IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

HERAEUS ELECTRO-NITE CO.	:	CIVIL ACTION
	:	
v.	:	
	:	
MIDWEST INSTRUMENT	:	
COMPANY, INC.	:	NO. 06-355

MEMORANDUM

Padova, J. **November 1, 2007**

Plaintiff Heraeus Eletro-Nite Co. ("HEN") has brought this patent infringement action concerning U.S. Patent No. 4,964,736 ("the '736 patent"), entitled "Immersion Measuring Probe for Use in Molten Metals," against Midwest Instrument Company, Inc. ("Minco"). Currently before the Court are the parties' claim construction briefs in which they seek to have the Court construe various claim terms of the patent pursuant to Markman v. Westview Instruments, Inc., 517 U.S. 370 (1996). We held a Markman hearing on October 17, 2007.

I. BACKGROUND

The '736 patent discloses a probe used to measure the temperature and oxygen content of molten steel. HEN alleges that Minco infringes claims 3 and 6 of the '736 patent. Claims 3 and 6 are identical except for one element. While the '736 patent is not the first probe designed to measure the temperature and oxygen content of molten steel, it discloses a physical arrangement of an immersion probe's component parts in a manner that more accurately measures the temperature and oxygen content. The '736 patent was first filed in Belgium in 1982, and the U.S. application was filed on July 13, 1983. The patent was issued on October 23, 1990. Prior to this litigation, the patent went though reexamination proceedings in which the United States Patent and Trademark Office

("the PTO") ultimately reaffirmed the patent claims.

II. PRINCIPLES OF CLAIM CONSTRUCTION

The first step in determining whether a patent has been infringed is construction of "any disputed terms and limiting expressions in the [asserted claims]." Vivid Techs., Inc. v. American Science & Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999). "Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement." U.S. Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554, 1568 (Fed. Cir. 1997). Construction of a patentee's claims is a matter of law. Markman, 517 U.S. at 388-90. In construing claims, a court need not redraft the claims in their entirety. U.S. Surgical Corp., 103 F.3d at 1568 ("The Markman decisions do not hold that the trial judge must repeat or restate every claim term in order to comply with the ruling that claim construction is for the court. . . . It is not an obligatory exercise in redundancy."). Rather, only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. Vivid Techs., 200 F.3d at 803.

The United States Court of Appeals for the Federal Circuit reaffirmed the basic principles of claim construction in Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005). "Claim interpretation begins with an examination of the intrinsic evidence, i.e., the claims, the rest of the specification and, if in evidence, the prosecution history." CCS Fitness, Inc. v. Brunswick Corp., 288 F.3d 1359, 1366 (Fed. Cir. 2002) (citing cases); see also Phillips, 415 F.3d at 1312-17 (affirming the "primary importance" of the claims themselves, recognizing that the claims must be read in light of the specification, and stating that the court should consider the prosecution history if it is in evidence); Interactive Gift Express, Inc. v. Compuserve Inc., 256 F.3d 1323, 1331 (Fed. Cir. 2001)

(stating that "[f]irst, we look to the claim language. Then we look to the rest of the intrinsic evidence . . ."). Words of a claim are generally given their ordinary and customary meaning, and the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention. Phillips, 415 F.3d at 1313. A person of ordinary skill in the art is deemed to read the claim terms not only in the context of the particular claim, but in the context of the entire patent, including the specification and the prosecution history. Id.; see also Medrad, Inc. v. MRI Devices Corp., 401 F.3d 1313, 1319 (Fed. Cir. 2005) ("We cannot look at the ordinary meaning of the term . . . in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history."). "In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." Phillips, 415 F.3d at 1314.

Reliance on the specification, or written description, for guidance as to the meaning of the claims is entirely appropriate. Id. at 1317. "[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. at 1315 (quoting Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). The specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs. Id. at 1316. The specification may also reveal an intentional disclaimer, or disavowal, of claim scope by the inventor, and the inventor's intention, as expressed in the specification, is dispositive. Id. Although courts should consider the specification when construing

a claim, a court cannot add "limitations appearing only in the specification." Electro Med. Sys. S.A. v. Cooper Life Sciences, Inc., 34 F.3d 1048, 1054 (Fed. Cir. 1994); see also Phillips, 415 F.3d at 1323 ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments."); Teleflex, Inc. v. Ficosa N. Am. Corp., 299 F.3d 1313, 1328 (Fed. Cir. 2002) (stating that the district court erred by importing a limitation from the specification into the claim); Johnson Worldwide Assocs. v. Zebco Corp., 175 F.3d 985, 990 (Fed. Cir. 1999) (stating that claim terms cannot be narrowed by reference to the written description or prosecution history unless the language of the claims invites reference to these sources). The Federal Circuit has recognized that there is a fine line between reading a claim in light of the specification, and reading a limitation into the claim from the specification. See Comark Commc'ns. Inc. v. Harris Corp., 156 F.3d 1182, 1186 (Fed. Cir. 1998). To help locate this "fine line," the Federal Circuit has reminded courts that they "look to the specification to ascertain the meaning of the claim term as it is used by the inventor in the context of the entirety of his invention, and not merely to limit a claim term." Interactive Gift Express, 256 F.3d at 1331 (internal quotations and citation omitted). Additionally, the Federal Circuit has "expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment." Phillips, 415 F.3d at 1323 (citing Gemstar-TV Guide Int'l., Inc. v. ITC, 383 F.3d 1352, 1366 (Fed. Cir. 2004)).

In addition to consulting the specification, the Federal Circuit has instructed that courts should also consider a patent's prosecution history, if it is in evidence. Phillips, 415 F.3d at 1317. However, the prosecution history often lacks clarity and is less useful than the specification because the prosecution represents an ongoing negotiation between the patent applicant and the PTO. Id.

Nevertheless, the Federal Circuit has instructed:

> Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent. Furthermore, like the specification, the prosecution history was created by the patentee in attempting to explain and obtain the patent. . . . [T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would be otherwise.

