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# Datasheet for the decision of 13 December 2022

**Case Number:** T 0746/21 - 3.2.01

**Application Number:** 12779208.3

**Publication Number:** 2885483

**IPC:** E21B17/02

**Language of the proceedings:** EN

**Title of invention:**
ENHANCED INTERCONNECT FOR DOWNHOLE TOOLS

**Applicant:**
Halliburton Energy Services, Inc.

**Headword:**

**Relevant legal provisions:**
EPC Art. 54

**Keyword:**
Novelty - main request (no) - auxiliary request (no)

**Decisions cited:**

**Catchword:**

Europäisches Patentamt
European Patent Office
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**Case Number: T 0746/21 - 3.2.01**

# D E C I S I O N
# of Technical Board of Appeal 3.2.01
# of 13 December 2022

| | |
|---|---|
| **Appellant:** (Applicant) | Halliburton Energy Services, Inc.<br>10200 Bellaire Boulevard<br>Houston, TX 77072 (US) |
| **Representative:** | Hoffmann Eitle<br>Patent- und Rechtsanwälte PartmbB<br>Arabellastraße 30<br>81925 München (DE) |
| **Decision under appeal:** | **Decision of the Examining Division of the European Patent Office posted on 1 February 2021 refusing European patent application No. 12779208.3 pursuant to Article 97(2) EPC.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | G. Pricolo |
| **Members:** | M. Geisenhofer |
| | P. Guntz |

## Summary of Facts and Submissions

I. The appeal was filed by the applicant (appellant) against the decision of the examining division to refuse the patent application in suit.

II. The examining division decided that neither the subject-matter of claim 1 of the main request, nor of claim 1 of the first or second auxiliary requests, respectively, fulfills the requirement of novelty over document

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III. Oral proceedings were held before the Board.

The appellant requested that the decision under appeal be set aside and that a patent be granted according to the main request or one of two auxiliary requests, all requests underlying the decision under appeal and re-submitted with the statement of grounds of appeal.

IV. Claim 1 of the **main request** reads as follows:
"*A system for an enhanced interconnect for downhole tools along a drill string used in subterranean operations, comprising:*
*a first drill string segment (302) comprising a first conductive element (306);*
*a second drill string segment (304) coupled to the first drill string segment;*
*a chamber (322) of the second drill string segment, the chamber being defined in part by an inner wall of the second drill string segment with a diameter greater than the borehole diameter of the second drill string segment;*

*a tool connect assembly (310) disposed within an internal bore of the second drill string segment, wherein:*

*the tool connect assembly comprises a second conductive element (312) electrically connected to the downhole tool and a hanger assembly (318) positioned within the chamber, and*

*the second conductive element is electrically coupled to the first conductive element through at most two electrical interfaces; and*

*at least one spacer (324) positioned between the hanger assembly and the bottom of the chamber, such that the hanger assembly is positioned within the chamber to contact a bottom of the first drill string segment to electrically couple the first conductive element to the second conductive element.*"

V. Claim 1 of the **first auxiliary request** differs therefrom in that the term "*at most two electrical interfaces*" is replaced by "*only one electrical interface*".

VI. Claim 1 of the **second auxiliary request** differs from claim 1 of the first auxiliary request only in that the downhole tool is specified to be "*a Logging while drilling (LWD) or Measuring While Drilling (MWD) sub*".

VII. The appellant's arguments can be summarized as follows:

(a) The term "*interconnect for downhole tools*" used in claim 1 of the **main request** implied that the downhole tool was not only electrically connected to the surface but also mechanically held within the centre of the borehole by the interconnect. Since D1 lacked the mechanical part of the interconnect, claim 1 was novel.

(b) The function of both holding the tool mechanically and connecting it electrically was further clarified by using the term "*tool connect assembly*" which again implied in addition to the electrical connection a mechanical connection of the downhole tool to the tool connect assembly.

(c) The term "*hanger assembly*" was a technical expression understood by the skilled person in the field of drilling. It referred to holding the downhole tool in the centre of the borehole.

In D1, the downhole tool neither hung in the centre of the borehole nor did the part considered to correspond to the hanger assembly provide for a mechanical connection, but only for an electrical connection.

(d) The spacer in figure 10 of D1 was not arranged between hanger assembly and bottom of the chamber, claim 1 thus being novel.

(e) The subject-matter of claim 1 of the **first auxiliary request** was novel since the system of figure 10 of D1 used a second interface (reference sign 1017).

(f) Since D1 lacked a direct connection of the LWD or MWD sub to the tool connect assembly, the subject-matter of claim 1 of the **second auxiliary request** was novel.

VIII. The respondent confirmed the examining division's arguments as set out within the following section "reasons for the decision".

## Reasons for the Decision

### Main request

1. The examining division came to the conclusion that the subject-matter of claim 1 of the main request lacks novelty over the embodiment of figure 10 of D1.

1.1 The board fully shares this conclusion and in particular the analysis of D1 as set out in the reasons for the decision on page 6, upper half of the page.

1.2 Contrary to the appellant's argument, the term *"interconnect for downhole tools"* does not necessarily refer to mechanically holding the downhole tool within the centre of the borehole.

1.2.1 An interconnect generally refers to the function of connecting two elements, whereby connecting may occur either mechanically or electrically. Therefore, the term itself cannot be relied upon to determine whether the function of the interconnect of claim 1 is a mechanical or electrical connection, or both.

