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**Datasheet for the decision
of 16 February 2012**

Case Number: T 1750/08 - 3.5.02

Application Number: 00114100.1

Publication Number: 1170846

IPC: H02G15/068, H02G15/00

Language of the proceedings: EN

Title of invention:

Outdoor termination for a high voltage cable

Applicant:

PRYSMIAN Kabel und Systeme GmbH

Opponent:

ABB AB

Headword:

Relevant legal provisions:

EPC Art. 56, 123(2)

Keyword:

Inventive step - (yes) after amendment
Amendments - added subject-matter (no)

Decisions cited:

Catchword:

See reasons, point 5.2



Case Number: T1750/08 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 16 February 2012

Appellant: PRYSMIAN Kabel und Systeme GmbH
(Patent Proprietor) Gartenfelder Strasse 28
13599 Berlin (ALLEMAGNE)

Representative: HOFFMANN EITLE
Patent- und Rechtsanwälte
Arabellastraße 4
81925 München (ALLEMAGNE)

Appellant: ABB AB
(Opponent) 72183 Västerås (SUEDE)

Representative: Israelsson, Stefan
Bjerkéns Patentbyrå KB
P.O. Box 5366
102 49 Stockholm (SUEDE)

Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
4 August 2008 concerning maintenance of the
European Patent No. 1170846 in amended form.

Composition of the Board:

Chairman: M. Ruggiu
Members: G. Flynn
R. Moufang

Summary of Facts and Submissions

- I. The proprietor and the opponent have appealed against the interlocutory decision of the opposition division that, taking account of the amendments made according to the proprietor's auxiliary request during the opposition procedure, the patent and the invention to which it related met the requirements of the EPC.

The contested decision referred inter alia to the following documents:

D1: GB 2 336 252 A
E1: EP 0 971 372 A1
E4: EP 0 477 857 A1

The opposition division held that document E4 was late filed (it was filed by the opponent on 23 May 2008 - the final date set by the opposition division for making written submissions prior to the oral proceedings), but decided to admit it to the opposition procedure in view of its relevance *prima facie*.

The opposition division found that the subject-matter of claim 1 of the patent as granted (main request) lacked an inventive step over the combination of document D1 (as closest prior art) with document E4, but that the subject-matter of claim 1 of the auxiliary request involved an inventive step over D1 and E4, as they did not give a hint to press the gel material into the insulator body.

- II. The proprietor filed grounds for appeal with a letter dated 28 November 2008.

The opponent filed grounds for appeal with a letter dated 4 December 2008 and made further submissions in a letter dated 23 December 2008.

The opponent replied to the proprietor's appeal in a letter dated 14 April 2009 and the proprietor replied to the opponent's appeal and further submissions in a letter dated 22 April 2009.

III. With a communication dated 9 August 2011 the Board summoned the parties to attend oral proceedings, setting out its preliminary observations in an annex. With a communication dated 23 September 2011 the Board postponed the date for the oral proceedings to 16 February 2012.

IV. With a letter dated 2 November 2011 the proprietor submitted a main request and seven auxiliary requests for consideration at the oral proceedings.

The opponent commented on these requests in a letter dated 13 January 2012.

V. Oral proceedings were held on 16 February 2012.

The proprietor requested:

- that the decision under appeal be set aside and the patent be maintained as granted or on the basis of the first auxiliary request filed with the letter dated 2 November 2011, or
- that the appeal of the opponent be dismissed (= second auxiliary request), or
- that the decision under appeal be set aside and the patent be maintained on the basis of the fifth auxiliary request, filed at the oral proceedings.

The proprietor withdrew the third, fourth, sixth and seventh auxiliary requests, all filed with the letter dated 2 November 2011, as well as a request for reimbursement of the appeal fee that had been submitted with the grounds for appeal.

The opponent requested that the decision under appeal be set aside and that the patent be revoked.

