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**Datasheet for the decision
of 25 April 2022**

Case Number: T 0709/20 - 3.2.04

Application Number: 13730476.2

Publication Number: 2859231

IPC: F03D13/10, F03D80/00

Language of the proceedings: EN

Title of invention:

ARRANGEMENT OF A SWITCHGEAR IN A TOWER OF A WIND TURBINE

Patent Proprietor:

Vestas Wind Systems A/S

Opponents:

Siemens Gamesa Renewable Energy GmbH & Co. KG
GE Wind Energy GmbH

Headword:

Relevant legal provisions:

EPC Art. 56

Keyword:

Inventive step - (no)

Decisions cited:

T 0170/06

Catchword:



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Case Number: T 0709/20 - 3.2.04

D E C I S I O N
of Technical Board of Appeal 3.2.04
of 25 April 2022

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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
20 January 2020 concerning maintenance of the
European Patent No. 2859231 in amended form.

Composition of the Board:

Chairman A. de Vries
Members: J. Wright
 C. Heath

Summary of Facts and Submissions

- I. Appeals were filed by the appellants (opponents 1 and 2) against the interlocutory decision of the opposition division finding that, on the basis of the auxiliary request 1, the patent in suit met the requirements of the EPC.
- II. The opposition division decided, amongst other things, that the subject matter of the claims as amended during the opposition proceedings according to auxiliary request 1 involved an inventive step.
- III. Oral proceedings were duly held on 25 April 2022 by videoconference.
- IV. The appellants (opponents 1 and 2) requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

The respondent (patent proprietor) requested that the appeals be dismissed (maintenance as upheld by the opposition division) or in the alternative that the patent be upheld according to auxiliary requests 1 and 2 corresponding to auxiliary requests 3 and 4 filed with the reply to appeal on 22 October 2020.

- V. The independent claim of the main request (as maintained) reads as follows:

"A wind turbine (10) comprising:
a tower (12);
a rotor (14) supported at an upper end of the tower;
a generator;

a transformer (34) for increasing the voltage output of the generator prior to supplying a collector grid; and switchgear arranged between the transformer (34) and the collector grid,

characterised in that:

the switchgear comprises a first switching device (40) associated with the transformer (34), and a second switching device (44) associated with one or more cables (48,50) connecting the wind turbine (10) to another wind turbine in the collector grid, wherein the first switching device (40) is connected to, but located remotely from, the second switching device (44), so that the first and second switching devices (40,44) are located in different physical locations within the vicinity of the wind turbine (10), wherein the first and second switching devices (40,44) are connected together via a cable (52)".

VI. Claim 1 of auxiliary request 1 (filed as auxiliary request 3 on 22 October 2020) reads as for the main request, except that the following wording is added to the end of the claim:

"wherein the first switching device (40) is located inside the tower (12), the second switching device (44) is located inside a container (46) and the container (46) is located outside the tower (12)".

Claim 1 of auxiliary request 2 (filed as auxiliary request 4 on 22 October 2020) reads as for the main request, except that the following wording is added to the end of the claim:

"wherein the container (46) is located on a platform (28) and the platform (28) is part of a foundation (26a-c) on which the tower (12) is supported".

VII. In the present decision, reference is made to the following documents:

E1 : WO 2009/003508
E2 : WO 2010/066303
E5 : US 2012/0139256
ZP7 : Medium Voltage Distribution Catalogue/2012 :
Flusarc36, Schneider Electric, Rueil Malmaison,
France, 2012

VIII. The appellant-opponents' arguments can be summarised as follows:

The subject matter of claim 1 of the main request lacks inventive step starting from E1 with the skilled person's general knowledge. The subject matter of claim 1 of auxiliary requests 1 and 2 lacks inventive step starting from E2 with E5.

IX. The respondent-proprietor's arguments can be summarised as follows:

The cited prior art does not take away inventive step of any of the requests.

Reasons for the Decision

1. The appeals are admissible.
2. The invention relates to switchgear for wind turbines (see published patent specification, paragraph [0001]).
 - 2.1 Wind power plants (wind farms) typically comprise a number of wind turbines that are electrically connected

to form a collector grid. Each wind turbine has its own transformer for supplying the collector grid and switchgear. The switchgear comprises a first switching device associated with the transformer, for protecting the electrical equipment inside the wind turbine in the event of a fault. It generally also includes a second switching device associated with cables that connect the turbine to the collector grid (see published patent specification, paragraphs [0002], [0003] and claim 1).

