

**UNITED STATES PATENT AND TRADEMARK OFFICE**

---

**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

---

**TOPSOE INC.,**  
*Petitioner*

**v.**

**CASALE SA,**  
*Patent Owner*

---

**Case IPR2025-01454**  
**U.S. Patent No. 11,286,168**

---

**PATENT OWNER'S SUR-REPLY**

**TABLE OF CONTENTS**

|      |                                                                                                                               |    |
|------|-------------------------------------------------------------------------------------------------------------------------------|----|
| I.   | Introduction.....                                                                                                             | 1  |
| II.  | Claim Construction.....                                                                                                       | 1  |
|      | A. Petitioner’s Position on the Construction of “Furnace”<br>Continues to Shift.....                                          | 1  |
|      | B. Petitioner Oversells the Sentence Following the Express<br>Definition.....                                                 | 3  |
|      | C. Petitioner Misconstrues the ’168 Patent’s Specification and<br>Claims to Disregard the Express Definition of Furnace ..... | 5  |
|      | D. Petitioner Attempts to Displace the Express Definition Through<br>Reliance on its Expert .....                             | 7  |
|      | E. Petitioner Fails to Distinguish Patent Owner’s Case Law .....                                                              | 9  |
| III. | 2007 IFA Is Not Prior Art.....                                                                                                | 9  |
| IV.  | Petitioner’s New Arguments and Evidence Should be Disregarded.....                                                            | 11 |
| V.   | Petitioner Has Failed to Show That Any Challenged Claim is<br>Anticipated or Rendered Obvious Over the Asserted Grounds ..... | 12 |
|      | A. Ground 1: The Challenged Claims Are Patentable over <i>2007</i><br><i>IFA</i> .....                                        | 12 |
|      | 1. Claim 17.....                                                                                                              | 18 |
|      | B. Ground 2: The Challenged Claims are Patentable over <i>Rytter</i> .....                                                    | 20 |
|      | C. Ground 3: The Challenged Claims are Patentable over<br><i>Fjellhaug</i> .....                                              | 22 |
| VI.  | Conclusion .....                                                                                                              | 24 |

**TABLE OF AUTHORITIES**

|                                                                                                            | <b>Page(s)</b> |
|------------------------------------------------------------------------------------------------------------|----------------|
| <b>Cases</b>                                                                                               |                |
| <i>3M Innovative Props. Co. v. Avery Dennison Corp</i> ,<br>350 F.3d 1365 (Fed. Cir. 2003) .....           | 9              |
| <i>In re Fulton</i> ,<br>391 F.3d 1195 (Fed. Cir. 2004) .....                                              | 23             |
| <i>Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.</i> ,<br>821 F.3d 1359 (Fed. Cir. 2016) ..... | 11, 12         |
| <i>In re Keller</i> ,<br>642 F.2d 413 (CCPA 1981) .....                                                    | 19             |
| <i>MIT v. AB Fortia</i> ,<br>774 F.2d 1104 (Fed. Cir. 1985) .....                                          | 10             |
| <i>ParkerVision, Inc. v. Vidal</i> ,<br>88 F.4th 969 (Fed. Cir. 2023) .....                                | 5              |
| <i>Phillips v. AWH Corp.</i> ,<br>415 F.3d 1303 (Fed. Cir. 2005) .....                                     | 7              |
| <i>Sinorgchem Co., Shandong v. ITC</i> ,<br>511 F.3d 1132 (Fed. Cir. 2007) .....                           | 9              |
| <i>Southwall Techs., Inc. v. Cardinal IG Co.</i> ,<br>54 F.3d 1570 (Fed. Cir. 1995) .....                  | 7              |

## **I. INTRODUCTION**

Claims 1-11 and 17-19 of the '168 Patent should be sustained over the Petitioned Grounds. Petitioner's Reply (Paper 49, "Reply") continues to apply the wrong claim constructions for "furnace," which is fatal to each of its grounds.

Beyond its application of the wrong claim constructions, the Petition failed to set forth all of Petitioner's anticipation and obviousness contentions with specificity. In Reply, Petitioner now resorts to gamesmanship to cover for this failure. For each of the failures of proof identified in Patent Owner's Response (Paper 33, "Response"), Petitioner resorts to new arguments, relies on uncited or new evidence, attempts to shift the burden of proof to Patent Owner, or some combination of all three. These arguments are shallow covers for the failure of the Petition and cannot be considered now.

## **II. CLAIM CONSTRUCTION**

### **A. Petitioner's Position on the Construction of "Furnace" Continues to Shift**

In its Petition, Petitioner averred that "no formal claim constructions are necessary." Paper 3 ("Petition") at 2. Originally relying on an incorrect implicit construction, *see* Response at 9-13, Petitioner has now reversed course and espoused *three* different, inconsistent constructions, simultaneously contending each is the term's "ordinary meaning":

- In co-pending litigation, Petitioner first contended “furnace” means “a fired heater in which fuel is combusted in a fired chamber and the resulting heat is transferred to a separate fluid or charge” (No. 3:24-cv-00033, Dkt. 229 at 1 (June 17, 2026));
- In its Reply, Petitioner has submitted a second construction: “a fired heater, an apparatus that operates by means of combustion, of which the specification’s four listed apparatus are examples” (Reply at 6-7);
- In litigation, Petitioner submitted a third construction: “a fired heater in which fuel is combusted in a firebox or combustion chamber” (No. 3:24-cv-00033, Dkt. 284 at 5 (Aug. 12, 2026)).