1.2.2 In fact, claim 1 does not define any mechanical function of the interconnect but only cites features relating to an electrical interconnect of the downhole tool:

- "*a second conductive element is* ***electrically*** *connected to the downhole tool*";
- "*the second conductive element is* ***electrically*** *coupled to the first conductive element through at most two electrical interfaces*"; and
- "*the hanger assembly is positioned within the chamber ... to* ***electrically*** *couple the first*

*conductive element to the second conductive element*".

1.2.3 The description of the application in suit also concentrates on how a downhole tool is electrically connected to the surface to exchange data measured within the borehole with a control means at the surface. As set out on page 1, lines 9 - 15, it is the/ an object of the application to improve the internal **electrical** connections. A mechanical function of the interconnect is not mentioned in the general part of the description.

1.2.4 The expression "*interconnect for a downhole tool*" therefore does not imply as an implicit characteristic that the downhole tool must be held mechanically by the system.

1.3 A similar argumentation also applies to the term "*tool connect assembly*".

1.3.1 Contrary to the appellant's allegation, a tool connect assembly must not necessarily provide at the same time an electrical connection and a mechanical connection to the downhole tool. Connecting the downhole tool may be achieved either mechanically or electrically, or both.

1.3.2 As regards the appellant's allegation that the skilled person in the field of drilling would implicitly understand from the used expression that a downhole tool is hung from the tool connect assembly in the centre of the drill string (and hence is mechanically connected to the tool connect assembly), the Board can only note that no supporting evidence was provided.

1.3.3 It is, however, noted that the application as originally filed discloses in figure 4 a connection between two drill string segments providing only an electrical connection for the downhole tool. The downhole tool is neither shown in figure 4 nor described in the originally filed description, and it is not even possible to hold the downhole tool with the arrangement of figure 4 in the centre of the borehole.

In connection with this embodiment, the application as filed refers to a "*tool connect assembly (410)*" disposed within an internal bore of the second drill string segment, but only describes the electrical connections that it provides, see page 6, lines 5 - 9. This passage hence cannot be used to corroborate the appellant's understanding of the term "*tool connect assembly*".

1.3.4 Figure 10 of D1 therefore also discloses a tool connect assembly in the sense of the application in suit.

1.4 A mechanical connection between downhole tool and spacer assembly is not implicitly derivable either from the feature of claim 1 that the tool connect assembly comprises apart from the second conductive element also a hanger assembly.

1.4.1 The term "*hanger assembly*" usually refers in the field of drilling to a casing hanger as correctly held by the examining division (cf. page 8 of the reasons for the decision, first paragraph). The term "*hanger assembly*" is therefore not used in its usual context in the present application. Accordingly, this term cannot be relied upon for deriving implicit features based on the skilled person's common general knowledge.

1.4.2 Albeit the appellant cited document US 9 038 739 B2 in support to their understanding of the term "*hanger assembly*", the board only understands from document US 9 038 739 B2 that a downhole tool may be hung in the centre of a drill string using a "*hanger*". The document however does not prove that the term "*hanger*" always implies specific features providing anything more than the function of allowing to hang something from it.

1.4.3 The board therefore concludes that the term "*hanger assembly*" must be interpreted in its broadest technical meaning. It only refers to an assembly which is suitable to hang something from it, the housing sleeve (1012) of D1 thus also falling within the meaning of the term as correctly decided by the examining division (cf. paragraph bridging pages 7 and 8 of the reasons for the decision).

1.5 The spacer of D1 is positioned between a shoulder of the hanger assembly (1016) and the bottom of the chamber defined by the shoulder (1020). The term "*being positioned between*" does not imply that the spacer must be in contact with the elements to which its position is set in relationship, but the spacer must only be located somewhere within the space delimited by the reference elements.

Contrary to the appellant's argument, the spacer of D1 hence also falls under the definition of claim 1.

**First auxiliary request**

2. The examining division held that the subject-matter of claim 1 according to the first auxiliary request still lacked novelty over the embodiment of figure 10 of D1.

The board fully shares this conclusion for the following reasons:

2.1 Figure 10 of D1 discloses a first conductive element (1014') and a second conductive element having two parts (1013, 1015) linked by a connector (1017).

There is only one single electrical interface (1037') disclosed where the second conductive element is electrically coupled to the first conductive element.

2.2 Contrary to the appellant's argument, the connector (1017) is not an interface between the first and second conductive elements. The connector (1017) is part of the second conductive element and it is arranged at a location that does not influence the transition between the first and second conductive elements as correctly decided by the examining division (cf. page 9, last paragraph of the reasons for the decision).

**Second auxiliary request**

3. The examining division finally held that the subject-matter of claim 1 according to the second auxiliary request lacks novelty over the embodiment of figure 10 of D1.

The board fully shares this conclusion for the following reasons:

3.1 It is undisputed that the data line of D1 serves to connect a LWD or MWD sub within the downhole to the surface.

3.2 The appellant only argued that the LWD or MWD sub of D1 would not be connected directly to the second

conductive element but further interfaces and/or intermediate elements would be required to provide for the connection.

3.2.1 This cannot be followed since claim 1 only requires the LWD or MWD sub to be electrically connected to the second conductive element without specifying the entire conductor path. It is hence not excluded by the wording of claim 1 that additional intermediate elements are present between the LWD or MWD sub and the second conductive element shown in figure 10.

3.2.2 The system of figure 10 of D1 therefore still anticipates the subject-matter of claim 1, as correctly decided by the examining division (cf. reasons for the decision, paragraph bridging pages 8 and 9, and paragraph bridging pages 9 and 10).

4. The board hence sees no reason to deviate from the examining division's conclusions.

## Order

## For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Voyé G. Pricolo

Decision electronically authenticated