2.2 Increases in the size and output of wind turbines has lead to the [electrical] equipment becoming larger. Housing such equipment inside the wind turbine tower is problematic (see published patent specification, paragraphs [0008]). To solve this problem, the patent (see published patent specification, paragraph [0010] and all versions of claim 1) proposes arranging the first and second switching devices in different physical locations within the vicinity of the wind turbine.

3. Main request, claim 1, inventive step starting from E1

3.1 E1 discloses a wind turbine with switchgear (see for example the abstract and figure 5). The usual wind turbine components of a tower 13 with a rotor 11 at its upper end (mounted on a nacelle) can be seen in figure 2. As explained in the paragraph bridging pages 7 and 8, the nacelle houses a generator and a transformer (not shown). The paragraph bridging pages 9 and 10 with figure 5 explains that switch gear is arranged in the base of the tower. The paragraph bridging pages 10 and 11 with figure 7 adds details about how these switches are vertically arranged, thus forming a stack of e.g. separate modules with reduced footprint, page 4 top, page 5, lines 13 and 14. A first switch (the uppermost

one) is associated with the transformer in the nacelle - it is connected to the nacelle via the cable 45. A second switching device (for example the lowermost of the switches 42) is associated with cables 41 that connect to other wind turbines in the collector grid (page 9, lines 30 to 32).

3.2 The Board agrees with the opposition division (see impugned decision, reasons, point 24) that E1 does not disclose the last claim feature (first and second switching devices connected via a cable). The uppermost (first) switch and lowermost switch(second switch) are certainly connected via a vertical busbar 64 (see page 11, lines 6 to 10 with figure 7). Whether or not the horizontal lines between individual switch units 65 and the busbar riser 64 represent busbars or cables is simply not said, and thus not directly and unambiguously disclosed.

3.3 The respondent-proprietor has argued that E1 also does not disclose the penultimate claim feature (switches remote from each other and in different locations).

In particular, it argued that the word *remotely* has no clear meaning and so cannot clearly define the relative locations of the switches. This, it argued, means that the skilled person would need to consult the description to interpret the claim, where they would find that switches connected by a busbar are, by definition, not *remote* from each other but in the *same location* (cf. paragraph [0011]). The Board disagrees.

3.3.1 The skilled person reads the claim giving terms their usual meanings. The word *remote* (cf. Oxford English dictionary online (OED), meaning 1a) means: *Of two or more things or (occasionally) persons: placed or*

situated at a distance or interval from each other; separated; far apart).

In the Board's view this usual meaning of *remote* is clear. Although the OED uses different words to define it (at a distance, at an interval, separated, far apart), this does not mean it is unclear or ambiguous but rather that it is broad. At its most general, *remote* simply means that there is a distance between things. Turning back to the claim, its cognate *remotely* thus defines that the first switching device is located *at a distance* from the second switch. The feature itself confirms this, with its formulation "*so that*" it defines the consequence of the switches being *remotely* located [from each other] to be that they are in *different physical locations*. Lastly the feature qualifies that these locations are *within the vicinity* of the wind turbine, thus giving an explicit context to the *located remotely* feature.

It is true that the claim sets no strict limits as to the distance between these different physical switch locations, such as a range of metres. However, this also does not render it unclear. The locations just have to be different and within the vicinity of the wind turbine. Thus the claim is neither unclear nor ambiguous, whether or not it might be said to be broad.

- 3.3.2 In accordance with established jurisprudence, where a claim feature has a clear unambiguous meaning, the skilled person does not resort to the description to interpret it differently (see Case Law of the Boards of Appeal, 9th edition, 2019 (CLBA) II.A. 6.3.1 and for example **T197/10**, reasons point 2.3).

- 3.3.3 Following this approach, the respondent-proprietor's argument that the (remotely) feature must be interpreted from the description to exclude switches connected by a busbar is moot.
- 3.4 As best seen in E1, figures 5 and 7 (see page 6, lines 3 and 4, page 10, lines 1 to 8 and page 10, line 31 to page 11, line 10), the switching devices 65 are stacked vertically and have a footprint of 2 m². They must also have a certain height. However closely stacked, the uppermost [first] switching device is separated by a vertical distance of at least the combined height of the three intervening switching devices from the lowermost [second] switching device 65. Therefore, the interconnected first and second switching devices are located *remotely* from each other in different physical locations as claimed. Moreover, since both switches are in the tower, they are within the vicinity of the wind turbine. Therefore, E1 discloses the penultimate claim feature. This means that the subject matter of claim 1 differs from E1 only by the last feature (switches connected by cables).
- 3.5 Development of the objective technical problem
- 3.5.1 According to established jurisprudence (see CLBA I.D. 4.3.2 and 4.4.1) the objective technical problem should normally start from the problem described in the contested patent. However, it may be necessary to modify this problem to take account of the closest prior art.
- 3.5.2 The respondent-proprietor has argued that the differing feature (cable) increases the flexibility of how the switching devices can be spatially arranged.