Id. at 1317 (internal citations omitted). "The purpose of consulting the prosecution history in construing a claim is to exclude any interpretation that was disclaimed during prosecution." Chimie v. PPG Indus., 402 F.3d 1371 (Fed. Cir. 2005) (quotation and citation omitted). An applicant before the PTO may actually disclaim claim scope during prosecution. Invitrogen Corp. v. Biocrest Manufacturing L.P., 327 F.3d 1364, 1367 (Fed. Cir. 2003). Such disclaimer must clearly and unambiguously express any such surrender of subject matter. Id. (citing Middleton, Inc. v. Minn. Mining & Mfg. Co., 311 F.3d 1384, 1388 (Fed. Cir. 2002); Inverness Med. Switz. GmbH v. Princeton Biomeditech Corp., 309 F.3d 1365, 1372 (Fed. Cir. 2002)).[1]

The Federal Circuit has also instructed that district courts may, in their discretion, admit and use extrinsic evidence, such as expert and inventor testimony, dictionaries, and learned treatises, to determine the meaning of a claim. Phillips, 415 F.3d at 1319. However, the Federal Circuit cautioned that extrinsic evidence, in general, is less reliable than the patent and its prosecution history in determining how to read claim terms unless considered in the context of intrinsic evidence. Id. One form of extrinsic evidence that a court may not use to supply limitations to the patent claim

[1]Minco repeatedly refers to prosecution history estoppel in its brief. However, prosecution history estoppel, which is a doctrine that limits the expansion of the protection under the doctrine of equivalents when a claim has been distinguished over relevant prior art, Southwall Techs., Inc. v. Cardinal IG Co., 54 F.3d 1570, 1578 (Fed. Cir. 1995), does not apply to determining the literal claim scope. Invitrogen, 327 F.3d at 1367.

language is the accused device. See Wilson Sporting Goods Co. v. Hillerich & Bradsby Co., 442 F.3d 1322, 1330-31 (Fed. Cir. 2006) (repeating the rule that "claims may not be construed with reference to the accused device") (quoting NeoMagic Corp. v. Trident Microsystems, Inc., 287 F.3d 1062, 1074 (Fed. Cir. 2002). However, a court may consider the accused device to determine what part of the claim must be construed. Exigent Tech., Inc. v. Atrana Solutions, Inc., 442 F.3d 1301, 1309 n.10 (Fed. Cir. 2006); see also Wilson, 442 F.3d at 1331 (stating that the court is not forbidden from being aware "of the accused product or process to supply the parameters and scope of the infringement analysis, including its claim construction component").

Claim construction is performed differently for "means-plus-function" claim elements. A "means-plus-function" claim element is one that is expressed as a means for performing a specified function without the recital in the claim of sufficient structure to perform the function. 35 U.S.C. § 112 ¶ 6. Under § 112, ¶ 6, a means-plus-function element "shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. § 112, ¶ 6. When a claim uses the term "means" to describe a limitation, a presumption inheres that the inventor used the term to invoke § 112, ¶ 6. Altiris, Inc. v. Symantec Corp., 318 F.3d 1363, 1375 (Fed. Cir. 2003). "This presumption can be rebutted when the claim, in addition to the functional language, recites structure sufficient to perform the claimed function in its entirety." Id. Once a court concludes that a claim limitation is a means-plus-function limitation, two steps of claim construction remain: 1) the court must first identify the function of the limitation; and 2) the court must then look to the specification and identify the corresponding structure for that function. Med. Instrumentation & Diagnostics Corp. v. Elekta AB, 344 F.3d 1205, 1210 (Fed. Cir. 2003). In construing the function of a means-plus-function limitation, the court must include those

limitations contained in the claim language, and only those limitations. Cardiac Pacemakers, Inc. v. St. Jude Med., Inc., 296 F.3d 1106, 1113 (Fed. Cir. 2002). A court may not narrow the scope of the function beyond the claim language, and similarly, the court cannot broaden the scope of the claimed function by ignoring clear limitations in the claim language. Id. In performing the second step, the structure the court identifies as corresponding to the structure must not only perform the claimed function, but the specification must clearly associate the structure with performance of the function. Id. If there is no structure in the specification corresponding to the means-plus-function limitation in the claims, the claim will be found invalid as indefinite. Id.

III. DISCUSSION

We address, seriatim, the disputed claim terms.[2]

A. Claim language to be construed from Claims 3 and 6 – "an elongated hollow electrically conductive tube, said tube having an **immersion end** and a **connector end**." – col. 4, ll. 24-26; col. 6, ll. 29-31

HEN contends that the terms "immersion end" and "connector end" refer to regions of the electrically conductive tube and are used for orientation purposes. Thus, HEN proposes that these terms be construed to mean "the region of the tube which is first immersed in molten metal," and "the region of the tube which is opposite the immersion end of the tube." (HEN CC Br. at 10.) Minco, on the other hand, contends that a person of ordinary skill in the art would understand "connector end" to mean "the actual final physical endpoint of the conductive tube."[3] (Minco CC Br. at 10.)

[2]For each dispute, the entire claim element is stated with emphasis on the disputed terms.

[3]Minco does not concede HEN's proposed construction of immersion end; however, because it believes "immersion end" is not relevant to this lawsuit, it only proposes a construction of the term "connector end."

HEN points to the language of the claim that describes the sheathing surrounding the electrically conductive tube. The sheathing is claimed as having a minimum thickness adjacent to the immersion end and a shoulder that is adjacent to the connector end. (HEN Ex. A. col. 4, ll. 54-56, 58-60). HEN argues that the shoulder identified in the claim extends approximately 15-22% up the length of the tube from the connector, (see HEN Ex. A. at Figure 1), and that, therefore, if the shoulder is adjacent to the connector end, then the connector end cannot only refer to the final physical endpoint of the tube. Additionally, HEN argues that the connector, for which the connector end is named, has a connector sleeve that extends up into the connector end of the probe reaching approximately 10% into the tube. Therefore, according to HEN the connector end must refer to the end region and not the physical endpoint, and HEN contends that adopting Minco's proposed construction would effectively exclude the preferred embodiment. HEN also argues that the other language in the specification supports its proposed construction. HEN points to the following "Summary of the Invention":

> The present invention is directed to an immersion probe which comprises [a] unit including a support tube which defines the outer periphery of the unit. One end of the tube is an immersion end. At least one measuring element is supported on a measuring head which closes said tube adjacent its immersion end. A connector closes the other end of said tube. Electrical conductors in said tube extend from said connector to said measuring element. Heat insulating material is provided in said tube for protecting said conductors.

(HEN Ex. A., col. 1, 1ine 61 – col. 2, line 2.) According to HEN, this language demonstrates that the patent applicants refer to the immersion end and other end (i.e., connector end) for orientation purposes, or to provide a frame of reference to the tube. Additionally, HEN contends that in figure 1 of the patent specification the applicants used an arrow to refer to the immersion end of the probe, as opposed to a lead line. (HEN Ex. A. at Figure 1 and col. 2, ll. 31-32.) HEN contends that if the

applicants meant to limit the "immersion end" to mean only the very tip of the immersion tube, the applicants would have used a lead line and not an arrow because arrows may be used at the end of lines, provided their meaning is clear, to indicate an entire section towards which it points. See 18 C.F.R. § 1.84(r).

Minco, however, points to the patent specification and contends that the only drawing presented in the specification shows that the electrical connector is in direct contact with the final physical endpoint of the conductive tube, and that this makes clear that the electrical connector is located at the final physical endpoint of the conductive tube. Minco concludes, therefore, that the "connector end" must be the actual final physical endpoint of the conductive tube. Relatedly, Minco argues that other language in the claim supports its proposed construction. Minco points to the portion of the claim that states that there are "electrical conductors extending from said enclosure to said connector end of said tube." (Minco Ex. A. col. 4, ll. 40-41.) Minco contends that the only representation in the specification shows that the electrical conductors extend from the gas impermeable enclosure all the way down to the actual final physical endpoint of the tube. Therefore, according to Minco, the claim language and the only figure contained in the specification show that the connector end is at the final physical endpoint of the tube, because that is the point to which the electrical conductors travel and end.

