

Internal distribution code:

- (A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

**Datasheet for the decision
of 23 January 2014**

Case Number: T 0762/11 - 3.2.03

Application Number: 02754576.3

Publication Number: 1389260

IPC: E21B17/046, E21B17/042,
E21B17/08, E21B43/10

Language of the proceedings: EN

Title of invention:
RADIALLY EXPANDABLE TUBULAR WITH SUPPORTED END PORTION

Patent Proprietor:
Enventure Global Technology, L.L.C.

Opponent:
VALLOUREC OIL AND GAS FRANCE

Headword:

Relevant legal provisions:
EPC Art. 54(3)
EPC 1973 Art. 100(b), 100(a), 87, 54(2), 56, 158(1)
RPBA Art. 12(4), 13(1)

Keyword:

Late-filed ground of opposition under Article 100(b) EPC -
admitted (yes)

Sufficiency of disclosure - (yes)

Late-raised objections - admitted (yes)

Priority - (no)

Novelty - (yes)

Inventive step - (yes)

Decisions cited:

Catchword:



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 0762/11 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 23 January 2014

Appellant: VALLOUREC OIL AND GAS FRANCE
(Opponent) 54 rue Anatole France
59620 Aulnoye-Aymeries (FR)

Representative: Marsolais, Richard
Vallourec & Mannesmann Tubes
Département Propriété Industrielle
27, avenue du Général Leclerc
92100 Boulogne-Billancourt (FR)

Respondent: Enventure Global Technology, L.L.C.
(Patent Proprietor) 15995 North Barkers Landing
Suite 350
Houston, TX 77079 (US)

Representative: Haseltine Lake LLP
Theatinerstr. 3
80333 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
25 January 2011 concerning maintenance of the
European Patent No. 1389260 in amended form.**

Composition of the Board:

Chairman: U. Krause
Members: V. Bouyssy
K. Garnett

Summary of Facts and Submissions

- I. European patent No. 1 389 260 (in the following: "the patent") concerns a method of radially expanding a connector interconnecting a first tube to a second tube, the connector including a pin member extending into a box member.
- II. The patent was already granted at the time of the entry into force of the EPC 2000 on 13 December 2007.
- III. The patent as a whole was opposed on the grounds of Article 100(a) EPC 1973 for lack of novelty and inventive step. The opposition division decided that the subject-matter of claim 1 as granted lacked novelty (Article 100(a) EPC 1973 with Article 52(1) EPC 1973 and Article 54(3) EPC) but that the patent could be maintained on the basis of the first auxiliary request filed at the end of the oral proceedings before it (Article 101(3) (a) EPC). The interlocutory decision was posted on 25 January 2011.
- IV. The opponent (here appellant) lodged an appeal against this interlocutory decision on 28 March 2011, paying the fee for appeal on the same day. The statement setting out the grounds of appeal was received on 1 June 2011.
- V. With the summons to oral proceedings, the Board sent a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA) indicating to the parties its preliminary, non-binding opinion of the case.
- VI. Oral proceedings before the Board were held on 23 January 2014.

VII. Requests

The appellant requested that the decision under appeal be set aside and the patent be revoked.

The patent proprietor (here respondent) requested that the appeal be dismissed and thus that the patent be maintained in the form as amended in opposition.

VIII. Claim 1 as maintained by the opposition division reads as follows (compared with claim 1 as granted, added features are in indicated bold, deleted features in strike-through):

"1. A method of radially expanding a connector for interconnecting a first tube (18) to a second tube (20), the connector including a pin member (26) having an end portion near an open end of the pin member, the pin member extending into a box member (28), the pin and box members having cooperating support means (34, 36) arranged to support the pin member so as to prevent radially inward movement of said end portion of the pin member relative to the box member, the method comprising:

- radially expanding the connector; and
- supporting the pin member by said cooperating support means (34, 36) so as to prevent radially inward movement of said end portion of the pin member relative to the box member,

wherein ~~characterized in that~~ the pin member is supported by said cooperating support means (34, 36) so as to prevent said radially inward movement during and after radial expansion of the connector,

wherein the support means (34, 36) includes at least one support surface extending in substantially axial

direction of the connector, each support surface being provided at one of the pin and box members (26, 28), wherein the support surface is formed by a recess (36) provided in one of the pin and box members, and wherein the other of the pin and box members extends into said recess (36), wherein the support means includes a first said support surface provided at the pin member and a second said support surface provided at the box member, the first support surface being supported by the second support surface, wherein a metal-to-metal seal is achieved between pin and box members as the first and second support surfaces are compressed against each other as a result of radial expansion of the connector."

IX. The appellant relied on the following documents which had already been filed in the opposition proceedings:

D1: WO0201102 A1
D3: WO0104520 A1
D6: US4629221 A
D7: US6047997 A
D8: US4611838 A
D12: Priority document of the patent
D13: WO9721901 A2
D14: EP1461562 B1

During the oral proceedings, the appellant referred to the following Euro-PCT application which had led to European patent D14:

D14a: WO03060370 A1

X. The arguments of the parties in the written and oral proceedings can be summarised as follows:

a) Admissibility of objections under Article 100(b)
EPC 1973

The respondent contended that insufficiency of disclosure had been raised for the first time in appeal, not in opposition, and that this new ground of opposition should be rejected as inadmissible since the patent proprietor did not consent to its introduction.

