

United States District Court,
E.D. Texas, Tyler Division.

REEDHYCALOG UK, LTD., et al,
Plaintiff.

v.
UNITED DIAMOND DRILLING SERVICES, INC., et al,
Defendant.

No. 6:07 CV 251

April 15, 2009.

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MEMORANDUM OPINION

LEONARD DAVIS, District Judge.

This Memorandum Opinion construes the terms in the Patents-in-Suit: U.S. Pat. No. 6,585,064 (the "'064 Patent"); U.S. Pat. No. 6,592,985 (the "'985 Patent"); U.S. Pat. No. 6,749,033 (the "'033 Patent"); U.S. Pat. No. 6,589,640 (the "'640 Patent"); U.S. Pat. No. 6,739,214 (the "'214 Patent"); U.S. Pat. No. 6,544,308 (the "'308 Patent"); U.S. Pat. No. 6,797,326 (the "'326 Patent"); U.S. Pat. No. 6,562,462 (the "'462 Patent"); U.S. Pat. No. 6,878,447 (the "'447 Patent"); U.S. Pat. No. 6,861,098 (the "'098 Patent"); U.S. Pat. No. 6,861,137 (the "'137 Patent"); and U.S. Pat. No. 6,601,662 (the "'662 Patent").

BACKGROUND

This case involves twelve related patents, each of which claim priority to two provisional applications filed in late 2000 and early 2001. Generally, the Patents-in-Suit describe a single invention: partially-leached polycrystalline diamond ("PCD") elements with the thermal characteristics of fully-leached PCD elements and the impact strength of traditional PCD elements. The Patents-in-Suit are directed to PCD elements that attach to drill bits and engage the drilled formation. Typically, a sintering process creates the PCD body by combining diamond powder with catalyzing material, usually Cobalt or another metal, at high temperatures and high pressures. The result of the process is a cutting body that contains the diamond and the catalyzing

material. This PCD body is attached to a metallic substrate usually through a sintering process that bonds the materials. The composite object is the PCD element. The PCD element is similar to a spear, with the working surface of the PCD body at the end that engages the formation and the metallic substrate attached, usually through a cylindrical carrier, to the drill bit.

When fixed on a drill bit, these PCD elements engage and crush the formation. As a result of the friction from this engagement, the PCD elements increase in temperature. The temperature increase causes the PCD elements to experience performance problems. Different thermal expansion rates between the diamond and the catalyzing material cause the PCD element to crack or chip when the temperature of the PCD element exceeds about 400 (deg.) C. In addition, the presence of the catalyzing material causes the PCD element's diamond particles to turn into graphite when the temperature of the PCD element approaches 750 (deg.) C. The graphitization process causes the PCD element to crack and decreases its useful lifespan.

A process known as leaching solves the thermal degradation problem by removing the catalyzing material from the PCD body such that only the diamond crystals remain. The resulting PCD element is "thermally stable" and can operate in temperatures up to 1200 (deg.) C before it begins to thermally degrade.

This thermally-stable PCD element, however, has weakened impact strength. The weakened impact strength results from the gaps in the PCD element that remain after the leaching process removes the catalyzing material that resided between the diamond particles. Moreover, the leaching process removes the PCD element's metallic substrate, which further reduces the PCD element's impact strength. Thus, according to the Patents-in-Suit, the prior art discloses two problems: unleached PCD elements thermally degrade and fully-leached PCD elements cannot forcefully engage the formation.

The inventors' solution was to partially leach the catalyzing material from the PCD element to achieve thermal characteristics similar to thermally-stable PCD elements while maintaining substantially the same the impact strength of unleached PCD elements . FN1 The twelve Patents-in-Suit claim this invention three different ways: (1) claiming a PCD element with a specified leach depth (the "Depth Patents") FN2; (2) claiming a PCD element leached to a depth such that the element exhibits certain thermal properties (the "Thermal Characteristic Patents") FN3; and (3) claiming a PCD element leached to a depth such that the element has substantially the same impact strength as an unleached PCD element (the "Impact Strength Patent"). FN4

FN1. From the prosecution history of the patent applications, it appears the "impact strength" aspect of the invention was not discovered until the filing of the applications that issued as the '662 and '308 Patents.

