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Datasheet for the decision of 20 April 2018

Case Number: T 0445/16 - 3.3.05

Application Number: 08010650.3

Publication Number: 2006418

IPC: C25B15/02

Language of the proceedings: EN

Title of invention:
Efficiency optimization and damage detection of electrolysis cells

Patent Proprietor:
Recherche 2000 Inc.

Opponent:
ThyssenKrupp Uhde GmbH

Headword:
Efficiency optimisation of electrolysis cells/Recherche 2000

Relevant legal provisions:
EPC Art. 54, 123(2), 56, 83, 84
RPBA Art. 13(1)

Keyword:
Transfer of opposition (no)
Main and first auxiliary requests - Novelty - no
Auxiliary requests 1ter and 3quater - not clearly allowable
Auxiliary request 3 - amendments - allowable(no)
Auxiliary request 3quater-bis - allowable

Decisions cited:
G 0003/14, T 1002/92, T 0249/12, G 0004/88, T 2357/12, T 1421/05, T 1931/14, T 1067/08

Catchword:

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Case Number: T 0445/16 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 20 April 2018

Appellant: (Opponent)	ThyssenKrupp Uhde GmbH Friedrich-Uhde-Strasse 44141 Dortmund (DE)
Representative:	Zeller, Andreas Jones Day Prinzregentenstraße 11 80538 München (DE)
Respondent: (Patent Proprietor)	Recherche 2000 Inc. 380 St-Antoine West, Suite 7500 Montréal QC H2Y 3X7 (CA)
Representative:	Gaillarde, Frédéric F. Ch. Cabinet Germain & Maureau 31-33, rue de la Baume 75008 Paris (FR)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 11 December 2015 rejecting the opposition filed against European patent No. 2006418 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	G. Glod
	P. Guntz

Summary of Facts and Submissions

I. The present appeal lies from the decision of the opposition division to reject the opposition against European patent EP-B1-2 006 418.

II. The decision cited the following documents, among others:

E1: Handbook of Chlor-Alkali Technology; T. F. O'Brien, T.V. Bommaraju, F. Hine; Springer Science + Business Media, Inc; 2005
E2: US 6 406 806 B1

III. In the notice of appeal the appellant (opponent) indicated that ThyssenKrupp Electrolysis GmbH was the successor in law of the initial opponent ThyssenKrupp Uhde GmbH. Subsequently, with the statement of grounds, it asked to transfer the opposition to ThyssenKrupp Uhde Chlorine Engineers GmbH. It provided:

E10: Extract from Handelsregister B des Amtsgerichts Dortmund.

IV. With the reply of 1 September 2016, the respondent (patent proprietor) maintained the claims as granted as its main request and additionally filed auxiliary requests, among them auxiliary requests 1, 3 and 3bis.

V. In the communication pursuant to Article 15(1) RPBA, the board was of the preliminary opinion that, among other things, E2 was relevant to the question of novelty of the main request and the first and second auxiliary requests. If admitted the subject-matter of auxiliary request 3 could possibly be new and

inventive. The subject-matter of claim 8 of the auxiliary requests was considered unclear.

VI. By letter of 20 March 2018, the respondent submitted further auxiliary requests, among them auxiliary requests 1ter and 3ter.

VII. Oral proceedings before the board took place on 20 April 2018. The appellant withdrew some of the auxiliary requests submitted in the course of the written procedure and additionally submitted auxiliary requests 3quater and 3quater-bis.

The remaining claims relevant to the present decision are explained here below, the order indicated represents the order of preference as requested by the respondent.

Independent claims 1 and 8 of the **main request** (patent as granted) read as follows:

"*1. A method for evaluating damage of a plurality of cells in an electrolyser, the method comprising : acquiring a voltage for each one of the cells; comparing the voltage to at least two threshold voltage levels; classifying the cells as one of: severely damaged cells, non-severely damaged cells and undamaged cells, based on the comparison of the voltage with the at least two threshold voltage levels; and deactivating the cells classified as severely damaged cells from the electrolyser.*"

"*8. A system for evaluating damage of a plurality of cells in an electrolyser, the system comprising :*

a voltage acquisition device coupled to each one of the cells in the electrolyser, for acquiring a voltage for each one of the cells; and
a damage evaluation module coupled to the voltage acquisition device, the damage evaluation module adapted to receive the voltage acquired for each one of the cells; compare the voltage to at least two threshold voltage levels; classify the cells as being one of: severely damaged cells, non-severely damaged cells and undamaged cells, based on the comparison; and send a signal to deactivate the cells classified as severely damaged cells."