The appellant contended that (a) insufficiency of disclosure had already been raised during the oral proceedings before the opposition division, (b) the opposition division had exercised its discretion to admit this ground of opposition into the proceedings and had then examined this matter and (c) the patent proprietor had not disputed the introduction of this new ground of opposition and in fact had taken a position on this issue.

b) Sufficiency of disclosure

Appellant's case:

It was insufficiently disclosed for a skilled person how to achieve the following features of claim 1:

- the pin member is supported by the cooperating support means so as to prevent radially inward movement of its end portion "during radial expansion of the connector";
- the "support surfaces"; and
- "a metal-to-metal seal is achieved between pin and box members as the first and second support surfaces are compressed against each other as a result of radial expansion of the connector".

Respondent's case:

A person skilled in the art of expandable connectors would have no practical difficulty to implement the teaching of the patent, even if the patent did not provide any detailed information on the dimensions and the mechanical properties of the connector and of the expander pulled or pumped through the tube. It was clear from the wording of claim 1, when read in isolation or together with paragraphs [0017] to [0019] of the patent, where and how the support surfaces had to be formed so as to prevent radially inward movement of the end portion of the pin member during and after radial expansion of the connector as well as to achieve a metal-to-metal seal after radial expansion of the connector. In particular, the metal-to-metal seal as defined in claim 1 was in conformity with the teaching in paragraph [0019] of the patent.

c) Priority

Appellant's case:

Claim 1 could not enjoy the priority from D12 dated 24 May 2001 because the following features of claim 1 extended beyond the original teaching in D12:

- the pin member is supported by the cooperating support means so as to prevent radially inward movement of its end portion "during radial expansion of the connector";
- the "support surfaces";
- the support surfaces extend "in substantially axial direction of the connector"; and
- "a metal-to-metal seal is achieved between pin and box members as the first and second support

surfaces are compressed against each other as a result of radial expansion of the connector".

Respondent's case:

With the exception of the first objection, the appellant's objections were raised for the first time in the oral proceedings. The raising of these new objections amounted to a late amendment to the Appellant's case which should not be admitted, pursuant to Articles 13(1) and (3) RPBA.

The first feature was derivable from the teaching on page 5, lines 11-26 of D12, whereby it was clear and unambiguous for a skilled reader that the passage on page 5, lines 15-26 described the process of expanding the connector, e.g. "by pulling or pumping an expander through the tube 16" (lines 16-17), whereby the pin member 26 remained locked into the groove 36 of the box member 28 (line 23) and flush with the inner surface of the tube 16 (lines 25-26) at any stage of the expansion process, i.e. before, during and after radial expansion of the connector.

The second and fourth features, when read in the context of claim 1, were derivable from D12, in particular from the teaching on page 5, lines 15-31 and Figures 2 and 3 of D12.

The third feature was derivable from D12, in particular from Figures 2 and 3 and from the teaching on page 3, lines 4-10 and page 5, lines 11-14 and lines 21-24 that the support surfaces prevent radially inward movement and radially inward bending of the pin member.

d) Admissibility of document D14a

Respondent's case:

Documents D14 and D14a should not be admitted into the proceedings, pursuant to Article 12(4) RPBA, because D14 had been filed at a very late stage of the opposition proceedings and the opposition division had decided to not admit this late-filed document into the proceedings.

Appellant's case:

In opposition, D14 had been filed directly in reaction to the filing of auxiliary requests by the patent proprietor. The opposition division decided to not admit D14 because it was not relevant since the patent's priority was found to be validly claimed. However, in the event that the priority was not validly claimed, D14, or rather Euro-PCT application D14a which had led to European patent D14, was prior art under Article 54(3) EPC and was highly relevant when assessing the novelty of the subject-matter of claim 1, in particular because it disclosed a "metal-to-metal seal" as defined in claim 1. Thus, D14a should be admitted into the proceedings.

e) Novelty vs. D1

Appellant's case:

It followed expressly from page 3a of the description of the patent as maintained by the opposition division that D1 disclosed all the features specified in claim 1 with the exception of the last feature of this claim, i.e. the "metal-to-metal seal" feature. During the

expansion process in Figures 4 to 7 of D1, the male lip 5 was bent into a banana shape (see Figures 5 to 7) and its end portion 13 inevitably had the tendency to spring back or bend radially inward after radial expansion of the connector (see Figure 1 of the patent). Thus, in Figure 7 of D1, the internal wall 17 of the tongue 13 and the internal wall 18 of the groove 14 were inevitably compressed against each other after the radial expansion of the connector, thereby achieving a metal-to-metal seal as defined in claim 1. Hence, the expansion process in Figures 4 to 7 of D1 anticipated the subject-matter of claim 1.

Even though D1 taught expressly on page 19, lines 20-21 that, after expansion, it might occur that the tongue 13 would be no longer in the groove 14 and in particular no longer against the internal wall 18 of the groove, it followed directly from Figure 7 and page 19, lines 4-6 that, during and after the expansion process shown in Figures 4-7, the internal wall 17 of the tongue 13 remained supported by the internal wall 18 of the groove 14, as required by claim 1.

Respondent's case:

D1 failed to disclose the feature of claim 1 that the pin member is supported by cooperating support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1.

f) Novelty vs. D14a

Appellant's case:

D14a was prior art according to Article 54(3) EPC in the event that the patent's priority was not validly claimed. The expansion process in Figures 4 to 7 of D14a anticipated the subject-matter of claim 1 for the reasons already set out with respect to D1. Moreover, the "metal-to-metal seal" feature was expressly disclosed on page 30, lines 29-33 and Figure 17, or alternatively on page 33, lines 21-25 and Figure 23 of D14a. The clearance between the internal walls of the tongue and groove before expansion, as shown in Figure 16 or 22, would be rapidly closed upon radial expansion of the connector, so that these internal walls would remain in contact during the expansion process. Thus, the embodiment of either Figures 16-17 or Figures 22-23 of D14a also anticipated the subject-matter of claim 1.