The description (see published patent specification, paragraph [0011], first sentence) explains that by locating the switching devices at different physical locations, the invention provides increased flexibility. The paragraph further explains (last two sentences) that the switches can be connected with cables to provide a more flexible solution compared to prior art busbar connected switchgear panels that are located at *the same physical location*. Thus the patent presents the *flexibility* effect achieved by cables as amounting to the same flexibility that is achieved by having switches in different locations.

E1, with its busbar connections, also achieves such flexibility because its switches are likewise in different locations. It might be that cables could offer a more flexible way of arranging one switch inside and one outside the wind turbine tower, as the respondent-proprietor considered. However, since the claim is not limited to such an arrangement, this consideration plays no role in determining the technical effect of using a cable in claim 1.

3.5.3 Therefore, a less ambitious technical problem must be formulated. In the Board's view, a cable is simply an alternative to a busbar for connecting the switches. Therefore, the objective technical problem can be formulated as *how to modify E1's wind turbine to provide an alternative way of interconnecting its switching devices*.

3.6 Obviousness of replacing E1's busbar connection with a cable connection

3.6.1 In the Board's view, the skilled person knows from their general knowledge that the only realistic

alternative to a busbar for connecting E1's switches would be a cable. Therefore, faced with the objective technical problem they would replace E1's busbar arrangement with a cable, as a matter of obviousness.

- 3.6.2 In this regard the Board is not convinced that E1's arrangement, with its vertically arranged switches connected by a vertical busbar would prejudice them against doing this, as the respondent-proprietor has argued. E1 (see page 3, lines 25 to 31) discloses that a direct connection of switches (by unspecified means) offers an alternative connection to a vertical busbar, so it would seem that a vertical busbar is not presented as being central to E1's teaching. Nor is the Board convinced that the skilled person would reject using a cable as an alternative to E1's busbar because installing it in a tower would require it being cut to length and provided with connection terminals (involving stripping the cable of insulation) in a confined space. Rather, the Board agrees with the appellant-opponents that, just as with a busbar, a cable can be prefabricated with a suitable length and terminals for immediate connection. Therefore, connecting vertically arranged switchgear with a cable in a wind turbine tower need be no more arduous than with a busbar. This is corroborated by ZP7, which discloses various switching devices for easy installation in wind turbines (see page 6), including devices arranged vertically and connected by cable (see page 14, second figure, and page 28, section CBO-D - cable bushings at the top).

- 3.7 For these reasons, the Board considers that the subject matter of claim 1 lacks inventive step starting from E1 combined with the skilled person's general knowledge.

4. Auxiliary request 1, claim 1, inventive step starting from E2
- 4.1 Claim 1 adds to the main request the feature that *the first switching device is located inside the tower, the second switching device is located inside a container and the container is located outside the tower.*
- 4.2 E2 discloses a wind turbine with an electrical power system (see page 12, line 9 to page 13, line 11 with figure 3). As best seen in figure 3, it has a tower, a rotor, a generator 57, a transformer 58 for increasing the voltage output to supply a collector grid (cables 40', 40" - see page 12, lines 26 to 30). Switchgear 60 (see dashed demarcation line at the base of the tower in figure 3) is arranged between the transformer 58 and the collector grid 40', 40". Moreover (see page 12, last paragraph), a first switching device 66 is associated with the transformer and a second switching device 66' is associated with the cables 40', 40" that connect to other wind turbines in the collector grid. It is not disputed that the first and second switching devices are connected via a cable.
- 4.3 However, E2 does not indicate how the two switches 66 and 66' are arranged in the switchgear 60, in particular whether they are located remotely from one another in the broad sense of claim 1. Nor does E2 disclose the second part of the last claim feature, namely that *the second switching device is located inside a container outside the tower.* In E2 (see figure 3) both switches 66 and 66' are in the tower.
- 4.4 According to the patent (see published patent specification paragraph [0013]), first and foremost, locating part of the switchgear outside the tower frees

up space inside the tower for other equipment and increases the accessibility of the equipment inside the tower. Furthermore, the patent discloses (see specification, paragraphs [0025] and [0039]) that containerising the second switching unit allows the collector grid cabling to be connected and tested prior to installing the wind turbines.