FN2. The "Depth Patents" are the '064, '985, '033, '640, '214, ' 308, '326, and '462 Patents.

FN3. The "Thermal Characteristic Patents" are the '447, '098, and ' 137 Patents.

FN4. The "Impact Strength Patent" is the '662 Patent.

Prior to this case, ReedHycalog FN5 sued Baker Hughes, Halliburton, and U.S. Synthetic (the "Tyler I"

case), and alleged infringement of the Impact Strength Patent and the Thermal Characteristic Patents. The Court construed these patents' claims in September 2007. *ReedHycalog U.K., Ltd. v. Baker Hughes Oilfield Operations, Inc.*, Case No. 6:06-cv-222, Memorandum Opinion & Order (Docket No. 237) (E.D.Tex. Sept. 11, 2007) ("Tyler I Claim Construction Opinion & Order").FN6 ReedHycalog then brought this suit and alleged infringement of all twelve patents. Docket No. 1.

FN5. The term "ReedHycalog" refers to ReedHycalog U.K., Ltd., ReedHycalog, LP, and Grant Prideco, Inc. collectively.

FN6. The Court incorporates and adopts its Tyler I Claim Construction Opinion & Order and its Supplemental Memorandum Opinion in *ReedHycalog U.K., Ltd. v. Baker Hughes Oilfield Operations Inc.*, 6:06-cv-222(Docket No. 460) (E.D.Tex. May 21, 2008).

APPLICABLE LAW

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed.Cir.2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed.Cir.2004)). In claim construction, courts examine the patent's intrinsic evidence to define the patented invention's scope. *See id.*; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed.Cir.2004); *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed.Cir.2001). This intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. Courts give claim terms their ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent. *Phillips*, 415 F.3d at 1312-13; *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed.Cir.2003).

The claims themselves provide substantial guidance in determining the meaning of particular claim terms. *Phillips*, 415 F.3d at 1314. First, a term's context in the asserted claim can be very instructive. *Id.* Other asserted or unasserted claims can also aid in determining the claim's meaning because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term's meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314-15.

"[C]laims 'must be read in view of the specification, of which they are a part.'" *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed.Cir.1995) (en banc)). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (quoting *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1582 (Fed.Cir.1996)); *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed.Cir.2002). This is true because a patentee may define his own terms, give a claim term a different meaning than the term would otherwise possess, or disclaim or disavow the claim scope. *Phillips*, 415 F.3d at 1316. In these situations, the inventor's lexicography governs. *Id.* Also, the specification may resolve ambiguous claim terms "where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone." *Teleflex, Inc.*, 299 F.3d at 1325. But, "[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language,

particular embodiments and examples appearing in the specification will not generally be read into the claims.' " *Comark Commerc's, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed.Cir.1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed.Cir.1988)); *see also* *Phillips*, 415 F.3d at 1323. The prosecution history is another tool to supply the proper context for claim construction because a patent applicant may also define a term in prosecuting the patent. *Home Diagnostics, Inc., v. Lifescan, Inc.*, 381 F.3d 1352, 1356 (Fed.Cir.2004) ("As in the case of the specification, a patent applicant may define a term in prosecuting a patent.").

Although extrinsic evidence can be useful, it is " 'less significant than the intrinsic record in determining the legally operative meaning of claim language.' " *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert's conclusory, unsupported assertions as to a term's definition is entirely unhelpful to a court. *Id.* Generally, extrinsic evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id.*

CLAIM TERMS

ReedHycalog and Defendants FN7 initially disputed the construction of seven terms. The Court addressed five of these terms in Tyler I, including two terms Defendants contend are indefinite. At the hearing, the parties agreed to the construction of the two claim terms that the Court did not address in the Tyler I Claim Construction Opinion.

FN7. The term "Defendants" refers to United Diamond Drilling Services, Inc., Varel International Ind., L.P., and Ulterra Drilling Technologies, L.P. collectively.

Gauge / Gauge Region

These terms appear in the claims of the '064 Patent, which is one of the Depth Patents. ReedHycalog contends the terms mean "a region at the outmost radius of the bit." Defendants argue the terms do not require construction.