Respondent's case:

The expansion process in Figures 4 to 7 of D14a was identical to that disclosed in Figures 4 to 7 of D1 and thus also failed to disclose the feature of claim 1 that the pin member is supported by cooperating support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1.

The embodiments of Figures 16-17 and Figures 22-23 of D14a also lacked these features of claim 1. Indeed, it could not be derived from D14a that, in either Figures 16-17 or Figures 22-23, the tongue 13 was supported by the wall 18 of the groove 14 so as to prevent radially

inward movement of the end portion of the pin member "during and after radial expansion of the connector". In fact, D14a made clear that no contact existed between the internal walls 17 and 18 of the tongue 13 and groove 14 before radial expansion of the connector: see page 27, lines 15-17. In accordance with this teaching, Figures 16 and 22 clearly showed a clearance between these internal walls. Thus, the internal wall 17 of the tongue 13 and the internal wall 18 of the groove 14 did not form "first and second support surfaces" in the sense of claim 1. For this reason alone, the internal walls 17 and 18 could not achieve the "metal-to-metal seal" of claim 1, since claim 1 required that the "metal-to-metal seal" was achieved by the "first and second support surfaces". Irrespective of this, it could not be derived from D14a that, in either Figure 17 or Figure 23, the tongue 13 and the groove 14 were compressed against each other to achieve a metal-to-metal seal.

g) Inventive step vs. D1

During the oral proceedings, the Board held that the patent's priority was not validly claimed so that D1 was prior art according to Article 54(2) EPC 1973 and that claim 1 differed from D1 in that the pin member is supported by the first and second support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector" and in that a "metal-to-metal seal is achieved between pin and box members as the first and second support surfaces are compressed against each other as a result of radial expansion of the connector".

Appellant's case:

The problem solved by these features distinguishing claim 1 from D1 was how to obtain an internal seal in addition to the existing metal-to-metal seal between the external contact surfaces 7 and 8 of the pin and box members. When seeking to solve this problem, the skilled person would obviously apply the teaching on page 5, lines 14-17 and Figures 4-7 of D1 and provide a metal-to-metal seal formed by the internal walls 17 and 18 of the tongue 13 and groove 14. By doing so, the skilled person would arrive at the distinguishing features. Thus, claim 1 lacked an inventive step against D1 alone.

Respondent's case:

The entire thrust of the disclosure of D1 was that a metal-to-metal seal was achieved between the external contact surfaces 7 and 8 of the pin and box members. Starting from D1, the skilled person thus had no motivation to provide an internal seal. Even if the skilled person considered the provision of an internal seal, D1 provided no motivation to achieve a metal-to-metal seal between the internal walls of the tongue and groove, let alone to modify the connector of D1 so that the internal walls of the tongue and groove would have a sealing function after expansion as well as a supporting function during and after expansion.

h) Inventive step vs. D3

Appellant's case:

It followed from page 4, lines 30-32 and page 15, lines 11-13 of D3 that the pin member was supported by the

cooperating support surfaces 34a and 39a so as to prevent radially inward movement of its end portion "during radial expansion of the connector". Moreover, it was implicitly disclosed on page 15, lines 11-13 in combination with Figure 7b that the support surfaces 34a and 39a were compressed against each other as a result of radial expansion of the connector, thereby achieving a metal-to-metal seal. Thus, D3 disclosed all the features specified in claim 1 with the exception of the feature that the support surfaces extend "in substantially axial direction of the connector". The problem solved by this distinguishing feature was how to provide a more efficient radial support of the end portion of the pin member in the recess of the box member. When seeking to solve this problem, the skilled person would obviously apply the teachings of D6, D7, D8 or D13 and so arrive at the claimed solution. In particular, D13 concerned a similar expandable connector and the distinguishing feature was disclosed on page 9, lines 21-25 and in Figures 12 and 13 of D13. Thus, claim 1 lacked an inventive step against D3 in combination with any of D6, D7, D8 or D13.

Respondent's case:

The gist of D3 was that an annular elastomeric seal was disposed between the external cooperating surfaces of the pin and box members. D3 failed to disclose the features of claim 1 that the support surfaces extend "in substantially axial direction of the connector" and that the pin member is supported by the cooperating support surfaces so as to prevent radially inward movement of its end portion "during radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1. Starting from D3, the problem solved by these distinguishing features was to prevent

damage to the end portion of the pin member when it was pushed back against the shoulder of the box member during the expansion process, as shown in Figures 10 and 10a of D3. When trying to solve this problem, the skilled person would disregard D6, D7, D8 and D13 because these documents did not address this problem. In particular, D6, D7 and D8 concerned non-expandable connectors. Moreover, D13 concerned a connector for joining longitudinally slotted tubings and thus would lead away from the claimed solution with a metal-to-metal seal.

Reasons for the Decision

1. The appeal is admissible.
2. Interpretation of claim 1
 - 2.1 Before turning to the arguments of the parties, it is necessary to establish how the disputed terms "support surfaces" and "metal-to-metal seal" of claim 1 are to be construed.
 - 2.2 Claim 1 is directed to a method of radially expanding a connector including a pin member extending into a box member. The pin and box members have cooperating support means supporting the pin member so as to prevent radially inward movement of the end portion of the pin member relative to the box member "during", i.e. throughout, as well as "after radial expansion of the connector". The support means includes at least one support surface "extending in substantially axial direction of the connector", each support surface being provided at one of the pin and box members. The support surface is formed by a recess provided in one of the

pin and box members, while the other of the pin and box members extends into said recess. The support means includes a first "said support surface" provided at the pin member and a second "said support surface" provided at the box member, the first support surface being supported by the second support surface (penultimate feature of claim 1). The first and second support surfaces are compressed against each other "as a result of", i.e. after, radial expansion of the connector, thereby achieving a metal-to-metal seal between the pin and box members (last feature of claim 1).

