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Paper 30
Date: January 21, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOLAREDGE TECHNOLOGIES LTD.,
Petitioner,

v.

SMA SOLAR TECHNOLOGY AG,
Patent Owner.

IPR2019-01224
Patent 7,816,631 B2

Before LYNNE H. BROWNE, HYUN J. JUNG, and
RICHARD H. MARSCHALL, *Administrative Patent Judges.*

MARSCHALL, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Denying Patent Owner's Motion to Exclude
37 C.F.R. § 42.64

INTRODUCTION

SolarEdge Technologies Ltd. ("Petitioner") filed a Petition (Paper 2, "Pet."), requesting institution of an *inter partes* review of claims 1–18 of U.S. Patent No. 7,816,631 B2 (Ex. 1101, "the '631 patent"). SMA Solar Technology AG ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review of claims 1–18 of the '631 patent on all presented challenges. Paper 10 ("Inst. Dec.").

After institution, Patent Owner filed a Response (Paper 16, "PO Resp."), Petitioner filed a Reply (Paper 20, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 21, "PO Sur-reply"). Patent Owner also filed a Motion to Exclude (Paper 25, "PO Mot. Exclude"), and Petitioner filed an Opposition to the Motion to Exclude (Paper 26, "Pet. Opp."). An oral hearing in this proceeding was held on October 26, 2020, and a transcript of the hearing is included in the record (Paper 29, "Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–18 of the '631 patent are unpatentable.

BACKGROUND

A. Real Parties in Interest and Related Matters

Petitioner states that the "real party-in-interest is Petitioner SolarEdge Technologies Ltd." Pet. 1. Patent Owner states that the "real party-in-interest is SMA Solar Technology AG." Paper 4, 2.

The parties do not identify any related litigation matters in the United States. Pet. 1; Paper 4, 2. The parties indicate that a European counterpart to the '631 patent has been asserted in Germany against Petitioner. Pet. 1 (citing Ex. 1135); Paper 4, 2. Petitioner also identifies four other petitions challenging the '631 patent based on different combinations of references. Pet. 18. The '631 patent is the subject of IPR2019-01223, IPR2019-01225, IPR2019-01226, and IPR2019-01227. We instituted review in IPR2019-01223, and we issue the Final Written Decision in that case concurrently with this Decision. We denied institution in IPR2019-01225, IPR2019-01226, and IPR2019-01227.

B. The '631 Patent

The '631 patent issued October 19, 2010, from an application filed June 22, 2005. Ex. 1101, codes (22), (45).

The '631 patent relates to "an inverter with a housing having a cooling unit for cooling the electronic and/or electric components of the inverter." Ex. 1101, 1:13–15. The '631 patent describes problems with prior art inverter housings having vents and fans that allow contamination to enter the housing, which in turn causes failures of the inverter. *Id.* at 1:21–29. The '631 patent seeks to address these problems by providing an inverter housing with two chambers having different characteristics. *Id.* at 1:40–50. Figure 1 of the '631 patent is reproduced below.

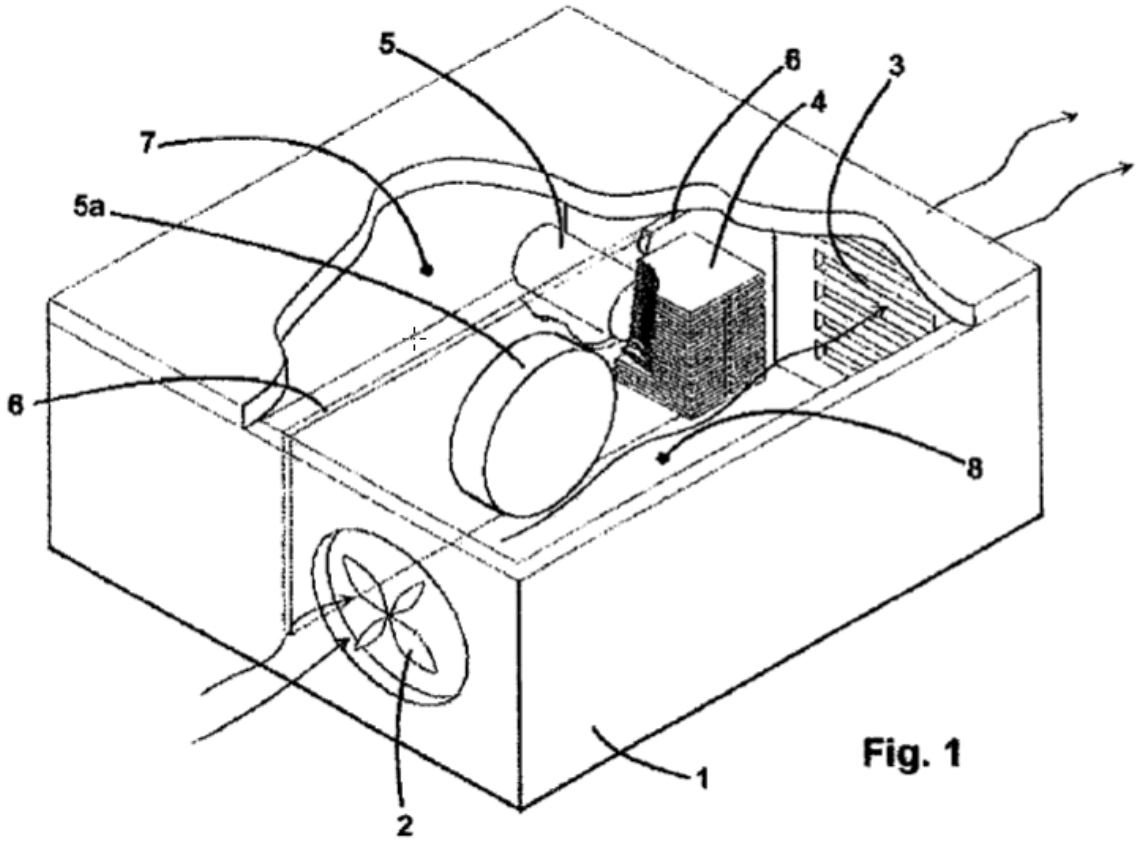


Fig. 1

Figure 1 "is a perspective view, with portions broken away, of the housing." *Id.* at 2:16–18. Housing 1 includes partition wall 6 that divides housing 1 into chambers 7 and 8. *Id.* at 2:22–23. Partition wall 6 receives electronic and electric components 5 that project into chamber 7. *Id.* at 2:24–26. Cooling bodies 4 disposed on components 5 project into chamber 8. *Id.* at 2:27–30. The thermal connection between cooling body 4 and component 5 allows heat transfer from component 5 to cooling body 4. *Id.* at 2:32–35.

The '631 patent emphasizes the different characteristics of chambers 7 and 8, and the different electrical components contained in each chamber. Chamber 7 includes components with low power dissipation, with no cooling or ventilation provided in the chamber. *Id.* at 2:49–52. Chamber 7 has a "higher protection grade" than chamber 8 "in order to make certain

that the electric or electronic components are protected against dirt and moisture." *Id.* at 2:43–46. Chamber 8 includes fan 10 and vent slots 3 to cool the chamber, and components such as a "transformer with a high protection grade" that "makes them insensitive to contamination." *Id.* at 2:36–41.

C. Challenged Claims

The '631 patent has 18 claims, all of which Petitioner challenges. Of those, claims 1, 9, and 17 are independent. Claims 2–8 depend from claim 1; claims 10–16 depend from claim 9; and claim 18 depends from claim 17.

Claim 1 is reproduced below with spacing and indentations added for readability.

> 1. An inverter with a housing having a cooling unit for cooling electronic components and electrical components of the inverter mounted in said housing, said housing of the inverter comprising
>
> first and second chambers, said first and second chambers being separated by a wall and configured to receive in the two chambers the electronic components and the electrical components said electronic components and electrical component being cooled by the cooling unit,
>
> said electronic components being sensitive to dirt and humidity and being located on one side of the wall in said first chamber which is closed and which has a higher IP grade rating for protection to humidity and dust than the electrical components mounted in said second chamber,
>
> heat sink cooling fins which are located on the other side of the wall in the said second chamber which is open to ambient atmosphere, said heat sink including heat exchange structure extending through said wall and being thermally conductively coupled to said electronic components in said first chamber and to said cooling fins in said second chamber and at least one of a

> choke and a transformer also being located in said second chamber,
>
> said electrical components in said second chamber being less sensitive to humidity and dirt than said electronic components in said first chamber, and
>
> said second chamber having a cooling system including said cooling unit positioned at one end of said second chamber for cooling both said cooling fins and said electrical components.

Ex. 1101, 2:55–3:13 (formatting added).

D. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–18 would have been unpatentable on the following grounds (Pet. 15):

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–7, 9–15, 17	103	Rodi[2]
1–7, 9–15, 17	103	Rodi, Brinkmann[3]
8, 16, 18	103	Rodi, Birger[4]
8, 16, 18	103	Rodi, Brinkmann, Birger

All references to Rodi, Brinkmann, and Birger in this Decision are to their certified translations filed, respectively, as Exhibits 1108, 1105, and 1110. Petitioner also relies on Declarations of Jonathan R. Wood, Ph.D. and James L. Mullins, Ph.D. *See* Ex. 1112 ("Wood Declaration"); Ex. 1144

[1] The relevant sections of the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, 125 Stat. 284 (Sept. 16, 2011), took effect on March 16, 2013. Because the application from which the '631 patent issued was filed before that date, unless otherwise stated, our citations to Title 35 are to its pre-AIA version.
[2] EP 0 297 308 A2, published January 4, 1989 (Ex. 1107; Ex. 1108 (certified translation)) ("Rodi").
[3] DE 296 07 354 U1, published August 22, 1996 (Ex. 1104; Ex. 1105 (certified translation)) ("Brinkmann").
[4] EP 0 900 621 A2, published March 10, 1999 (Ex. 1109; Ex. 1110 (certified translation)) ("Birger").

("Reply Wood Declaration"); Ex. 1120. Patent Owner relies on Declarations of Yogendra Joshi, Ph.D. *See* Ex. 2101 ("Joshi Declaration"); Ex. 2105 ("Response Joshi Declaration"); Ex. 2111[5] ("Revised Joshi Declaration").

ANALYSIS

A. Legal Standards

To prevail in its challenges, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2018). "In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burdens of proof in an *inter partes* review).

Petitioner relies on obviousness in its challenges to the claims of the '631 patent. A claim is unpatentable as obvious under 35 U.S.C. § 103(a) if

[5] Patent Owner cites to an Exhibit 2111 in its Sur-reply, but there is no Exhibit 2111 in the record for our review, as Patent Owner intentionally served but did not file it. *See* PO Sur-reply ii (Ex. 2111 "Served (Not Filed)"). Because Patent Owner's Sur-reply indicates that for this "Revised" Declaration of Dr. Joshi at Exhibit 2111 the "paragraphs citations remain the same as in Ex. 2105," we rely on the Joshi Declaration at Exhibit 2105 for the substantive support for the citations to Exhibit 2111. To the extent this "Revised" Declaration includes material or opinions beyond that in Exhibit 2105, we cannot and do not consider it in our analysis.

the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).[6]

B. Level of Ordinary Skill in the Art

The level of skill in the art is "a prism or lens" through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). "The person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant art" at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.*

Petitioner asserts that one of ordinary skill in the art "would have had a bachelor's degree in mechanical engineering, electrical engineering, or a similar discipline and at least 3 years of design experience with power

[6] Neither party presents arguments or evidence as to secondary considerations.

electronics, including thermal management." Pet. 24 (citing Ex. 1112 ¶¶ 24–28). Patent Owner does not address Petitioner's proposal in its briefing, but its declarant Dr. Joshi agrees with Petitioner's proposed level of ordinary skill in the art. *See* Ex. 2101 ¶ 23.