The parties' briefs do not explain what the parties' claim-scope dispute is. However, the parties agreed at the *Markman* hearing that the terms "gauge" and "gauge region" mean "a region at the outermost radius of the bit." The Court adopts the parties' construction.

Integrally Formed With a Metal Substrate

The claims of the '419, '462, '137, '308 and '662 Patents contain the term "integrally formed with a metal substrate." ReedHycalog proposed the term means "formed as a unit with a metallic base." Defendants argued the term means "bonded to a metallic substrate during the formation of the body of bonded diamonds." The parties' constructions raised three disputes: (1) whether "integrally formed" requires the PCD body to be bonded to the metal substrate; (2) whether the integral formation occurs during the formation of the body of bonded diamonds; and (3) whether the term "substrate" requires construction.

The parties agreed at the *Markman* hearing that "integrally formed with a metal substrate" means "formed as a unit with a metallic base." The Court adopts the parties' construction.

Catalyzing Material

All the asserted claims contain the term "catalyzing material." ReedHycalog contends the term means "a material used to help form bonds between adjacent crystals during the formation of the body of bonded diamonds." Defendants argue the term "catalyzing material" means "the material used to help form bonds between adjacent diamond crystals during sintering of the diamond table." FN8 The parties' constructions raise three disputes: (1) whether the claims cover PCD elements made from multiple catalysts; (2) whether the catalyzing material is used during the formation of the body of diamonds or during sintering of the diamond table; and (3) whether the crystals used with the catalyzing material are limited to diamond crystals.FN9

FN8. Defendants, in their response brief, indicated they were amenable to replace the "adjacent diamond crystals" portion of their construction with "adjacent superhard, diamond, or diamond-like crystals." Defendants' Joint Responsive Claim Construction Brief, Docket No. 179, p. 11. However, at the *Markman* hearing, Defendants retreated to their initial proposed construction.

FN9. The parties in Tyler I disputed the construction of this term but then agreed to ReedHycalog's construction at the *Markman* hearing. Tyler I Claim Construction Opinion & Order, 12.

The Term "A Catalyzing Material" is Not Limited to a Single Material

The asserted claims contain the term "a catalyzing material," which presumptively covers one or more catalyzing materials. *Good Sportsman Mktg. LLC v. Testa Assocs., LLC*, 440 F.Supp.2d 570, 578-79 (E.D.Tex.2006) (Davis, J.) (citing *Free Motion Fitness, Inc. v. Cybex Int'l, Inc.*, 423 F.3d 1343, 1350-51 (Fed.Cir.2005)). If the claims specifically limit the catalyzing material to a single material or the patents reveal the inventors' clear intent to limit the Patents-in-Suit to PCD elements with a single catalyzing material, the presumption of plurality no longer applies, and the term "a catalyzing material" has a singular meaning. *Id.* (citing *Free Motion Fitness*, 423 F.3d at 1350).

Nothing in the Patents-in-Suit-including the portions Defendants cite in their responsive brief-rebutts the presumption of plurality. Defendants contend the claims' usage of "the catalyzing material" indicates the inventors' clear intent to limit the term to a single catalyzing material. Claim 1 of the '985 Patent, for example, claims:

a polycrystalline diamond element comprising a body of bonded diamond crystals ... and a working surface on the body, wherein a first volume of the body remote from the working surface contains a *catalyzing material*, a second volume of the body adjacent to the working surface is substantially free of *the catalyzing material*, the *catalyzing material* remaining within the second volume of the body increases with distance from the working surface

'985 Patent, col. 14:21-31 (emphasis added).

The usage of "the catalyzing material" does not limit the claims to a single catalyzing material. The term

"the catalyzing material" refers to the previously claimed "a catalyzing material." Free Motion Fitness, 423 F.3d at 1350-51. Thus, unless the intrinsic record otherwise requires a contrary construction, "the catalyzing material" means "the one or more catalyzing materials." *Id.*

The specifications support a plural construction of "a catalyzing material." The specifications indicate PCD elements are most often formed by sintering diamond powder with a suitable binder-catalyzing material in a high-pressure, high-temperature press. '985 Patent, col. 2:1-3. In one common process, diamond powder is applied to the surface of a preform tungsten carbide substrate that incorporates Cobalt. *Id.* at col. 2:6-9. A press then subjects the assembly to high temperatures and pressures, during which the Cobalt migrates from the substrate into the diamond layer. *Id.* at col. 2:9-15. The Cobalt acts as a binder-catalyzing material, causes the diamond particles to bond diamond-to-diamond, and causes the diamond layer to bond to the tungsten carbide substrate. *Id.* While Cobalt is the most commonly used catalyst, the specifications do not limit the binder-catalyzing material to Cobalt. *Id.* at col. 2:44-46.