Claim 8 of **auxiliary request 1** includes the following amendment (underlined) compared with claim 8 of the main request:

"*8. [...] to deactivate the cells classified as severely damaged cells, a maintenance module coupled to the damage evaluation module and adapted to output or to perform directly on each cell or on the electrolyser maintenance actions depending on the damage evaluation.*"

Claim 1 of **auxiliary request 1ter** includes the following amendment (underlined) compared with claim 1 of the main request:

"*1.[...] deactivating the cells classified as severely damaged cells from the electrolyser, by removing the cells that are classified as such altogether, or replacing them with new ones.*"

Independent claims 1 and 6 of **auxiliary request 3** include the following amendments (underlined) compared with claims 1 and 8 of the main request, respectively:

"*1.[...] deactivating the cells classified as severely damaged cells from the electrolyser, by removing the cells that are classified as such altogether, or replacing them with new ones; acquiring a temperature and a current distribution of one of the undamaged cells and the non-severely damaged cells; estimating an efficiency of each one of the cells, wherein the estimating an efficiency comprises comparing the temperature and the current distribution of each one of the cells with nominal cell parameters; and maximizing an overall efficiency of the electrolyser by moving at least one of the cells to a new position in the electrolyser.*"

"*6. [...] to deactivate the cells classified as severely damaged cells, a temperature sensor and a current sensor for acquiring a temperature and a current distribution of each one of the cells classified as one of undamaged cells and non-severely damaged cells; a cell efficiency evaluation module for estimating an efficiency of each one of the cells; and an electrolyser maintenance module adapted to receive the efficiency of each one of the cells and indicate an action to be performed for adjusting an overall efficiency of the electrolyser.*"

Independent claims 1 and 2 of **auxiliary request 3quater** are identical with claims 1 and 6 of auxiliary request 3.

Independent claim 1 of **auxiliary request 3quater-bis** is identical to claim 1 of auxiliary request 3, while independent claim 2 includes the following amendment(underlined) compared with claim 6 of auxiliary request 3.

"*2. [...] , for acquiring a voltage for each one of the cells, said voltage acquisition device comprising a current controlling device for acquiring a voltage versus current distribution for each one of the cells, the current controlling device varying a current in each one of the cells at one of startup and shutdown of the electrolyser; a damage evaluation [...].*"

Auxiliary request 3quater-bis contains one dependent claim 3.

VIII. The relevant arguments of the **appellant (opponent)** can be summarised as follows:

Main request

E2 disclosed the generation of a signal, where upon generation of the signal, the supply of power to the external load was terminated and the fuel cell system was shut down. This was evident from Figure 3 and the corresponding description. The subject-matter of claims 1 and 8 lacked novelty over E2.

Auxiliary request 1

The request should not be admitted under Article 12(4) RPBA, since it could already have been filed before the opposition division, as the case had not changed.

Even if it were admitted, claim 8 would still lack novelty, since EECM shown in Figure 2 of E2 could also be considered as a maintenance module within the meaning of claim 8.

Auxiliary request 1ter

This request should not be admitted, since it was clearly not allowable as the subject-matter of claim 1 was *prima facie* not inventive.

Auxiliary request 3

The combination of claims 1 and 2 was not directly and unambiguously derivable from the application as filed. This also applied to claims 6 and 7.

Auxiliary request 3quater

Since claim 2 was an intermediate generalisation of the original disclosure, and thus not clearly allowable, it should not be admitted into the proceedings.

Auxiliary request 3quater-bis

Claim 2 did not meet the requirements of Article 84 EPC in view of the wording "for each one of the cells".

Regarding claim 2, the patent did not provide sufficient information on how a continuous current measurement could be realised. Further, the skilled person did not know how to ensure that in each cell the current was adjusted separately. It was also not possible to detect the pinholes at the shutdown of the electrolyser so the invention could not be carried out over the whole scope of the claim 2.

The subject-matter of claim 2 still lacked novelty.

The subject-matter of claims 1 and 2 lacked an inventive step in view of E2 in combination with E1. E2

taught to exchange individual cells (column 1, lines 48 to 52) and to react to the change in voltage by reducing the load (column 2, lines 23 to 26). It was also evident from E1 (page 347) to move the cells to a new position in the electrolyser.