We adopt Petitioner's asserted level of ordinary skill because it is consistent with the problems identified and solutions provided in the '631 patent and the prior art.

C. Claim Construction

In *inter partes* reviews, we interpret claims in the same manner used in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (2019); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) (setting forth claim construction approach in district court cases). Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1313–14. Although extrinsic evidence, when available, may also be useful when construing claim terms under this standard, extrinsic evidence is generally "less reliable" than the intrinsic record. *See id.* at 1318–19. Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

1. Whether "Inverter" in the Preambles Limits the Independent Claims

The language that begins claim 1 reads as follows: "An inverter with a housing having a cooling unit for cooling electronic components and

electrical components of the inverter mounted in said housing, said housing of the inverter comprising." Ex. 1101, 2:55–2:58. The preambles of claims 9 and 17 recite: "An inverter comprising." *Id.* at 3:31, 4:22. Patent Owner contends that "inverter" in the preambles of all three independent claims limits the claims. PO Resp. 19–20. Because the preamble to independent claim 1 differs from independent claims 9 and 17, we will address each claim separately.

a. Claim 1

As a threshold matter, we consider what the preamble to claim 1 includes. Claim 1 does not contain any colon or indentation separating the preamble from the body of the claim. Ex. 1101, 2:55–58. The language that begins claim 1 also includes two terms that could serve as the transition from the preamble to the body of claim 1, "having" and "comprising." *See id.* In the Petition, Petitioner does not address the preamble or propose any constructions for terms in the preamble other than to argue, for each of the independent claims, that the preamble does not limit the claims. Pet. 25, 53, 63. When addressing the preambles, Petitioner assumes that all of the claim language through the term "comprising" defines the preambles. *Id.*

Patent Owner argues that the term "having" in the preamble marks the end of the preamble, rather than "comprising," so that the entirety of the preamble reads as "[a]n inverter with a housing having." PO Resp. at 13. Under that approach, the remaining language, "a cooling unit . . . and electrical components of the inverter mounted in said housing, said housing of the inverter comprising," appears in the body of the claim and limits the claim. *Id.* at 13–14. Patent Owner acknowledges that "comprising" is a "common transitional term," but contends that "having" may also be used as

a transitional term and that it makes sense to view "having" as the transitional term for claim 1 because that places the electronic and electrical components and the cooling unit in the body of the claim as part of the inverter, rather than as part of the housing. *Id.*; *see also* PO Sur-reply 2.

In its Reply, Petitioner argues that "comprising" signifies the end of the preamble in claim 1 because "comprising" represents the typical transitional term identifying the end of the preamble. Pet. Reply. 3–4. Petitioner also argues that in cases addressing whether preambles are limiting that include "having" as well as "comprising," the cases presume that "comprising" marks the end of the preamble rather than "having." *Id.* at 4–5 (citing cases). Petitioner also contends that "comprising" marks the end of the preamble of claim 1 because the next language in claim 1 identifies the first and second chambers of the housing, which "is the main point of the invention." *Id.* at 5 (citing Ex. 1101, 1:40–50, 2:42–46).

We agree with Petitioner that the preamble of claim 1 ends at the term "comprising" for several reasons. First, "comprising" represents the more common transitional phrase. *See* PO Resp. 13 (acknowledging that "'comprising' is considered a common transitional term"); Tr. 47:13–19 (Patent Owner's counsel indicating that "having" transitional term "not as common as 'comprising'"). Second, the '631 patent consistently uses "comprising" as a transitional phrase in other claims, and never uses "having" as a transitional phrase, suggesting that we should not read "having" as the transitional phrase for claim 1. *See* Ex. 1101, 3:31, 4:1, 4:12, 4:22. Third, the body of claim 1 still makes sense when the preamble concludes with "said housing of the inverter comprising" because the body of the claim recites first and second chambers of the housing "configured to

receive" certain electronic and electrical components arranged within the housing. *Id.* at 2:57–2:13.

Having determined that the preamble of claim 1 ends at "comprising," we next consider whether "inverter" is limiting. Even if the body of the claim does not include the term "inverter," Patent Owner contends that "inverter" in the preamble limits the claim because "the preamble breathes life and meaning into the claims since the terms 'cooling unit' and 'electronic components and electric components' serve as antecedent basis for the same terms in the body of the claim." PO Resp. 15. In Patent Owner's view, since the preamble refers to "electronic components and electrical components of the inverter," once the body of the claim refers to those components, it necessarily means that the inverter should be considered limiting as well. *Id.* at 15–16. Patent Owner also contends that dependent claim 7 refers to "inverter," suggesting that the preamble to claim 1 was used as antecedent to "inverter" in claim 7. *Id.* at 17. As to the specification, Patent Owner argues that it "refers only to an inverter and not to any other device such as converter, power supply or module." *Id.* at 17–19. As to the prosecution history, Patent Owner contends that the applicant relied on the inverter to distinguish the claims over the prior art of record. *Id.* at 19–20.

Petitioner contends that the reference to "inverter" in the preamble merely signifies intended use for certain claimed components. Pet. Reply 6–7. As to the antecedent basis issue, Petitioner contends that dependent claim 7 supports its position that claim 1 does not require an inverter because claim 7 does not use "inverter" in claim 1 to provide antecedent basis and claim 7 merely requires electronic components found in an inverter, which

would be unnecessary if claim 1 already required components found in an inverter. *Id.* at 8–9. Petitioner also alleges that even if some language in the preamble serves as antecedent basis for limitations in the body of claim 1, that does not mean that "inverter" limits the claim. *Id.* at 9. As to the specification, Petitioner argues that it stresses the two-chambers of the housing and the manner in which it cools components as the key to the invention, without describing the inverter functionality as important or critical to the invention. *Id.* at 6–8. As to the prosecution history, Petitioner argues that "inverter" was not used to distinguish the prior art because the prior art at issue already disclosed inverters and the applicant never argued that it failed to contain an inverter. *Id.* at 10–11.

In its Sur-reply, Patent Owner argues that the heat-dissipation aspects of the invention are necessary because the inverter components generate that heat, and therefore "inverter" is "essential to the invention" and "underscored as important by the specification." PO Sur-reply 3. Patent Owner also contends that dependent claim 7 supports its position because it refers back to the inverter. *Id.* at 4. As to the prosecution history issue, Patent Owner contends that the applicant's reliance on the term "inverter" shows that it limits the claim even if that reliance did not distinguish the claim over the prior art. *Id.* at 5.

A preamble generally limits a claim "if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claim." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). On the other hand, "a preamble is not limiting 'where a patentee defines a structurally complete invention in the claim body

and uses the preamble only to state a purpose or intended use for the invention.'" *Id.* (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). These general principles support Petitioner's position that "inverter" in the preamble does not limit the claim. The body of the claim defines a structurally complete invention requiring a two-chambered housing configured to receive certain components arranged within the housing in certain ways—that language does not suggest that "inverter" must be read as a limitation in order to give those limitations meaning. *See id.* at 810 (concluding that preamble language was not "essential to understand limitations or terms in the claim body"). Instead, "inverter" in the preamble more closely resembles an intended use of the invention.[7]

We further consider several "guideposts" when determining whether language in a preamble limits a claim. *Catalina Mktg.*, 289 F.3d at 808. We agree with Petitioner that those guideposts do not establish that "inverter" in the preamble limits claim 1 here. For example, "inverter" in the preamble of claim 1 does not provide antecedent basis for "inverter" for any limitation in the body of claim 1 or for "inverter" recited in dependent claim 7. Claim 7 depends from claim 1 and further requires "wherein said electronic components comprise electronic components normally found in an inverter." Ex. 1101, 3:26–28. As claim 7 and other claims make clear, when referring

[7] The fact that "inverter" standing alone recites nothing more than intended use becomes more apparent when considering the preambles of claims 9 and 17, which simply recite "An inverter comprising." Ex. 1101, 3:31, 4:22; *see also Arctic Cat Inc. v. GEP Power Prods., Inc.*, 919 F.3d 1320, 1328 (2019) (finding preamble language reciting "personal recreational vehicle" not limiting where it merely identified an intended use for the claimed power distribution module, and did not impose any structural requirement on the claimed module).

back to a term that provides antecedent basis, the claims use "said" or "the" to refer to the term. *See, e.g.*, *id.* ("said electronic components"). Claim 7 refers to "*an* inverter," however, which signifies that it does not rely on a previous use of "inverter," in the preamble of claim 1 for instance, to provide antecedent basis. *Id.* (emphasis added). This distinguishes this situation from cases where dependent claims clearly use terms in the preamble of the independent claim from which they depend to provide antecedent basis. *See Pacing Tech. v. Garmin*, 778 F.3d 1021, 1024 (Fed. Cir. 2015) (finding recitation of "*the* repetitive motion pacing system" in body of dependent claim relies on preamble of independent claim as antecedent basis (emphasis added)). We also find Patent Owner's reliance on dependent claim 7 undermines its argument because Patent Owner contends that claim 1, standing alone, requires electronic components of an inverter; if so, claim 7 would add no meaningful limitation to claim 1. *See* PO Resp. 15–17.[8] Further, the fact that some terms in the preamble of claim 1 provide antecedent basis for terms in the body of claim 1 does not require reading other terms, such as "inverter," as limiting. *See, e.g.*, *TomTom, Inc. v. Adolph*, 790 F.3d 1315, 1323–24 (Fed. Cir. 2015) ("That [one] phrase in the preamble . . . provides a necessary structure for claim 1 does not necessarily convert the entire preamble into a limitation, particularly one that only states the intended use of the invention.").

As to the specification, which uses the term "inverter" in several places, each use remains consistent with reading "inverter" as the intended

[8] Petitioner also correctly points out that claim 7 does not require an inverter, or components functioning as an inverter, and instead merely requires components "normally found" in an inverter. *See* Pet. Reply 8, n.4.

use of the claimed invention rather than a critical requirement of the invention. *See* Ex. 1101, codes (54), (57), 1:1, 1:13, 1:15, 1:19, 1:21, 1:24, 1:28, 1:36, 1:41, 1:56. These references to "inverter" are found in the Title, Abstract, Field of Invention, Description of the Prior Art, and Summary sections of the specification and are often paired with a reference to the inverter "housing," which includes the structures that are the focus of the alleged improvements over the prior art. *See id.* at 1:40–42 (stating that object of invention "is solved . . . in that the housing of the inverter comprises at least two chambers"). Notably, the specification acknowledges that "[i]nverters are well known" and only mentions "inverter" once in the Detailed Description of the Invention, in the first line noting that the "inverter has the housing 1." *Id.* at 1:19, 2:22. Nothing in the specification suggests that "inverter" provides a critical part of the claimed invention that must be read as part of the claimed invention in order for the invention to have meaning. *See* Ex. 1144 ¶¶ 6–9 (Dr. Wood explaining why "inverter" is not essential to the invention).