The specifications explicitly explain the catalyzing material may contain "any group VIII element, including cobalt, nickel, iron, and alloys thereof." *Id.* Alloys are combinations of multiple elements. Thus, the specification supports the presumption that the term "catalyzing material" is not limited to a single material.

In total, nothing in the intrinsic record rebuts the presumption that the term "a catalyzing material" means "one or more catalyzing materials." For that reason, the Court will not import a singular meaning into the claims.

The Catalyzing Material is Used to Form Bonds During Formation of the Body of Bonded Diamonds

As described above, the specifications describe a process where the catalyzing material helps form the diamond-to-diamond bonds of the PCD element. *Id.* at col. 2:1-15. While the specifications describe a "sintering" process, that process is an example of a process to create a PCD element and does not limit the claim language, which describes a PCD element comprised of a body of bonded diamonds where the body contains a catalyzing material. *Id.* at col. 2:1-15, col. 14:21-34. Thus, the claims indicate the catalyzing material is used to form bonds during the formation of the body of bonded diamonds.

It is Improper to Limit the Catalyzing Material to Materials that Bond Diamond Crystals

The Patents-in-Suit indicate that it is improper to limit the term "a catalyzing material" to materials used to bond diamond crystals. The claims do not exclude non-diamond materials from the PCD body. The claims generally describe a PCD element that comprises a "body of bonded diamonds." E.g., '447 Patent, col. 14:24-32. A number of claims require the claimed body to comprise at least an 85% by volume diamond density. E.g., '137 Patent, col. 16:57-67. The claims do not require the catalyzing material to comprise a specific volume of the PCD body, and some claims indicate the PCD body may contain other superhard polycrystalline materials. E.g., '308 Patent, col. 16:50-64 (claiming a "preform cutting element comprising a body of superhard polycrystalline material comprising a plurality of bonded diamond crystals"). Thus, the claims indicate the catalyzing material may act to bond other crystals in the PCD body.

The specifications also indicate the catalyzing material need not only bond diamond crystals. The specifications explain that the PCD element of the present invention may contain a plurality of partially bonded superhard, diamond or diamond-like crystals. E.g., '447 Patent, col. 2:16-24. In total, the Patents-in-Suit do not limit the catalyzing material to materials that only help bond diamond crystals.

For the above reasons, "catalyzing material" means "a material used to help form bonds between adjacent crystals during the formation of the body of bonded diamonds."

To a Depth

The Patents-in-Suit contain the term "to a depth." ReedHycalog contends the term does not require construction. Defendants argue "to a depth" means "to a distance of a minimum of 0.1 mm measured perpendicularly from the top of each part of each working surface." The parties' constructions raise two issues: (1) whether the leach depth has a minimum of 0.1 mm; and (2) whether the depth is measured perpendicularly from the top part of each working surface. The Court in Tyler I addressed the first dispute, rejected Defendants' construction, and concluded the term did not require construction. Defendants do not raise any new or persuasive arguments in this case.

The Patents-in-Suit Do Not Require a Minimum Leach Depth of 0.1 mm

The Court in Tyler I addressed and rejected Defendants' arguments that the specifications' statement that "a 0.1 mm depth is the critical depletion depth from the working surface" mandated a minimum leach depth of 0.1 mm. Tyler I Claim Construction Opinion & Order, 10-11. For the reasons delineated in that opinion, the Court rejects Defendants' attempt to limit the claims.

The claims that contain the "to a depth" limitation and do not specify a particular depth appear in the Thermal Characteristic Patents, which generally claim a leach depth such that a 950 (deg.) C temperature at the PCD element's working surface results in a temperature of less than 750 (deg.) C at the depth. E.g., ' 447 Patent, col. 14:24-33. Thus, the claims themselves define the leach depth by the resulting thermal gradient and do not require a minimum leach depth of 0.1 mm.