IX. The relevant arguments of the **respondent (patent proprietor)** can be summarised as follows:

Main request

Novelty was given, since E2 did not relate to damaged cells. The goal in E2 was to maintain the integrity of the cells (column 2, lines 23 to 26; column 11, lines 3 to 8). The reduction of the external load after generation of the first signal (step (e) of claim 1 of E2) involved preventive action to avoid damaging the cells. Therefore, a classification of the cells as severely damaged could not occur in E2. The generation of the second signal in E2 (step (f)) led to a system shutdown so the signal was not adapted to deactivate the cells classified as severely damaged.

Auxiliary request 1

This request was only changed in claim 8 compared with the request filed before the opposition division.

The features disclosed in paragraph [0038] of the patent in suit were implied by the claimed maintenance module. EECM of E2 ensured a complete shutdown of the system, which was not foreseen by the maintenance module present in claim 8 of this request.

Auxiliary request 1ter

There was was no teaching in the prior art to individually replace or remove severely damaged cells while keeping the system running. It was evident that an inventive step was present.

Auxiliary request 3

Claim 6 had only been amended by introducing features from dependent granted claims. The same applied to claim 1, which further included the features taken from paragraph [0050] of the application as filed. The combination of features was also derivable from the application as filed taken as a whole.

Auxiliary request 3quater

The dependent claims 2 and 7 had been deleted so the objections under Article 123(2) EPC should be overcome.

Auxiliary request 3quater-bis

The clarity objection under Article 84 EPC could not be raised in view of G 3/14.

The requirements of Article 83 EPC were fulfilled, since Figures 9, 10 and paragraphs [0055] to [0060] taught the skilled person how to perform an optimisation treatment. It was also possible to measure the voltage at each cell as a function of the current density passing through said cell. In addition, paragraph [0067] indicated how the position of a pinhole in a membrane could be estimated based on the regression parameters of equation (2).

Claim 2 did not require the system to vary the current in each of the cells differently. It was evident to the skilled person that the current in the cells could be varied independently if they were connected in parallel, while such was not the case when the cells were connected in series.

It was not apparent why the objection under Article 54 EPC was only raised at this stage of the proceedings.

The problem to be solved was to improve the functioning of the electrolyser. None of the documents E1 and E2 dealt with this problem and provided any teaching that this could be done by taking the necessary steps after evaluation of each of the cells.

X. At the end of the oral proceedings, the requests of the parties were established as follows:

The appellant requests that the impugned decision be set aside and that the patent be revoked.

The respondent requests that the appeal be dismissed, alternatively that the patent be maintained in amended form on the basis of auxiliary request 1 submitted with the letter of 1 September 2016, or auxiliary request 1ter submitted with the letter of 20 March 2018, or auxiliary request 3 submitted with the letter of 1 September 2016, or auxiliary requests 3quater or 3quater-bis submitted during oral proceedings of 20 April 2018, or auxiliary request 3bis submitted with the letter of 1 September 2016, or auxiliary request 3ter submitted with the letter of 20 March 2018.

Reasons for the Decision

1. Transfer of opposition

The appellant suggested E10 to show that the name of the appellant was ThyssenKrupp Uhde Chlorine Engineers GmbH. E10 showed that the assets relating to the electrolysis business of the original opponent ThyssenKrupp Uhde GmbH were completely transferred to ThyssenKrupp Electrolysis GmbH (see row 2, column 6 b)). This company was apparently renamed ThyssenKrupp Uhde Chlorine Engineers GmbH (row 6, columns 2 and 6).

However, the transfer of assets by means of a spin-off ("Ausgliederung") to ThyssenKrupp Electrolysis GmbH had already taken place in December 2013, shortly after filing the notice of opposition and well before the case was decided by the opposition division. It has to be kept in mind that although a spin-off merger ("Umwandlung durch Ausgliederung") is seen as a form of universal succession in German national law, it is, in the context of transfer of opposition status under EPC law considered to be a transfer of assets within the meaning of G 04/88 (Reasons 6; see in great detail decision T 2357/12, Reasons 8 to 11). Therefore, the transfer of opposition becomes only effective at the moment where the party has notified the office and submitted sufficient evidence to prove the transfer of the opposition and the transfer of the relevant assets.