These constructions differ materially, their scope cannot be reconciled, and they cannot represent the plain and ordinary meaning of “furnace.” Only Petitioner’s first proposal recites the function of heating a charge in the furnace, which is absent in the others. Its litigation constructions both identify distinct locations wherein the combustion must occur, while its Reply proposal curiously omits any such requirement. In fact, the only point Petitioner’s three constructions expressly agree on—aside from the unhelpful “fired heater” recitation—is that combustion must occur in the furnace.

Petitioner’s assertion that Patent Owner’s litigation position is “inconsistent” is unsupported (and ironic). Petitioner incorrectly states that in the infringement

counterclaims, “PO maps the claim onto ‘a fired heater (i.e., a furnace),’ not the four listed apparatus.” Reply at 10. Petitioner omits that its own documents referenced and excerpted in the counterclaims are the source of the recited “fired heater,” and that Patent Owner also directly ties the documents’ “fired heater” to the ’168 Patent’s furnace (“fired heater (*i.e.*, a furnace).”). EX1044 at 39 (¶66).

**B. Petitioner Oversells the Sentence Following the Express Definition**

Petitioner attempts to minimize the ’168 Patent’s express definition of “furnace”, arguing that it is merely “descriptive” even though “furnace” is in quotes and the specification specifically says “The term ‘furnace’ is understood as meaning...”. Petitioner’s argument is based on its incorrect assertion that the sentence directly after the express definition—“[t]hese apparatus, which operate by means of combustion, are identified by the term ‘fired heater’”—equates the term “with a functional class. . .and presents the four apparatus as members.” Reply at 7. But the definition is not a mere description. The two sentences express the clear grammatical instruction that the ’168 Patent uses “fired heater” interchangeably with the apparatuses identified. EX1001 at 2:49-51. Petitioner’s expert agrees. EX2008 at 71:16-25 (“[Q.] The words ‘these apparatus’ in the sentence starting in Column 2, Line 49, do you agree that ‘these apparatus’ refers to the four items named in the previous sentence: a steam reformer, charge pre-heater, steam generator, and steam superheater? . . . A. Yes, it is reporting back to those four items.”).

Petitioner accuses Patent Owner of “deleting” the subsequent sentence from the definition, Reply at 8, but Petitioner conflates the two sentences. Patent Owner’s proposed construction is—and always has been—the patent’s single-sentence express definition. The subsequent sentence, on the other hand, describes the reality that the claims reflect: because fuel is fed to the furnace, the furnace must “operate by means of combustion.” *Compare* EX1001 claim 1 (“said fuel fraction is fed as fuel to at least one furnace”), claim 10 (“said fuel fraction of the synthesis gas feeds one or more of the following apparatuses”), claim 17 (“synthesis gas fuel fraction forms all of the fuel of the furnaces”), *with id.* at 2:49-51. Thus, the definition is limited to the four recited apparatuses, which must operate by means of combustion.

Petitioner’s argument that Patent Owner selectively invokes the second sentence to exclude HRSGs from “furnace” ignores the need for combustion. Likewise, though Petitioner argues for a “heat-versus-electricity dichotomy underlying PO’s construction,” Reply at 9, Petitioner misleads: it is how the HRSG operates (***without combustion***), not its function, that excludes it as a furnace in the context of the ’168 Patent. The Response stated that the HRSG “is fed with an exhaust gas resulting from combustion in the gas turbine, *not* with a ‘CO<sub>2</sub>-depleted synthesis gas’ as required by [claim 1].” Response at 28. And unlike the four apparatuses identified in the ’168 Patent’s express definition, the HRSG “does not ‘operate by means of combustion.’” *Id.* at 29. Furthermore, Petitioner’s own claim

construction positions are inconsistent with its IPR argument that such an HRSG is a “furnace,” as each would require that combustion occur within the furnace.