Fig. 10 of the Thermal Characteristic Patents depicts the relationship between leach depth and wear index, where a higher wear index corresponds to a greater ability of the PCD element to withstand heat. *Id.* at Fig. 10, col. 10:33-36. The accompanying portion of the specifications indicate it is improper to read in a required minimum leach depth of 0.1 mm.

The specifications indicate the depth required to achieve the claimed thermal gradient is a function of the leaching process, the crystal size, and the amount of inter-crystal bonding, among other variables. *Id.* at col. 9:56-63 (stating leach depth required to achieve the reduced thermal degradation depends upon the method used to deplete the catalyzing material); *id.* at col. 10:38-57 (stating the difference between PCD elements that create curves A and B is that the PCD element from curve B was leached using a more economical process); *id.* at col. 11:11-13 (stating that temperature gradient between leached and unleached portions of the PCD element depends upon the crystal size and the amount of inter-crystal bonding). Therefore, a particular diamond crystal size, the amount of interstitial bonding that resulted from forming the PCD element, and a particular leaching process could create a PCD element with a steeper wear index versus leach depth curve than curve A depicted in Fig. 10. This steeper curve would allow the resulting PCD element to achieve the claimed thermal gradient at a leach depth of less than 0.1 mm. Thus, while 0.1 mm may be the "critical depletion depth" for PCD elements affiliated with curve A, the critical depletion depth for PCD elements affiliated with a steeper curve would be less than 0.1 mm.

Further, nothing in the Thermal Gradient Patents indicates the claims are limited to PCD elements affiliated with curve A or B. Thus, the term "to a depth" covers partially leached PCD elements affiliated curves that achieve the claimed thermal gradient at shallower leach depths.FN10

FN10. In addition, the '137 Patent confirms that the claims do not require a minimum leach depth of 0.1 mm:

It is believed, however, that as the volume density of the diamond in the body 8 increases from the 85%-90% range to the 95%-99% range, the distance D needed to produce a particular wear index will decrease. Therefore, it is also believed that a distance D of less than 0.1 mm could provide approximately the same wear index in a cutting element with a diamond density of the body approaching 99% as the 0.2 mm to 0.3 mm D distance in a body with 85% to 90% diamond volume density.

'137 Patent, col. 13:21-29.

The Ordinary Meaning of "Depth" Requires a Perpendicular Measurement

The claims require a portion of the PCD body to be substantially free of the catalyzing material to a depth from the working surface or cutting surface. *E.g.*, '447 Patent, col. 14:24-33; '033 Patent, col. 14:26-34. Some of these claims require this region to extend to a specified depth, such as 0.1 mm. *E.g.*, '985 Patent, col. 14:21-31 (claiming a PCD element comprising a body of bonded diamond crystals and a working surface on the body wherein "a second volume of the body adjacent to the working surface is substantially free of the catalyzing material ..., wherein the second volume extends to a depth of at least 0.1 mm from the working surface").

The ordinary meaning of depth requires a perpendicular measurement from a reference point, in this case the working surface or cutting surface depending on the claim. Nothing in the Patents-in-Suit indicates a departure from this ordinary meaning. Nothing in the Patents-in-Suit, however, requires the measurement to be from the top of all working surfaces.

The Court has resolved the parties' dispute. A lay jury will understand the term "to a depth," and it does not require construction.

Thermal Characteristic

The Thermal Characteristic Patents' claims require the PCD body to exhibit a "thermal characteristic such that a 950 degrees C. temperature at the working surface results in a temperature of less than 750 degrees C. at the depth." ReedHycalog argues this term does not require construction. Defendants contended the claimed thermal characteristic is indefinite and, in the alternative, argue the term is not enabled. The Court addressed this dispute in Tyler I, concluded the claimed thermal characteristic was definite, and found the term did not require construction. Defendants do not raise any new or persuasive arguments in this case.

