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**Datasheet for the decision  
of 13 February 2017**

**Case Number:** T 1731/15 - 3.2.05

**Application Number:** 08735502.0

**Publication Number:** 2134997

**IPC:** F16L15/06

**Language of the proceedings:** EN

**Title of invention:**

Super High Torque Dope-Free Threaded Joint

**Patent Proprietor:**

Tenaris Connections Ltd.

**Opponent:**

Vallourec Oil and Gas France

**Relevant legal provisions:**

EPC Art. 100(b), 111(1)

**Keyword:**

Sufficiency of disclosure - (yes)

Remittal to the department of first instance - (yes)



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Case Number: T 1731/15 - 3.2.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.05**  
**of 13 February 2017**

**Appellant:** Tenaris Connections Ltd.  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 3 July 2015  
revoking European patent No. 2 134 997 pursuant  
to Article 101(2) EPC.**

**Composition of the Board:**

**Chairman** P. Lanz  
**Members:** S. Bridge  
D. Rogers

## **Summary of Facts and Submissions**

- I. The appeal was lodged against the decision of the opposition division revoking the European patent No. 2 134 997 in view of the ground for opposition under Article 100(b) EPC.
- II. An opposition was filed against the patent as a whole based on Article 100(a) EPC (lack of novelty, Article 54 EPC, and lack of inventive step, Article 56 EPC ) and Article 100(b) EPC (the invention is not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art).
- III. Oral proceedings were held before the board of appeal on 13 February 2017.
- IV. The request of the appellant (patent proprietor) was to set aside the decision under appeal and to remit the case to the Opposition Division for further prosecution.
- V. The requests of the respondent (opponent) were that the appeal be dismissed, or alternatively that the case be remitted to the Opposition Division for further prosecution.
- VI. Claim 1 of the patent in suit as granted (main request) reads as follows:

"A high torque threaded joint comprising a box member having female threads and a pin member having male threads configured to mate with the threads of the box member, wherein the box member and the pin member have a trapezoidal thread profile and thread pitch adapted for a simultaneous mating contact between load flanks

(12, 22) and stabbing flanks (14, 24), and wherein further at least one of the pin and the box threads are coated with a thin layer of a dope-free solid material, that comprises a dry lubricant, characterised in that the box member and the pin member have a value of radial interference ranging between 0 mm and 0.5 mm, and in that the load flank angle ( $\beta_1$ ) and the stabbing flank angle ( $\beta_2$ ), as measured from a plane perpendicular to the longitudinal axis of the joint, each are of a positive value and range between approximately  $3^\circ$  to approximately  $15^\circ$ ."

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

Claim 1 requires the box and the pin member to have a value of radial interference ranging between 0 mm and 0.5 mm which excludes the extreme values of 0 mm and 0.5 mm. Low values of torque due to radial interference can be supplemented by torque arising from a torque shoulder as set out in paragraph [0025] of the patent in suit.

The objections to the relative terms "*high torque*" and "*thin layer*" concern the clarity of the claim and do not concern the issue of sufficiency of disclosure.

The skilled person will seek to implement the invention and will not try to find potentially unworkable embodiments. The patent in suit contains examples for implementing the invention.

The subject-matter of claim 1 should be interpreted as a made-up joint, i.e. the claim covers the joint in use.

The only location for the interference mentioned in claim 1 is the thread, since this is the only component of the pin and box which is explicitly mentioned.

The threads are to be understood as *tapered* threads, for which there is no problem achieving a simultaneous mating contact between load flanks and stabbing flanks and having a value of radial interference (which can occur on the flanks) ranging between 0 mm and 0.5 mm, as the load flank angle and the stabbing flank angle each are of a positive value.

The invention is thus disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

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

The term "*high-torque*" of claim 1 is not sufficiently clear for the skilled person to practice the invention. Paragraph [0002] of the patent in suit only defines "*super high torque performance*" in terms of the over-torque capacity relative to the pipe body resistance. The examples in the patent in suit only compare a same joint with and without lubricating grease ("*dope*"). When the interference is 0 mm, the corresponding torque of equation (1) of the patent in suit is also zero and is thus incompatible with the claimed high torque joint. Therefore, the skilled person does not know when he is working within the scope of the "*high-torque*" of claim 1.