**C. Petitioner Misconstrues the ’168 Patent’s Specification and Claims to Disregard the Express Definition of Furnace**

Petitioner continues to misconstrue the specification to erase the express definition and fails to explain how exactly these passages would be inconsistent or create ambiguity with the express definition. Petitioner does not say how its claimed “open-ended” sentence about specific embodiments is inconsistent with the definition. *See* Reply at 7. To the contrary, the “furnace” definition is separate from adjacent sentences expressly describing specific embodiments, which further supports the definition. *ParkerVision, Inc. v. Vidal*, 88 F.4th 969, 976 (Fed. Cir. 2023) (“[P]atentee’s use of the phrases ‘as used herein’ and ‘refer to’ conveys an intent for sentence 5 to be definitional” as opposed to adjacent sentences describing embodiments); EX1001 at 2:47-54. Likewise, Petitioner alleges the following statements reflect “generic” use of “furnace” without explanation, *see* Reply at 7-8:

- “furnaces equipped with dual-fuel burners” (*id.* at 10:61-63)<sup>1</sup>: There is no generic or inconsistent use between the express definition and stating that

---

<sup>1</sup> Petitioner incorrectly cites this passage, as the above is the only instance in the ’168 Patent.

furnaces have “dual-fuel burners able to burn both natural gas and synthesis gas.” *Id.*

- “the AUX ‘charge pre-heater furnace and auxiliary boiler,” “AUX block,” Fig. 1: “auxiliary boiler” is not one of the four apparatuses in the “furnace” definition, while a “charge preheater” is such a furnace. EX1001 at 2:47-49.
- EX1001 at 7:44-53: Petitioner merely cites this sentence without quoting from or explaining the alleged “generic” use of furnace, particularly as the passage does not include the word “furnace.” *Id.*

Petitioner further attempts to create ambiguity from claim 10 where there is none. Petitioner argues that applying the express definition as the construction of “furnace” would render claim 1 and 10 as having the same scope, Reply at 8, but its premise is wrong: claim 10 limits the scope relative to claim 1. Claim 1 is agnostic as to which of the many potential furnaces is fed the fuel fraction or the specific location of the furnace. In contrast, claim 10 specifically requires that one of the following furnaces be fed the fuel fraction, including at one of the two specific locations in the process for the third option: “steam production and/or superheating furnace; or one or more furnaces for pre-heating the charge of the autothermal reformer or natural-gas desulphurization section.” *Compare* EX1001 at claim 1, *with* claim 10. Petitioner also states that “[t]he reexamination amendment removing

‘primary steam reformer burners’ from claim 10 narrowed the claimed configuration, not the meaning of ‘furnace’; a primary steam reformer remains a furnace even if the amended claims no longer recite processes using one.” Reply at 11. But that does not create any ambiguity or confusion: claim 1 was amended in reexamination to recite “a conversion section including an autothermal reformer downstream from a pre-reformer and without *a primary reformer* therebetween.” EX1001 at 20 (claim 1). No present claim of the ’168 Patent could therefore include a “primary steam reformer” as a “furnace.”

**D. Petitioner Attempts to Displace the Express Definition Through Reliance on its Expert**

Though Petitioner correctly states “[e]xtrinsic evidence cannot override the intrinsic record,” Reply at 11, that is exactly what Petitioner attempts to do. Petitioner merely cites to its expert in support of its new construction on reply instead of any intrinsic evidence, *id.* at 7 (citing EX1005 ¶¶56, 60; EX2008, 61:7-10). Petitioner’s reliance on expert testimony fails because “evidence extrinsic to the patent and prosecution history, such as expert testimony, cannot be relied on to change the meaning of the claims when that meaning is made clear by those documents.” *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1578 (Fed. Cir. 1995); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1318 (Fed. Cir. 2005). Petitioner does not otherwise attempt to support its new claim construction position.

Petitioner (which chose to **not** conduct a re-direct examination of its expert at his first deposition) also attempts to post-hoc change the testimony of its expert: while its expert stated that a car engine or a gas grill would constitute a “furnace” under his own definition (which is a version of Petitioner’s proposed definitions), the transcript itself makes clear exactly what its expert testified to. EX2008 at 68:3-11 (“Q. But it could include a gas grill, like a Weber? A. I don’t think it would function very well in a chemical process plant, but it would function to generate heat. Q. Does it meet your definition of a furnace? A. A place where--**a fired heater where combustion takes place**, if that’s what I needed to do, yes.”) (emphasis added)), 133:19-134:5 (“Q. Do you think the engine in your car is a furnace? A. I use it to keep warm, so it generates heat. Q. So you do? It meets your definition of a furnace? A. I think we went through this, but a POSA would know there’s combustion going on in Box 7. Q. Can you answer my question, please? A. There’s combustion going on in my engine, and a car generates heat. It can function as a furnace.”).

Meanwhile, Patent Owner’s construction is solely based on the intrinsic record. *See, e.g.*, Response at 7-8. The Response identified two extrinsic references that further support the correct construction of “furnace” as defined in the ’168 Patent, *id.* at 13-14. Petitioner’s own application reflects Petitioner does not believe its own strained, IPR-inspired position: the application’s specification separates “fired heaters” and “gas turbines” as distinct and different components. EX2011,

[0084]. Petitioner’s Reply does not attempt to dispute this. And Petitioner does not dispute that the EPO concluded that a “turbine” is not a “furnace” when affirming the patentability of the ’168 Patent’s European counterpart over *2007 IFA*. EX2009.