2.3 In the context of claim 1, the term "metal-to-metal seal" is clear and, in the absence of any other specific indication in the claim, it can only be given its normal meaning in the art of expandable connectors for interconnecting tubes: the "metal-to-metal seal" is a seal formed by contacting metal surfaces to prevent the passage of fluid through the connector.

2.4 Hence, it follows from claim 1 read in isolation that the first and second support surfaces are cooperating metal surfaces:

- which are formed at the pin and box members, whereby one of the first and second support surfaces is formed by a recess provided in one of the pin and box members, the other of the pin and box members extending into this recess;
- which extend "in substantially axial direction of the connector";
- which have the function to support the pin member so as to prevent radially inward movement of its end portion relative to the box member "during and after radial expansion of the connector"; and
- which also have the function to achieve a metal-to-metal seal between the pin and box members by

being compressed against each other after radial expansion of the connector.

- 2.5 This understanding is confirmed by the teaching in the patent specification: see in particular Figures 2 and 3 and page 6, lines 6-26 of the patent as maintained by the opposition division. In the embodiment as illustrated in Figures 2 and 3, the support surfaces are the internal walls of the nose section 34 of the pin member 26 and the annular groove 36 of the box member 28.
3. Admissibility of objections under Article 100(b) EPC 1973
- 3.1 During the opposition period, the opponent did not raise any objection under Article 100(b) EPC 1973.
- 3.2 The minutes of the oral proceedings before the opposition division (points 15.2, 15.3 and 16) show that the opponent raised an objection under Article 83 EPC 1973 during the oral proceedings and that the patent proprietor took a position on this objection before the opposition division decided that the patent as amended fulfilled the requirements of Article 83 EPC 1973.
- 3.3 By raising this objection under Article 83 EPC 1973 after expiry of the opposition period, the opponent effectively late-filed the ground of opposition under Article 100(b) EPC 1973.
- 3.4 Neither the minutes of the oral proceedings nor the appealed decision contains any explicit statement that the opposition division exercised its discretion to admit this late-filed ground of opposition in

conformity with the criteria for relevance given in G 10/91.

3.5 However, it follows implicitly from the fact that the objection under Article 83 EPC 1973 was discussed as to its merit during the oral proceedings (see the minutes) and that the reasons for the decision contain a (very short) statement regarding the matter (see point 6.1 of the reasons) that the opposition division did exercise its discretion to admit the objection (see also T 1592/09, points 2.3 and 2.6 of the reasons).

3.6 The respondent did not contest the correctness of the minutes nor did it contest that the opposition division had exercised its discretion to admit the ground of opposition under Article 100(b) EPC 1973 into the proceedings, as alleged by the appellant. In fact, the respondent only argued that this ground of opposition had been raised for the first time in appeal.

3.7 Thus, the Board considers that the ground of opposition under Article 100(b) EPC 1973 was already in the opposition proceedings and does not constitute a "fresh" ground within the meaning of G 10/91.

4. Sufficiency of disclosure

4.1 According to the established jurisprudence of the boards of appeal, the requirement of sufficiency of disclosure is only met if the invention as defined in the independent claim(s) can be performed by the person skilled in the art within the whole area claimed without the burden of an undue amount of experimentation, taking into consideration common general knowledge and the whole information-content of the patent in suit.

- 4.2 The appellant contends that it is insufficiently disclosed for a skilled person how to achieve the following features of claim 1:
- the pin member is supported by the cooperating support means so as to prevent radially inward movement of its end portion "during radial expansion of the connector";
 - the "support surfaces"; and
 - "a metal-to-metal seal is achieved between pin and box members as the first and second support surfaces are compressed against each other as a result of radial expansion of the connector".

4.3 "During radial expansion of the connector"

The appellant contends that it is generally known in the art, e.g. from D1, D3 and D14a, that the expansion process yields complex plastic deformations of the pin and box members of the connector. In particular, a skilled person would expect that during radial expansion of the connector the pin member would be bent into a banana shape, as shown in Figures 4 to 7 of D1 or D14a, so that the pin member would not remain flush with the inner surface of the tubes. In contrast to this, so the appellant says, the patent teaches that the pin member remains supported by support surfaces to prevent radially inward movement of its end portion "during radial expansion of the connector" (claim 1), so that "the pin member 26 remains flush with the inner surface of the tube 16" (see paragraph [0017] of the patent as granted). The appellant argues that the patent does not comprise enough information as how to achieve this effect. In particular, the patent does not provide any detailed information on the dimensions and the mechanical properties of the connector and of the

expander pulled or pumped through the tube, although in practice the plastic deformations would be function of such dimensions and properties. According to the appellant, the missing information cannot be derived from the drawings as filed: Figure 1 concerns a single tubular element, not a connector; Figures 2 and 3 are only schematic representations of the connector in expanded state, i.e. after radial expansion of the connector.

This argumentation is not convincing.

The fact that the patent does not describe in detail how the pin member is supported by the cooperating support surfaces so as to prevent radially inward movement of its end portion "during radial expansion of the connector" and that this feature is not disclosed in the cited prior art documents does not establish that a skilled reader of the patent, using common general knowledge, would be unable to carry out the invention.

In fact, the skilled reader of the patent is not only aware of the invention as disclosed in the patent but also of what was common general knowledge in the art of manufacturing expandable connectors at the priority date. For this reason, he/she is familiar with the elastic and plastic deformations of the pin and box members of the connector upon its radial expansion, depending on the dimensions and the mechanical properties of the connector and of the expander pulled or pumped through it.