Where a party has failed to request the registration of a transfer of opposition, the status of opponent remains with the transferor (T 1421/05, cf. headword 1 and Reasons 3.3, 3.4 and 3.11)

In the case at hand, the appellant did not request the registration of the transfer during opposition proceedings and has even failed to notify the office of the transfer. The decision, thus, was taken when ThyssenKrupp Uhde GmbH was still a party to the proceedings. Therefore, it is only this still existing company that is affected by the decision, not ThyssenKrupp Electrolysis GmbH which was named in the notice of appeal as an alternative appellant. The latter alternative could be seen as an auxiliary measure which, in fact, does not become relevant, since the first-named appellant ThyssenKrupp Uhde GmbH is the rightful appellant. The fact that the name of the alternative appellant was incorrect because it had already been changed to ThyssenKrupp Uhde Chlorine Engineers GmbH on 1 April 2015 is, therefore, also irrelevant.

Main request - patent as granted

2. Article 100(a) - novelty

2.1 Prior to evaluating the question of novelty, the scope of claims 1 and 8 has to be established.

2.1.1 Claim 1 relates to a method for evaluating damage of a plurality of cells in an electrolyser and not to a method for operating an electrolyser. It comprises the steps of acquiring a voltage, comparing the voltage, classifying the cells and deactivating some cells. The step of deactivating the cells is part of the method claim although it seems beyond what the skilled person would understand by "evaluating damage".

In the present case the purpose of the claimed method "evaluating damage of a plurality of cells in an

electrolyser" is considered to be the inevitable consequence of the steps defined in claim 1 and can therefore be considered as the effect arising from the steps of the method within the meaning of T 1931/14 (Reasons 2.2.4). The presence of other steps is however not excluded. No details are given on how the deactivation of the severely damaged cells is executed. Furthermore, the claim does not specify which values trigger the classification into severely damaged, non-severely damaged and undamaged. In fact, the classification is dependent upon the specific cell and electrolyser configuration (page 7, lines 21 and 22) so it can be set by the user as required.

It is established jurisprudence that Article 69 EPC and the protocol thereto cannot be relied on to exclude what was literally covered by the terms of the claims (Case Law of the Boards of Appeal of the European Patent Office, 8th edition, 2016, part II.A.6.3.4).

This means that claim 1 does not exclude that the electrolyser could be completely shut down, the cells replaced and the electrolyser restarted. It is also not excluded that other cells besides the severely damaged ones are deactivated.

2.1.2 Claim 8 relates to a system comprising a voltage acquisition device and a damage evaluation module. It should be able to receive the voltage acquired for each of the cells, and to compare this to at least two threshold voltage levels. Further it should allow classifying the cells into three groups. In that respect it is to be noted that the naming (labelling) of the three groups is not technical but rather a mental act, since it is only the classification into the three groups that represents a technical step,

especially since no details are given about the technical characteristics (i.e. voltage) that would lead to a specific classification. Here the labelling is severely damaged, non-severely damaged or undamaged. There would be no technical difference if the labelling was for example inacceptable, acceptable and good.

The evaluation module should also be able to send a signal. For what purpose this signal is sent is irrelevant, since there is nothing in the claim to indicate whether the intended purpose is really achieved. Therefore, it cannot be argued that the system has to be able to deactivate the cells.

2.2 E2 relates to a fuel cell system having a plurality of cells which consume an H_2-rich gas to produce power for vehicle propulsion (column 1, lines 6 to 9). Therefore, as undisputed by the parties, it concerns an electrolyser (compare paragraph [0003] of the patent).

It comprises a voltage acquisition device coupled to each of the cells in the electrolyser (column 9, lines 29 to 32). The BPM (battery pack module) and EECM (electrochemical engine control module) can also be considered as damage-evaluation modules, since they classify the cells into three categories (voltage below shutdown level, voltage below higher low voltage level, voltage above higher low voltage level) and send a signal if any of the cells have a voltage below the shutdown level (see Figure 3 and column 9, lines 35 to 38; 53 to 65). Therefore, E2 anticipates the novelty of the subject-matter of claim 8.

Claim 1 also lacks novelty, since, as indicated above, the BPM and EECM compare the voltage and classify the cells. Furthermore, the shutdown of the system in E2

deactivates all the cells including the cells labelled as severely damaged.