#### **E. Petitioner Fails to Distinguish Patent Owner’s Case Law**

Petitioner cites, but fails to distinguish, Patent Owner’s cited case law. As Petitioner states, in *Sinorgchem Co., Shandong v. ITC*, “the quotation-marked definition was applied consistently throughout the patent.” Reply at 9 (citing 511 F.3d 1132, 1136-38 (Fed. Cir. 2007)). That is true here as well, and Petitioner cites nothing to the contrary. And Petitioner states in *3M Innovative Props. Co. v. Avery Dennison Corp.*, “the specification used the express formula “‘embossed’ means.”” *Id.* (citing 350 F.3d 1365, 1374 (Fed. Cir. 2003)). That formulation is not meaningfully different from that here: “The term ‘furnace’ is understood as meaning. . . .” EX1001, 2:47-49. Petitioner makes no distinction between the two.

The Board should apply the ’168 Patent’s express definition of “furnace.”

### **III. 2007 IFA IS NOT PRIOR ART**

Petitioner still has not established that *2007 IFA* was publicly accessible and therefore qualifies as prior art. Patent Owner has already addressed the shortcomings

in the Nielsen declaration (EX1045)<sup>2</sup> in its Response (at 19) and Petitioner's arguments and new evidence in Reply do not advance its case.

Patent Owner does not “misstate the law” on public accessibility or otherwise suggest that “hand-distribution” and “indexing” are required. Reply at 3; Response at 21-22, 24 (“While indexing and dissemination are not individually dispositive of public accessibility, when analyzed together in this case, Petitioner has not shown that *2007 IFA* was publicly accessible as of the critical date.”).

Further, *MIT v. AB Fortia* does not support Petitioner. Reply at 3, citing 774 F.2d 1104, 1108-09 (Fed. Cir. 1985). In that case, the Federal Circuit specifically noted “copies [of the paper] were distributed on request, without any restrictions, to as many as six persons” in addition to a presentation and supply of the paper to the conference head. *Id.* (“the document itself was actually disseminated without restriction to at least six persons”). The same is not true here.

Finally, the Board should disregard Petitioner's expert's new opinions regarding “public accessibility of 2007 IFA.” EX1068 ¶¶6-10. Dr. Ritter opines that “the ‘/2023/’ file path reflects a website migration, not first publication,” *Id.* ¶ 8, but he admits that he has never built or migrated a website. EX2017 at 15:17-17:12. Dr. Ritter testified that the complete basis for his opinion here is his personal experience

---

<sup>2</sup> Patent Owner reserved the right to move to exclude EX1045. Paper 17.

with his “IT person” getting “your files off your old computer and put[ting] them on your new computer, which is like migrating a website.” *Id.* He also testified that he learned about the “WordPress Platform” (referenced in Paragraph 8 of his declaration) “[f]rom Patent Owner’s Response.” *Id.* at 19:3-20:4. But there is no reference or discussion of “WordPress Platform” in the Response. Dr. Ritter’s further testimony makes clear that he has no understanding of the “WordPress Platform” or its “file architecture,” despite his declaration purportedly explaining the same. *Compare* EX2017 at 19:3-20:22 with EX1068 ¶8.

Because Petitioner has failed to prove that *2007 IFA* was publicly accessible before the critical date, it should not be considered as prior art.

#### **IV. PETITIONER’S NEW ARGUMENTS AND EVIDENCE SHOULD BE DISREGARDED**

With its Petition, Petitioner submitted an 186-page expert declaration totaling 338 paragraphs of testimony. For each anticipation and obviousness argument included in the Petition, Petitioner presumably cited to the specific paragraphs of the declaration that it relied on for support for each claim limitation. *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’”); 37 C.F.R. §42.104(b)(5) (The Petition must identify “[t]he exhibit number of the supporting evidence relied

upon to support the challenge...including identifying specific portions of the evidence that support the challenge. The Board may exclude or give no weight to the evidence where a party has failed to state its relevance or to identify specific portions of the evidence that support the challenge.”).

Patent Owner relied on the arguments and evidence identified in the Petition in crafting its Response to the same. In Reply, Petitioner both improperly refers to expert testimony that was not specifically cited in the Petition (while misleadingly suggesting it was) and submits a new 24-page expert declaration that goes well beyond responding to arguments in Patent Owner’s Response. EX1068; *Intelligent Bio-Systems*, 821 F.3d at 1369; Trial Practice Guide (2019) at 73 (“Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability.”).

The Board should disregard Petitioner’s repeated improper attempts in its Reply to support its grounds with new arguments, new citations to evidence, and new evidence that were not presented in the Petition.

## **V. PETITIONER HAS FAILED TO SHOW THAT ANY CHALLENGED CLAIM IS ANTICIPATED OR RENDERED OBVIOUS OVER THE ASSERTED GROUNDS**

### **A. Ground 1: The Challenged Claims Are Patentable over 2007 IFA**

2007 IFA does not disclose the furnace of Claim 1. For this reason alone, its arguments based on 2007 IFA fail. After pointing to a gas turbine and/or HRSG as the “furnace” in its Petition, the Reply attempts for the first time to point to an

“auxiliary furnace” *within* the gas turbine and/or HRSG. This new misdirection still fails.