The thinness of the claimed "*thin layer of a dope-free solid material, that comprises a dry lubricant*" is not quantified. Even a reasonable value of 1% of the pipe

outside diameter of 177.8 mm (used in the examples in the patent in suit) would lead to a 1.77 mm thick layer. This is thicker than the height of the thread, so that all of the thread would be formed in the "*dope-free solid material, that comprises a dry lubricant*". Such a thread could not meet the "*high-torque*" of claim 1. The skilled person would thus have the undue burden of starting a research program to determine what thicknesses are appropriate. The unclear term "*thin*" thus leads to a lack of sufficiency of disclosure.

The subject-matter of claim 1 is not limited to wedge threads discussed as prior art in paragraphs [0003] and [0004] of the patent in suit. A wedge thread has a tooth width which increases along the length of the thread so that the load and stabbing flanks attain simultaneous mating contact at the end of make-up. A conventional non-wedge thread in which the load flanks and the stabbing flanks are in simultaneous mating contact and which has radial interference of more than 0 mm (and less than 0.5 mm) falls under the scope of claim 1 but is impossible to make up.

The subject-matter of claim 1 fails to specify at what stage of make-up interference occurs: defining the high torque in terms of the interference and the interference as a means of achieving high torque leads to a circular definition. The skilled person does not have a defined reference point from which to start.

The following four open questions arise with respect to "*radial interference*":

- *How to measure the radial interference (on a radius or on the diameter)?*

- *Where to measure the radial interference (in the threaded region or not of the box member and pin member)?*
- *At which stage of the assembly of the threaded joint does radial interference occur?*
- *Should the radial interference be measured with or without the 'dope-free' coating - in particular, for a very small amount of radial interference such as 0.15  $\mu\text{m}$ ?*

For all of the above reasons, claim 1 cannot be implemented across all of its broad scope. The invention is thus not disclosed in a manner sufficiently clear and complete to enable it to be carried out by a person skilled in the art.

## **Reasons for the Decision**

### 1. *Sufficiency of disclosure - claim 1 as granted*

#### 1.1 Clarity objections

The respondent raised objections concerning the relative terms "*high-torque*" and "*thin layer*" of claim 1. The issue how high the torque is, and how thin the layer is, only concerns the clarity of the claim and clarity (Article 84 EPC) is not a ground for opposition listed in Article 100 EPC.

The examples of joints presented in the patent in suit support a certain torque and involve a layer of a certain thickness. The respondent did not argue that the skilled person is unable to rework the examples in the patent in suit to implement the invention. The use

of relative terms in the claim thus does not lead to an insufficiency of disclosure.

## 1.2 Unworkable embodiments

- 1.2.1 The respondent presented a first hypothetical embodiment potentially falling within the scope of the wording of claim 1: A "*thin*" layer of "*dope-free solid material, that comprises a dry lubricant*" of 1% of the pipe outside diameter of 177.8 mm (used in the examples in the patent in suit) leads to a 1.77 mm thick layer which is thicker than the height of the thread: thus all of the thread would be formed in the "*dope-free solid material, that comprises a dry lubricant*" instead of being formed in the material of the box or pin. The respondent further argued that it is immediately obvious to the skilled person that such a thread could not meet the requirements of a "*high-torque*" threaded joint.

The board is not convinced that the skilled person would select the thickness of the "*dope-free solid material, that comprises a dry lubricant*" on the basis of the pipe outside diameter: since the purpose of the "*thin layer of a dope-free solid material, that comprises a dry lubricant*" is clearly to provide lubrication to the thread, the reasonable starting point of the skilled person would be the friction conditions expected in the threads and not the outside diameter of the pipe. In this context a layer which is thicker than the height of the thread is technically unreasonable and would not be considered by the skilled person seeking to carry out the invention.

- 1.2.2 The respondent presented a second hypothetical embodiment potentially falling within the scope of the wor-



ding of claim 1: A conventional (non-wedge) thread in which the load flanks and the stabbing flanks are in simultaneous mating contact and which has radial interference of more than 0 mm (and less than 0.5 mm) is impossible to make up. The respondent further argued that it is immediately obvious to the skilled person that this is the case.