2.3 Since the requirements of Article 54 EPC are not met, the main request must fail.

Auxiliary request 1

3. Article 12(4) RPBA

This request was submitted with the reply to the statement of grounds of appeal. This request differs from the request already submitted during opposition proceedings by an amendment only in claim 8.

The board sees no reason why this relatively small amendment would completely change the case and could be considered "forum shopping" within the meaning of T 1067/08 (Reasons 7.2), especially since the opposition division did not decide on any auxiliary request.

The decisions T 1002/92 and T 249/12 cited by the appellant are not contradicting this, since the first decision does not relate to new requests (Reasons 3.4), while in the latter case requests amended at a later stage in the proceedings were admitted (Reasons 2.1.2 to 2.1.4).

As a consequence, the request is part of the proceedings.

4. Article 54 EPC

The added feature relates to a maintenance module that only needs to be coupled to the damage-evaluation

module and that only should be able to perform an undefined maintenance action on each cell **or on the electrolyser** after having evaluated the damage.

The only difference that could possibly be found with respect to the damage-evaluation module is that the maintenance module does not only send a signal, but is also able to perform actions.

The EECM of the system of E2 is able to initiate a stop sequence to stop the fuel cell system (column 9, lines 35 to 38) or to request reduced load from the vehicle controller (column 9, lines 59 to 60). Both actions are considered maintenance actions, since they directly influence the functioning of the system. Again the wording of the claim does not exclude that the maintenance module shuts down the whole system.

Therefore, claim 8 still lacks novelty with respect to E2 and for this reason alone the request must fail.

Auxiliary request 1ter

5. Article 13(1) RPBA

This request was submitted on 20 March 2018, one month before the oral proceedings.

According to established jurisprudence (Case Law of the Boards of Appeal of the EPO, 8th edition, 2016, part IV.E.4.2.5, page 1 133 of the English-language version), a request filed after the grounds of appeal may be admitted and considered at the board's discretion if the amended request is clearly or obviously allowable.

In the present case, the wording of claim 1 does not exclude that, subsequent to a shutdown of the system as discussed above, all the cells including the severely damaged ones are replaced by new ones. The replacement of all the fuel cells by new ones is an obvious measure that the skilled person would take, or even necessarily has to take if the system did not function any more.

Even if it were accepted that claim 1 had to be understood such that only the severely damaged cells were meant, it still is an obvious option for the skilled person to replace the severely damaged cells by new ones to ensure that the system is running again at full power.

Therefore, it is immediately evident that the subject-matter of claim 1 does not meet the requirements of Article 56 EPC so this request is not clearly or obviously allowable. It is not admitted into the proceedings.

Auxiliary request 3

6. Article 12(4) RPBA

The comments made under point 3 also apply here, since this request only differs from auxiliary request 3 submitted before the opposition division by an amendment in claim 6.

As a consequence, the request is part of the proceedings.

7. Article 123(2) EPC

Claim 1 of this request is identical to claim 1 of auxiliary request 3 that was submitted approximately one month before the oral proceedings of the opposition division. Since the opposition was rejected, the request was not discussed before the opposition division. It was only during the oral proceedings before the board, after having admitted the present request, that the appellant raised an objection under Article 123(2) EPC with respect to dependent claims 2 and 7. Although this objection had been raised at the latest possible moment, the board still exercised in this particular case its discretion in favour of its admission, since it was *prima facie* highly relevant, easy to understand and could be dealt with without adjournment of the oral proceedings. The reasoning brought forward was as follows:

Claim 1 of this request includes features taken from claims 3 and 4 of the granted patent, which means that dependent claim 2 is now also referring back to said combination of features.

Claim 1 is a combination of claims 1, 3, 4 and 5, and of features taken from paragraph [0050] of the application as filed. Claim 2 is based on claim 2 of the application as filed.

Claims 3, 4 and 5 of the application as filed directly or indirectly refer back to claim 1 and do not refer back to claim 2. Therefore, the combination of features of claims 1 to 5 of the application as filed (as now present in claim 2) is not directly and unambiguously derivable from the claims of the application as filed. There is also no passage in the application as filed

that discloses that the voltage versus current distribution is measured for each of the cells, and that the temperature and current distribution of one of the undamaged cells and non-severely damages cells is also obtained. Therefore the subject-matter of claim 2 is not directly and unambiguously derivable from the application as filed.