Petitioner asserts that “[t]he Petition’s [anticipation] mapping rests on the “Integrated reforming and power cycle flowsheet, a single embodiment on one slide,” pointing to EX1006 at 9 and Pet. at 16-17. Reply at 11. The Reply goes on to seemingly summarize Claim 1’s limitations, but not surprisingly, a limitation is completely omitted. The Reply states that “immediately downstream, the CO<sub>2</sub>-depleted syngas splits into *a stream labeled ‘H<sub>2</sub> Fuel’ and a stream sent to the methanator* to become ‘Ammonia Syngas.’” *Id.* But Claim 1 requires “separation of a part of said CO<sub>2</sub>-depleted synthesis gas as fuel fraction, *wherein said fuel fraction is fed as fuel to at least one furnace* and wherein said separation of the fuel fraction includes the split of said CO<sub>2</sub>-depleted synthesis gas into at least *a first stream and a second stream*, said first and second streams having the same composition, wherein *the first stream forms the fuel fraction...*”

The Reply correctly cites to the Petition at pages 16-17 for its “mapping” to limitation 1[c]. But because 2007 IFA and its “mapping” do not disclose “wherein said fuel fraction is fed as fuel to at least one furnace” under the correct claim construction, Petitioner tries to sneak in a new reference to “EX1005 ¶92” in the Reply. Reply at 11. While the Petition points to several paragraphs of its expert’s

declaration (EX1005) in its “mapping” of limitation 1[c], Paragraph 92 is not one of them. *See* Petition at 16-18 (citing EX1005 ¶¶56, 60 and EX1005 ¶¶136-41.).

This is not surprising, as the Petition’s only argument regarding disclosure of a furnace in *2007 IFA* points to the “GT” (gas turbine) and “HRSG” (heat recovery steam generator) on page 9. Petition at 17. Dr. Ritter says they are the required furnace in Paragraph 60 of his declaration. EX1005 ¶60 (opining that “[t]hese furnaces also include those ‘for the production and/or superheating of steam’ (*id.* 7:41-43), which also include steam generators and gas turbines for generating electricity (*id.* 7:44-53).”)

Petitioner **now** asserts that “Dr. Ritter’s opening declaration describes the H2 fuel as used ‘in an auxiliary furnace of a gas turbine (GT) and heat recovery steam generator (HRSG).’ EX1005 ¶92” (Reply at 12) and “Dr. Ritter’s opening opinion is that the slide-18 unit fed by the H2 fuel is an ‘auxiliary furnace’ of the GT/HRSG. EX1005 ¶92” (Reply at 14). But “auxiliary furnace” (or the word “auxiliary”) does not appear anywhere in the Petition. Nor does it appear in the Petition’s cited evidence for limitation 1[c]. To the contrary, the Petition and cited expert testimony (EX1005 ¶¶56, 60, 136-41) independently identify only a gas turbine (using combustion) and potentially a steam generator (the “HRSG”) as the claimed furnace. Petition at 16-17.

Most importantly, *2007 IFA* itself does not disclose an “auxiliary furnace of a gas turbine (GT) and heat recovery steam generator (HRSG).” No “auxiliary furnace” (of any kind) is disclosed in *2007 IFA*, on page 9 or otherwise. *See generally* EX1006. *Even if* the Petition had relied on Dr. Ritter’s so-called “opening opinion” that “the other stream of syngas is used as fuel (‘H<sub>2</sub> fuel’) in an auxiliary furnace of a gas turbine (GT) and heat recovery steam generator (HRSG),” this bald “opening opinion” relies only on page 9 of *2007 IFA*, which does not identify any “auxiliary furnace,” only a “GT” and separate “HRSG.” EX1005 ¶92; EX1006 at 9.

Patent Owner does not ignore or brush past the Petition’s reference to the “HRSG,” as argued by Petitioner. Reply at 13; Response at 28-29. In its Response, Patent Owner explained why the “HRSG” shown on page 9 of *2007 IFA* cannot be the claimed furnace since it does not use combustion and does not meet limitation 1[c], supported by the expert testimony of Dr. Wolden. Response at 28-29 (citing EX2007 ¶73<sup>3</sup> (“An ‘HRSG’ is not a furnace as claimed in limitation 1[c] despite including the words ‘steam generator’ in its name. A heat recovery steam generator is a *heat exchanger*.”).) Patent Owner also explained why the order of the slides in

---

<sup>3</sup> Petitioner ignores the citation to Dr. Wolden, and instead misleadingly suggests that Patent Owner cites only to an “unauthenticated vendor webpage.” Reply at 14-15.

*2007 IFA* is important, and how a POSITA would read the same. Response at 24-26 (citing EX1006 at 7-9 and EX2007 ¶¶67, ¶68, and ¶71). To that point, Patent Owner agrees with Dr. Ritter’s assessment that “the presentation’s labeling is deliberate” (EX1068 ¶24)—*2007 IFA* identifies “H<sub>2</sub> fuel” for the first time on slide 18 (EX1006 at 9), while the only fuel identified in previous slides is natural gas (EX1006 at 7, 8, 9).