Minco also relies on the prosecution history and argues that HEN's proposed construction contradicts limiting arguments it made to the patent examiner to overcome prior art. According to Minco, the prosecution history shows that the patent examiner at one point rejected claims 3 and 6 based on the prior art disclosed in Jackson (U.S. Patent No. 3,784,459)("Jackson"), in part because Jackson disclosed a molten metal sensing probe comprising "an electrical connector

(46/58/60/62/70) closing the connector end of the tube and providing electrical connections for the cell and the tube. . . ." (Minco App. 5E at HEN000313.) According to Minco, in order to overcome this rejection, HEN distinguished Jackson by arguing that the electrical connector in Jackson was not at the final physical endpoint of the tube, but rather removed at a distance away from the end of the tube, and therefore, Jackson did not disclose an electrical connector closing the end of the tube as required by the claims of the '736 patent. According to Minco, through this prosecution history HEN assigned a particular meaning to the claim words "connector end," namely, that the "connector end" means the physical endpoint of the tube. HEN disputes Minco's characterization of the prosecution history. HEN argues that the probe disclosed in Jackson does not even have a connector, thus HEN could not distinguish it on the basis alleged by Minco. Therefore, HEN argues that because it never acknowledged that Jackson has a connector at all (and therefore no "connector end"), we cannot conclude that HEN's statements about Jackson have any bearing on how "connector end" should be construed.

We construe "immersion end" to mean "the region of the tube which is first inserted into molten metal" and "connector end" to mean "the region of the tube opposite the immersion end of the tube." Our construction is based on the claim language and the specification. First, the figure contained in the specification shows the "immersion end" depicted by an arrow, and it does not point to the final physical end point of the tube. The applicants used lead lines to identify every other element in the figure. According to 18 C.F.R. § 1.84(r), arrows may be used, provided their meaning is clear, to indicate an entire section towards which it points. This is sufficient evidence to conclude that the term "immersion end" refers to the region of the tube, and not the final endpoint. With respect to "connector end," the connector and its sleeve together comprise the elements that connect

the tube to a lance or pole. The specification states, "Connector 17 has an electrically conductive sleeve 13 . . . ." (Minco Ex. A, col. 2, ll. 52-53.) The sleeve is the portion of the connector that is in intimate contact with the conductive tube, and it extends up a portion of the conductive tube. Therefore, the connector end cannot mean the physical endpoint because, in the preferred embodiment, the connector and its sleeve are not solely located at the final physical endpoint of the tube. Additionally, the specification states that a sheathing forms a shoulder adjacent to the connector end, (Minco Ex. A, col. 4, ll. 59-60), and we agree with HEN that the shoulder, as depicted in figure 1 of the patent, is located a significant distance up the length of the tube from the connector. (See Minco Ex. A at Figure 1.) We reject Minco's argument that adjacent in this context merely means nearby and that if we were to construe connector end to be only the final physical endpoint, the shoulder would still be adjacent to the connector end. The only construction of the term "connector end" that would be consistent with the preferred embodiment, therefore, is a construction in which "connector end" refers to a region of the tube. Finally, we reject Minco's argument based on the prosecution history. We fail to see how the fact that HEN distinguished the '736 patent from the prior art in Jackson based on the location of a connector has any bearing on whether "connector end" means the physical endpoint and not the region of the tube opposite that which is inserted into the molten bath. Furthermore, we discern no clear disavowal of claim coverage in the prosecution history that leads us to conclude that the patentee understood the term "connector end" to refer solely to the final physical end point of the conductive tube. We have considered all other arguments made by Minco with respect to its proposed construction of these terms, and we find them to be similarly unavailing.

B. Claim language to be construed from Claim 3 – "**a gas impermeable enclosure** receiving the electrically conductive portions of said thermocouple" – col. 2, ll. 36-37

HEN contends that "gas impermeable enclosure" should be construed to mean "a receptacle made of a material which gas cannot pass through." (HEN CC Br. at 16.) HEN contends that the claim itself and the specification support its proposed construction, and that the claim language does not contain any language requiring the enclosure to be completely closed on all sides and gas tight. Minco, on the other hand, argues that "gas impermeable enclosure" should be construed to mean "a gas tight enclosure, into which or out of which gas cannot move or flow, such as a body of silicone surrounded by a small plastic casing." (Minco CC Br. at 16.) Minco argues that according to the specification, the purpose of the gas impermeable enclosure is to provide protection for the cold welds located inside the enclosure from heat or temperature differences. Furthermore, Minco argues that the patent specification describes the gas impermeable enclosure as follows: "The cold joints of the thermocouple 5 are embedded in a gas tight enclosure such as a body of silicone 8 surrounded by a small plastic casing 9. The conductors at the cold joints 7 are V-shaped with the apexes adjacent one another but electrically insulated from one another by the silicone 8." (Minco Ex. A, col. 2, ll. 39-44.) Minco argues that use of the word "embedded" supports the conclusion that the cold welds are encapsulated inside a body of silicone, which is known to be gas tight.

HEN's argument regarding the construction of "gas impermeable enclosure" is predicated on the fact that the enclosure is represented in the specification only by the small plastic casing, (see HEN Ex. A at Figure 1, number 9) which HEN construes as a receptacle that can be open on top. However, we understand the enclosure, based on the specification, as being an enclosure "such as a body of silicone 8 surrounded by a small plastic casing 9," (see HEN Ex. A at col. 2, ll. 40-41),

and that this entire enclosure, not just the small plastic casing, must be gas impermeable. Consequently, we reject HEN's use of the word "receptacle" in its proposed construction and its related argument that the enclosure need not be closed on all sides as this is inconsistent with how the applicants understood the term "gas impermeable enclosure" as indicated in the specification. Additionally, HEN's construction of "impermeable" would make more sense if it were used to modify something that was typically two-dimensional, such as a barrier. In such a context, an impermeable barrier means that gas cannot pass through it. However, in the context of this invention, "impermeable" modifies "enclosure," which is something that connotes a three-dimensional element, and an impermeable enclosure means that gas cannot pass into or out of the enclosure. We believe, therefore, that HEN's proposed construction of an impermeable enclosure as a receptacle that is open on the top is not consistent with the understanding of these terms held by an ordinary person skilled in the art. An impermeable enclosure means that gas cannot enter the enclosure from any attitude – from the bottom, the sides, or the top. Consequently, we construe "gas impermeable enclosure" to mean "an enclosure, into which and out of which gas cannot move or pass."[4]

[4]The parties have relied in their arguments on extrinsic evidence such as the mechanics of the flow of gases in the area of the enclosure during the immersion of the probe in molten metal and dictionary definitions. However, we need not address this extrinsic evidence as we are able to construe the claim term based on the intrinsic evidence alone. See Phillips, 415 F.3d at 1319 (stating that courts in their discretion may use extrinsic evidence to determine claim meaning). Moreover, even if we rely on the dictionary definition of impermeable supplied by HEN, this would not support its position because "impermeable" is defined, in part, as "(of substances) not permitting the passage of a fluid through the pores, interstices, etc." See Webster's Encyclopedic Unabridged Dictionary of the English Language (1989). Allowing a substance, such as gas, to enter through the top of the enclosure would not be consistent with this definition.