As to the prosecution history, "clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention." *Catalina Mktg.*, 289 F.3d at 808. "Without such reliance, however, a preamble generally is not limiting when the claim body describes a structurally complete invention." *Id.* at 809. Patent Owner acknowledges that when applicant invoked an "inverter" during prosecution, the prior art the applicant was addressing disclosed an "inverter." *See* PO Resp. 19 ("art cited against the claim also was directed to components of an inverter").

Therefore, the presence of the term "inverter" in the preamble, standing alone, did not distinguish the claims from the prior art. Patent Owner suggests that "inverter" combined with other limitations of the claim distinguished the prior art, but merely repeating language from the preamble as part of an overall effort to distinguish the prior art does not convert that language into a necessary part of the claimed invention, especially when the applicant made no effort to distinguish the prior art using the claim term in the preamble. *See Catalina Mktg.*, 289 F.3d at 810 (finding that the applicants "did not rely on the preamble phrase to distinguish over" the prior art in question); *Georgetown Rail Equip. Co. v. Holland L.P.*, 867 F.3d 1229, 1238 (Fed. Cir. 2017) (finding arguments in prosecution history in relation to claim limitations in the body of the claim insufficient to distinguish the prior art based on the language in the preamble).

Based on the foregoing, we do not construe "inverter" in the preamble of claim 1 as limiting.

b. Claims 9 and 17

Patent Owner argues that "inverter" in the preambles to claims 9 and 17 limit those claims, but does not set forth any additional arguments beyond those addressed above in support of its argument. *See* PO Resp. 11–20. Patent Owner's arguments are weaker here than with respect to claim 1. Patent Owner does not argue that any portion of the preambles of claims 9 and 17 provides antecedent basis for any terms in the body of the claims. *See id.* In addition, both preambles of claims 9 and 17 merely recite "[a]n inverter comprising," without any suggestion that the recitation of "inverter" means anything more than an intended use, and the bodies of the claims define complete inventions. Ex. 1101, 3:31–49, 4:22–45. Patent Owner's

arguments that the specification and prosecution history support its position apply to claims 9 and 17, but those arguments are not persuasive for the reasons provided above. Accordingly, we do not construe "inverter" in the preambles of claims 9 and 17 as limiting.[9]

2. High Protection Grade

Petitioner argues that the limitation reciting a "component of a high protection grade" in independent claims 9 and 17 should be construed as "component of a protection grade sufficient to be insensitive to contamination from exposure to ambient air." Pet. 23. Petitioner relies on the specification's description of the components in the second chamber as exposed to ambient air, which requires protection against dust and moisture to function properly. *Id.* (citing Ex. 1101, 1:57–62, 2:36–39); *see also* Pet. Reply 12–13. According to Petitioner, this link between the components with a high protection grade and their ability to function while exposed to ambient air supports its construction. Pet. 23–24.

In its Preliminary Response, Patent Owner argued that "a component of a high protection grade" means "a component having an IP [(ingress protection)] Rating of IP65." Prelim. Resp. 22. In our Institution Decision, we declined to adopt Patent Owner's proposed construction as too narrow and adopted Petitioner's proposed construction. Inst. Dec. 20. In its Response, Patent Owner argues that we should construe "a component of a high protection grade" to mean "a component having a high ingress protection (IP) grade." PO Resp. 22. Patent Owner relies on the

[9] Although we conclude that "inverter" does not limit these claims, for the reasons discussed below, we conclude that Petitioner establishes that all of the challenged claims are unpatentable even if the claims require an inverter.

specification's description of a high protection grade component as having an IP rating of IP65, "which is an ingress protection grade." *Id.* (citing Ex. 1101, code (57), 1:57–63, 2:36–39, 2:46–48). Patent Owner contends that "a POSITA [(person of ordinary skill in the art)] would understand that a component with a high IP grade is, by definition, a component that itself is enclosed with (or comprises) an enclosure that provides that high IP grade." *Id.* at 22–23. Patent Owner argues that the "sensitivity of the component itself has no bearing on the protection grade of the component, and thus cannot be the basis for a definition of the protection grade of the component." *Id.* at 23; *see also* PO Sur-reply 8. Patent Owner also contends that Petitioner's proposal lacks support in the specification and improperly encompasses components located in open chambers that may lack sufficient protection. PO Resp. 23 (citing Ex. 1101, 1:26–29). Patent Owner stresses that "it is an enclosure of the component itself that provides a high protection grade . . . and that the protection grade is not provided by the insensitivity of the component." *Id.* at 23–24 (citing Ex. 1101, 1:40–50, 2:36–39); *see also* PO Sur-reply 9–10. According to Patent Owner, "a POSITA knows that certain types of components such as transformers and chokes can be relatively insensitive to moisture and dust," but this does not mean that they necessarily have an "IP grade" because that requires an enclosure. PO Resp. 24.

In its Reply, Petitioner argues that Patent Owner's new proposal "unnecessarily inserts limitations into the claims, while also being vague as to what constitutes a 'high' grade." Pet. Reply 11–12 (citing Ex. 1143, 118–119, 128–131; Ex. 1144 ¶¶ 10–13). Petitioner contends that the specification's reference "to one particular standard ('e.g. IP65') is merely

an example." *Id.* at 12 (citing Ex. 1101, 1:61; Ex. 1143, 118–22; Ex. 1144 ¶ 11). Petitioner also contends that claim 1 refers to "IP grade rating" with respect to the first chamber, and the absence of "IP" in claims 9 and 17 suggests a broader meaning. *Id.* (citing Ex. 1143, 132).

We find Petitioner's proposed construction for "high protection grade" more consistent with the claims and specification. Patent Owner's primary complaint as to Petitioner's construction involves the reference to "insensitivity"—Petitioner's proposal covers components "sufficient to be insensitive to contamination from exposure to ambient air." Pet. 23. Whatever the drawbacks of such an approach, Petitioner's proposal tracks very similar language the specification uses to describe components of a "high protection grade." *See* Ex. 1101, 2:36–39 (describing components in cooled chamber 8 having a "high protection grade" that "makes them insensitive to contamination"). Given that the specification links high protection grade with the insensitivity of components so that they can function in the open, cooled chamber, we see no issue with Petitioner's proposal that tracks that same approach. *See id.*; *see also id.* at 1:57–62; Ex. 1112 ¶ 113.

In addition, Patent Owner's approach introduces additional concerns. In our Institution Decision, we emphasized that we did "not view the specification's reference to 'e.g. IP65' as a definition of 'high protection grade,'" "and read the passage as stating that IP65 provides one example of a grade that falls within the scope of 'high protection grade.'" Inst. Dec. 20. We also emphasized that "high protection grade" in claims 9 and 17 did not specify any particular grade, while claim 5 specifies an "IP grade rating" of "IP65." *Id.* While Patent Owner's revised proposal avoids a specific

numerical rating, it still requires some specific numerical "IP grade" without any reference to "IP" in claims 9 or 17. Several claims, including claims 1, 5, and 10, refer to "IP grade rating," strongly suggesting that the applicant knew how to specifically claim an IP grade rating when it desired, and that we should not read that requirement into other claims that avoid that claim language. Patent Owner's proposal also begs the question of how "high" the IP grade must be to meet the claim limitation. When pressed on this issue at the oral hearing, Patent Owner's counsel indicated that "high" would mean more than halfway up the IP grade scale of 00-68, or higher than an IP grade of 34. Tr. 57:1–25. While such a numeric definition provides clarity, nothing in the specification suggests that "high protection grade" means IP grades above 34. Similarly, Patent Owner argues "that a component with a high IP grade is, by definition, a component that itself is enclosed with (or comprises) an enclosure that provides that high IP grade." PO Resp. 22–23. Nothing in the specification supports this "enclosure" requirement either, and we are reluctant to read requirements into claims that the specification never mentions.

Based on the foregoing, we construe "high protection grade" in claims 9 and 17 to mean "component of a protection grade sufficient to be insensitive to contamination from exposure to ambient air."

3. At Least One of a Choke and a Transformer; At Least One of a Transformer, a Cast Winding, and a Choke

Petitioner contends that "at least one of a choke and a transformer" in claim 1 means "at least one choke *or* transformer," and "at least one of a transformer, a cast winding and a choke" in claims 13 and 17 means "at least one transformer, cast winding *or* choke." Pet. at 21–22 (emphasis added).

Petitioner contends that the limitations should be read in the disjunctive because the specification indicates that the "second chamber may have a transformer or a choke (both of which are described as cast windings), but need not have both." *Id.* at 21 (citing Ex. 1101, 1:45–49, 2:36–39, 2:42–49). Petitioner also argues that the Patent Owner affirmatively adopted this construction during prosecution. *Id.* at 22.

In our Institution Decision, we noted the apparent agreement of the parties as to these constructions and adopted Petitioner's proposed constructions. Inst. Dec. 21–22. In its Response, Patent Owner does not address our adoption of Petitioner's proposals or argue for any different constructions. Accordingly, because the full record presents no dispute regarding these limitations, we adopt Petitioner's proposed constructions and construe (1) "at least one of a choke and a transformer" as "at least one choke or transformer" and (2) "at least one of a transformer, a cast winding and a choke" as "at least one transformer, cast winding or choke."

4. Higher IP Grade Rating

Petitioner contends that when claim 1 recites a "first chamber . . . which has a higher IP grade rating for protection to humidity and dust than the electrical components mounted in said second chamber," the claim means a first chamber "which protects against the ingress of moisture and dust to a greater degree than the second chamber." Pet. 19. According to Petitioner, the specification supports its proposed construction because it stresses that the two chambers have different protection ratings. *Id.* at 19–20. Petitioner contends that the limitation should not be construed to require "that the first chamber has a higher protection against dust and moisture ingress than the *electronics* in the second chamber," as the claim language

suggests, because a later limitation requires those same components to have less sensitivity than the components in the first chamber. *Id.* at 20–21. Petitioner also contends that the specification never compares "the protection rating of the first chamber to the protection rating of the *electronics* in the second chamber," suggesting that the claim should not be construed to cover an embodiment not disclosed in the specification. *Id.*; *see also* Pet. Reply 13–14.

Patent Owner argues that the limitation "should be interpreted as what the term recites" and that the "ordinary and customary meaning of the term is clear on its face." PO Resp. 21; *see also* PO Sur-reply 7. According to Patent Owner, the "term clearly compares the IP grade rating of the first chamber with the IP grade rating of the electrical components (of the inverter) mounted in the second chamber." PO Resp. 21.