The skilled reader would use this common general knowledge to complement the information contained in the patent. For instance, the skilled reader would

readily recognize that if the lower lip of the annular groove 36 shown in Figures 2 and 3 were made longer and/or thicker, it would more likely prevent radially inward movement of the end portion of the pin member during and after radial expansion of the connector, as required by claim 1. The skilled reader would also be in a position to use a numerical simulation and/or testing to try and find out a connector and an expander adapted to carry out the claimed invention.

Finally, the Board notes that, contrary to the view of the appellant, claim 1 does not require that "the pin member remains flush with the inner surface of the tube" during and after the expansion process. This effect is mentioned only in the description of the schematic drawings in Figures 2 and 3 (see page 6, line 25 in the patent as maintained by the opposition division) and must be read in this context. The patent does not promise that the pin member as a whole "remains flush with the inner surface of the tube", but rather that the end portion of the pin member is prevented from radially moving/bending during and after the expansion process.

4.4 "Support surfaces"

The appellant contends that the location and the function of the "support surfaces" of claim 1 are not clearly and sufficiently defined.

This objection appears to be a clarity objection rather than an objection of insufficiency. As indicated above (see point 2.4), it follows clearly from claim 1 where and how the support surfaces are formed. The appellant has not established any reasonable doubt that a skilled

reader of the patent would be able to provide a connector with such support surfaces.

4.5 "Metal-to-metal seal"

The appellant contends that it is not clearly and sufficiently defined where the metal-to-metal seal is achieved and which compression is required to achieve this seal. The appellant adds that the patent describes three different metal-to-metal seals (see paragraphs [0019] to [0021]) and that it is not clear which of these seals is claimed.

These objections also appear to be clarity objections rather than objections of insufficiency. It is clear from claim 1 how the metal-to-metal seal is achieved, namely by the cooperating support surfaces being compressed against each other after radial expansion of the connector (see point 2.4 above). The metal-to-metal seal as defined in claim 1 is in conformity with the teaching on page 6, lines 27-31 of the patent as maintained by the opposition division. The appellant has not indicated, and the Board cannot find, any reason why a skilled reader of the patent would be unable to achieve a metal-to-metal seal as defined in claim 1.

4.6 Thus, the Board agrees with the respondent and the opposition division that a skilled reader of the patent, using common general knowledge, would have no practical difficulty in implementing the teaching of the patent, even if the patent does not provide any detailed information on the dimensions and the mechanical properties of the connector and of the expander.

5. Priority

5.1 The appellant contends that the following features of claim 1 cannot be derived from D12, the priority document of the patent:

- the pin member is supported by the cooperating support means so as to prevent radially inward movement of its end portion "during radial expansion of the connector";
- the "support surfaces";
- the support surfaces extend "in substantially axial direction of the connector"; and
- "a metal-to-metal seal is achieved between pin and box members as the first and second support surfaces are compressed against each other as a result of radial expansion of the connector".

5.2 Admissibility of late-raised objections

Of the above objections, only the first one was raised in the statement of grounds of appeal. The other objections were raised for the first time during the oral proceedings before the Board. As noted by the respondent, the third objection had not been raised in the written proceedings, even though it was mentioned in the statement of grounds of appeal that the application as filed differed from D12 *inter alia* in that it comprised the teaching that the support means includes at least one support surface "extending in substantially axial direction of the connector".

The respondent contended that the raising of these three new objections amounted to a late amendment to the appellant's case which should not be admitted, pursuant to Articles 13(1) and (3) RPBA.

However, in view of the fact that the late-raised objections were *prima facie* highly relevant and that these objections did not raise complex issues, in particular since D12 is a relatively short document, the Board considered that it was appropriate to admit these late-raised objections into the proceedings, pursuant to Article 114(1) EPC 1973 and Article 13(1) RPBA.

The respondent was granted an interruption of the oral proceedings for 25 minutes (see minutes) to deal with the issues raised by these late-raised objections.

5.3 "In substantially axial direction of the connector"

The feature of claim 1 that the support surfaces extend "in substantially axial direction of the connector" was neither expressly nor implicitly disclosed in D12.

The fact that the support surfaces prevent radially inward movement and radially inward bending of the end portion of the pin member (see page 3, lines 4-10 and page 5, lines 11-14 and lines 21-24 of D12) does not necessarily imply that the support surfaces extend "in substantially axial direction of the connector". For instance, in Figure 7b of D3 this effect is achieved after expansion by means of support surfaces 34a and 39a which are inclined at an angle relative to the axial direction of the connector.

This feature of claim 1 can also not be directly and unambiguously derived from Figures 2 and 3 of D12, which are hand-drawn schematic representations of the connector in an expanded state. In fact, these drawings provide no information as to the orientation of the

support surfaces before and during the expansion process.

5.4 Thus, the Board shares the view of the appellant that at least the feature of claim 1 that the support surfaces extend "in substantially axial direction of the connector" is not directly and unambiguously derivable from D12.

5.5 Therefore, the subject-matter of claim 1 goes beyond the content of D12, so that its priority cannot be validly claimed (Article 87(1) EPC 1973 and Article 88(3) EPC; G 2/98).

5.6 Under these circumstances, it is not necessary to discuss the other three objections raised by the appellant.

6. Relevance of D1 and D14a

6.1 Since the priority is not valid, the relevant date for assessing the invention is 22 May 2002, i.e. the filing date of the patent.

6.2 Thus, D1 is prior art under Article 54(2) EPC 1973 while D14a is prior art under Article 54(3) EPC by virtue of Article 158(1) EPC 1973. This was not disputed by the parties.

7. Admissibility of document D14a

The appellant relied on D14a for the first time during the oral proceedings before the Board.