The same argumentation applies to claim 7 that is based on claim 13 of the application as filed. Said claim 13 did not incorporate the features of claims 15 and 16 of the application as filed, the features thereof now being present in claim 1.

Although this objection under Article 123(2) EPC arises due to the combination of only dependent claims of the granted patent and the ground of opposition under Article 100(c) not being part of the proceedings, the specific combination of claims leads to a combination of features that was not present in the granted claims so the objection of Article 123(2) EPC is allowable, since it is based on a new situation.

Auxiliary request 3quater

8. Article 13(1) RPBA

This request was submitted during oral proceedings before the board as a reaction to the objection under Article 123(2) EPC. As indicated under point 5 above, requests may be admitted at this stage of the proceedings if they are clearly or obviously allowable.

This is not the case in the present situation, since the features of claims 15 and 16 of the original application that are now part of claim 2 were only

disclosed in combination with features of claim 14 of the original application, which was, however, not introduced in claim 2. In other words, original claim 16 referred to claim 15 that referred to claim 14, so it is highly doubtful that only the features from claims 15 and 16 as filed can be introduced in isolation into claim 12 as filed.

Since the request is not clearly allowable, it is not admitted into the proceedings.

Auxiliary request 3quater-bis

9. Article 13(1) RPBA

This request was also submitted during oral proceedings as reaction to the discussion on the requirements of Article 123(2) EPC and the newly raised objections in this respect (see point 7 above). Since it appeared clearly allowable, as confirmed below, the board decided to admit it into the proceedings.

10. Article 123(2) EPC

The appellant did not raise any further objections under Article 123(2) EPC. The board sees no reason to take a different stance, since claim 1 is based on claims 1 and 3 to 5 and paragraph [0050] of the application as filed, claim 2 is based on claims 12 and 14 to 16 as filed, and claim 3 corresponds to claim 17 as filed, which was dependent on claim 16.

11. Article 84 EPC

The appellant's objection related to the expression "for each one of the cells" present in claim 2. Since

said expression was already present in the same context in claim 10 as granted, it cannot be questioned under Article 84 EPC (G 03/14, Reasons 81).

12. Article 83 EPC

In view of the interpretation given under points 2.1.1 and 2.1.2 that still applies to present claims 1 and 2, and since the complete shutdown of the electrolyser is not excluded by the wording of claims 1 and 2, there is no difficulty in replacing and/or removing severely damaged cells including cells in a bipolar electrolyser. This was no longer contested by the appellant in view of this interpretation of the claim.

The objection with respect to claim 8 is based on the understanding that the current in each cell should be adjusted individually. However, the wording of claim 2 does not require that the current-controlling device varies the current in each cell to a different degree. The variation of the current could also be the same for several cells. Further the claim is not limited to damage relating to pinholes in the membrane and does not refer to a continuous current measurement.

The patent explains that voltages at each cell are measured while a given current density passes through each cell (paragraph [0045]). Such measurements are illustrated in Figures 5 to 8 for different current densities (paragraph [0076]) at start-up (paragraph [0074]), which can be used to establish a graph as shown in Figure 10 (paragraph [0082], in particular page 7, lines 16 and 17). After classification of the cells (see also paragraphs [0077] to [0080]), some may be removed, while others may be repositioned to improve efficiency (see paragraphs [0053] and [0060]). Pinholes

can be detected and further specified according to the steps described in paragraphs [0062] to [0070].

It is evident to the skilled person that the current in the individual cells can be adjusted individually if they are connected in parallel, but this is not possible when they are connected in series. However, this does not put sufficiency of disclosure of the claimed invention into question; at least no proof in this respect has been provided by the appellant.

The requirements of Article 83 EPC are thus fulfilled.

13. Article 54 EPC

In its communication pursuant to Article 15(1) RPBA, the board was of the preliminary opinion that "the movement of at least one of the cells to a new position" and the "cell efficiency module" were not disclosed in the prior art (see point 5.4). These features are still present in claims 1 and 2, respectively, of the present request. It was only during oral proceedings before the board that the appellant wanted to contest novelty of claims 1 and 2, without however explaining why the finding of the board with respect to the differentiating features had not been contested before. Further the appellant could not clearly point out where the features identified by the board in its notification could be found in E2.

Therefore, in view of the lateness of the novelty objection and the lack of *prima facie* relevance, it is not admitted into the proceedings.