The Thermal Characteristic is Definite

The Thermal Characteristic Patents claim a PCD element or method to produce a PCD element such that "said bonded diamonds exhibit a thermal characteristic such that a 950 degrees C. temperature at the working surface results in a temperature of less than 750 degrees C. at the depth." *E.g.*, '447 Patent, col. 14:24-33. The claim language exactly defines the claims' bounds—a 950 (deg.) C temperature at the working surface results in a temperature less than 750 (deg.) C at the depth from the working surface. Defendants argue that an ordinarily-skilled artisan would not know if a partially-leached PCD element contains the claimed thermal characteristic because the specifications do not disclose the conditions, tests, or methods to measure the claimed "thermal characteristic."

Defendants' arguments are without merit. A claim is invalid as indefinite under 35 U.S.C. s. 112 para. 2 if the claim fails to particularly point out and distinctly claim the subject matter the applicants regard as the invention. The primary purpose of the definiteness requirement is to ensure public notice of the scope of the patentee's legal protection, such that interested members of the public can determine whether or not they infringe. *Halliburton Energy Servs., Inc. v. M-I, LLC*, 514 F.3d 1244, 1249 (Fed.Cir.2008). Thus, the definiteness inquiry focuses on how a skilled artisan understands the claims, and a claim is indefinite if the accused infringer shows by clear and convincing evidence that "a skilled artisan could not discern the boundaries of the claim based on the claim language, the specification, and the prosecution history, as well as her knowledge of the relevant art area." *Id.* at 1249-50.

A claimed parameter is definite "when the relevant values can be 'calculated or measured.'" *Marley Mouldings Ltd. v. Mikron Indus., Inc.*, 417 F.3d 1356, 1360 (Fed.Cir.2005) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.3d 1540, 1558 (Fed.Cir.1983)). However, a claim's bounds are not sufficiently defined where the number of methods used to measure the claimed parameter, the different results each method yields, and the uncertainty as to which method to use render the parameter insolubly ambiguous and effectively incapable of measurement. *Honeywell Int'l, Inc. v. Int'l Trade Comm'n*, 341 F.3d 1332, 1339-41 (Fed.Cir.2003); *Halliburton*, 514 F.3d at 1249; *see also* *Marley Mouldings*, 417 F.3d at 1360. Thus, a claimed parameter is indefinite where the accused infringer shows by clear and convincing evidence: (1) persons of ordinary skill in the art, at the time the application was filed, knew of multiple methods to measure the claimed parameter; (2) the different methods yield significantly different results such that the claims are insolubly ambiguous as a result; (3) and the intrinsic record or knowledge of the relevant art area do not sufficiently define the bounds of claim by specifying to a skilled artisan which method or set of measurement methods to use. *See Kinetic Concepts, Inc. v. Blue Sky Med. Group, Inc.*, 554 F.3d 1010, 1022 (Fed.Cir.2009); *Marley Mouldings*, 417 F.3d at 1360; *Honeywell*, 341 F.3d at 1339-41; *Halliburton*, 514 F.3d at 1249-50; *In re Gabapentin Patent Litig.*, 395 F.Supp.2d 164, 173 (D.N.J.2005).

Defendants merely state the specifications do not describe a method to test for the claimed thermal characteristic. Defendants do not explain why that alleged omission is fatal-Defendants do not show that skilled artisans were aware of multiple methods to measure the claimed thermal characteristic and that the methods produced significantly varied results such that the thermal characteristic cannot be calculated or measured. *See Honeywell*, 341 F.3d at 1340-41. Without such a showing, it is irrelevant that the specifications allegedly do not disclose a method to test the claimed thermal characteristic. *See Marley Mouldings*, 417 F.3d at 1358, 1360; *Gabapentin*, 395 F.Supp.2d at 173.

Further, Defendants' allegations do not show by clear and convincing evidence that the intrinsic record or knowledge of the relevant art area do not specify to a skilled artisan which method or set of methods to use. The specifications describe using a wear test to calculate a wear index for a partially-leached PCD element. '447 Patent, col. 10:21-col. 11:11. During these tests, friction at the working surface inputs heat into the PCD element, and the tests allow a skilled artisan to calculate a wear index for the PCD element. *Id.* at col. 10:20-37, col. 11:1-11. The higher the wear index from this test, the more heat the leached portion of the PCD element can withstand before it degrades. *Id.* at col. 10:34-37, col. 10:66-col. 11:26.