Patent Owner’s Response could not directly address the new arguments and purported evidence cited for the first time in Petitioner’s Reply. *See* Reply at 13-14 (The Petition is pointing to the “HRSG” “three ways”). As explained above, the Petition did not point to or otherwise rely on “Dr. Ritter’s ‘auxiliary furnace’,” “EX1005 ¶92,” “EX1005 ¶¶92-93,” “EX1068 ¶¶17-22,” or “EX1068 ¶23” for claim limitation 1[c]. Petition at 16-18. Nor did the Petition explain the purported links between Slides 16, 17, and 18 in *2007 IFA*. *Id.* At most, the Petition incorrectly cited “EX1006 at 8” when it meant to cite “EX1006 at 9.” Petition at 17.

EX1068 is Dr. Ritter’s new declaration submitted with the Reply, where Dr. Ritter discusses a modified HRSG never raised in the Petition or in *2007 IFA*, a

“HRSG featur[ing] supplementary duct burners”<sup>4, 5</sup> and otherwise tracks the Petitioner’s new arguments in the Reply. Reply at 12-14; EX1068 ¶¶17-23.

Further, Petitioner asserts that “Pages 7-8 [of 2007 IFA] were cited for the steam-and-power train into which that fuel is fired, Pet. 17; EX1005 ¶93, not the fuel’s identity.” Reply at 12. This is incorrect. The Petition does not cite to Page 7, and when it cites to page 8, it refers only to the “GT” and “HRSG” shown on page 9 (and reproduces an annotated image from page 9). Petition at 16-18. And as

---

<sup>4</sup> Petitioner cites to Dr. Wolden’s testimony at 204:19-206:8 for the proposition that “PO’s expert admit[s] a duct-fired HRSG is a ‘steam generator.” Reply at 15 (citing EX1066). During that testimony, Petitioner’s counsel was asking about a diagram (EX1067, Deposition Exhibit 4) that is not from *2007 IFA* or even purporting to show anything from *2007 IFA*. EX1066 at 204:19-206:8, 198:8-199:17 (“It’s just demonstratives”). In the cited testimony, Dr. Wolden distinguishes HRSGs and steam generators. EX1066 at 204:19-205:7 (“This [EX1067] is a very different unit operation. This is an independently fired steam generator--steam turbine, because there’s a burner. A HRSG is simply a heat exchanger recovering the energy from the flue gas. That does not exist in this diagram.”).

<sup>5</sup> Dr. Ritter admits that *2007 IFA* does not disclose an HRSG with supplementary duct burners on page 9 (slide 18). EX2017 at 48:15-48:22.

explained in the Response, slide 8 does not disclose the use of “H<sub>2</sub> fuel” and does not disclose an “HRSG.” Response at 25. It also does not follow that “slide 16’s title (“Integration of gas turbine driver in the ammonia process”) confirms that ‘Fuel’ includes H<sub>2</sub> Fuel; otherwise the slide would show no integration with the ammonia process.” Reply at 12. Slide 12 (on page 6) of *2007 IFA* is titled “S-350 ammonia synthesis loop” and discloses the heating of “BFW” (boiler feed water). EX1006 at 6. Thereafter, slide 16 (on page 8) discloses “BFW” feeding a “Package HP Steam Boiler” (along with the disclosure of a gas turbine). *Id.* at 8. In the normal forward progression of the slides, this appears to be the “Integration of gas turbine driver in the ammonia process.” In any case, Petitioner’s “confirmation” about the fuel on slide 16 does not necessarily follow from the title of the slide; there is other “integration with the ammonia process” disclosed in *2007 IFA*.

The Board should disregard Petitioner’s attempts to bolster and add to its Petition and should instead focus on the arguments and evidence actually presented for limitation 1[c] in the Petition. Petition at 16-18. Patent Owner’s Response explains why *the Petition* fails to show that limitation 1[c] is met by *2007 IFA*.

### 1. Claim 17

Petitioner appears to concede that Claim 17 is not obvious over *2007 IFA* and a POSA’s knowledge or skill (Ground 1A). Reply at 18; *see* Response at 39-40 (“*2007 IFA* does not disclose any of the ‘synthesis gas fuel fraction’ forming ‘the

fuel of the furnaces used in the conversion section.’). In Reply, Petitioner asserts only that “Licht discloses the claimed endpoint,” implicating Ground 1E. Reply at 18. Petitioner argues that “Licht is cited for the fuel-allocation principle, not its reformer configuration, so its primary reformer is beside the point,” citing *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). *Id.* If, as it appears, the Petitioner is not arguing that 2007 IFA’s ammonia synthesis process could be modified by *Licht*’s synthesis process to include “fuel of the furnaces *used in the conversion section*,” then Petitioner has failed to present an obviousness combination that discloses all of the limitations of Claim 17 in Ground 1E. If, on the other hand, Petitioner is implicitly arguing that the synthesis processes in 2007 IFA and *Licht* could be combined to meet all the limitations in Claim 17, Petitioner misapplies *In re Keller*’s instruction here. In *In re Keller*, the obviousness combination related to use of a digital timing circuit in a cardiac pacer, that is, the combination of two devices. 642 F.2d at 425. The CCPA noted that “[t]o justify combining reference teachings in support of a rejection it is not necessary that a device shown in one reference can be physically inserted into the device shown in in the other” and “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.” *Id.* These principles clearly apply to the combination of two or more physical devices or structures, but do not

apply to a claim with multiple sequential process steps such as the claims at issue here, including Claim 17. *See* Response at 60-61.