The disputed language includes a comparison of IP grades between the first chamber and the "components mounted in said second chamber." Although both components and the second chamber are referenced, the language references the components first and appears to require a comparison of the IP grade rating of the first chamber and those components rather than the second chamber itself. If the claim meant to clearly compare the IP grade rating of the first chamber and second chamber, as Petitioner proposes, the claim could have placed the reference to "components" after "second chamber," e.g., "first chamber . . . has a higher IP grade rating than said *second chamber* having components therein," or something similar. Patent Owner asks us to stop our analysis after reading the disputed phrase, and not even consult the specification because the claim language contains no ambiguity. *See* PO Resp. 21 ("[T]he term is clear on its face. It does not

need to be interpreted."); Tr. 95:14–22, 96:6–11 ("[T]o construe it, you don't need to go to the spec to construe it.").

We decline to limit our analysis to the disputed claim language in isolation. The "context in which a term is used in the asserted claim can be highly instructive" and "claims must be read in view of the specification, of which they are a part." *Phillips*, 415 F.3d at 1314–15 (citation and quotation marks omitted). When we consider other language in claim 1, ambiguities arise. For example, the limitation at issue seems to stress that the components in the second chamber have an IP grade rating *lower* than the IP grade rating of the first chamber, but a later limitation requires those same components in the second chamber to be "less sensitive to humidity and dirt" than components in the first chamber, which generally suggests a *higher* protection level, or higher IP grade, for the components in the second chamber. Ex. 1101, 2:64–67, 3:8–10. Requiring the same components to have a comparatively low protection rating in one context and a high protection rating in another creates confusion as to the claim meaning. Turning to the specification, we find no support for a reading of the claim requiring a comparison of IP grade ratings between the first chamber and components in the second chamber. Instead, the specification stresses that the first chamber has a higher IP grade rating than the second chamber itself, not the components within that chamber. Ex. 1101, 2:4–5, 2:42–46. Because the specification only describes a relative comparison of IP grades between the first chamber and second chamber, and never mentions a comparison of IP grades between the first chamber and components in the second chamber, we view the disputed limitation, which references both the components in the second chamber and the second chamber itself, as

referring to the second chamber's IP grade rating for comparison with the first chamber's IP grade rating. Construing the limitation as requiring a comparison of IP grades between the chambers also resolves the tension with the later limitation requiring components in the second chamber "less sensitive to humidity and dirt." Ex. 1101, 3:8–10.

Based on the foregoing, we adopt Petitioner's construction and construe "first chamber . . . which has a higher IP grade rating for protection to humidity and dust than the electrical components mounted in said second chamber" to mean a first chamber "which protects against the ingress of moisture and dust to a greater degree than the second chamber."

D. Challenge Under § 103(a) Based on Rodi and Brinkman

Petitioner contends that claims 1–7, 9–15, and 17 are unpatentable over Rodi and Brinkman. Pet. 24–64. For these challenges, Petitioner relies on the Wood Declarations. *Id.*

1. Rodi (Ex. 1108)

Rodi describes "a switchgear cabinet for electrical or electronic components, which is divided into two regions." Ex. 1108, code (57). Figure 1 of Rodi is reproduced below.

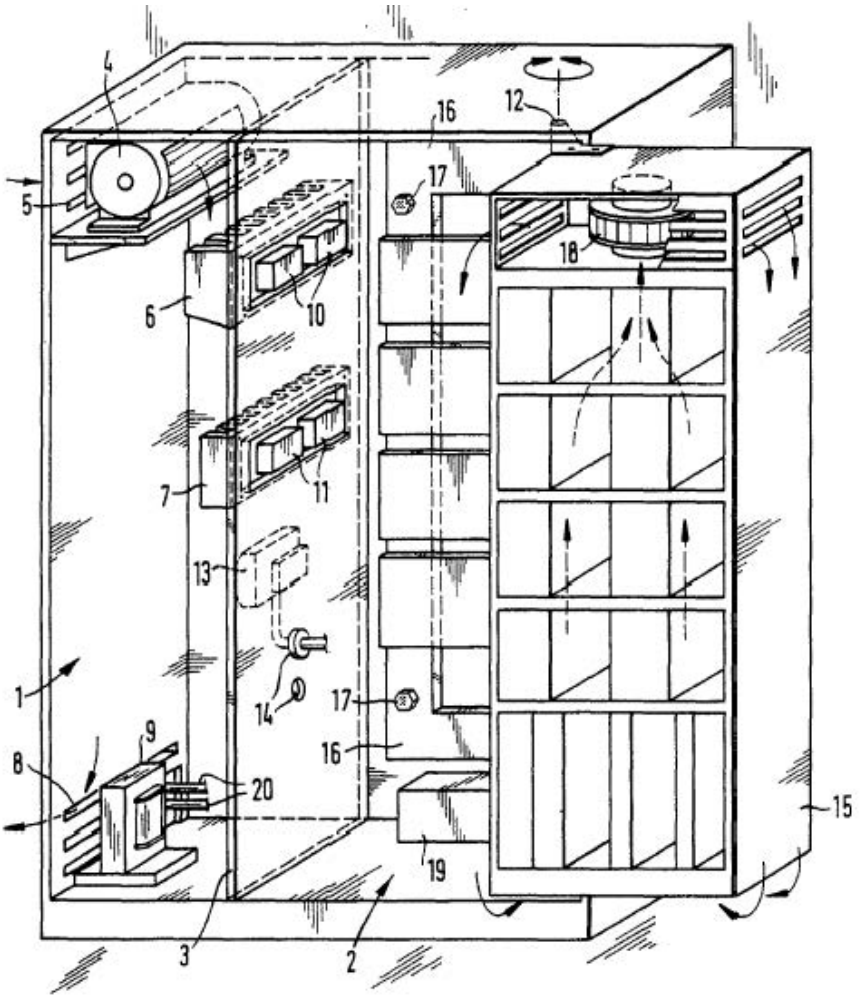


Figure 1 is a perspective view of Rodi's switchgear cabinet. *Id.* 2:45–46. The switchgear cabinet includes two regions 1, 2 separated by dividing wall 3. *Id.* at 2:49–3:2. Region 1, with a suggested protection rating of IP20, houses "components of high power loss, which are less demanding with respect to the protection class," such as heat sinks 6, 7 and transformer 9. *Id.* at 3:5–16. Region 1 includes fan 4 and air slots 5, 8 so that ambient air can be drawn through region 1 to cool the components housed within the region. *Id.* at 3:10–19. Region 2, with a suggested protection rating of IP54, houses sensitive electronic modules such as power semiconductors 10, 11.

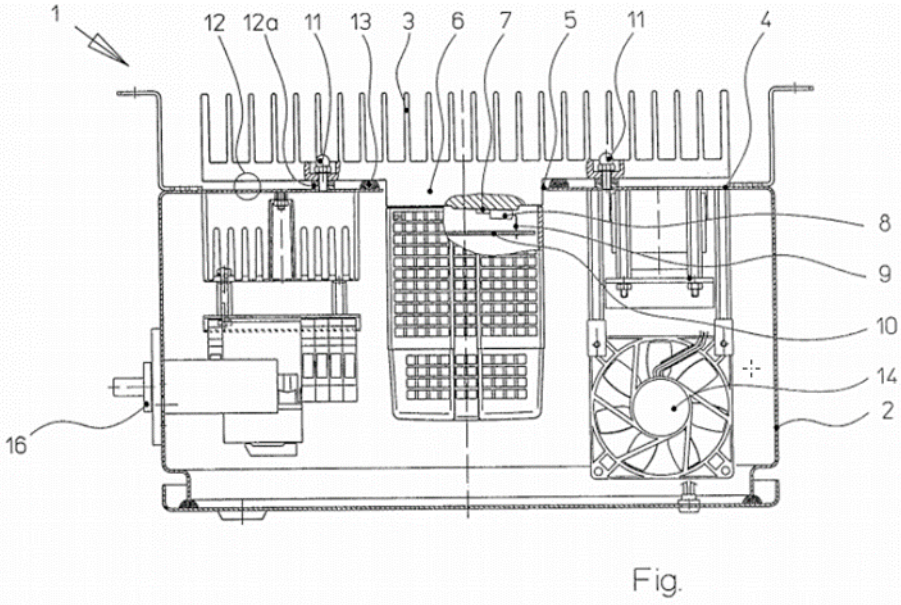
Id. at 3:2–5, 3:30–32. Region 2 includes radial fan 18 to "conduct the heat generated by the electronics to the outer walls." *Id.* at 4:8–16.

Rodi describes mounting semiconductors 10, 11 on dividing wall 3, with openings in wall 3 providing direct contact between semiconductors 10, 11 and heat sinks 6, 7. Ex. 1108, 3:30–34. The openings in wall 3 allow heat sinks 6, 7 to "extend into the first region and be cooled by outside air." *Id.* at 1:49–53. Rodi's separation of the cabinet into two regions enables the protection of highly sensitive components in one region protected from dust and moisture, while components such as transformers, chokes, and heat sinks with high heat loss that are "less sensitive to environmental influences" are disposed in another region "cooled by the outside air." *Id.* at 1:24–40.

2. Brinkmann (Ex. 1105)

Brinkmann "relates in particular to the cooling of power components in frequency inverters comprising a housing that is completely closed in

accordance with protection level IP65." Ex. 1105, 1. The only figure of Brinkmann is reproduced below.



The figure "is a partially sectional side view of a frequency inverter." *Id.* at 3. Frequency inverter 1 comprises housing 2 and cooling element 3 with cooling element projection 6. *Id.* Housing wall 4 has recess 5 through which cooling element projection 6 extends inwardly into housing 2. *Id.* Power components 8 are fixed to planar cooling element surface 7 of cooling element projection 6. *Id.* Housing 2 "is substantially closed on all sides in accordance with protection level IP65." *Id.*

3. Claims 1–4, 7, 9–15, and 17

Petitioner asserts that Rodi and Brinkmann disclose all of the limitations of claims 1–4, 7, 9–15, and 17 and that one of ordinary skill in the art would have been motivated to apply Brinkmann's teachings to Rodi. Pet. 24–47, 53–64. We first address the challenges to these claims using Petitioner's claim constructions, which we find persuasive and adopt as our own for the reasons set forth above, followed by an analysis using Patent

Owner's proposed constructions and addressing Patent Owner's arguments based on those constructions.

a) Analysis Based on Petitioner's Constructions

As discussed above, we find Petitioner's claim construction arguments persuasive and adopt Petitioner's constructions as our own.[10] Patent Owner does not argue that the combination of Rodi and Brinkman fails to disclose any of the limitations of the challenged claims if we adopt Petitioner's constructions, nor does Patent Owner argue that Petitioner failed to articulate a sufficient motivation to combine the references.

Petitioner contends that Rodi discloses all of the limitations of claims 1–4, 7, 9–15, and 17 with the possible exception of an "inverter" and "heat exchange structure extending through said wall," which Petitioner contends Brinkmann discloses. *See* Pet. 24, 28, 36–40, 57–58. Petitioner provides analysis of each limitation in the challenged claims with citations to the references that correspond to each of the claim limitations and the relevant declaration testimony. *Id.* (citing Ex. 1112). Petitioner also sets forth rationales supporting the combination of Rodi and Brinkmann. *See id.* at 28, 40–43.