C. Claim language to be construed from Claims 3 and 6 – "an electrical connector **closing** said connector end of said tube" – col. 4, ll. 42-43; col. 6, ll. 44-45

HEN contends that the term "closing" should be constructed to mean "spanning a diameter of the tube." (HEN CC Br. at 19.) HEN argues that its proposed construction would mean that the electrical connector does not necessarily seal the tube, and thus can have openings into the internal cavity of the tube. Minco, on the other hand, proposes that the term "closing" should be construed to mean "attached to the final physical endpoint of the tube without openings into the internal cavity of the conductive tube." (Minco CC Br. at 27.)

Minco asserts that it does not claim that "closed" means "sealed." (Id. at 30.) However, Minco's proposed construction is effectively a construction that the tube must be sealed by the connector because Minco's proposed construction states that the connector cannot have any openings into the internal cavity of the conductive tube. Other courts have found, and we agree, that there is a difference in the ordinary meaning of the terms "closed" and "sealed." See Pharmacia & Upjohn Co. v. Sicor, Inc., 447 F. Supp. 2d 363, 374 (D. Del. 2006) ("ordinary meaning of the term 'sealed' is different from, and encompasses something more than, the ordinary meaning of the term 'closed.'"); Protective Optics, Inc. v. Panoptix, Inc., 458 F. Supp. 2d 1053, 1063-64 (N.D. Ca. 2006) (noting that "close" is different from "close hermetically"); HBB Limited Partnership v. Morton International, Inc., 1996 U.S. Dist. LEXIS 4047, *17-18 (E.D. Il. Mar. 29, 1996) ("closed" does not mean "sealed" to the flow of gas). The patent applicants in this case also understood that there was a difference between "closed" and "sealed" because the applicants state in the patent that the immersion end is "sealed by a plug of refractory heat resistant material such as cement," (Minco Ex. A, col. 2, ll. 30-32), but only refer to the connector as "closing said connector end." (Minco Ex. A,

col. 4, ll. 42-43.) HEN argues that the figure in the specification supports its contention that the connector merely closes and does not seal the conductive tube. However, we find that the figure is inconclusive on this point because there is nothing in the figure to indicate that there is a difference between the refractory heat resistant plug (see id. at Figure 1, number 4), which "seals" the immersion end, and the connector plug (see id. at Figure 1, number 17), which "closes" the connector end.

Minco contends that the specification and prosecution history both support its contention that the connector must be located at the final physical endpoint of the conductive tube and that it cannot have openings into the internal cavity of the tube. However, it would be improper for us to use the specification to import a limitation into the claim that does not appear in the claim itself, and therefore, we find it inappropriate to conclude based on the specification that the connector must be located at the final physical endpoint of the conductive tube. See Electro Med. Sys., 34 F.3d at 1048 (stating that a court cannot add limitations appearing only in the specification). Moreover, we find that the specification does not show the connector only at the final physical endpoint of the conductive tube. The specification states that the connector has an electrically conductive sleeve in intimate contact with the conductive tube, and, in the figure contained in the specification, the connector sleeve extends up into the tube. (Minco App. A at Figure 1, number 13 and col. 2, ll. 51-53.) Consequently, we reject Minco's arguments based on the specification that the connector must be at the final physical endpoint of the conductive tube, opposite the immersion end.

With respect to the prosecution history, Minco argues that the PTO initially rejected the application in part because Jackson disclosed "an electrical connector (46/58/60/62/70) closing the connector end of the tube and providing electrical connections for the cell and the tube." (Minco

App. 5E at HEN000312-313.) Minco contends that, in order to overcome Jackson, HEN distinguished Jackson as follows:

> The Examiner is of the position that Jackson discloses a hollow electrically conductive tube 72 having an immersion end, connector end and an electrical connector 46/58/60/62/70 closing the connector end of the tube.
>
> Jackson disclosed a spring collet 46 which encircles and engages the tube 72. (See Fig. 2). As shown in Fig. 3, the spring collet 46 has fingers 48 spaced apart by slots which extend up from the end of the collet 46 and open into the cavity of the device 10. Element 58 closes the cavity at a distance up the cavity from the end of the tube 72. Requestor respectfully submits that since the spring collet 46 has openings into the cavity of the probe, Jackson does not disclose an electrical connector providing electrical connections which closes the end of the tube 72, as recited in claims 1, 3, 5, and 6.

(Minco App. 5F at HEN000297-298.) Therefore, according to Minco, HEN argued that the electrical connector disclosed in Jackson with holes opening into the internal cavity of the conductive tube could not close the conductive tube as claimed in the '736 patent, because the connector had openings into the internal cavity of the probe. In response, HEN argues that Jackson does not have a connector at all, and therefore, HEN could not have distinguished Jackson by discussing its connector in comparison to the '736 invention. In the portion of the prosecution history relied upon by Minco, the applicant did not acknowledge that Jackson has a connector, rather it stated Jackson discloses a spring collet that has openings into the cavity of the probe, and therefore, does not disclose an electrical connector which closes the end of the tube as recited in the '736 patent. The Federal Circuit has warned that prosecution history often lacks clarity. See Phillips, 415 F.3d at 1317. We find that to be the case here. Thus, it does not help explain how the applicant understood the invention. Nevertheless, we do not find that the applicant made a clear disavowal of claim coverage that would require us to construe "closing" to mean that there cannot be any openings in

the connector into the internal cavity of the conductive tube.

Consequently, based on the claim language and the specification, we construe "closing" to mean "spanning the diameter of the tube, regardless of whether there are or are not openings in the connector into the internal cavity of the conductive tube."

D. Claim language to be construed from Claims 3 and 6 – "said tube between said plug and said connector being filed with a heat insulating **particulate material which is loosely packed such that it is gas permeable**" – col. 4, ll. 45-48; col 6, ll. 47-50

HEN contends that "particulate material which is loosely packed such that it is gas permeable" should be construed to mean "particles/particulate-matter arranged such that gas may pass through it." (HEN CC Br. at 22.) Minco, on the other hand, argues that this claim language should be construed to mean "particulate material which is unrestrained, not bonded together into a solid or rigid form, but rather free to move." (Minco CC Br. at 31.)