14. Article 56 EPC

14.1 The invention relates to a method and a system for diagnosing and evaluating damage to an electrolyser (paragraph [0001]).

14.2 E2 is considered the closest prior art, since it also relates to the monitoring of cells of an electrolyser (column 2, lines 35 to 37; see also point 2.2 above).

14.3 The problem to be solved can be seen as improving the efficiency of the electrolyser (paragraph [0006]).

14.4 Claim 1

14.4.1 The problem is solved by a method according to claim 1, characterised in that the method comprises maximising an overall efficiency of the electrolyser by moving at least one of the cells to a new position in the electrolyser.

14.4.2 In view of the explanations given in paragraph [0060] of the patent, it is accepted that the problem is solved, which was not contested by the appellant.

14.4.3 The solution to the problem is considered not obvious for the following reasons:

The goal of E2 is to maintain the integrity and capability of the fuel cell stack by detecting a low voltage event and implementing "adjustive action" (column 2, lines 24 to 27). Dependent on the measured voltage, either the load is reduced or the system is shut down (column 2, lines 54 to 61, and Figure 3). D2 does not disclose that cells should be moved to a different position to improve the efficiency

of the whole system. The skilled person only understands from E2 that if the system needs to be shut down in view of ultra-low voltage conditions, then there is a problem with one or more cells (column 11, lines 3 to 18). As a consequence said cells would probably be replaced.

E1 is a document of almost 1 600 pages. It is very doubtful that the whole content is part of the skilled person's knowledge. In any case, it can be accepted that the skilled person knows that the efficiency of a cell is temperature-dependent (see also page 347 of E1, item 2). However, there is no teaching that in a system according to E2 cells should be moved within the electrolyser to improve efficiency. E1 rather teaches that the temperature of the cells should be chosen such that no damage occurs, but it does not provide any indication that a change of location of cells not working efficiently any more could help improving the efficiency of the electrolyser. Such an interpretation is based on *ex post facto* considerations.

14.5 Claim 2

14.5.1 In this case the problem is solved by a system according to claim 8, characterised in that the system comprises a cell-efficiency evaluation module for estimating the efficiency of each of the cells and an electrolyser-maintenance module adapted to receive the efficiency of each of the cells and indicate an action to be performed for adjusting the overall efficiency of the electrolyser.

14.5.2 It is also accepted that the system allows the posed problem to be solved, since the cell-efficiency module in combination with the electrolyser-maintenance module

allows the system to take different types of actions, including the rearrangement of the cells within the electrolyser (paragraph [0038] of the patent).

14.5.3 The solution to the problem is considered not obvious for the following reasons:

The EECM, in combination with the BPM of the system of E2, monitors the voltage level of each individual cell and initiates an action such as **reduced load or system shutdown**, depending on the voltage level measured (Figure 3). E2 does not disclose that the efficiency of each of the cells is estimated and an action is taken on the cells such that the overall efficiency of the electrolyser is adjusted, since in E2 the electrolyser is either shut down or reduced in performance (load reduction). E2 is also completely silent about any system component that would be able to take actions on individual cells to ensure that the overall efficiency of the electrolyser is adapted. In fact the system in E2 does not deal with the adjustment of the efficiency of the electrolyser (fuel cell system).

E1 teaches that the voltage should be monitored for individual cells and a rectification should be undertaken if the value exceeds a specific limit (page 1 290, chapter 13.11.4., lines 1 to 5). This is what is already done in E2 by reducing the load or shutting down the system. E1 is silent about an electrolyser-maintenance module that is able to indicate an action to be performed on each of the cells with the goal of adjusting the overall efficiency of the electrolyser. The skilled person when reading E2 in combination with E1 would possibly shut down the whole system of E2 to replace the underperforming cells, but there is no

teaching about an electrolyser-maintenance module within the meaning of claim 2.

14.6 The subject-matter of independent claims 1 and 2 involves an inventive step. The same applies to claim 3 dependent on claim 2.

Order

For these reasons it is decided that:

1. The impugned decision is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent in amended form on the basis of the claims (1 to 3) of auxiliary request 3quater-bis submitted during the oral proceedings on 20 April 2018 and a description and figures to be adapted thereto, if necessary.

The Registrar: The Chairman:

I. Aperribay E. Bendl

Decision electronically authenticated