We have reviewed Petitioner's challenge of claims 1–4, 7, 9–15, and 17. *See* Pet. 24–47, 53–64. Patent Owner does not dispute that Petitioner carried its burden of proving that the combination of Rodi and Brinkmann discloses all of the limitations of claim 1 or that one of ordinary skill in the

[10] Although Petitioner broadly argues that the preamble does not limit the claims, it does not dispute that terms appearing both in the preamble and the body of claim 1, such as "cooling unit" and "electronic and electrical components" limit the claim. *See* Pet. 25, 30. We agree that such terms appearing in both the preamble and body of claim 1 limits claim 1.

art would have been motivated to combine Rodi and Brinkmann, when using Petitioner's constructions. *See* PO Resp. 25–40. Based on our review of Petitioner's arguments and evidence for these claims, we determine that Petitioner establishes by a preponderance of the evidence that the combination of Rodi and Brinkmann discloses all of the limitations of claims 1–4, 7, 9–15, and 17, and that one of ordinary skill in the art would have been motivated to combine Rodi and Brinkmann in the manner Petitioner proposes and for the reasons provided by Petitioner. We adopt Petitioner's arguments and evidence as to the obviousness of claims 1–4, 7, 9–15, and 17 based on Rodi and Brinkmann as our own. *See* Pet. 24–47, 53–64; Ex. 1112 ¶¶ 122–183, 199–243.[11]

b) Analysis Based on Patent Owner's Constructions

Although we reject Patent Owner's claim constructions for the reasons discussed above, for completeness, we will assume for purposes of this analysis that Patent Owner's claim constructions govern. Patent Owner raises several arguments against Petitioner's challenges based on the

[11] We need not set forth formal findings as to the undisputed assertions by Petitioner that the references disclose the limitations of these claims, and Petitioner's undisputed rationale for the combination of the references. *See In re NuVasive, Inc.*, 841 F.3d 966, 974 (Fed. Cir. 2016) ("Although the Board did not make findings as to whether any of the other claim limitations (such as fusion apertures or anti-migration teeth) are disclosed in the prior art, it did not have to: NuVasive did not present arguments about those limitations to the Board. . . . The Board, having found the only disputed limitations together in one reference, was not required to address undisputed matters."); Paper 11, 7 (emphasizing that "any arguments for patentability not raised in the response may be deemed waived"). Here and elsewhere in this Decision, we adopt Petitioner's argument and evidence as our own to make the clear the basis for our conclusion that the claims at issue would have been obvious.

assumption that we adopt one or more of Patent Owner's claim construction arguments. While we do not find Patent Owner's arguments persuasive, we address Patent Owner's arguments to show that even if we had adopted Patent Owner's claim construction arguments, we would still find that Petitioner met its burden of showing that claims 1–4, 7, 9–15, and 17 would have been obvious.

i. Inverter Having a Housing with Two Chambers (Claims 1, 9, 17)

We assume for purposes of this analysis that the preamble limits the claims in the manner Patent Owner contends, such that "all claim elements recited in this claim are claim elements of an inverter (including a housing with two chambers and electronic and electrical components)." PO Resp. 25. In the Petition, Petitioner argues that Rodi's switchgear cabinet discloses a "housing" and adding Brinkmann's inverter to Rodi's cabinet would have been obvious because it involves adding common power supply electronics to a power supply housing. Pet. 25 (citing Ex. 1108, code (57), Figs. 1–2, 1:24–53, 2:26–39, 2:44–3:47, 4:35–57), 28 (citing Ex. 1105, 3; Ex. 1112 ¶¶ 147, 164–165). Petitioner also contends that Rodi discloses the first and second chambers of the housing, chambers 1 (open chamber), 2 (sealed chamber), separated by dividing wall 3. *Id.* at 28–29 (citing Ex. 1108, code (57), Figs. 1–2, 1:24–53, 2:44–3:44; Ex. 1112 ¶¶ 115–116, 148).

According to Patent Owner, if claim elements are "of an inverter," then the Rodi-Brinkmann combination fails to disclose an inverter having a housing with two chambers, as required in some form by each of independent claims 1, 9, and 17. PO Resp. 25–30 (argument as to claim 1),

35 (relying on same argument for claims 9 and 17). In support of its argument, Patent Owner contends that the claims not only require an inverter, but "an inverter configured to convert DC power to AC power, i.e., configured to receive DC power at its input, convert DC power to AC power and provide AC power at its output." PO Resp. 25 (citing Ex. 2105 ¶ 81). Patent Owner then argues that Rodi does not disclose such an inverter and that Brinkmann's "frequency inverter" receives AC power, converts AC power to AC power on another frequency, and provides AC power. *Id.* at 25, 28–29. According to Patent Owner, the addition of Brinkmann's frequency inverter to Rodi's "switchgear cabinet," which "typically receives AC power from the grid," would not result in an inverter as Patent Owner defines it. *Id.* at 29 (citing Ex. 1112 ¶¶ 71–72; Ex. 2104, 57:12–15, 62:16–22; Ex. 2105 ¶¶ 95–97); *see also* PO Sur-reply 12–13. Patent Owner also argues that if Rodi's switchgear cabinet received DC power, there would be no reason to combine it with Brinkmann's AC to AC frequency inverter. PO Resp. 29–30 (citing Ex. 2105 ¶ 98).

As to Patent Owner's contentions, Petitioner argues that Patent Owner's statement that switchgear/power supply cabinets, such as Rodi's, typically receive DC power lacks any support. Pet. Reply 14 (citing PO Resp. 26; Ex. 1143, 180–181). Petitioner also argues that Brinkmann's frequency inverter indisputably contains an inverter, and once placed inside Rodi's housing, Rodi's housing discloses an inverter housing. *Id.* at 16. Petitioner also contends that "nothing in either the claims or specification of the '631 patent requires that the housing itself have any particular input or output." *Id.* (citing Ex. 1144 ¶ 21). Petitioner further argues that "with Brinkmann's inverter in the sealed chamber of Rodi, the transformer and

heat sinks in the open chamber are inverter components in an inverter housing, just as the transformer and heat sink in the open chamber of the '631 patent are inverter components in an inverter housing." *Id.* at 17 (citing Ex. 1144 ¶ 24). Petitioner also argues that Rodi does not limit its application to powering printing presses as Patent Owner suggests, and merely cites that as an example. *Id.* (citing Ex. 1108, 2:26–27).

In its Sur-reply, Patent Owner argues that "inverter housing" does not encompass every housing that contains an inverter inside and a "switchgear cabinet is a term of art having a well understood meaning that is distinct and different from that of an inverter housing." PO Sur-reply 11 (citing PO Resp. 26; Ex. 2111 ¶¶ 84–85). Patent Owner also argues that Rodi's large switchgear cabinet, which "holds a plethora of components and provides a plurality of functions," does not become an inverter housing merely by placing Brinkmann's inverter inside the cabinet. *Id.* at 12 (citing Ex. 2111 ¶¶ 84, 91).

As noted above, Petitioner contends that Rodi unquestionably discloses a housing that includes an inverter having two chambers, and that is all the claim requires. *See* Pet. Reply 16–17. We agree. The fact that Rodi's housing—its cabinet—includes other components that perform other power delivery functions beyond inverting does not change the fact that the cabinet houses an inverter. The claims require nothing more. For similar reasons, housing Brinkmann's inverter in Rodi's cabinet on Rodi's dividing wall, with sensitive components within closed chamber 2 (the claimed "first chamber") and less sensitive components within open chamber 1 (the claimed "second chamber"), as Petitioner proposes, results in a combination that includes inverter components residing in both chambers as the claims

require. *See* Pet. 28–30, 38–43.[12] We are persuaded by Petitioner's arguments and evidence on these points, including credible declarant testimony from Dr. Woods, and we adopt them as our own. *See id.*; Pet. Reply 16–18; Ex. 1112 ¶¶ 115–141, 147–150, 162–166; Ex. 1144 ¶¶ 14–17, 20–24.

Patent Owner's arguments place unwarranted restrictions on the scope of the claims. For example, Patent Owner argues that some housings that contain inverters, such as Rodi's switchgear cabinet, are not inverter housings and contends that "switchgear cabinet" is a "term of art . . . different from that of an inverter housing." PO Sur-reply 11; Ex. 2105 ¶¶ 84–85. Such an argument that relies on distinctions between terms of art in a given field requires further elaboration, if not a devoted claim construction argument explaining why a construction of "inverter" or "housing" in the '631 patent does not cover a housing that includes an inverter in Rodi. Simply stating it, without support to authority beyond an identical statement from a declarant, does not persuade us that we should read the claim so narrowly that it does not cover the Rodi-Brinkmann combination. *See id.* Patent Owner also fails to support its implicit argument that the claimed housing cannot house other components that are not part of the inverter—an argument refuted by the open-ended nature of the claims. *See* PO Su-reply 12 (citing Ex. 2111 ¶¶ 84, 91).

[12] For the Rodi-Brinkmann combination, Patent Owner's argument here focuses on the alleged lack of "an inverter in the sense of claim 1, namely an inverter (with a two-chambered housing) configured to convert DC to AC." PO Resp. 29–30. Patent Owner does not argue that the combination lacks inverter components in each chamber of the housing if we conclude that the combination discloses a two-chambered inverter housing. *See id.*

Patent Owner takes a similar approach when it argues that the claims not only require an inverter, but "an inverter configured to convert DC power to AC power, i.e., configured to receive DC power at its input, convert DC power to AC power and provide AC power at its output." PO Resp. 25 (citing Ex. 2105 ¶ 81). Nothing in the claims or the specification, however, suggests that the invention only covers structures that have "DC power as its input." *See id.*; Pet. Reply 16 (citing Ex. 1144 ¶ 21). We decline to read in any such requirement, especially when Patent Owner has not argued for a claim construction, supported by the intrinsic record, that would support its position. Accordingly, the fact that Brinkmann discloses an AC-AC frequency inverter or that printing presses may not typically receive DC power as an input does not adequately support Patent Owner's argument that the Rodi-Brinkmann combination does not disclose an inverter in a housing having two chambers.

ii. First Chamber Having Higher IP Rating (Claim 1)

For purposes of this analysis, we assume that when claim 1 recites a "first chamber . . . which has a higher IP grade rating for protection to humidity and dust than the electrical components mounted in said second chamber," the claim means a first chamber with a higher IP grade rating than the *components* in the second chamber, not a higher IP grade rating than the second chamber itself. *See* PO Resp. 21. Petitioner contends that Rodi discloses a first chamber with an IP54 rating and that the Rodi-Brinkmann combination would have an IP65 rating because Brinkmann's sealed chamber has an IP rating of IP65, and one of ordinary skill in the art would have been motivated to apply it to provide further protection. Pet. 33–34 (citing Ex. 1108, 3:1–9; Ex. 1112 ¶¶ 155). Petitioner also argues that one of

ordinary skill in the art "would have been motivated to use electrical components having IP grade ratings lower than IP65 and IP54 in the second chamber for cost reasons, because he or she would have known that lower grade ratings would still allow for suitable electrical performance, and because passive electrical components, such as transformers and chokes, are relatively insensitive to degradation caused by exposure to dust and moisture." *Id.* at 34 (citing Ex. 1112 ¶ 155; Ex. 1124; Ex. 1125; Ex. 1126, 12.1, 12.4, 12.10).