**B. Ground 2: The Challenged Claims are Patentable over *Rytter***

Patent Owner's read of *Rytter* does not "concede[] obviousness" of limitation 1[a]. Reply at 19. Rather, the Response explained that the *only* conversion section configuration disclosed by *Rytter* includes a prereformer followed by a steam reformer (a primary reformer) followed by an ATR. Response at 41-42.

Petitioner's expert also confirms that *Rytter* requires a steam (or primary) reformer. EX1068 ¶ 33. Dr. Ritter opines that "Part of the H<sub>2</sub>-containing stream 'is fed to the reforming plant as a fuel' (EX1008, cl. 11; 4:55-57), and reformers are fired by burners that combust the fuel." EX1068 ¶33. Dr. Ritter confirmed during his deposition that pre-reformers do not have burners and ATRs do not have burners for fuel—by stating "reformers are fired by burners that combust the fuel," Dr. Ritter is not talking about a pre-reformer or an ATR in the reforming plant of *Rytter*. EX2017 at 38:2-39:5. While Dr. Ritter testified, on re-direct, that "[i]n an ATR-based plant with no primary reformer" a "charge preheater" "burns fuel," Dr. Ritter also testified that a charge preheater is not a reformer. EX1066 at 56:14-20; 61:5-11 ("Is a charge preheater a reformer? A. No."). Thus, a "charge preheater" is not the "reformer" Dr. Ritter is talking about in Paragraph 33. That reformer must be a steam (or primary) reformer.

Petitioner also misleadingly cites to Dr. Wolden’s testimony about the figure in *Rytter*. The Reply asserts “PO’s expert agreeing Rytter’s figure shows no primary reformer before the ATR,” citing EX1066 at 307:20-308:21. Reply at 19. But Dr. Wolden actually testified that “you can’t point to anything on this figure because it’s so poorly described. It describes one as a pretreatment plant, and it describes two as the reforming station. It makes no explicit thing—outside of saying the reforming station has to have an ATR—it does say that—but it says nothing else about what’s included in it.” EX1066 at 307:20-308:8.

Because *Rytter* does not disclose “an autothermal reformer downstream from a pre-reformer and *without a primary reformer therebetween*,” Petitioner fails to demonstrate that Claim 1 is anticipated or rendered obvious by *Rytter*.

Further, *Rytter* does not disclose feeding a “steam reformer” or a “steam generator.” Reply at 19-20. *Rytter* at 4:55-57 does not tell us *what component* the “H<sub>2</sub>-containing stream from the separator for the H<sub>2</sub> and CO<sub>2</sub> reformer” is supplying with fuel, and claim 11 does not identify what in the “reforming plant” the stream is feeding. Further, hydrogen power station 7 is not a “steam generator.” The Petition does not assert as much. Petition at 42-43; EX1066 at 309:21-323:20 (“The hydrogen power station is where electricity is produced. That requires a turbine. This patent explicitly and only describes the use of a gas turbine. So anyone, I think, would conclude that the gas turbine is in 7.”).

Dr. Wolden does not “agree[] steam-first cogeneration is a feasible alternative.” Reply at 20, citing EX1066 at 333:1-334:17. In response to a question that admitted Dr. Wolden did not agree with Petitioner’s counsel’s “read” of *Rytter*, Dr. Wolden agreed that “in general, you can produce electricity through gas turbines or through steam turbines.” EX1066 at 333:13-334:17. This “general” testimony does not say anything about the specific hydrogen power station of *Rytter*.

**C. Ground 3: The Challenged Claims are Patentable over *Fjellhaug***

Not surprisingly, Petitioner’s expert agrees that mixing air with turbine exhaust gas will lead to a stream with a *lower* oxygen concentration than air (lower than 21% oxygen). EX2008 at 146:16-147:25. Dr. Ritter confirmed during his deposition that his opinion is that “combining air with oxygen-deficient exhaust creates oxygen enrichment because there’s more absolute moles going” in. *Id.* But the ’168 Patent describes “oxygen-enriched air” as “preferably contains at least 50% oxygen by volume and more preferably at least 90% oxygen by volume and even more preferably at least 95%”—it is not described in “absolute or total moles.” EX1001 at 3:36-38. Dr. Wolden agrees: “When you’re describing air as either oxygen rich or oxygen lean, it is described in terms of percentages. Air is 21 percent oxygen, 79 percent nitrogen. Anything above 21 percent is oxygen enriched, anything below is oxygen deficient.” EX1066 at 337:18-340:10. As Dr. Wolden explained during his deposition, “[t]he composition matters. And if you dilute it too

much, you can't burn it no matter how many moles [of oxygen] you send in." *Id.* *Fjellhaug* does not disclose the use of "oxygen-enriched air or with oxygen" as required by limitation 1[a].

