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Datasheet for the decision of 3 August 2015

Case Number: T 0970/11 - 3.5.02

Application Number: 05785551.2

Publication Number: 1776708

IPC: H01B3/00, H01B19/04, H02K3/30, H01F41/12, H01F5/06

Language of the proceedings: EN

Title of invention:
Surface Coating of Insulation Tape

Applicant:
Siemens Energy, Inc.

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)

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Case Number: T 0970/11 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 3 August 2015

Appellant: (Applicant)	Siemens Energy, Inc. 4400 Alafaya Trail Orlando, FL 32826-2399 (US)
Representative:	Tergau & Walkenhorst Patentanwälte - Rechtsanwälte Patentanwälte - Rechtsanwälte Eschersheimer Landstrasse 105-107 60322 Frankfurt/Main (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 8 February 2011 refusing European patent application No. 05785551.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	M. Ruggiu
Members:	R. Lord
	W. Ungler

Summary of Facts and Submissions

I. This is an appeal of the applicant against the decision of the examining division to refuse European patent application No. 05 785 551.2. The reasons given for the refusal were that claim 1 of the main request as filed during the oral proceedings of 5 May 2010 was not clear (Article 84 EPC) and that the subject-matter of that claim did not involve an inventive step (Article 56 EPC).

II. The following documents of the prior art cited during the procedure before the examining division are relevant for this decision:

D2: WO 2004/006271 A1 (reference being made in this decision to the translation EP 1 530 223 A1), and
D4: WO 95/02504 A1.

III. In a communication accompanying a summons to oral proceedings, dated 8 May 2015, the board indicated its preliminary opinion that the subject-matter of claim 1 of the request as refused in the decision under appeal did not involve an inventive step, referring to D2, D4 and to excerpts from the Wikipedia pages concerning zinc oxide, silicon dioxide, aluminium oxide, silicon carbide and silicon nitride.

Oral proceedings before the board took place on 3 August 2015. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 9 of the main request filed at the oral proceedings of 5 May 2010.

IV. Claim 1 according to the appellant's sole request reads as follows:

"An insulation tape that is surface coated with a high thermal conductivity layer, wherein said high thermal conductivity layer is coated on at least a top surface, a bottom surface, and a side surface of said insulation tape;

wherein said high thermal conductivity layer is a thin substrate layer loaded with high thermal conductivity materials and is approximately 12.7-76.2 µm in thickness;

wherein said substrate layer is chosen from the group comprising of mica, glass and a polymer film and characterized by said high thermal conductivity materials being chosen from the group consisting of silica, zinc oxide and dendrimers of approximately 1-1000 nm in size."

V. The appellant essentially argued as follows:

It was inherent from the description of the method in D2 (see for instance figure 9, in particular the lowest three boxes) that the sides of the tape were not coated with the high thermal conductivity layer. This distinguishing feature as defined in claim 1 was not suggested anywhere in the prior art. As depicted in figure 5 of the application, this side-coating provided a second heat conduction path from the lower tape layer to the top surface, thus effectively doubling the overall radial thermal conductivity of the lapped tapes.

The choice of silica or zinc oxide as the high thermal conductivity material resulted in improved thermal performance. This was particularly the case for zinc oxide, which sublimes at 1800°C. Silica also had the advantage of widespread availability. Document D4 was

not relevant in this respect because, unlike D2, it did not relate to tapes which are coated with high thermal conductivity material on top and bottom.

Reasons for the Decision

1. The appeal is admissible.

2. Document D2 describes (see for instance figure 17 and paragraphs [0090] to [0094]) an insulation tape, which like that of the present application is intended for use in the electrical insulation of heat-producing electrical objects, in particular by winding the tape such that layers overlap each other. As described in particular in paragraph [0094] the tape comprises a low thermal conductivity backing layer coated on its top and bottom surfaces with a high thermal conductivity layer comprising a mica substrate layer loaded with "second particles having a heat conductivity of 0.5 W/mK". Paragraph [0019] lists a number of materials which can be used for these second particles, including boron nitride, aluminium nitride, aluminium oxide, magnesium oxide, silicon nitride and silicon carbide. Paragraph [0024] discloses the thickness of the tape and its constituent layers. The lower range of the total thickness, given the preferred range for the relative thicknesses, implies a thickness for the high thermal conductivity layer of approximately 70 µm.

3. The insulation tape of the present claim 1 is thus distinguished from that of D2 in that the high thermal conductivity layer is also formed on at least one side of the tape, and in that the high thermal conductivity material (i.e. the "second particles") are of silica,

zinc oxide or dendrimers of approximately 1-1000 nm in size.