In view of the fact that D14a was *prima facie* highly relevant, in particular with respect to the "metal-to-

metal seal" feature (see page 30, lines 29-33 and Figure 17, or alternatively page 33, lines 21-25 and Figure 23 of D14a), the Board decided to admit D14a into the proceedings, pursuant to Article 114(1) EPC 1973 and Article 13(1) RPBA.

8. Novelty vs. D1

8.1 The appellant contends that the subject-matter of claim 1 lacks novelty over D1.

8.2 It was undisputed among the parties that D1 discloses, using the words of claim 1, a method of radially expanding a connector for interconnecting a first tube 11 and a second tube 12 (Figures 4-7), the connector including a pin member (see male element 1) and a box member (see female element 2) and the pin member having an end portion in the form of an annular tongue 13, which extends into a recess of the box member, this recess being in the form of an annular groove 14.

8.3 The parties have however disputed whether or not D1 discloses the feature of claim 1 that the pin member is supported by cooperating support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1. In particular, the appellant contends that the internal walls 17 and 18 of the tongue 13 and groove 14 form the "first and second support surfaces" of claim 1.

8.4 The walls 17 and 25 of the annular tongue 13 are tapered and converge towards the free end of the tongue, while the walls 18 and 26 of the annular groove 14 are tapered and converge towards the base of the groove (see Figures 8-10, page 12, line 35 to page 13,

line 2 and page 14, lines 5-9). Before expansion and during the early phases of the expansion process as shown in Figures 4 and 5, the walls 17 and 25 of the tongue 13 are pressed against the walls 18 and 26 of the groove 14 and the transverse surfaces 15 and 16 abut against each other (page 14, lines 11-18 and Figure 10; page 16, lines 21-22 and Figure 4; page 17, lines 18-19 and Figure 5). In a latter phase of the expansion process, namely the straightening phase as shown in Figure 6, the male lip 5 loses its compressive state, so that the initially abutting surfaces 15 and 16 are separated (page 18, lines 25-30). From then on, the tongue 13 is separated from the groove 14, as shown in Figures 6 and 7. Due to the tapering of the walls of the tongue and groove, it may then well happen that the internal wall 17 of the tongue is no longer supported by the internal wall 18 of the groove, as taught on page 19, lines 20-21. In such a case, the internal wall 17 of the tongue 13 will not be supported by the internal wall 18 of the groove 14 "during and after radial expansion of the connector" and no metal-to-metal seal will be achieved between these surfaces after expansion.

- 8.5 Contrary to the view of the appellant, it cannot be derived from D1 that the male lip 5 implicitly springs back after the expansion of the connector, so that the internal wall 17 will eventually contact the internal wall 18. In fact, D1 expressly teaches that the spring-back of the elements of the connector after passage of the expander is negligible in the light of the plastic deformations involved (page 19, lines 8-9). Interestingly, Figure 19 of D14a shows that, after radial expansion of a connector similar to that of D1, the internal wall 17 of the tongue 13 may well lose contact with the internal wall 18 of the groove 14.

8.6 Thus, the Board shares the view of the respondent that it is neither expressly nor implicitly disclosed in D1 that, "during and after the radial expansion of the connector", the internal wall 17 of the tongue 13 is supported by the internal wall 18 of the groove 14, and that, after the radial expansion of the connector, the internal wall 17 of the tongue 13 is pressed against the internal wall 18 of the groove 14 to achieve a "metal-to-metal seal".

8.7 Hence, D1 fails to disclose the feature of claim 1 that the pin member is supported by cooperating support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1.

8.8 It is stated on page 3a of the description of the patent as amended that D1 discloses the feature of claim 1 that the pin member is supported by cooperating support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector". However, for the reasons in points 8.4 to 8.6 above, this statement is not in fact correct.

8.9 Thus, the subject-matter of claim 1 is novel over D1.

9. Novelty vs. D14a

9.1 The appellant contends that the subject-matter of claim 1 lacks novelty over D14a.

9.2 D14a comprises the teaching of D1 and, in addition, further embodiments. In particular, the expansion

process in Figures 4 to 7 of D14a corresponds to that disclosed in Figures 4 to 7 of D1. Figures 16 to 23 of D14 relate to variants of the connector, which are not disclosed in D1, whereby the even and odd numbered figures represent the connector before and after expansion, respectively (page 8, line 37 to page 9, line 7).

- 9.3 For the reasons set out above with respect to D1, the subject-matter of claim 1 is novel over the expansion process shown in Figures 4 to 7 of D14a.
- 9.4 The appellant contends that the feature of claim 1 that the pin member is supported by cooperating support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1 can be derived from Figures 16 and 17 and Figures 22 and 23 of D14a. In particular, the appellant contends that the internal walls 17 and 18 of the tongue 13 and groove 14 form the "first and second support surfaces" of claim 1.
- 9.5 However, as argued by the respondent, it cannot be derived from D14a that, in either Figures 16-17 or Figures 22-23, the tongue 13 will be supported by the wall 18 of the groove 14 so as to prevent radially inward movement of the end portion of the pin member "during and after radial expansion of the connector". In particular, D14a makes clear that no contact exists between the internal walls 17 and 18 of the tongue 13 and groove 14 before radial expansion of the connector (see page 27, lines 15-17) while the external surfaces of the tongue and groove are in tight contact (see page 27, lines 8-10 and lines 25-27). In accordance with this teaching, Figures 16 and 22 representing the

connector before expansion clearly show a clearance between the internal walls of the tongue 13 and groove 14. Thus, the internal wall 17 of the tongue 13 and the internal wall 18 of the groove 14 do not form "first and second support surfaces" in the sense of claim 1, i.e. cooperating surfaces for supporting the pin member to prevent radially inward movement of its end portion "during and after radial expansion of the connector".