Minco argues that the specification supports its proposed construction. First, Minco notes that the figure in the specification depicts the sheathing and the particulate matter inside the tube differently and in a manner consistent with the PTO guidelines for how to indicate loose particulate matter versus packed particulate matter. Minco asserts that the area showing the particulate matter inside the conductive tube (see Minco Ex. A at Figure 1, number 10) is depicted by dots, indicating that it is loose, whereas the sheathing (see id. at Figure 1, number 2) is depicted with dots and hash lines indicating that it is packed. Additionally, Minco asserts that the specification states that both the sheathing and the particulate material inside the tube can be resin coated molding sand. Minco asserts that the sheathing must be physically solid and rigid because it is not otherwise contained by any structure, but that since the particulate matter in the conductive tube is contained by the tube, it does not need to be solid and rigid. Minco concludes that because the sheathing and the particulate

matter are depicted differently and the sheathing is solid and rigid, the logical consequence is that the particulate material must be loose, unbonded, and free to move. We find this reasoning to be an insufficient basis for us to conclude that the particulate matter cannot bonded together and must be free to move because, by depicting the two areas differently, the applicant could simply be conveying that the two areas are different elements, not that one element must necessarily be solid and the other loose. Moreover, even if we were to accept Minco's arguments that the specification shows the particulate matter inside the conductive tube as being loose, unbonded, and free to move, construing the claim language to require the particulate material to be in such a state would result in the importation a limitation that only appears in the specification, and not in the claim language.

Minco also relies on the prosecution history to support its proposed construction. First, Minco claims that, in order to overcome the prior art contained in German Patent No. 2207307 to Kunzer ("the Kunzer patent"), HEN stated, "Note that the resin coated molding sand of the present invention is utilized for the refractory sheath 2 while molding sand is provided within the support tube 1." (Minco App. 4D at HEN000058.) Minco claims that this statement supports the conclusion that the sheath must be physically hard baked, but that the interior of the tube is filled with loose particles of sand, since molding sand contains no resin and cannot be baked hard or rigid. Regardless of whether molding sand can or cannot be baked into a solid form, we find that this statement by HEN does not amount to a clear disavowal of claim coverage over particulate matter that is bonded together. Minco also asserts that the patent examiner clearly understood the particulate matter to be loose sand, not baked hard rigid sand. However, what the patent examiner thought is not a clear disavowal of claim coverage by HEN.

Consequently, Minco's arguments that HEN limited the allowable construction of these

claims terms during the prosecution history are without merit and we construe the claim language "particulate material which is loosely packed such that it is gas permeable" to mean "particles/particulate-material arranged such that gas may pass through it."

E. Claim language to be construed from Claims 3 and 6 – "a **sheathing** surrounding a major portion of the length of said tube, said sheathing being made of a fireproof, refractory heat resistant material attached to said tube exterior" – col. 4, ll. 49-52; col. 6, ll. 51-54

HEN contends that the term "sheathing" does not require any construction as anyone would understand the plain and ordinary meaning of this word. (HEN CC Br. at 25.) Minco proposes to construe "sheathing" to mean "the sheathing is attached to the outside of the conductive tube; it is not physically attached to the inside of the tube, and it is capable of being slide [sic] over, telescoped onto, the conductive tube." (Minco CC Br. at 34.) We agree with HEN that the term "sheathing" does not require any construction and we reject Minco's proposed construction because it would add limitations that have no basis in the claim, the specification, or the prosecution history.

First, the portion of Minco's proposed construction that states that the sheathing is attached to the outside of the conductive tube is unnecessary as it is apparent to us that this would be understood to be required by a person of ordinary skill in the art. See Phillips, 415 F.3d at 1314 (stating that the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges). Second, with respect to the proposed construction that the sheathing is not physically attached to the inside of the tube, Minco's argument in support of this proposed construction is merely that the claim does not specify that the sheath is attached to the tube's interior, and that it would go against common sense for a sheath to be attached to the inside of the tube. We find that this is an insufficient basis to import a limitation into the claim that the

sheath cannot be attached to the inside of the tube.

Finally, Minco argues that the specification and the prosecution history illustrate that the patent applicants understood the sheath to be a separate pre-formed unit, that is later "telescoped," "joined to," or 'bonded to" the outside of the conductive tube. According to Minco, the specification states that one of the principal advantages of the invention is the ability to "preassemble the probe on a production line basis." (Minco Ex. A, col. 3, l. 21.) Then the specification describes the sheathing as being "telescoped" over the major length of the tube. Minco asserts that "telescoped" commonly means to slide or pass one within another like the cylindrical sections of a hand telescope. Minco also points to the portion of the specification that states "tube 1 performs the dual function of providing support for elements therewithin [sic] which may be preassembled as a unit and then joined to the sheath 2 and support 16 in an economical manner." (Minco Ex. A., col. 3, ll. 23-28.) Therefore, Minco concludes based on specification that the sheathing must be a separate pre-formed unit, so that it can be later "telescoped," "joined to," or "bonded to" the outside of the conductive tube. Minco also contends that the figure contained in the specification supports its argument that the sheathing is a separate unit, capable of being slid over the tube.

We find that these arguments by Minco are meritless. Minco essentially asks us to construe a word, "telescoped," contained in the specification and then import this limitation from the specification into the claim. Additionally, the specification does not fully support Minco's proposed construction as it also states "[t]he sheath . . . is bonded [to the tube] in any convenient manner." It seems impossible that the sheathing could be bonded to the tube, as described in the specification, but also a separate unit capable of being slid over the tube, as Minco proposes in its construction. Contrary to Minco's proposed construction, the claim only requires that the sheathing be attached

to the exterior of the tube. See Minco Ex. A., col. 4, ll. 50-53.

Turning to Minco's prosecution history argument, it claims that HEN distinguished the prior art disclosed in Norburn (U.S. Patent No. 3,353,808) ("Norburn") and made other statements to the PTO thereby narrowing the construction of sheathing so that it does not include a molded-on refractory coating and that it must be a separate and distinct entity from the rest of the probe, capable of being slid on or telescoped over the tube. HEN made the following representation to the PTO concerning Norburn:

> The Norburn patent has been cited as teaching the use of a sheath forming a shoulder, to which hollow support means abuts when receiving the probe. It is again submitted that the Examiner's reliance upon the Norburn patent for this teaching is misplaced. The Norburn patent discloses a refractory coated oxygen lance which includes a generally central section of tubing (14) which is press-fitted onto a portion of a surrounding tubing called the "rear section" (11) formed of relatively thick, black iron pipe. The two tubes are press-fitted together by heating both tubes and then installing a portion of tube 14 into the end of tube 11. Because the tubes are of differing outer diameters, a shoulder is formed. Thereafter, a heat-resistant refractory coating (15) is applied over the entire length of tubing (14) and over a portion of tube (11). Preferably, the coating is molded onto the tubes. Thus, the protective coating (15) cannot be said to be a "sheath" in the same manner as applicant's sheath. In addition, the coating does not initially contain a shoulder which abuts against a hollow support tube in the manner of applicants' claimed invention. Instead, to the extent the coating includes a shoulder, the shoulder is formed only when the coating is applied to conform to the fitted-together tubes. . . . Thus, none of the references cited by the Examiner teaches the applicants' claimed concept of employing such an abutting shoulder arrangement.