- 4.5 The objective technical problem can therefore be formulated *as how to increase space and improve accessibility of the equipment inside the tower and to make initial testing more convenient.*
- 4.6 In accordance with established jurisprudence (see CLBA, I.D.10.8 and **T170/06**, reasons 2.2.4) if it is obvious for the skilled person to combine prior art teachings in order to solve an essential part of the problem, the presence of even an unexpected extra effect allowing another part of the problem to be solved at the same time does not in principle imply the presence of inventive step.
- 4.7 In the present case, faced with at least the first part of the objective technical problem (space/accessibility in the tower), the skilled person would consult E5. This is because E5 also relates to wind turbines (see paragraph [0001]) and recognises the problem of lack of space and access when the essential power production components such as switchgear are located inside the base of the tower (see paragraphs [0002] and [0003] and figure 1, reference 24).
- 4.8 E5 proposes a solution to this problem (see paragraphs [0007] and [0008]). This is to provide a self-contained external enclosure, in other words a container, near the base of the tower for housing power production

components. In more detail, E5 explains (see paragraph [0025] with figure 5) that the enclosure may be pre-assembled with any combination of the essential power production components 24 associated with the wind turbine.

4.9 Turning again to E2 (see page 12, lines 9 to 18 and the paragraph bridging pages 12 and 13 with figure 3), apart from a transient over voltage (TOV) reducing device 6 and a fuse 68, the only power producing components located at the base of the tower are the first switching device 66 associated with the transformer in the nacelle and the switching device 66' associated with power collector grid cables 40', 40". Considering the first part of the objective technical problem (space/accessibility) and the teaching of E5, the Board holds that it would be obvious for the skilled person to modify E2 by relocating at least one of the two switches in a container outside the tower. Since the switch 66' is electrically the furthest removed from the generating equipment in the nacelle, the Board holds that it would be the first choice for placing in the container, with or without the first switch 66. In the latter case (just the switch 66' split off and placed in the container), they would arrive at the subject matter of claim 1 as a matter of obviousness.

4.10 Following the approach outlined above (essential part of the problem solved), the subject matter of claim 1 thus lacks inventive step, whether or not the skilled person would recognise that the *split switchgear* arrangement might achieve the extra advantageous effects of allowing separate testing of various components in combination (cf. published patent

specification, paragraphs [0025] and [0039] and [0041]).

- 4.11 The respondent-proprietor has argued that, considering the combination of E2 (figure 3) with E5 and the underlying (space/accessibility) problem, the skilled person would place the whole of the switchgear 60 into an external container, but they would not split the switchgear (switch 66 in the tower, switch 66' in an external container).

In particular it argued that the essence of E2's teaching is to have the TOV reducing device as close as possible to the switchgear, as defined in the characterising feature of its claim 1, which means it must be close to both switches. This, it argued, is confirmed in E2's description of figure 3 - "the TOV reducing device [is] arranged inside the switchgear" (see page 12, lines 9 to 12) which includes both switches 66 and 66'. Thus, so the argument continues, the skilled person would never house the second switch outside the tower remote from the first switch (which is electrically directly connected to the TOV) in the tower. The respondent-proprietor furthermore argued that the skilled person would understand the need for both switches being close to the TOV reducing device to result from electrical considerations: Namely that the switches are the source of TOVs (see page 13, lines 13 to 19), so the skilled person would never split the switches, leaving the first in the tower with the TOV reducing device and putting the second switch outside and thus at a distance from the TOV reducing device.

4.12 As far as the characterising feature of E2's claim 1 is concerned, the respondent-proprietor's argument is predicated on the switchgear defined there *necessarily* comprising two switches. In the Board's view, this is not the case. The preamble of claim 1 defines only a single switch (*switch 5*). Moreover, this is consistent with certain embodiments that have only a single switch 5 (see for example page 11, lines 6 to 21 with figure 2a). Therefore, the argument is moot.

4.13 With regard to figure 3 and the passage on page 12, lines 9 to 12 (TOV reducing device *inside switchgear*), this statement has to be read in the context of E2's complete teaching. The purpose of the TOV reducing device is to protect electrical apparatus in the nacelle, notably the transformer (see page 2, lines 28 to 35). E2 recognises that, in the prior art, it was known to place a TOV reducing device close to the transformer in the nacelle (see page 2, lines 13 to 16, cf. published patent specification, paragraph [0016]). Thus, in this arrangement there was no suggestion of the TOV reducing device needing to be close to either switch to protect against TOVs. Starting from this arrangement, E2 does not set out to improve TOV protection from an electrical point of view. Rather, it aims to find a new place to install the TOV reducing device because of the limited space in the nacelle (see page 3, lines 1 to 10). E2's teaching is that a - not ideal - though adequate level of TOV protection can be achieved when the TOV reducing device is at a distance from the apparatus to be protected (see page 4, lines 10 to 19). It is against this background that the skilled person reads in the next paragraph (page 4, lines 20 to 25) that the TOV reducing device should be placed inside or in immediate proximity to the switchgear. This is reiterated further on (see page 10,

lines 10 to 15): the same protection can be achieved when the TOV reducing device is inside the switchgear as when it is close to the apparatus to be protected (in the nacelle).