9.6 The appellant argues that the clearance between the internal walls of the tongue and groove in Figure 16 or 22 would be rapidly closed upon radial expansion of the connector, so that these internal walls would remain in contact during the expansion process. This, however, appears to be pure speculation. Moreover, even if this were true, the internal walls would not be in contact during, i.e. throughout, the expansion process.

9.7 Finally, it can also not be derived from D14a that, in the expanded state shown in either Figure 17 or 23, the internal wall 17 of the tongue 13 and the internal wall 18 of the groove 14 achieve a "metal-to-metal seal" as defined in claim 1. Indeed, as reasoned above, the internal wall 17 of the tongue 13 and the wall 18 of the groove 14 do not form "first and second support surfaces" in the sense of claim 1. Thus, for this reason alone, the surfaces 17 and 18 cannot achieve the "metal-to-metal seal" of claim 1, since claim 1 requires that the "metal-to-metal seal" is achieved by the "first and second support surfaces".

9.8 Under these circumstances, it is not necessary to discuss whether, in the expanded state as shown in Figures 17 and 23 of D14a wherein the tongue 13 is in contact with the wall 18 of the groove 14, the contacting tongue and groove form a metal-to-metal

seal, as alleged by the appellant. In this respect, the Board notes that the entire thrust of the disclosure of D14a, as in D1, is that a metal-to-metal seal is achieved between the external contact surfaces 7 and 8 of the male lip 5 and the female receiving element 6 (see contact point F in Figure 17).

9.9 Thus, the Board shares the view of the respondent that it is neither expressly nor implicitly disclosed in D14a that, "during and after the radial expansion of the connector", the internal wall 17 of the tongue 13 is supported by the internal wall 18 of the groove 14, and that, after the radial expansion of the connector, the internal wall 17 of the tongue 13 is pressed against the internal wall 18 of the groove 14 to achieve a "metal-to-metal seal".

9.10 Hence, as with D1, D14a fails to disclose the feature of claim 1 that the pin member is supported by cooperating support surfaces so as to prevent radially inward movement of its end portion "during and after radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1.

9.11 Thus, the subject-matter of claim 1 is novel over D14a.

10. Inventive step vs. D1

10.1 The appellant contends that the subject-matter of claim 1 lacks an inventive step over D1.

10.2 A technical effect of the above mentioned features distinguishing claim 1 from D1 (see point 8.7 above) is that an internal metal-to-metal seal is achieved, in addition to the existing external metal-to-metal seal between the external contact surfaces 7 and 8 of the

male lip 5 and the female receiving element 6, thereby providing a better seal against the passage of fluid through the connector.

10.3 The appellant concludes that the objective technical problem solved over D1 is as how to provide an internal seal. However, this formulation of the technical problem contains a pointer to the claimed solution and thus this formulation is not admissible as it would necessarily result in an *ex post facto* view of inventive activity. Instead, the Board considers that the objective technical problem solved over D1 has to be formulated in a broader manner as how to improve sealing against the passage of fluid through the connector.

10.4 For a skilled person starting from D1 and facing this objective technical problem, it was not obvious to arrive at the claimed solution.

10.5 Firstly, starting from D1, the skilled person has no clear motivation to solve this problem by providing a further internal seal. In fact, the entire thrust of the teaching of D1 is that a metal-to-metal seal is provided between the external contact surfaces 7 and 8 and that this seal is sufficient "to ensure a seal at the internal or external pressures applied to the threaded connection" (page 19, lines 1-6 and lines 11-13). If need be, the skilled person would rather try to improve the performance of this external metal-to-metal seal, possibly by providing an additional seal between the external contact surfaces 7 and 8 (see e.g. the annular elastomeric seals 28, 35 and 38 in Figures 7 and 8 of D3).

10.6 Secondly, even if the skilled person were to consider providing an internal seal in the connector of D1 to solve the above problem, it was not obvious to arrive at the claimed solution in view of the teaching of D1 alone. The only information which can be gleaned from D1 is how a metal-to-metal seal can be achieved between the external contact surfaces 7 and 8, see e.g. page 5, lines 14-17 and Figures 4-7. D1 does not provide any suggestion to achieve an internal seal, still less an internal metal-to-metal seal between the internal walls of the tongue and groove. Moreover, D1 does not provide any suggestion to modify the connector as disclosed therein so that the internal walls would have a sealing function after expansion as well as a support function during and after expansion. The claimed solution, however, requires cooperating surfaces having a sealing function as well as a support function (see point 2.4 above). Thus, a skilled reader of D1 would not arrive at the claimed solution in an obvious manner.

10.7 In conclusion, the subject-matter of claim 1 involves an inventive step when starting from D1.

11. Inventive step vs. D3

11.1 The appellant contends that the subject-matter of claim 1 lacks an inventive step over D3.

11.2 It was undisputed among the parties that D3 discloses, using the words of claim 1, a method of radially expanding a connector 25 for interconnecting a first tube to a second tube (see Figures 7a, 9, 10, 7b), the connector including a pin member 26 and a box member 27, the pin member having a tapered end portion which extends into a recess of the box member, the pin member being supported by cooperating surfaces 34a and 39a so

as to prevent radially inward movement of its end portion after radial expansion of the connector (Figure 7b).

11.3 It was also undisputed among the parties that D3 does not disclose the feature of claim 1 that the support surfaces 34a and 39b extend "in substantially axial direction of the connector" (see Figures 7b).

11.4 The parties have however disputed whether D3 discloses the feature of claim 1 that the pin member is supported by the cooperating support surfaces 34a and 39a so as to prevent radially inward movement of its end portion "during radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1.