(Minco App. 4J at HEN000144-145) (emphasis omitted). Minco only points to a portion of this quote in its argument. However, after examining HEN's entire statement regarding Norburn, we conclude that HEN distinguished the sheathing in its claim from the Norburn sheathing based on the formation of a shoulder, and not based on whether the sheathing was molded or not molded onto the probe's electrically conductive tube. Minco's other references to the prosecution history are

similarly unavailing. Consequently, we find that HEN has not made a clear disavowal of claim coverage regarding whether the sheathing can or cannot be molded onto the conductive tube, or whether it must be a separate unit that is capable of being slid on and off the probe.

F. Claim language to be construed from Claims 3 and 6 – "sheathing **surrounding a major portion** of the length of said tube" – col. 4, ll. 49-50; col. 6, ll. 51-52

HEN's proposes to construe the claim language "surrounding a major portion of the length of said tube" to mean "covering a section of the tube sufficient to protect the tube." (HEN CC Br. at 25.) Minco, on the other hand, proposes to construe this claim language to mean that "the sheathing must cover more than 50% of the conductive tube." (Minco CC Br. at 38.)

We construe "surrounding a major portion" to mean "covering a significant portion." In this instance, we believe that a person of ordinary skill in the art in question would understand that the term major portion refers to a significant portion, such as a portion of the tube sufficient to protect the functional integrity of the measuring device. We reject Minco's contention that a major portion must mean that the sheathing merely surrounds more that 50%. Had the claim stated that the sheathing surrounds the majority of the conductive tube, then we would agree with Minco that more than 50% of the tube must be covered by the sheathing. We also reject HEN's proposed construction that the sheathing must cover a section of the tube sufficient to protect it. HEN's proposed construction is derived from the following language in the specification: "[s]heath 2 is tapered along a major portion of its length toward the immersion end 3 for protecting the tube 1 and for minimizing the ability of gasses to be trapped adjacent the measuring elements 5 and 6." (Minco Ex. A., col. 2, ll. 61-64.) However, the use of the word "major" in this instance refers to the portion of the sheath that is tapered, and not to the portion of the tube covered by the sheath.

G. Claim language to be construed from Claims 3 and 6 – **"the outer surface of said sheathing being tapered towards the immersion end of said tube such that a minimum thickness of said sheathing is directly adjacent to and exposing said immersion end of said tube for minimizing trapped gases adjacent to the measuring head when immersed in a metal bath"** – col. 4, ll. 53-58; col. 6, ll. 54 60

HEN contends that no construction of these terms is required and that they should be given their plain and ordinary meaning. (HEN CC Br. at 27.) Minco, however, proposes the following construction: "the outer surface of said sheathing is continuously and substantially tapered, and the minimum thickness of the sheath at the immersion end does not taper to a flat, radially outwardly extending annular shoulder (like that described in Russian/Soviet reference 144620 or German patent 1928845)." (Minco CC Br. at 40.) We agree with HEN that no construction of this claim language is required, and we reject Minco's proposed construction.

Minco argues that the specification and the prosecution history support its proposed construction. Minco argues that the specification language calls for a sheathing that has a minimum thickness at the immersion end in order, inter alia, to reduce the trapping of liberated oxygen and other gases in the area of the oxygen sensor. Minco contends that to conform to this requirement, the sheathing cannot taper to a "flat, radially outwardly extending annular shoulder." (Minco CC Br. at 40.) We disagree. A sheathing that tapers towards the immersion end of the probe and comes to a flat, radially and outwardly extending annular shoulder adjacent to the immersion end would still have its minimum thickness adjacent to the immersion end. Additionally, although the figure included in the specification does not contain a flat, radially and outwardly extending annular shoulder, but rather continuously tapers towards the immersion end, it would be improper to import this limitation appearing solely in the specification into the patent claims.

We also disagree with Minco's argument based on the prosecution history. Minco argues that during the prosecution of the '736 patent, HEN distinguished its probe from Russian/Soviet Patent No. 144,620 ("the Russian patent") and German Patent No. 1,928,845 ("the German patent") because they both had flat, radially and outwardly extending annular shoulders proximate to the measuring area that would serve to trap gases near the measuring unit and negatively affect the accuracy of the readings. Therefore, according to Minco, a taper that comes to a generally annular flat shoulder near the measuring area is not covered by the '736 patent. However, when distinguishing the Russian patent, HEN stated:

> [i]t appears as though the outer sheath (5) of the Russian probe does not taper down to a minimum cross-sectional thickness. Instead, while it does slightly taper, a radially outwardly extending annular shoulder of approximately one-half of the overall wall thickness of the outer sheath remains proximate the measuring element. A shoulder of this type could disrupt the flow of gases away from the measuring element.

(Minco App. 4L at HEN000164.) The distinction identified by HEN is not simply that the Russian probe has a radially and outwardly extending annular shoulder while its probe does not. Rather, HEN stated that the Russian probe's radially and outwardly extending annular shoulder was approximately one-half of the overall wall thickness of the outer sheath. HEN stated the following with respect to the German patent:

> [i]t appears as though the [German patent] relates to a probe which includes an outer sheath (7) which is tapered toward the immersion end. The manner in which the sheath is tapered is different from that of the applicants' sheath in that both the inner diameter and the outer diameter are tapered toward a generally flat annular shoulder which extends outwardly from the probe body. An additional annular member (6) extends beyond the outer sheath towards the immersion end and forms an additional radially outwardly extending annular shoulder closer to the measuring element (5). Thus, neither the outer sheath (7) nor the additional element (6) tapers down to a minimum thickness proximate the measuring element to avoid trapping the gases proximate to the measuring element.

(Minco App. 4L at HEN000163-164.) Again, HEN did not distinguish the German patent based on the fact that the German patent has a radially and outwardly extending annular shoulder and its probe does not. Rather, HEN distinguished the German patent because the German probe's sheath tapered both towards and away from the probe's body, and the German probe included an additional annular member that extended beyond the sheath. We conclude that the arguments HEN made to distinguish the Russian and German patents do not amount to a clear disavowal of claim coverage over any sheath that tapers to a radially outwardly extending annular shoulder as proposed by Minco.