A person of ordinary skill can infer the working surface's temperature when he performs the wear test. ReedHycalog's expert in Tyler I, David Hall, declared that the leached portion of the PCD element emits different colored light depending on its temperature during the wear test. Tyler I Claim Construction Opinion & Order, 6. Hall further declared that those skilled in the art know that emissions of orange light

and white-hot light indicate the working surface of the PCD element is 950 (deg.) C. Id. Defendants do not argue or submit evidence to the contrary.

The specifications also explain how an ordinarily-skilled artisan can infer that the temperature of the unleached portion of the PCD element did not reach 750 (deg.) C during the wear test. The specifications detail the two modes of thermal degradation of unleached PCD elements, due to different thermal expansion rates (at about 400 (deg.) C) and graphitization (at about 750 (deg.) C). '447 Patent, col. 2:31-47, col. 9:12-34. Of interest here, the diamond in unleached PCD elements begins to graphitize as the temperature of the unleached PCD element approaches 750 (deg.) C. Id. at col. 9:24-33. Thus, a person of ordinary skill could, after the wear test completes, inspect the PCD element for graphitization and infer whether the temperature of the unleached portion reached 750 (deg.) C during the wear test. Tyler I Claim Construction Opinion & Order, 6. Defendants do not raise any arguments or present any evidence to the contrary.

In total, Defendants have not shown by clear and convincing evidence that the term "thermal characteristic such that a 950 degrees C. temperature at the working surface results in a temperature of less than 750 degrees C. at the depth" is indefinite. Thus, the Court concludes the term is definite. In addition, the claim language is clear and does not require construction. *See* Tyler I Claim Construction Opinion & Order, 8-9, 11.

Defendants' Enablement Arguments Are Unsupported

Defendants argue that the specifications fail to enable the claimed thermal characteristic and cite Baker Hughes's expert report from the Tyler I litigation, which generally states the patents in that lawsuit do not contain adequate written description. Defendants' enablement conclusions are unsupported.

Pursuant to 35 U.S.C. s. 112 para. 1, the specification must enable those skilled in the art to make and use the full scope of the claimed invention without undue experimentation. *Harris Corp. v. IXYS Corp.*, 114 F.3d 1149, 1155 (Fed.Cir.1997). Enablement is a question of law based on underlying facts. *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed.Cir.2008). Courts presume the specification enables the claims, and the party alleging invalidity for lack of enablement must show by clear and convincing evidence that the specification does not enable the claims to prevail. *Ormo Corp. v. Align Tech., Inc.*, 498 F.3d 1307, 1318 (Fed.Cir.2007).

Whether the specification enables the claimed invention is a highly factual inquiry that requires the Court to determine (1) the level of skill in the art and the knowledge an ordinarily-skilled artisan possessed when the inventors filed the applications that matured into the Patents-in-Suit; (2) the full scope FN11 of the claimed invention; and (3) the level of experimentation that constitutes undue FN12 experimentation. Defendants address none of these inquires.

FN11. The enablement inquiry implicates claim construction, and courts first construe the asserted claims before determining whether the specification enables those claims. *See, e.g., Sitrick*, 516 F.3d at 999-1000.

FN12. Courts generally consider up to eight factors to determine whether the amount of experimentation is undue: (1) the quantity of experimentation necessary; (2) the amount of direction or guidance presented; (3) the presence or absence of working examples; (4) the nature of the invention; (5) the state of the prior art; (6) the relative skill of those in the art; (7) the predictability or unpredictability of the art; and (8) the

breadth of the claims. In re Wands, 858 F.2d 731, 737 (Fed.Cir.1988).

Substantially the Same Impact Strength

The Impact Strength Patent's claims contain the term "wherein the first volume and the second volume have substantially the same impact strength." ReedHycalog contends the term does not require construction. Defendants argue the term is indefinite and, in the alternative, that the term is not enabled.FN13 The Court addressed this dispute in Tyler I, concluded the "substantially the same impact strength" limitation was definite, and found the term did not require construction. Defendants do not raise any new or persuasive arguments in this case.

FN13. For the same reasons explained above, Defendants' enablement arguments are without merit.

