REQUEST 1

Added subject-matter

Compared with the main request, the subject-matter of claim 1 of auxiliary request 1 contains the additional feature of a sealing surface (11) of a spherical shape at the end (13) of the male member. Appellant II refers to the last paragraph of page 6 as a basis for this amendment in the application as filed.

The board notes that in this passage of the original description the sealing surface is defined as a part of the tapered external, i.e. lateral, surface of the end

part of male joint member. However, this limitation is neither explicitly not implicitly reflected in the wording of the amended claim, which thus goes beyond the content of the application as originally filed. The board concludes that claim 1 according to auxiliary request 1 does not meet the requirements of Article 123(2) EPC.

3. AUXILIARY REQUESTS 2 AND 3

Admissibility of the requests

The above feature of a sealing surface of a spherical shape at the end of the male member objected to under Article 123(2) EPC in the context of auxiliary request 1 is equally present in the independent claims of auxiliary requests 2 and 3, which were filed after the oral proceedings had been arranged. In view of this deficiency, the board decided not admit auxiliary requests 2 and 3 under Article 13(1) of the Rules of Procedure of the Boards of Appeal (RPBA) for reasons of procedural economy.

4. AUXILIARY REQUEST 4

4.1 Admissibility of the request

Both parties agree that, due to the modified wording of the feature of the spherically shaped sealing surface, the objection rendering auxiliary requests 2 and 3 inadmissible does not apply to claim 1 of auxiliary request 4. The board additionally observes that the substance of the claim essentially corresponds to the auxiliary request dealt with during the first instance proceedings and referred to in appellant I's statement setting out its grounds of appeal. It thus does not

raise any complex or unforeseeable issues which the board and appellant I cannot be expected to deal with without adjourning the oral proceedings. In view of that, the bord admitted auxiliary request 4 into the proceedings, Article 13(1) and (3) RPBA.

4.2 Inventive step

4.2.1 Example A3 of document D11 forms the closest prior art for claim 1 according to auxiliary request 4. The subject-matter claimed differs from the disclosure of example A3 as established in the context of the main request in that

(a) a backlash of the size of between 0.01 and 0.12 mm is foreseen between the lead-in flank of the threading formed on the male member and that of the thread made on the female member, and in that

(b) the male member of the joint is provided with a sealing surface of a spherical shape at one of its ends.

The objective technical problem to be solved is to provide a joint with high resistance and seal performance even under high compression loads (cf. patent in suit, paragraph [0019]).

Turning to the solution, both parties agree that the spherical sealing surfaces of feature (b) above are generally known in the oil and gas industry for threaded tube joints. Reference is made, for example, to document D18, cf. the drawings on pages 4 and 11 showing a threaded profile of a threaded joint, wherein the sealing surface of the male part is referred to as "Spheroid". Moreover, the thread profile on page 4 of

document D18 also renders obvious the disputed feature (a) since it discloses the manufacturing tolerances of the lead-in flanks of the threading formed on the male and on the female side as being +/- 0.003" (0.0762 mm). Thus, the backlash of the joint of document D18 has the same size as in the contested patent.

Additionally, none of the distinguishing features is presented as causing an unexpected effect, either alone or in combination: feature (a) is directed to standard values of the backlash (0.01 and 0.12 mm) merely defining the technologically achievable limits of accuracy when manufacturing the threaded joints. Regarding feature (b), the contested patent, in particular paragraph [0029], is silent on possible technical effects which could be achieved with a sealing surface of a spherical shape:

"The part of the external surface of the end 13 comprising the sealing surface 11 is not threaded and is generally with a greater taper than the threaded part. The surface 11 can also be of a spherical shape in other alternative embodiments, but other shapes are also possible."

In particular, no unexpected synergistic effect of the spherical sealing surface on the subject-matter claimed can be deduced from the cited passage.

It has to be concluded that the distinguishing features (a) and (b) are generally known in the technical field concerned and have to be considered as obvious design possibilities for threaded joints, which the skilled person would select, depending on the circumstances, without the need for any inventive activity.

4.2.2 Concerning appellant II's submission that the spherical shape of the sealing surface was not primarily proposed in view of the sealing properties, but in order to avoid plastic deformation and, in cooperation with the other features of the characterising portion, to improve the load-bearing capabilities of the joint, as demonstrated by the comparative tests, the board notes the following:

First, claim 1 is drafted as a product claim and defines the joint to be protected in structural terms. The claim, in particular its feature directed to the sealing surface, does not make any reference to a possible function of improving the load-bearing capabilities.