Finally, Minco argues that HEN submitted a drawing to the PTO attached to its application that showed a flat, outwardly extending annular shoulder, and that later, during the prosecution of the patent, HEN submitted a revised drawing omitting the flat, outwardly, extending annular shoulder and showing instead a rounded shoulder like that depicted in the figure in the '736 patent specification. Minco argues that HEN revised the drawing of its probe in order to distinguish it from the German and Russian patents, which included flat, outwardly extending annular shoulders, and that, therefore, we should construe the patent claim to exclude coverage of probes with such shoulders. We find that Minco's argument is not supported by the record. The drawing submitted by HEN to the patent office showing a flat, outwardly extending annular shoulder is from the Belgian patent application No. 2/59866 from which the '736 patent claims priority. (Minco App. 4B at HEN000034, 000042.) HEN argued during the Markman hearing that it submitted the drawing as part of its Claim of Foreign Priority and Transmittal of Priority Document. Additionally, the parties have submitted into evidence the original patent application. (See Minco App. 4A at HEN000020-29.) However, while the original patent application in the record before us does not include a drawing of the applicant's probe, there is evidence which leads us to conclude that the original

drawing of the applicant's probe is not the drawing with a flat, annular shoulder as Minco asserts. First, HEN argues that the original patent application was stamped with the number "513532." (See Minco App. 4A at HEN00022.) The first time a drawing depicting a probe with a rounded shoulder appears in the record before us is in a document titled "Request for File Wrapper Continuing Application Under 37 CFR 1.62," and dated September 26, 1985. (Minco App. 4F at HEN000079-82.) This drawing is stamped with the same number as that which appears on the original patent application. (Id. at HEN000082.) HEN argues that this shows that the figure with the rounded shoulders was how the probe was depicted in the original patent application because it was stamped with the same number by the PTO. Finally, the original patent application contains references to a drawing containing elements marked 6A and 8A. (Minco App. 4A at HEN00024025.) The drawing alleged by Minco to have been the original depiction of the probe, and which shows a probe with a flat annular shoulder, does not contain any elements marked 6A or 8A, whereas the drawing that contains rounded shoulders does have elements marked 6A and 8A. (See Minco App. 4B at HEN000042 and Minco App. 4F at HEN000082.) During the Markman hearing Minco did not present any evidence or make any arguments countering this evidence. We therefore reject Minco's claim that HEN limited the scope of its patent by allegedly modifying the depiction of its probe during the patent prosecution in order to distinguish it from the German and Russian prior art.

H. Claim language to be construed from Claims 3 and 6 – "an elongated hollow support for receiving said shoulder of said sheathing in an abutting relationship such that **the end of said tube is inserted into said support** and said outer diameter of said sheathing and said support are substantially the same at said shoulder" – col. 4, ll. 61-66; col. 6, ll. 63-68

HEN contends that this claim language does not require any construction and that it should be given its plain and ordinary meaning. (HEN CC Br. at 31.) HEN argues that there is no reason

to ignore the heavy presumption that claim terms should be given their plain and ordinary meaning. On the other hand, Minco proposes to construe the terms "the end of said tube is inserted into said support" to mean that "the electrically conductive tube contacts and is force-fit into the interior of the hollow support tube such that the hollow support tube telescopes over the conductive tube to hold the conductive tube in place." (Minco CC Br. at 50.) We agree with HEN that this claim language should be given its plain and ordinary meaning and does not require any construction. In addition, we reject each of Minco's arguments pertaining to its proposed construction.

Minco relies on the patent specification which states, "To facilitate immersing the probe into the molten metal, a support is provided in the form of a paperboard tube 16, which is force-fit over the tube numeral 1." (Minco Ex. A., col. 3, ll. 6-10.) The specification also states, "An elongated hollow support tube is telescopically coupled to the other end of the tube for supporting the tube and the sheath during immersion into a bath of molten metal." (Minco Ex. A., col. 2 ll. 13-14.) Minco also notes that the only figure in the patent specification shows the conductive tube inserted into the paper tube, in direct contact, force fit and telescopically coupled. Minco's proposed construction requests us to import limitations found only in the specification, and not in the claims themselves. This would be improper. See Electro Med. Sys., 34 F.3d at 1054 (stating that a court cannot add limitations appearing only in the specification). Furthermore, Minco's reliance on what it claims is the only embodiment in the patent is misplaced as the Federal Circuit has repeatedly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment. See Philips, 415 F.3d at 1323.

Minco also points to the prosecution history to support its proposed construction. Minco claims that HEN disclosed to the patent examiner U.S. Patent No. 4,342,633 ("the '633 patent"),

which contains an alternative plastic connector, ceramic housing support, and electrical connector system. Minco asserts that HEN never made any attempt to obtain coverage for the electrical connector/support design disclosed in the '633 patent, and argues that by disclosing the '633 patent to the examiner but failing to argue that such a design was patentable, HEN deprived the examiner of the opportunity to consider whether this alternative electrical connector/support design was a permissible construction of the '736 claim language. Therefore, according to Minco, HEN cannot now claim that the prior art disclosed by the '633 patent is a permissible construction of the '736 patent. Minco offers no case law to support this argument. More importantly, this prosecution history that Minco urges us to use to limit the construction of the claim in no way constitutes a clear, unambiguous disavowal of claim coverage. Consequently, we reject Minco's argument that the prosecution history supports its proposed construction.

I. Claim language to be construed from Claim 6 – "means within said tube for receiving the electrically conductive portion of said thermocouple" – col. 6, ll. 40-41

Both HEN and Minco argue that this claim language is a means-plus-function claim element. Because the claim uses the term "means" to describe a limitation, thus creating a presumption that this is a means-plus-function claim element, see Altiris, Inc. v. Symantec Corp., 318 F.3d at 1375, and there are no reasons rebuting this presumption in this case, we agree that this is a means-plus-function element. The function of this mean-plus-function element is "receiving the electrically conductive portion of the thermocouple." Our next step is to look to the specification to determine what the corresponding structure is for this function.

The parties disagree on what corresponding structure is required to accomplish the claimed function. HEN contends that the only corresponding structure required to accomplish the claimed

function is the cold joints (depicted in the specification figure as number 7) because the cold joints mechanically and electrically join the electrically conductive portions of the thermocouple to the electrical conductors. (HEN CC Br. at 34-35.) HEN argues that because the claimed function actually occurs at the cold joints, any attempt to include a gas tight enclosure into the corresponding structure includes more structure than what is needed to perform the stated function, and thus would be over-inclusive.

Minco, on the other hand, contends that the corresponding structure is a gas tight enclosure made up of a body of silicone surrounded by a small plastic casing, or an equivalent thereof. (Minco CC Br. at 53.) Minco relies on the following language from the specification:

> The cold joints 7 of the thermocouple 5 are embedded in a gas tight enclosure such as a body of silicone 8 surrounded by a small plastic casing 9. The conductors at the cold joints 7 are V-shaped with the apexes adjacent one another but electrically insulated from another by the silicone 8. The bottom wall of the casing 9 may be separable and defined by a plastic disk 8A.