11.5 "During radial expansion of the connector"

D3 teaches:

- (a) that "an internal, reverse angle torque shoulder engages the end of the pin to prevent the pin end from moving radially inwardly away from the expanded box following the expansion of the connection" (page 4, lines 1-3);
- (b) that "the reverse angle torque shoulder provides radial support to the nose of the pin to prevent the pin from disengaging from the box during the expansion process" (page 4, lines 30-32);
- (c) that, "in an intermediate phase of the expansion" (page 9, line 18), "the nose of the pin is ... deflected radially inwardly away from the surrounding box connection during the initial phase of the expansion of the pin nose" (Figures 10 and 10a and page 15, lines 4-9); and
- (d) that "an internal reverse angle torque shoulder 39a is formed at the base of the threads of the

box section 33", wherein "the shoulder 39a functions to hold the reversely tapered nose end 34a of the pin section in its expanded position after the connection has been fully expanded" (page 15, lines 9-13).

The appellant contends that passages (b) and (d) anticipate the feature of claim 1 that the pin member is supported by the cooperating support surfaces 34a and 39a so as to prevent said radially inward movement "during radial expansion of the connector".

However, when passages (b) and (d) are read in context, i.e. in particular in combination with passages (a) and (c), it follows directly that the pin end is allowed to deflect radially inwardly in an intermediate phase of the expansion of the connector, more precisely during the initial expansion of the pin end as shown in Figure 10, and that the shoulder 39a prevents the radially inward movement of the nose end 34a only before (Figure 7a) and after radial expansion of the connector (Figure 7b). It is implicit that, before the intermediate phase shown in Figure 10, the expander P deforms the pin end so that it is shortened axially and that it bends inwardly to the extent that the nose end 34a disengages the shoulder 39a (Figure 10a) and that, after the intermediate phase shown in Figure 10, the expander P further deforms the pin end until the nose end 34a moves back behind the shoulder 39a, whereby eventually the shoulder 39a supports the nose end 34a (Figure 7b).

Hence, D3 does not disclose that the pin member is supported by the cooperating support surfaces 34a and 39a so as to prevent radially inward movement of its

end portion "during", i.e. throughout, radial expansion of the connector.

11.6 "Metal-to-metal seal"

The appellant contends that it is implicitly disclosed in D3, on page 15, lines 11-13 in combination with Figure 7b, that the support surfaces 34a and 39a are compressed against each other as a result of radial expansion of the connector, thereby achieving a metal-to-metal seal. However, the Board shares the view of the respondent that such a seal is not directly and unambiguously disclosed in D3. The gist of this document is that an annular, preferably elastomeric seal is positioned between the pin and box members "in a way to prevent or reduce passage of well bore fluids from the inside of the pipe, even after the connection has been expanded radially" (page 6, lines 8-10). The mere fact that the support surfaces 34a and 39a are in contact after expansion of the connector does not necessarily imply that these surfaces form a metal-to-metal seal in addition to this annular, preferably elastomeric seal.

11.7 Thus, the Board concludes that D3 fails to disclose the features of claim 1 that the support surfaces extend "in substantially axial direction of the connector", that the pin member is supported by the cooperating support surfaces so as to prevent radially inward movement of its end portion "during radial expansion of the connector" and also the "metal-to-metal seal" feature of claim 1.

11.8 These features distinguishing claim 1 from D3 have *inter alia* the effect of preventing damage to the end portion of the pin member and/or to the shoulder of the

box member during the expansion process (see Figures 10 and 10a of D3; see page 3, lines 11-25 in the patent as maintained by the opposition division; see paragraphs [0005] and [0006] of the patent as granted). Thus, the objective technical problem solved by these distinguishing features over D3 can be seen as how to achieve this technical effect (see page 3b, lines 26-28 in the patent as maintained by the opposition division).

- 11.9 For a skilled person starting from D3 and facing this objective technical problem, it was not obvious to arrive at the claimed solution.
- 11.10 Firstly, the skilled person gains no indication from D3 itself to solve this problem in the claimed manner. In fact, D3 does not address the problem but is mainly concerned with the provision of the annular, preferably elastomeric, seal, which is disposed between the pin and box members before expansion.
- 11.11 Secondly, the skilled person would disregard the teaching of D6, D7 or D8 to solve the problem starting from D3, i.e. to prevent damage to the nose end of the pin member and/or to the shoulder of the box member during the expansion process, because these documents concern non-expandable connectors and do not address this problem. Moreover, even if the skilled person were to consider D6, D7 or D8, it would not be straightforward to apply its teaching for non-expandable connectors to the expandable connector of D3 in view of the plastic deformations to which the latter connector is submitted.
- 11.12 Thirdly, the skilled person would also disregard D13 as it does not address the above defined problem.

Moreover, D13 is mainly concerned with the provision of a connector for joining lengths of expandable, longitudinally slotted tubing (see page 1 to page 2, line 8; see the paragraph bridging pages 6 and 7). There is no hint that this connector provides a seal. On the contrary, it is generally known in the art that such a connector is not aimed at providing a seal, given that the tubing is provided with slots to allow influx of fluids from the hydrocarbon-containing formation into the tubing (see e.g. D1, page 3, line 30 to page 4, line 2 or WO-A-9325800 as cited in D13, page 1, line 4 and page 7, line 2). Thus, even if the skilled person were to consider D13, he/she would not arrive at the "metal-to-metal seal" feature as defined in claim 1.

- 11.13 The Board therefore agrees with the opposition division that the subject-matter of claim 1 involves an inventive step when starting from D3.
12. No other prior art was relied on by the appellant in its attack on inventive step
13. In conclusion, none of the grounds for opposition raised by the appellant prejudices the maintenance of the patent as amended before the opposition division.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Spira

U. Krause

Decision electronically authenticated