If it is immediately obvious to the skilled person that a conventional (i.e. non-wedge, non-tapered) thread in which the load flanks and the stabbing flanks are in simultaneous mating contact and which has radial interference of more than 0 mm (and less than 0.5 mm) is impossible to make up, then the skilled person would not consider such a constellation when seeking to carry out the invention. If it is obviously not technically feasible for such a thread to be made up, because the pin cannot be fitted in to the box due to the interference and the simultaneous mating contacts, then it is also not a reasonable technical solution the skilled person would consider when seeking to carry out the invention.

- 1.2.3 With respect to the two hypothetical embodiments falling within the scope of the wording of claim 1 presented by the respondent, the skilled person would disregard such obviously technically unreasonable constellations and instead seek to carry out the invention in a realistic manner, for example, by starting from the examples in the patent in suit.

1.3 Additional questions raised by the respondent with respect to "*radial interference*":

1.3.1 "*How to measure the radial interference (on a radius or on the diameter)?*"

The patent in suit uses both the expressions "*radial interference*" and "*diametrical interference*" and thus draws a distinction. The skilled person expects the numerical value of a particular amount of interference when referred to as a "*radial interference*" to be half that of the numerical value of the same particular amount of interference when described in terms of a "*diametrical interference*".

Thus the skilled person may determine either: the two values are simply related by a factor of two and one can be calculated from the other, if required. The range specified in claim 1 is for the "*value of radial interference*".

The fact that both the terms "*radial interference*" and "*diametrical interference*" are used in the patent in suit does not prevent the skilled person from manufacturing the claimed joint. In the case of *tapered threads* the joint can be assembled until a desired value of radial interference is achieved.

1.3.2 "*Where to measure the radial interference (in the threaded region or not of the box member and pin member)?*"

For *tapered threads*, the amount of interference will depend on how far the tapered threads have been wound into each other so that the value of radial interference is not an intrinsic feature of the box member

and pin member themselves as opposed to a feature of the manner of using them when assembling the joint.

The patent in suit does not appear to contain any explicit statements concerning the location of the interference on the box member and pin member. The only implicit indication occurs in paragraph [0007] which discusses "*radial interference*" in the prior art in the context of the lubricating compound ("*dope*") creating a high pressure in both the crests and roots. This indication implies that "*radial interference*" occurs in the threads. Similarly, the threads are the only feature of the box member and pin member explicitly mentioned in claim 1.

However, claim 1 does not explicitly specify where on the box member and pin member the radial interference has to occur. This makes the claim broader in that the radial interference may occur anywhere on the box member and pin member, i.e. not necessarily in the threads.

Since the patent in suit only discusses *tapered threads*, the patent in suit does not provide any explicit guidance for the skilled person for arranging a region of radial interference between the box member and the pin member which is outside the tapered thread. Nevertheless, once the skilled person has decided where and how a required radial interference should occur, there does not appear to be any *a priori* reason why the box member and pin member cannot be manufactured and assembled accordingly, insofar as designing two members for a given amount of radial interference forms part of the normal practice of the person skilled in the art of mechanical engineering. The respondent did not argue the contrary.

1.3.3 *"At which stage of the assembly of the threaded joint does radial interference occur?"*

The respondent argued that it is necessary to know *"at which stage of the assembly of the threaded joint"* the amount of radial interference (for *tapered threads*) should be determined. The board disagrees, because a given box member and pin member with *tapered threads* may be used to achieve different amounts of radial interference, depending on how much the threads are wound into each other. According to the patent in suit, the required torque can be calculated (e.g. equation (1) in the patent in suit) and the box member and pin member are suitable for a given amount of radial interference inasmuch as the materials used do not fail when such a torque is applied. For zero interference, the torque is zero as well and the contested feature does not impose any limitations on the box member and pin member with tapered threads.

1.3.4 *"Should the radial interference be measured with or without the 'dope-free' coating?"*

A further feature of granted claim 1 is *"wherein further at least one of the pin and the box threads are coated with a thin layer of a dope-free solid material, that comprises a dry lubricant"* and the respondent questions whether this layer should be taken into account when considering the amount of interference.