Patent Owner argues that although "components such as transformers and chokes can be relatively insensitive to moisture and dust . . . . that does not mean that they automatically have an IP grade." PO Resp. 31 (citing Ex. 2105 ¶ 104). Patent Owner contends that neither Rodi nor Brinkmann disclose IP grades for the components in their open chamber, which means they do not have an IP grade. *Id.* at 32 (citing Ex. 2105 ¶¶ 105–106; Inst. Dec. 32). Patent Owner further contends that Petitioner's various rationales for selecting components with a lower IP grade are flawed. *Id.* at 33–35 (citing Ex. 1112 ¶¶ 85–88, 155; Ex. 2104, 103:13–19; Ex. 2105 ¶¶ 107–110). For example, Patent Owner argues that (1) Rodi's open chamber already has an IP20 grade, and no further protection of the components in that chamber is necessary; (2) the added cost to provide an IP grade undermines the motivation to provide the added protection; and (3) "replacing" components without an IP grade to components with an IP grade cannot be deemed a mere "design choice." *See id.*

In its Reply, Petitioner argues that "it would have been obvious for a POSITA to use any commercially-available transformer, with the IP grade selected based on the degree of protection the POSITA wanted to achieve"

and that Patent Owner concedes that "the most common transformer had an IP grade of IP20." Pet. Reply 18–19 (citing PO Resp. 31; Pet. 33–34; Exs. 1124–1126; Ex. 1143, 189–190; Ex. 1144 ¶¶ 25–26, 33). Petitioner also contends that components with no stated protection would not have no IP grade as Patent Owner assumes; they would have an IP grade of IP00, which is also lower than the IP grade of the first chamber in Rodi (IP54). *Id.* at 19 (citing Ex. 1112 ¶¶ 88–90, 155; Ex. 1114, 15, 41, 45; Ex. 1143, 192–194; Ex. 1144 ¶¶ 26–27; Ex. 2104, 95:5–9).

In its Sur-reply, Patent Owner argues that Petitioner now argues that one would have been motivated to provide components having whatever IP grade that one wanted, but argues that Petitioner should be held to its position in the Petition, which relies on lower cost as a reason to provide a lower IP grade. PO Sur-reply 14 (citing Pet. 34; Pet. Reply 18; Ex. 112 ¶ 155). Patent Owner also argues that transformers are available with or without IP grades, so the lack of an IP grade for a component, such as the transformer in Rodi, does not indicate a grade of IP00. *Id.* at 14–16.

We need not reach the parties' dispute over whether Rodi's silence on the IP grade rating of its components indicates no rating or an IP00 rating. We find Petitioner's more general argument persuasive and credible—that "it would have been obvious for a POSITA to use any commercially-available transformer, with the IP grade selected based on the degree of protection the POSITA wanted to achieve." Pet. Reply 18. The argument finds support in the wide availability of transformers with various IP grade ratings. *See* Ex. 1024, 1 (product data sheet showing transformers with "IP23, IP54 or IP65 protection" available); Ex. 1025, 2 (noting that available transformers "can be supplied either open or enclosed in steel wall or floor

mounted enclosures up to IP65 rating"), Ex. 1026, 12.1, 12.4, 12.10. Petitioner persuasively argues that in the Rodi-Brinkman combination, one of ordinary skill in the art would have been motivated to raise the closed chamber IP rating from IP54 to IP65 as Brinkmann teaches, but either way, selecting an IP rating for a transformer in the second, open chamber under IP65 or IP54 would have been obvious. Pet. 33–34 (citing Ex. 1108, 3:1–9; Ex. 1112 ¶¶ 155); Pet. Reply 18 (citing Ex. 1143, 190–194; Ex. 1144 ¶¶ 25–26, 33). Petitioner also sets forth several persuasive reasons why one of ordinary skill in the art would have been motivated to select commercially-available transformers with an IP grade rating lower than IP65 or IP54. Pet. 33–34 (citing Ex. 1112 ¶ 155); Pet. Reply 18–19 (citing Pet. 33–34; Ex. 1112 ¶¶ 88–90, 155; Ex. 1143, 190–194; Ex. 1144 ¶¶ 25–26). These reasons include the lack of any need to select parts with a very high rating such as IP54 or IP65 due to their relatively insensitivity to moisture and dust, the wide availability of transformers with IP ratings below IP54 or IP65, and the ability to save money by selecting a less protected transformer. *See id.*

Patent Owner's arguments do not persuade us that one of ordinary skill in the art would not have been motivated to select a component in the second chamber with an IP grade rating less than IP65 or IP54. Patent Owner does not dispute (1) that transformers with ratings less than IP54 were widely available and that a rating of IP20 was most common; (2) that a transformer with an IP rating below IP65/IP54 would perform adequately in many environments, because an IP65/IP54 rating is not required for many applications given the relative insensitivity of transformers to the environment; and (3) that transformers with less than an IP54 rating would save money compared to a transformer with an IP65/IP54 rating. *See* PO

Sur-reply 14 (acknowledging availability of transformers with multiple IP grades). Patent Owner concedes these critical points, but then takes these same issues to the extreme by arguing that the relative insensitivity of transformers means that one of ordinary skill in the art would be motivated to use a transformer with *no* rating, because the device could still function and such a transformer would maximize cost savings. *See* PO Resp. 33–34. These arguments do not refute Petitioner's case or explain why one of ordinary skill must limit its selection to the most extreme, cheapest choice, when some environments may call for a more protected transformer that costs a bit more than the least expensive option.

iii. Component of a High Protection Grade (Claims 9 and 17)

For purposes of this analysis we assume that when claims 9 and 17 refer to a component having a "high protection grade" it means a high IP grade, as Patent Owner proposes. PO Resp. 36. In the Petition, Petitioner argues that Rodi describes transformer 9 and component 13 as "less sensitive to environmental influences" and less sensitive to dust and moisture. Pet. 55–56 (citing Ex. 1108, 1:35–40, 3:1–9; Ex. 1112 ¶¶ 75, 85, 209). Petitioner contends that such components have a high protection grade, as evidenced by their location in Rodi's open second chamber. *Id.* at 56 (citing Ex. 1108, 1:24–26, 3:1–9; Ex. 1112 ¶ 209; Ex. 1114, 7, 9, 13, 16, 18).

Patent Owner acknowledges that Rodi's resistors and transformer "can be relatively insensitive to moisture and dust," but argues that insensitivity does not necessarily equate to a high IP grade. PO Resp. 37 (citing Ex. 1114, 7; Ex. 1124; Ex. 1125; Ex. 1126; Ex. 2105 ¶¶ 76–77, 116–118). Patent Owner further argues that Rodi's silence regarding IP grade

means that its components do not have an IP grade, and that in any event, they would not need an IP grade because Rodi's open chamber provides protection, i.e., IP20. *Id.* at 38 (citing Ex. 1108, 3:5–6; Ex. 2104, 103:13–19, 168:19–169:1; Ex. 2105 ¶¶ 120–121). As to whether it would have been obvious to select a high IP grade for Rodi's transformer 9 or choke, Patent Owner "notes" that Petitioner's declarant, Dr. Wood, made his own inverters in the past and included an open housing with components that "were neither particularly protected nor individually enclosed according to an IP protection grade." *Id.* at 39 (citing Ex. 1112 ¶ 70; Ex. 2104, 78:7–17); *see also* PO Sur-reply 18. Patent Owner also contends that one would not have been motivated to add an enclosure that provides a higher IP grade for cost reasons, and that a higher IP grade is unnecessary. PO Resp. 39–40 (citing Ex. 1112 ¶ 155; Ex. 2105 ¶¶ 123–127).

Petitioner argues that even using Patent Owner's new construction for "high protection grade," it would have been obvious to select components having a high IP grade given their placement in a chamber exposed to dust and moisture. Pet. Reply 20 (citing Ex. 1112 ¶¶ 88–90; Ex. 1143, 61–62, 171, 191–194; Ex. 1144 ¶¶ 30–39). Petitioner also argues that "[i]f the power supply were going to be subject to strong jets of water and prevalent dust, a POSITA would know to use an IP grade as high as IP65 to protect the components from that environment." *Id.* (citing Ex. 1144 ¶ 30).

In its Sur-reply, Patent Owner argues that Petitioner's obviousness argument "essentially states that selecting a high IP grade for the components in the second chamber is nothing else than an optimization through routine experimentation," and argues that this new argument should not be considered. PO Sur-reply 19 (citing Pet. Reply 20). Patent Owner

also argues that routine optimization theory fails because it lacks a result-effective variable. *Id.* Finally, Patent Owner contends that Petitioner fails to identify any need or demand to select a component with high IP grade. *Id.* at 20.

We find that Petitioner establishes sufficiently that it would have been obvious to select a high IP grade for Rodi's transformer 9 or choke in the second chamber. Petitioner, supported by credible testimony from its declarant, persuasively argues that selecting a component with a high IP grade for use in an environment more prone to contamination would have been obvious. *See* Pet. Reply 20 (citing Ex. 1112 ¶¶ 88–90; Ex. 1143, 61–62, 171, 191–194; Ex. 1144 ¶¶ 30–39); Pet. 34 (transformers come in variety of IP grade ratings, including IP54), 55–56 (components in open chamber call for less sensitivity to contamination); Ex. 1112 ¶¶ 88–90; Ex. 1144 ¶¶ 30–33; Ex. 1024, 1; Ex. 1025, 2; Ex. 1026, 12.1, 12.4, 12.10. This evidence includes product documents indicating that transformers with a "high" IP grade were known and readily available commercially. *See* Ex. 1024, 1; Ex. 1025, 2. Contrary to Patent Owner's assertion, Petitioner explains that one may need such a transformer and would have been motivated to provide the added protection of a high IP grade in certain environments subject to contamination, such as an open chamber of a housing. *See* Pet. Reply 20; Pet. 34, 55–56; Ex. 1112 ¶¶ 88–90; Ex. 1144 ¶¶ 30–33. We adopt Petitioner's argument and evidence in support of its obviousness argument as to the "high protection grade" limitation in claims 9 and 17 as our own. *See* Pet. Reply 20; Pet. 34, 55–56; Ex. 1112 ¶¶ 88–90; Ex. 1144 ¶¶ 30–33; Ex. 1024, 1; Ex. 1025, 2.