(Minco Ex. A., col. 2, ll. 39-46.) Minco also points to the prosecution history. According to Minco, HEN argued the following to the patent examiner: "Claims 5 and 6 each recite means for receiving the electrically conductive portions of the thermocouple. The means are clearly described by Cure et al. at col. 2, lines 39-46 [quoted above] and are shown in the figure as a gas tight enclosure such as body of silicone 8 which is closely adjacent to the head end." (Minco App. 5F at HEN0000296) (emphasis omitted). Furthermore, Minco asserts that HEN argued repeatedly to the examiner that claims 1, 3, 5, and 6 each recite "a gas impermeable <u>enclosure</u> receiving the electrically conductive portions of the thermocouple." (Minco App. 5F at HEN0000297.) While claims 1 and 3 both contain the limitation "a gas impermeable enclosure receiving the electrically conductive portions of said thermocouple, said enclosure being closely adjacent to said measuring head within said tube,"

claims 5 and 6 do not contain such a limitation. Rather, claims 5 and 6 both contain the language, "means within said tube for receiving the electrically conductive portion of said thermocouple." Therefore, Minco argues that the "means for receiving the electrically conductive portion of the thermocouple" must be the gas impermeable enclosure that HEN had claimed was recited in claims 5 and 6. Finally, Minco argues that HEN cannot be permitted to argue one construction during prosecution, i.e., that the corresponding structure is the gas tight enclosure, and then argue a different construction later in litigation, i.e., that the corresponding structure consists of the cold joints.

HEN makes several counter-arguments to Minco's claim that the structure is a gas tight enclosure. HEN asserts that the statements in the prosecution history relied upon by Minco were made in response to the patent examiner's rejection of the application due to the prior art Jackson, that Jackson does not even have a thermocouple, and that HEN cited numerous other reasons to distinguish Jackson from its probe. We find these arguments to be irrelevant. The fact remains that HEN clearly stated to the examiner that claim 6 recites a means for receiving the electrically conductive portions of the thermocouple, and that the means are shown in the figure as a gas tight enclosure such as a body of silicone 8 which is closely adjacent to the head end. (See Minco App. 5F at HEN000296.)

HEN also claims that if we determine the corresponding structure of this means-plus-function element to be a gas tight enclosure as proposed by Minco, this would violate the doctrine of claim differentiation. The doctrine of claim differentiation is based on "the common sense notion that different words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scope." Karlin Tech., Inc. v. Surgical Dynamics, Inc., 177 F.3d 968, 971-72 (Fed. Cir. 1999). "To the extent that the absence of such difference in meaning and scope would

make a claim superfluous, the doctrine of claim differentiation states the presumption that the difference between claims is significant." Tandon Corp. v. U.S. Int'l Trade Comm'n, 831 F.2d 1017, 1023 (Fed. Cir. 1987). Claim differentiation is particularly useful when construing dependent claims. See Wenger Mfg., Inc. v. Coating Mach. Sys., Inc., 239 F.3d 1225, 1233 (Fed. Cir. 2001) (stating that "[c]laim differentiation, while often argued to be controlling when it does not apply, is clearly applicable when there is a dispute over whether a limitation found in a dependant claim should be read into an independent claim, and that limitation is the only meaningful difference between the two claims"); Dow Chem. Co. v. United States, 226 F.3d 1334, 1341-42 (Fed. Cir. 2000) (applying the doctrine of claim differentiation and concluding that an independent claim should be given broader scope than a dependent claim to avoid rendering the dependent claim redundant); and Karlin Tech., 177 F.3d at 971-72 (explaining that the doctrine of claim differentiation "normally means that limitations stated in dependent claims are not to be read into the independent claim from which they depend"). However, this does not mean that the doctrine of claim differentiation is inapplicable when construing independent claims. See Kraft Foods, Inc. v. Int'l Trading Co., 203 F.3d 1362, 1368 (Fed. Cir. 2000) (applying the doctrine of claim differentiation but finding that the presumption was overcome in a case involving two independent claims). Furthermore, claim differentiation is not "a hard and fast rule of construction" and cannot be relied upon to "broaden claims beyond their correct scope." Id. (citation omitted). Written descriptions and prosecution history can overcome a presumption arising from the doctrine of claim differentiation. Id.

HEN argues that if Minco's proposed construction were adopted, claim 6 would read exactly how Minco construes a "gas impermeable enclosure" in claim 3, and thus would violate the doctrine

of claim differentiation. The only difference between claims 3 and 6 is that claim 3 calls for a particular structure, i.e., a gas impermeable enclosure receiving the electrically conductive portions of said thermocouple, whereas claim 6 simply calls for a "means . . . for receiving the electrically conductive portions of said thermocouple." (Minco Ex. A., col. 4, ll. 36-39 and col. 6, ll. 40-41.) HEN contends that the inventors were obviously attempting to vary the scope between claim 3 and claim 6, so that claim 6 is broader than claim 3, and therefore, we should not construe the means-plus-function element of claim 6 in a way that makes claim 6 indistinguishable from claim 3.

While we recognize that the doctrine of claim differentiation is applicable in cases such as this where there are independent claims, and that therefore there is a presumption that claim 3 and claim 6 have different meanings and scope, we find that this presumption is overcome by the unambiguous statements made by HEN during the prosecution history describing the means in the probe to perform the stated function. We conclude, therefore, that the structure defined in the specification that satisfies the function of receiving the electrically conductive portion of the thermocouple consists of "a gas tight enclosure."

An appropriate Order follows.

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

HERAEUS ELECTRO-NITE CO.	:	CIVIL ACTION
	:	
v.	:	
	:	
MIDWEST INSTRUMENT	:	
COMPANY, INC.	:	NO. 06-355

ORDER

AND NOW, this 1st day of November, 2007, upon consideration of the parties' Memoranda on Claim Construction, and the Markman hearing held during the October 17, 2007, **IT IS HEREBY ORDERED** as follows:

1. The following disputed claim terms of the '736 patent are construed as indicated:

   a. "immersion end" is construed as: "the region of the tube which is first inserted into molten metal."

   b. "connector end" is construed as: "the region of the tube opposite the immersion end of the tube."

   c. "gas impermeable enclosure" is construed as: "an enclosure, into which and out of which gas cannot move or pass."

   d. "closing" is construed as: "spanning the diameter of the tube, regardless of whether there are or are not openings in the connector into the internal cavity of the conductive tube."

   e. "particulate material which is loosely packed such that it is gas permeable" is construed as: "particles/particulate-material arranged such that gas may pass through it."

f. "surrounding a major portion" is construed as: "covering a significant portion."

2. The claim element "means within said tube for receiving the electrically conductive portion of said thermocouple" contained in Claim 6 of the'736 patent is construed as a means-plus-function element with a function of "receiving the electrically conductive portion of the thermocouple" and a corresponding structure of "a gas tight enclosure."

3. The following claims terms of the '736 patent require no construction:

a. "sheathing"

b. "the outer surface of said sheathing being tapered towards the immersion end of said tube such that a minimum thickness of said sheathing is directly adjacent to and exposing said immersion end of said tube for minimizing trapped gases adjacent to the measuring head when immersed in a metal bath."

c. "the end of said tube is inserted into said support."

BY THE COURT:

s/ John R. Padova, J.
John R. Padova, J.