The skilled person will simply use his usual skill to settle the issue: if the layer is thick enough to have an influence, then it will have to be taken into account; if, on the other hand, it is sufficiently thin

for its contribution to radial interference to be negligible, it will be ignored.

The patent in suit discloses in paragraph [0028] that: "*Upon those thread surfaces a thin dope-free layer comprising a dry lubricant has been applied, with a thickness,  $D_{Ft}$ , that is on the order of 10-20 $\mu$ m in thickness*". Thus the layer appears to be up to 0.02 mm thick whereas the interference is up to 0.5 mm, i.e. bigger by an order of magnitude. Since interference occurs at the outer limits of the interfering parts, the layer will only have to be taken into account when aiming for very small amounts of interference such as the 0.15  $\mu$ m mentioned by the respondent.

Again, once the skilled person has decided what amount of radial interference should occur, no reasons were provided why the box member and pin member cannot be manufactured and assembled accordingly. The board cannot see why this issue should be able to justify a lack of sufficiency of disclosure.

- 1.4 The appellant argued that in accordance with the examples set out in the patent in suit, a *tapered thread* in which the load flanks and the stabbing flanks are in simultaneous mating contact and which has radial interference of more than 0 mm and less than 0.5 mm can be made up because the load flank angle and the stabbing flank angle are of a low positive value between approximately 3° to approximately 15°.

According to the patent in suit, the domain of application ("*oil and gas industries*", page 2, line 11) may involve *tapered threads* and all the embodiments involve such *tapered threads* (paragraphs [0028], [0030] and [0031]).

For *tapered threads*, the amount of interference is not an inherent feature of the claimed box member or pin member: instead, the interference depends on the manner of making up the box member and the pin member, in that the value of radial interference depends on how far the tapered threads are wound into one another. Thus, although the contested feature "*the box member and the pin member have a value of radial interference ranging between 0 mm and 0.5 mm*" is in granted claim 1, it cannot characterise the claimed joint in the case of tapered threads, because this feature relates to a possible manner of using the box member and the pin member when assembling the "*high torque threaded joint*". For *tapered threads*, the contested feature thus cannot justify a lack of sufficiency of disclosure (Article 100(b) EPC). However, claim 1 is not explicitly limited to *tapered threads*.

- 1.5 The appellant further argued that subject-matter of claim 1 should be interpreted as a made-up joint, i.e. claim the joint *in use*.

The board cannot accept this view, because claim 1 is drafted as an apparatus claim and thus concerns "*a high torque threaded joint comprising a box member ... and a pin member ...*" whether the joint is made-up or not. The appellant's interpretation would appear to imply that no protection is afforded for the joint when it is not "*in use*" - this is contrary to the principle of an apparatus claim which protects the apparatus as such independently of whether it is used or not. In addition, in the present case the claim does not define when the joint should be considered as being "*in use*" and does not explicitly mention any particular state of the box member and pin member. This applies all the

more to *tapered threads* since the value of radial interference depends on how far the pin member is wound into the box member.

However, an apparatus claim may have technical features which make it suitable for a particular manner of using it. In the present case, claim 1 does not explicitly mention technical features required for achieving the specified amounts of radial interference. This absence of explicit features implies that it is considered to be within the usual practice of the skilled person to select the materials and dimensions of the box member and of the pin member such that they do not fail under the applied torque needed to achieve a particular value of radial interference between 0 mm and 0.5 mm when the joint is assembled accordingly. The respondent did not argue that to do so was beyond the usual practice of the skilled person.

- 1.6 The respondent also did not argue that the skilled person is unable to rework the examples in the patent in suit and thereby carry out the invention.
- 1.7 The invention is thus disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

## 2. *Remittal*

Both parties requested remittal to the department of first instance. Since the issues raised under Article 100(a) EPC have not yet been examined by the opposition division, the board considers it appropriate to exercise its discretion under Article 111(1) EPC and remit the case to the department of first instance for further prosecution.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution.

The Registrar:

The Chairman:



D. Meyfarth

P. Lanz

Decision electronically authenticated