Patent Owner's arguments do not persuade us that Petitioner failed to make its case here. Notably, Patent Owner concedes that "the same transformer can be purchased with different enclosures providing different IP grades based on the enclosure this transformer may be enclosed with." PO Resp. 24 (citing Ex. 1026, 4). Patent Owner argues that even though it may have been possible to select a high IP grade for a component, there would have been no reason to do so given the cost considerations. Patent Owner's briefing does not take into account the breadth of the limitation it conceded at the oral hearing, where Patent Owner contended that a "high" IP grade rating on the scale of IP00-IP68 includes any component with a rating above IP34. Tr. 57:1–25. The question becomes whether it would have been obvious to select components having an IP grade above IP34 when components having various IP grade ratings, including IP54 and IP65, were already well known and readily available in the art. *See* Ex. 1144 ¶¶ 30–33; Ex. 1024, 1; Ex. 1025, 2. Patent Owner does not argue or point to any evidence that such a minor change would have resulted in material cost differences, or persuasively argue that such a difference would have dissuaded one of ordinary skill in the art from making such a selection. Patent Owner's argument that there is no need for such protection fails to persuasively refute Petitioner's position that such protection may have been desired when placing a component in an open chamber exposed to contamination, including jets of moisture or dust, and the availability of transformers having IP ratings well above IP34 presumably exist to meet that market need. We also do not view a selection of a known, available component with a slightly higher IP rating as requiring "optimization" of the type that requires a result-effective variable, and therefore this does not

amount to an improper "new" argument as Patent Owner argues. *See* PO Sur-reply 19–20. Finally, we view the issue of whether Dr. Wood personally constructed a device that meets the claim requirements prior to this dispute, or failed to do so, as largely irrelevant and insufficient to undermine Petitioner's obviousness arguments.

c) Conclusion as to Claims 1–4, 7, 9–15, and 17

We find that Petitioner has proven by a preponderance of the evidence that the combination of Rodi and Brinkmann discloses all of the limitations of claims 1–4, 7, 9–15, and 17, using Petitioner's proposed constructions that we adopt, or using Patent Owner's proposed constructions. We also find that Petitioner has established by a preponderance of the evidence that one of ordinary skill in the art would have been motivated to combine Rodi and Brinkmann for the reasons stated by Petitioner. *See* Pet. 28, 40–43.

4. Dependent Claim 5

Claim 5 depends from claim 1 and further requires "wherein said IP grade rating is IP 65." Ex. 1101, 3:21–22. Claim 5 refers back to the "IP grade rating" related to the first chamber in claim 1, and therefore requires a first chamber having an IP grade rating of IP65. *See id.* at 2:64–65. Neither party proposes any claim constructions for terms appearing in claim 5.

Petitioner contends that in addition to being within the general knowledge in this art, Brinkmann discloses a closed chamber with an IP grade rating of IP65. Pet. 49 (citing Ex. 1105, 1, 3; Ex. 1112 ¶ 188). Petitioner argues that one of ordinary skill in the art would have been motivated to increase Rodi's protection level in its closed chamber from IP54 to IP65 to increase protection of the components inside, which may be especially appropriate in outdoor environments, such as construction sites,

moving vehicles, or trains. *Id.* at 48–49 (citing Ex. 1112 ¶ 186). Petitioner also argues that when combining Rodi and Brinkmann, one of ordinary skill in the art would have been motivated to have Rodi's closed chamber meet the IP65 rating of Brinkmann's closed chamber because Rodi expressly teaches the advantages of protecting electronics in a closed chamber, and Brinkmann improves upon that protection. *Id.* at 50 (citing Ex. 1112 ¶¶ 130–133, 140, 189–191). Petitioner also contends that "a PHOSITA would have appreciated that the benefit would apply to Rodi, which, like Brinkmann, similarly places electronics in a sealed chamber to protect them from dust and moisture." *Id.* at 50–51 (citing Ex. 1108, code (57), 1:24–34, 1:43–49, 3:1–5, Figs. 1–2; Ex. 1105, 1–3, Fig. 1; Ex. 1112 ¶ 133).

Patent Owner argues that because Rodi relates to a switchgear cabinet typically used for printing presses, "it is not obvious why the switchgear cabinet should be operated outdoors" where an IP grade of IP65 might be more appropriate. PO Resp. 41. According to Patent Owner, Rodi's existing IP54 protection "seems to be pretty high and sufficient for indoor operation," especially in light of Dr. Wood's personal experience building inverters without such protection. *Id.* at 41–42. Patent Owner also states that Petitioner's reference to protection from jets of moisture or dust would only apply outdoors, and "notes that it is not clear why the switchgear cabinet of Rodi should be moved outside and exposed to heavy dust and jets of moisture when the related printing presses are located indoors in a production facility." *Id.* at 42–43 (citing Pet. 48–49; Ex. 1112 ¶ 186; Ex. 2105 ¶¶ 134–135); *see also* PO Sur-reply 22. Patent Owner also alleges that increasing the IP rating from IP54 to IP65 would not involve a simple

substitution and would require careful balancing of many parameters. PO Resp. 43 (citing Ex. 2105 ¶ 136).

In its Reply, Petitioner contends that sealed enclosures of up to IP65 were known in the art and that "[t]he '631 patent did not invent the idea of having a hermetically-sealed chamber meeting the rating of IP65." Pet. Reply 20 (citing Exs. 1114; 1121; 1122). Petitioner also argues that given Brinkmann's use of just such an enclosure for an inverter, use of such an IP grade was a known option for those seeking more protection for an enclosure. *Id.* at 20–21 (citing Pet. 48–50; Ex. 1112, ¶¶ 184–193; Ex. 1144, ¶¶ 40, 43; Ex. 2104, 170–71). Petitioner further replies that Patent Owner's argument that printing presses were unlikely to be in environments requiring IP65 protection lacks support, and Patent Owner's references to what Dr. Wood built on his own time are irrelevant. *Id.* at 21 (citing Ex. 1108, 2:26–27; Ex. 2104, 164, 166; Ex. 1144 ¶ 41; PO Resp. 41–42).

We find that it would have been obvious to increase the rating of Rodi's closed chamber from IP54 to IP65 given Brinkmann's disclosure of a closed chamber with an IP65 rating. Ex. 1105, 1 (disclosing "housing that is completely closed in accordance with protection level IP65"), 3 (same). Petitioner provides straightforward and persuasive reasons why one of ordinary skill in the art would have been motivated to modify Rodi with Brinkmann's teachings—because Rodi itself espouses the need to protect components within a closed container, and some environments warrant the increased protection level afforded by the IP65 rating. *See* Pet. 48–50; Pet. Reply 20–21; Ex. 1112 ¶¶ 130–133, 140, 186, 189–191; Ex. 1133 ¶¶ 40, 41, 43; Ex. 2104, 170–171. We adopt Petitioner's argument and evidence on these points as our own.

Patent Owner's arguments focus on its skepticism that Rodi's switchgear cabinet would be used in an outdoor environment that would require an IP65 rating. *See, e.g.*, PO Resp. 41. But Patent Owner provides no support at all for its statement that "it is not obvious why the switchgear cabinet should be operated outdoors" and that Rodi's existing IP54 protection "seems to be pretty high and sufficient for indoor operations." PO Resp. 41–42. Patent Owner's reference to Dr. Wood's prior work building inverters is irrelevant, and does not persuasively undermine Petitioner's and Dr. Wood's reasons why one would be motivated to make the combination. Further, the '631 patent does not restrict the application of its switchgear cabinet to printing presses alone, and the mere fact that a power supply or "switchgear" cabinet such as Rodi's does not often see outdoor use, e.g., on a construction site, does not suggest that providing a chamber with IP65 protection, as Brinkmann teaches, is nonobvious. *See* Ex. 1108, 2:26–27 ("Such a switchgear cabinet can be used on a printing press."). As to the difficulty in making an IP65 enclosure, Patent Owner vaguely alleges it may not be "simple" to move from an IP54 enclosure to an IP65 enclosure, but Petitioner correctly points out that the '631 patent provides no disclosure as to how to provide an IP65 enclosure, and simply assumes one of ordinary skill in the art knows how to do so, underscoring the ease with which one of ordinary skill in the art could achieve the task using available information. *See* PO Resp. 43; Pet. 49; Ex. 1112 ¶ 187.

5. Dependent Claim 6

Claim 6 depends from claim 1 and further requires "wherein said at least one of the choke and the transformer is located on a side of the wall in said second chamber." Ex. 1101, 3:23–25. The "wall" in claim 6 refers

back to the wall separating the chambers in claim 1. *Id.* at 2:58–59. Neither party proposes any claim constructions for terms appearing in claim 6.

Petitioner argues that Rodi discloses a number of components in its second chamber, including transformers and chokes. Pet. 51 (citing Ex. 1108, 1:35–40, 3:3–39, Figs. 1–2). Petitioner also argues that Rodi expressly states that these items can "be positioned on the dividing wall 3." *Id.* at 52 (quoting Ex. 1108, 3:35–39) (citing Ex. 1108, Fig. 2; Ex. 1112 ¶ 197). Petitioner contends that Rodi's figures depict component 13, which can be a choke, on dividing wall 3. *Id.* (citing Ex. 1108, Fig. 2; Ex. 1112 ¶¶ 196–198).

Patent Owner argues that "Rodi does not explicitly show that the choke or transformer is located at the dividing wall 3." PO Resp. 44. Patent Owner contends that "component 13 is not identified as a choke" and therefore Rodi does not disclose a choke on wall 3, and transformer 9 is shown mounted on a different wall. *Id.* (citing Ex. 1108, Fig. 1; Ex. 2104, 167:9–168:2; Ex. 2105 ¶ 140).

Petitioner argues that failing to recognize that "components" 13 do not include a choke "treats a POSITA as a dunce." Pet. Reply 22. According to Petitioner, "[a] POSITA reading Rodi would have understood that, while the 'components' 13 on the wall did not necessarily all have to be chokes, they would obviously include a choke, since that is the only component (aside from the transformer 9 and heat sinks 6 and 7, each labeled separately in the figure) described as being in that chamber." *Id.* (citing Ex. 1108, 1:35–40; Ex. 1112 ¶¶ 196–197; Ex. 2104, 171–172; Ex. 1143, 196–197; Ex. 1144 ¶¶ 44–45). Patent Owner did not address Petitioner's arguments in the "dependent claims" section of its Sur-reply. PO Sur-reply 21–22.

Petitioner has easily satisfied its burden of proof here. Rodi describes "components" in the second chamber that include transformers, chokes, and heat sinks. Ex. 1108, 1:35–40. Rodi also refers to "components 13" in that same second chamber that can "be positioned on the dividing wall 3." *Id.* at 3:35–37. This text alone supports Petitioner's argument, because "components 13" in the second chamber refers back to the list of components in the second chamber that includes transformers, chokes, and heat sinks, and Rodi describes placing any such components on wall 3. *See id.* In addition, Rodi shows components 13 on wall 3 in Figures 1 and 2, along with transformer 9 within the second chamber and heat sinks 6, 7 on wall 3. *Id.* at Figures 1–2. We agree with Petitioner that this suggests that components 13 represents a group of components that includes a choke, because the other components mentioned as residing in the second chamber (transformer 9, heat sinks 6, 7) are already depicted in the Figures. *See id.*; Pet. Reply 22.

6. Conclusion

"Once all relevant facts are found, the ultimate legal determination [of obviousness] involves weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan." *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1361 (Fed. Cir. 2017). Above, based on the full record before us, we provide our factual findings regarding (1) the level of ordinary skill in the art, (2) the

scope and content of the prior art, and (3) any differences between the claimed subject matter and the prior art.[13]

In particular, we find that (1) Petitioner's proposed level of ordinary skill in the art is consistent with the art of record; (2) Rodi and Brinkmann disclose all the limitations of claims 1–7, 9–15, and 17 using either party's proposed claim constructions; (3) one of ordinary skill in the art would have been motivated to combine Rodi with Brinkmann in the manner Petitioner proposes; and (4) there is no objective evidence of nonobviousness in the record. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that claims 1–7, 9–15, and 17 of the '631 patent are unpatentable over the combination of Rodi and Brinkmann.