Returning to the statement on page 12, lines 9 to 14, the skilled person will understand that also where the switchgear 60 has two switches 66, 66', the only motivation for locating the TOV inside the switchgear is to make the best use of available space. Therefore, there is no teaching here of any electrical considerations that might necessitate having the TOV reducing device close to either the first 66 or the second switch 66'. In the light of this, whilst it is true that TOVs can be caused by operating either switch as the respondent-proprietor has highlighted, this does not prove that E2 teaches away from splitting the switches, that is making one more remote from the TOV reducing device. This is all the more true since a wind turbine's TOV reducing device not only protects against TOVs locally generated by its own switches, but also those generated by very remote switches in other wind turbines (see page 13, lines 16 to 19).

- 4.14 For all these reasons, the arguments of the respondent-proprietor have not convinced the Board that the skilled person would not split E2's first and second switches (leaving switch 66 in the tower, placing switch 66' in an external container) in order to free up space in the tower, as a matter of obviousness. Therefore the Board concludes that the subject matter of claim 1 of the first auxiliary request lacks inventive step.

5. Auxiliary request 2, claim 1, inventive step starting from E2 with E5
- 5.1 Claim 1 adds to the first auxiliary request the feature that *the container is located on a platform and the platform is part of a foundation on which the tower is supported.*
- 5.2 E2 leaves open whether its wind turbine is onshore or offshore - where it would routinely be mounted on a platform foundation (cf. page 1, line 21 - *wind farm*). Nor does E2 disclose anything about a foundation. At most, figure 3 only shows the wind turbine tower 64. That said, it is implicit that the tower 64 must have a foundation, whether it is onshore or offshore. As to the technical effect of this further differing (foundation) feature, the patent does not attribute any particular advantage to the feature. It merely says (see specification, paragraphs [0028] and [0030]) that the tower is located on an [offshore] foundation which includes a platform and the container is also located on the platform. Other than that it provides an advantageous location for supporting the container offshore the respondent proprietor has not explained any effect of this arrangement. The basic function of a foundation being to provide a firm substructure, the objective technical problem associated with this further difference can be formulated accordingly as providing a firm substructure for the container housing the second switch. This is the problem the skilled person will face when they must put into practice the obvious combination of the teachings of E2 and E5.
- 5.3 As explained for the first auxiliary request, it is obvious to arrange a container adjacent to the tower from the combination of E2 and E5. Both the tower and

the container must have a foundation. E5 itself, see paragraph [0023] and figure 2, suggests placing the container 26 on its own foundation pad 40 proximate to the tower foundation 20. Though in figure 2 reference 20 is likely to be only the connecting flange of a much more substantial substructure, as for example shown in figure 1 of E5, as argued by the respondent proprietor E5 cannot be said to directly and unambiguously teach placing the container on the tower foundation.

5.4 Regardless, the Board holds that in combining the teachings of E2 and E5 and with the aim of providing a substructure for the container, the skilled person would not be bound by E5's suggestion, but would also consider other options. The core teaching of E5, see claim 1, is by no means limited to this suggestion. In the Board's view the most obvious of these options is to make use of the already extensive foundation of the tower itself, if the turbine is located onshore. It requires no special insight beyond common sense that this saves on space and effort, as only a single foundation need be built and the container can be placed as close as possible to the tower. If it is an offshore turbine - and the Board notes that there is nothing that limits the core teaching of E5 to land-based turbines, see again claim 1 - then it seems to the Board the only reasonable option to use the same support substructure of the tower for the container also. In either case the skilled person would arrive at the subject matter of claim 1 as a matter of obviousness.

5.5 The Board concludes that the combination of E2 and E5 takes away inventive step of claim 1. Therefore, the second auxiliary request also fails.

6. The appellant opponents succeed in their challenge to the appealed decision's finding of inventive step for the claims as upheld, and the Board must therefore set aside the decision. Since claim 1 of the auxiliary requests of the respondent-proprietor's requests are also not seen to involve an inventive step and these requests are therefore not allowable, the Board must revoke the patent, Art 101(3)(b) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



G. Magouliotis

A. de Vries

Decision electronically authenticated