Secondly, when deciding on the requirements of Article 56 EPC 1973 in case of a product claim, it has to be asked whether or not the claimed combination of structural features is obvious for the skilled person in view of the state of the art. Where the state of the art prompts a skilled person to adopt a certain solution, that solution is not rendered inventive just by the fact that it - even unexpectedly - provides a further advantage. Thus, an unexpected bonus effect does not confer inventiveness on an obvious solution (cf. Case Law of the Boards of Appeal of the European Patent Office, 7th edition, 2013, I.D.10.8).

Finally, as observed by appellant I, the comparative examples filed by appellant II with letter of 3 April 2015 do not specify which joint geometries were compared under which loads and what were the absolute values for the resulting stress. They are thus of limited value for proving the effects caused by

selecting a spherically shaped sealing surface instead of a conical shape.

In view of the above, the subject-matter of claim 1 of auxiliary request 4 is not based on an inventive step, Article 56 EPC 1973.

5. AUXILIARY REQUESTS 5 AND 6

5.1 Admissibility of the requests

Compared with auxiliary request 4, the subject-matter of claim 1 of auxiliary request 5 contains the additional feature that the portions with a threading have a taper of a value comprised between 6% and 15%. Claim 1 of auxiliary request 6 additionally specifies that the thread has from 3 to 5 turns per 2.54 cm (inch). These further limitations have their respective basis in dependent claims 4 and 6 of the original application. The filing of auxiliary requests 5 and 6 can be considered a reaction to the board's preliminary opinion expressed in its communication under Article 15(1) RPBA and to appellant I's submission of 24 April 2015. Auxiliary requests 5 and 6 are convergent and do not raise complex or unexpected issues which the board and appellant I cannot be expected to deal with without adjourning the oral proceedings. In view of that, the bord admitted auxiliary requests 5 and 6 into the proceedings, Articles 13(1) and 13(3) RPBA.

5.2 Inventive step

5.2.1 Example A3 of document D11 forms the closest prior art for claim 1 of auxiliary requests 5 and 6. As stated above in point 1.1.4, the description of the joint in

document D13, in particular the detailed information on page 10, is to be regarded as incorporated into the teaching of document D11. Page 10 of document D13 specifically reveals that the VAM ACE joint with a diameter of 9 5/8", which was used in example A3 of document D11, has not only a second angle (β) of 10°, but also a taper of 1:16 (corresponding to 6.25%) and a threading having a pitch of 4 TPI (equivalent to 4 turns per 2.54 cm). These additional features of the independent claims of auxiliary requests 5 and 6 are thus not suitable to further delimit the subject-matter claimed against the closest prior art D11. Like auxiliary request 4, the independent claims of auxiliary request 5 and 6 differ from the disclosure of document D11 in that

(a) a backlash of the size of between 0.01 and 0.12 mm is foreseen between the lead-in flank of the threading formed on the male member and that of the thread made on the female member, and in that

(b) the male member of the joint is provided with a sealing surface of a spherical shape at one of its ends.

As explained in the context of auxiliary request 4 above, these features cannot justify the presence of an inventive step. The corresponding reasoning fully applies also to the subject-matter of auxiliary requests 5 and 6.

5.2.2 Regarding appellant II's submission that the taper and the pitch of the threading were previously selected to influence the assembly of a joint of a certain diameter, but were not known to contribute to the load-bearing capabilities of a made-up joint of any

diameter, reference is again made to the established case law that a solution is not rendered inventive just by the fact that it (unexpectedly) provides a further advantage (cf. point 4.2.2 above). As to the alleged synergistic effect resulting from a careful selection of the parameters, it is not apparent to the board that a combined effect would go beyond the sum of the effects of the features when considered individually. Additionally, it is observed that the threaded joint of document D18, lower part of page 4 (cf. "Thread Profile" and "Detail A"), already contains, in combination, an abutment shoulder as well as the claimed parameters of the second angle (β), the backlash, the spherically shaped sealing surface, the taper and the pitch, together with specific values anticipating the claimed ranges for these parameters. If the combination of these features created a synergistic effect, as alleged by appellant II, it would also occur in the prior art joint of document D18.

In view of the above, the subject-matter of claim 1 of auxiliary requests 5 and 6 is not based on an inventive step, Article 56 EPC 1973.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

3. The appeal of appellant II is dismissed.

The Registrar: The Chairman:

D. Meyfarth M. Poock

Decision electronically authenticated