E. Challenges Under § 103(a) Based on Rodi, Brinkman, and Birger

Petitioner contends that claims 8, 16, and 18, which depend from claims 1, 9, and 17, respectively, are unpatentable as obvious over Rodi, Brinkmann, and Birger. Pet. 64–68. These claims require the lack of an air movement device in the first chamber (the chamber with more protection). Ex. 1101, 3:29–30, 4:20–21, 4:46–47. For this challenge, Petitioner relies on the Wood Declarations. *Id.*

Birger seeks to minimize dust contamination in a power supply by employing a two-chambered power supply housing, with a sealed chamber containing sensitive circuits, and an open chamber enabling cooling of the circuits. Ex. 1110, code (57), Figs. 1–2, ¶¶ 3–6. A partition wall 30 separates closed circuit chamber 14 from open chamber 16. *Id.* ¶¶ 45–47.

[13] Neither party presents argument and evidence as to objective indicia of nonobviousness.

Electronics 62 in closed chamber 14 are mounted adjacent to radiator/heat sink 32, which extends through aperture 64 in wall 30. *Id.* ¶ 49, 51–52. Fans 40 blow air on cooling fins 34 of heat sink 32 within open chamber 16 in order to cool electronics 62 in closed chamber 14. *Id.* ¶¶ 49, 51, 54. Birger states that it does not include an airflow device such as a fan in closed chamber 14 to minimize dust contamination. *Id.* ¶ 41.

Petitioner contends that although Rodi discloses a fan in its first chamber, the claims of Rodi do not require the fan and one of ordinary skill in the art would have viewed the fan as an optional feature with corresponding costs and benefits. Pet. 64–65 (citing Ex. 1108, 4:8–16, 5:1–20; Ex. 1112 ¶ 248). Petitioner relies on Birger as teaching the avoidance of an airflow device in its closed chamber 14. *Id.* at 65–66 (citing Ex. 1108, code (57), 1:24–53, 2:44–3:47; Ex. 1110, code (57), Figs. 1–2, ¶¶ 3–6, 18, 21–23, 26–32, 34, 37, 41, 45–49, 51–54; Ex. 1112 ¶¶ 248–250). Petitioner alleges that it would have been obvious to combine Birger with the Rodi-Brinkmann combination for a number of reasons, including the benefits described by Birger that stem from the lack of air movement within the chamber, such as protecting against unwanted contamination, which Rodi itself recognizes as a concern. *Id.* at 66–68 (citing Ex. 1105, 1–3, Fig. 1; Ex. 1108, code (57), 1:24–53, 2:26–39, 2:44–3:47, 4:35–57, 5:48–52; Ex. 1110, code (57), ¶¶ 1–7, 21, 26–31, 45–54; Ex. 1112 ¶¶ 244–245, 250–253).

Patent Owner argues that Rodi's fan is not optional and performs functions that stress its importance and undermine the motivation to remove the fan. PO. Resp. 45–46 (citing Ex. 1108, 4:8–19; Ex. 2105 ¶¶ 144–146). Patent Owner also argues that removing the fan as Birger suggests renders "Rodi [and/or] Brinkmann unsatisfactory for its intended purpose." *Id.* at 47

(citing Ex. 2105 ¶ 152). Patent Owner further contends that Birger teaches mounting all circuit components in the closed chamber 14 rather than open cooling chamber 16, such that no motivation exists to add Birger to Rodi, which teaches mounting certain components in its open chamber. *Id.* at 48–49 (citing Ex. 1108, 1:35–40; Ex. 1110 ¶¶ 7, 24, 25; Ex. 2105 ¶ 153).

In its Reply, Petitioner argues that Rodi's description of the benefits of a fan in its closed chamber does not mean that removal of a fan in Rodi's device renders its device inoperable. Pet. Reply 23. According to Petitioner, "[r]emoving an optional feature is obvious, even though by definition one loses the benefit of the feature." *Id.* Petitioner also argues that using a fan has costs and benefits, and among the benefits are "less power usage, cost, complexity, and less likelihood of contamination infiltration." *Id.* (citing Pet. 65). Petitioner also argues that Rodi's inclusion of components in its open chamber is irrelevant, and Birger's ability to cool its device while placing all of its components in the sealed chamber "only underscores to a POSITA that fan 18 is not necessary in Rodi." *Id.* at 24 (citing Ex. 1144 ¶ 49). Patent Owner did not address Petitioner's arguments in the "dependent claims" section of its Sur-reply. PO Sur-reply 21–22.

Based on our review of the record, Petitioner has established sufficiently that the combination of Rodi, Brinkmann, and Birger discloses all of the limitations of claims 8, 16, and 18, and that one of ordinary skill in the art would have been motivated to modify Rodi-Brinkmann with the further teachings of Birger. Birger itself discloses the closed chamber without a fan limitation. Ex. 1110 ¶ 41. As to the motivation to combine, Birger itself expressly teaches the advantages in removing a fan from the closed chamber—less dust contamination of circuits—which complements

Rodi's stated goal of reducing contamination of sensitive components in its closed chamber. *Id.*; Ex. 1108, code (57), 1:28–34, 3:1–5). These aspects of the references themselves, coupled with the credible testimony of Dr. Wood identifying other advantages stemming from the removal of a fan, adequately support Petitioner's motivation to combine argument. *See id.*; Ex. 1112 ¶¶ 248–250; Ex. 1144 ¶¶ 46–48.

Patent Owner's arguments focus on the alleged inoperability of Rodi's device without a fan in its closed chamber, but nothing in Rodi suggests that its device will not work at all without a fan, and Birger suggests that power devices operate even when all circuitry resides in the closed container. *See* PO Resp. 47–48. Whether to retain or remove a fan undoubtedly includes costs and benefits as Petitioner acknowledges, but Patent Owner's arguments do not establish that the costs are so steep that removing a fan as Birger teaches would have been nonobvious. *See* PO Resp. 46–49; Pet. Reply 23. Finally, as to Patent Owner's argument that the lack of components in Birger's cooled chamber undermines the motivation to combine with Rodi, we agree with Petitioner that placing some heat-generating components in Rodi's open cooled chamber, while Birger does not, underscores that Rodi's fan is not necessary in its closed chamber because less than all of the components reside in its closed chamber. *See id.* at 24.

Based on the foregoing, we find that (1) Petitioner's proposed level of ordinary skill in the art is consistent with the art of record; (2) Rodi, Brinkmann, and Birger disclose all the limitations of claims 8, 16, and 18; (3) one of ordinary skill in the art would have had a reason to combine the Rodi, Brinkmann, and Birger in the manner Petitioner proposes; and

(4) there is no objective evidence of nonobviousness in the record. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that claims 8, 16, and 18 of the '631 patent are unpatentable over the combination of Rodi, Brinkmann, and Birger.

F. Remaining Challenges

Petitioner includes additional challenges based at least in part on Rodi. For example, Petitioner contends that claims 1–7, 9–15, and 17 are unpatentable as obvious over Rodi alone. Pet. 24–64. Petitioner also contends that claims 8, 16, and 18 are unpatentable as obvious over Rodi and Brinkmann or Rodi and Birger. *Id.* at 64–68. We need not reach the merits of these challenges because we have already concluded that all challenged claims are unpatentable for the reasons provided above. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, Nos. 2019-1594, -1604, -1605, 2020 WL 2071962, at *4 (Fed. Cir. Apr. 30, 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims").

G. Patent Owner's Motion to Exclude

Patent Owner moves to exclude Exhibits 1119, 1121, 1123, 1127, 1130, and 1131, and related portions of Exhibits 1112 and 1141. PO Mot. Exclude 1, 7–8. Petitioner opposes Patent Owner's Motion to Exclude in all respects. Pet. Opp. 1–14.

As to Patent Owner's effort to exclude the Exhibits 1119, 1121, 1123, 1127, 1130, and 1131, and 1141, the arguments appear weak, but we need not reach the merits of these issues because we do not rely on any of the exhibits in our analysis. Patent Owner's Motion to Exclude is therefore moot as to Exhibits 1119, 1121, 1123, 1127, 1130, and 1131, and 1141.

As to Patent Owner's effort to exclude portions of Ex. 1112, Dr. Wood's Declaration, Patent Owner's arguments fall into two groups. For paragraphs 70, 79, 81, 82 of Exhibit 1112, which discuss allegedly inadmissible Exhibits 1127, 1130, and 1131, Patent Owner argues that the paragraphs "should be excluded under FRE 702 as an opinion not based on sufficient facts or data and under FRE 401 as irrelevant because they are based on inadmissible evidence." PO Mot. Exclude 6–7. Petitioner argues that "Patent Owner provides no explanation of which statements it purports are not based on sufficient facts or data," and argues that the cited exhibits are admissible. Pet. Opp. 9–10.

We agree with Petitioner that Patent Owner's arguments are not adequately developed and do not support exclusion of the paragraphs in question. Patent Owner does not specify which statements in the cited paragraphs are not based on sufficient facts or data, and does not support its argument that we must exclude paragraphs that cite to inadmissible exhibits with any citation to legal or other authority. *Cf.* FRE 703 (allowing experts to base opinions on inadmissible facts or data under certain circumstances).

As to paragraphs 49–62, 68–74, 246, and 247 of Exhibit 1112, Patent Owner argues that the Petition does not cite to the paragraphs, and they are therefore irrelevant. PO Mot. Exclude 8. Petitioner argues that these paragraphs provide basic background information and that several of the

paragraphs are cited in either Petitioner's Reply or Dr. Wood's Reply Declaration. Pet. Opp. 13–14.

We disagree with Patent Owner's apparent position that we should exclude all paragraphs from a declarant's declaration that are not cited in a party's papers. Such material could be relevant or helpful background to the Board when reviewing the technical background of the prior art or the declarant's expertise. Further, Patent Owner's list of "uncited" material is inaccurate because several paragraphs were relied upon by Petitioner, and Patent Owner does not explain how such paragraphs can be irrelevant under these circumstances. *See* Pet. Reply 18 (citing Ex. 1112 ¶ 72), 21 (citing Ex. 1112 ¶ 70); Ex. 1144 ¶¶ 23, 37, 42.

Based on the foregoing, we deny Patent Owner's Motion to Exclude.

CONCLUSION[14]

A summary of our conclusions appears in the chart below:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–7, 9–15, 17	103(a)[15]	Rodi		
1–7, 9–15, 17	103	Rodi, Brinkmann	1–7, 9–15, 17	
8, 16, 18	103	Rodi, Birger		
8, 16, 18	103	Rodi, Brinkmann, Birger	8, 16, 18	
Overall Outcome			1–18	

[14] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

[15] Because we determined that all of the challenged claims are unpatentable based on other challenges, we did not reach the grounds based on Rodi alone or Rodi and Birger.

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–18 of U.S. Patent 7,816,631 B2 have been shown, by a preponderance of the evidence, to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *denied*; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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