Turning to its asserted combination with *Rytter*, Petitioner asserts that "PO's teaching-away argument (POR46-49, 54-55) overreads *Fjellhaug*." Reply at 22 ("It neither criticizes nor discredits oxygen operation.") Petitioner is wrong. *Fjellhaug*, when describing the "Related Art," specifically describes the problems with using oxygen:

This process requires oxygen, demanding a power consuming PSA unit. According to the application flow sheet, the natural gas must be decompressed nearly to ambient pressure to permit the addition of oxygen. After the PSA separation, the oxygen must be compressed a second time. All of these extra compressions reduce the efficiency of the process.

EX1010 at 1:14-52. *Fjellhaug* is absolutely criticizing "oxygen operation," which explains its decision "that the ATR should be an air driven reactor, i.e., not an oxygen driven reactor." *Id.* at 2:16-19. This is unlike the facts in *In re Fulton*, Reply at 22, where the prior art disclosed "a number of alternative shoe sole designs but do not teach that hexagonal projections in a facing orientation are undesirable and, therefore, do not teach away." 391 F.3d 1195, 1201 (Fed. Cir. 2004) (reference "does not teach that hexagons in a facing orientation would be ineffective."). In contrast, *Fjellhaug* expressly states that the use of oxygen will "reduce the efficiency of the

process.” A POSITA would not use *Rytter*’s oxygen enriched air in *Fjellhaug*’s air-driven reactor or replace *Fjellhaug*’s air-driven reactor with an oxygen-driven reactor. EX2007 ¶¶117-119.

The Reply admits that *Fjellhaug*’s “gas turbine 24” could only qualify as limitation 1[c]’s furnace under its claim construction read. Reply at 23. And for the first time in Reply, Petitioner also argues that “Fjellhaug’s train raises and superheats steam from that fuel’s combustion heat.” *Id.* (citing EX1010, 4:38-50). Petitioner’s assertion admits that this “train” does not receive “CO2-depleted synthesis gas” as required by limitation 1[c], rather, it receives “exhaust 26 from the turbine 24.” EX1010 at 4:39-50.

## **VI. CONCLUSION**

For the foregoing reasons and those presented in Response, Patent Owner respectfully requests the Board uphold the validity of the Challenged Claims. Patent Owner does not concede any point in the Reply not expressly addressed herein.

Dated: September 14, 2026

/Case Collard/

---

Case Collard (Reg. No. 72,901)  
Dorsey & Whitney LLP  
1400 Wewatta Street, Suite 400  
Denver, Colorado 80202-5549  
Tel: 303-352-1116  
Fax: 303-629-3450

Payton George (*pro hac vice*)  
Dorsey & Whitney LLP  
1401 New York Ave. NW, Suite 900  
Washington, D.C. 20005  
Tel: 202-442-3509  
Fax: 202-442-3199

Erin Kolter (*pro hac vice*)  
Dorsey & Whitney LLP  
701 Fifth Avenue, Suite 6100  
Seattle, WA 98104  
Tel: 206-903-8800  
Fax: 206-903-8820

Attorneys for Patent Owner, Casale SA

**CERTIFICATION OF WORD COUNT UNDER 37 C.F.R. §42.24**

Under the provisions of 37 C.F.R. §42.24(d), the undersigned hereby certifies that the word count for the foregoing Patent Owner's Sur-Reply totals 5,580 words, excluding the parts exempted by 37 C.F.R. §42.24(c). Accordingly, this Patent Owner's Sur-Reply is under the word count limit of 5,600 words. This word count was made by using the built-in word count function tool in the Microsoft Word software Version 2607 used to prepare the document.

/Case Collard/

---

Case Collard

Reg. No. 72,901

Dorsey & Whitney LLP

1400 Wewatta Street, Suite 400

Denver, Colorado 80202-5549

Tel: 303-629-3400

Fax: 303-629-3450

## **CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. § 42.6(e)(4), the undersigned certifies that on September 14, 2026 a complete and entire copy of this Patent Owner's Sur-Reply was served on the Petitioner via electronic mail at the following addresses:

Jeffrey A. Andrews: jandrews@yettercoleman.com

Christopher R. Johnson: cjohnson@yettercoleman.com

Jeffrey J. Phillips: jphillips@spencerfane.com

/Case Collard/

Case Collard

Reg. No. 72,901

Dorsey & Whitney LLP

1400 Wewatta Street, Suite 400

Denver, Colorado 80202-5549

Tel: 303-629-3400

Fax: 303-629-3450