4. Concerning the first of these differences, the appellant argued that this addressed the technical problem of improving the radial heat conduction of the lapped insulation tapes, in that it provided an additional heat conduction path in the radial direction, as depicted in figure 5 of the application (see the vertical arrow to the left of the upper tape). The board does not find this argument convincing for the following reasons.

4.1 The board observes initially, that the forming of the high thermal conductivity layer only on the top and bottom of the tape in D2 is a consequence of the manufacturing technique, by which the high thermal conductivity layer is applied to a sheet of backing material, which is subsequently cut into tapes (see e.g. figure 9). In the opinion of the board it would be obvious to the skilled person that, depending on factors such as the materials to be used for the backing layer and the high thermal conductivity layer, it would in some cases be appropriate to first form tapes of the backing layer, and then coat these with the high thermal conductivity material, which would result in tapes coated on the top and bottom and both sides.

4.2 Given this conclusion, this difference could only be regarded as involving an inventive step if it involved an unexpected technical effect. The appellant has argued in effect that the additional thermal conduction pathway provided by the coating of the sides of the tape results in such an effect. The board accepts that some improvement in this respect could be expected.

However, the board notes also that according to the application (see for instance paragraph [0026]) a significant part of the thermal conduction occurs through the insulating material of the tape (see e.g. the arrows labelled 22 and 25 in figure 5), with the transfer of heat from the lower tape to the upper one being improved as a result of the presence of the high thermal conductivity layer on both tapes. Furthermore, the relative dimensions (in terms of area) of the thermal pathways through the insulating material and the high thermal conductivity material suggest that the heat conduction through the high thermal conductivity layers on the sides of the tape would be significant only if the thermal conductivity improvement with respect to the insulating material was several orders of magnitude, for which the application provides no basis. In this context the board notes the disclosure in D2 of a layer thickness of 70 µm, as already indicated in paragraph 2. above, and the tape width of 35 mm indicated in paragraph [0076], which would result in a ratio of about 500:1. On this basis, the board concludes that any improvement of heat conduction from the presence of the high thermal conductivity layer on the side of the tape would be insignificant, and would therefore not be relevant for the assessment of inventive step.

5. Concerning the selection of the high thermal conductivity material, the board observes that the original application contained a longer list than that now claimed (see e.g. original claim 8), which included also those disclosed in D2 as listed in paragraph 2. above.

5.1 The board considers that the selection of either silica or zinc oxide as an alternative to those known

materials would be obvious to the skilled person, silica because it would be known as a lower cost alternative, and zinc oxide because its use in similar circumstances is known from D4 (see page 1, third line from bottom). Regarding the latter point, the board is not convinced by the argument of the appellant in this respect, that D4 is not relevant to the present case because it does not describe a tape with a high thermal conductivity coating on both sides, since there is no special interaction between the identity of the high thermal conductivity material and the construction of the tape.

5.2 The appellant additionally argued that the use of zinc oxide or silica would be beneficial because of their high temperature performance. However, a comparison of these materials with other alternatives disclosed both in D2 and in the original application shows the following high temperature behaviour:

- zinc oxide: decomposes at 1975°C
- silica: melts at 1600°C
- alumina: melts at 2072°C
- silicon carbide: decomposes at 2730°C
- silicon nitride: melts at 1900°C

(see the pages from Wikipedia annexed to the summons to oral proceedings of 8 May 2015).

From this it can be seen that the high temperature behaviour of zinc oxide is by no means exceptional, and that that of silica is relatively poor. The board therefore considers the restriction to the claimed materials to be merely an arbitrary selection of known alternatives, which thus cannot be seen as involving an inventive step.

5.3 The board notes also that the application does not contain any teaching as to why the presently claimed

high thermal conductivity materials might be preferable to the other materials in the original claim 8, in particular to those known from D2 as discussed above. It also contains no teaching that the high temperature characteristics discussed above are significant in this respect. Concerning these high temperature characteristics, the board observes moreover that claim 1 explicitly covers the option in which the substrate layer is a polymer film, which would melt or otherwise degrade at temperatures much below those discussed by the appellant in this respect. Moreover, even the metal parts of most electrical objects would melt at temperatures lower than those indicated by the appellant. It is thus not clear to the board what advantage might arise in practice from the alleged improvements of the high temperature characteristics described by the appellant.

6. The board therefore concludes that the subject-matter of the independent claim 1 does not involve an inventive step according to Article 56 EPC. As a result, it was not necessary to discuss the various objections raised with respect to the definition of dendrimers in the claim.

7. Since the appellant's sole request is not allowable, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu

Decision electronically authenticated