The "substantially the same impact strength" limitation requires the leached and unleached portion of the PCD element have "substantially the same impact strength." '662 Patent, col. 18:23-31. Similar to the "thermal characteristic" limitation, Defendants contend the '662 Patent does not disclose the conditions, tests or methods to measure the impact strength of the leached and unleached volumes, and that the claims are indefinite and invalid.

Defendants' arguments are without merit. As noted above, a claimed parameter is indefinite where the accused infringer shows by clear and convincing evidence: (1) persons of ordinary skill in the art, at the time the application was filed, knew of multiple methods to measure the claimed parameter; (2) the different methods yield significantly different results such that the claims are insolubly ambiguous as a result; (3) and the intrinsic record or knowledge of the relevant art area do not sufficiently define the bounds of claim by specifying to a skilled artisan which method or set of measurement methods to use. *See* Kinetic Concepts, 554 F.3d at 1022; Marley Mouldings, 417 F.3d at 1360; Honeywell, 341 F.3d at 1339-41; Halliburton, 514 F.3d at 1249-50; Gabapentin, 395 F.Supp.2d at 173.

Similar to above, Defendants do not raise any arguments or present evidence that skilled artisans were aware of multiple methods to measure the claimed impact strength and that the methods produced significantly varied results such that the impact strength cannot be calculated or measured. Absent such a showing, it is irrelevant that the specifications allegedly do not disclose a method to test the impact strength of the leached and unleached portions of the PCD element.FN14 *See* Marley Mouldings, 417 F.3d at 1358; Gabapentin, 395 F.Supp.2d at 174. Thus, Defendants have not shown by clear and convincing evidence the term "wherein the first volume and the second volume have substantially the same impact strength" is indefinite.

FN14. Despite Defendants' assertions, David Hall testified that those in art have been aware of standardized drop tests for over 30 years and that skilled artisans can infer the impact strength of the leached and unleached portions of the PCD element by comparing the drop test results for partially leached PCD elements with the drop test results for unleached PCD elements. Tyler I Claim Construction Opinion & Order, 9. Defendants do not offer any arguments or evidence to the contrary.

The Court concludes the term "wherein the first volume and the second volume have substantially the same

impact strength" is definite. Additionally, the claim language is clear and does not require construction. *See* Tyler I Claim Construction Opinion & Order, 15; *ReedHycalog U.K., Ltd. v. Baker Hughes Oilfield Operations Inc.*, 6:06-cv-222, Supplemental Memorandum Opinion (Docket No. 460) (E.D.Tex. May 21, 2008).

At Least About 0.1 mm / At Least 0.1 mm

These terms appear in the Impact Strength Patent and the Depth Patents and refer to the depth of the leached portion of the PCD element. ReedHycalog argues the terms do not require construction. Defendants contend the terms mean "a minimum of 0.1 mm." At the hearing, the parties agreed the term "at least 0.1 mm" required a minimum measurement of 0.1 mm.

The parties' dispute is identical to the dispute regarding the "to a depth" limitation. For the same reasons explained above, the Patents-in-Suit do not require a minimum leach depth of 0.1 mm. In addition, Defendants' construction improperly reads out of the claims the term "about." *See* *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1368 (Fed.Cir.2008). Thus, the term "at least about 0.1 mm" is not limited to "a minimum of 0.1 mm." The terms "at least about 0.1 mm" and "at least 0.1 mm" are easily understood terms and do not require construction.

CONCLUSION

For the foregoing reasons, the Court interprets the claim language in this case in the manner set forth above. For ease of reference, the Court's claim interpretations are set forth in a table as Appendix A.

So ORDERED.

APPENDIX A

Claim Term	Court's Construction
Gauge/ Gauge Region	A region at the outermost radius of the bit.
Integrally Formed With a Metal Substrate	Formed as a unit with a metallic base
Catalyzing Material	A material used to help form bonds between adjacent crystals during the formation of the body of bonded diamonds
To a depth	[No construction necessary]
Thermal Characteristic	[No construction necessary]
Substantially the Same Impact Strength	[No construction necessary]
At least About 0.1 mm/ At least 0.1 mm	[No construction necessary]

E.D.Tex.,2009.

ReedHycalog UK, Ltd. v. United Diamond Drilling Services, Inc.