VI. The patent as granted (= **main request**) includes an independent apparatus claim 1 and an independent method claim 15. Claim 1 reads as follows:

"1. An outdoor termination (OT) for a high voltage cable (CA), comprising:
a) an insulator body (2) for receiving the high voltage cable (CA);
b) a filling compound (3) provided within the insulator body (2) and filling at least a portion of the space between the insulator body interior walls (2.1) and the cable insulation (5);
c1) wherein said filling compound (3) consists of a mixture of particles (3.1) and an insulating compound (3.2); wherein characterized in that
c2) wherein said particles (3.1) are solid particles (3.1) without cavities, wherein
c3) said insulating compound (3.2) is a cross-linked gel material;
c4) said gel material (3.2) is one selected from the group consisting of silicone gel and cross-linked polybutene."

Claim 1 of the **first auxiliary request** differs from claim 1 of the patent only by the deletion of the phrase "characterized in that".

Claim 1 as maintained by the opposition division
(= **second auxiliary request**) reads as follows:

- "1. A method of making an outdoor termination (OT) for a high voltage cable (CA), comprising:
- a) an insulator body (2) for receiving the high voltage cable (CA);
 - b) a filling compound (3) provided within the insulator body (2) and filling at least a portion of the space between the insulator body interior walls (2.1) and the cable insulation (5);
 - c1) wherein said filling compound (3) consists of a mixture of particles (3.1) and an insulating compound (3.2); wherein characterized in that
 - c2) wherein said particles (3.1) are solid particles (3.1) without cavities, wherein
 - c3) said insulating compound (3.2) is a cross-linked gel material;
 - c4) said gel material (3.2) is one selected from the group consisting of silicone gel and cross-linked polybutene,
- comprising the following steps:
- a) preparing (S1) an insulator body (2) for receiving the high voltage cable (CA);
 - b) inserting (S2) a filling material (3) into the insulator body (2) to fill at least a portion of the space between the insulator body interior walls (2.1) and the cable insulation (5); whereby
 - c) said filling material (3) consists of solid particles (3.1) and an insulating compound (3.2); characterized in that,
 - d1) in a first step (S21) said solid particles (3.1) are inserted in said insulator body (2);

- d2) in a second step (S22, S23) said insulating compound (3.2) is pressed into the insulator body (2); wherein said solid particles (3.1) and said insulating compound (3.2) are mixed; and wherein
- d3) said insulating compound (3.2) is a cross-linking capable gel material;
- d4) said cross-linking capable material is one selected from the group consisting of silicone gel and cross-linking polybutene; and
- d5) causing the cross-linking capable gel material, after being filled into said insulator body, to cross-link for forming a cross-linked gel material in said insulator body."

Claim 1 of the **fifth auxiliary request** reads:

- "1. A method of making an outdoor termination (OT) for a high voltage cable (CA), comprising:
- a) an insulator body (2) for receiving the high voltage cable (CA);
 - b) a filling compound (3) provided within the insulator body (2) and filling at least a portion of the space between the insulator body interior walls (2.1) and the cable insulation (5);
 - c1) wherein said filling compound (3) consists of a mixture of particles (3.1) and an insulating compound (3.2); wherein
 - c2) said particles (3.1) are solid particles (3.1) without cavities, wherein
 - c3) said insulating compound (3.2) is a cross-linked gel material;
 - c4) said gel material (3.2) is one selected from the group consisting of silicone gel and cross-linked polybutene,
- comprising the following steps:

- a) preparing (S1) an insulator body (2) for receiving the high voltage cable (CA);
- b) inserting (S2) a filling material (3) into the insulator body (2) to fill at least a portion of the space between the insulator body interior walls (2.1) and the cable insulation (5); whereby
- c) said filling material (3) consists of solid particles (3.1) and an insulating compound (3.2);
wherein
 - d1) in a first step (S21) said solid particles (3.1) are inserted in said insulator body (2);
 - d2) in a second step (S22, S23) said insulating compound (3.2) is pressed into the insulator body (2); wherein said solid particles (3.1) and said insulating compound (3.2) are mixed;
wherein the filling pressure is continuously increased with increasing filling duration; and
wherein
 - d3) said insulating compound (3.2) is a cross-linking capable gel material;
 - d4) said cross-linking capable material is one selected from the group consisting of silicone gel and cross-linking polybutene; and
 - d5) causing the cross-linking capable gel material, after being filled into said insulator body, to cross-link for forming a cross-linked gel material in said insulator body."

The fifth auxiliary request further comprises:

- claims 2 to 7, that are dependent on claim 1 and that were filed at the oral proceedings of 16 February 2012;
- pages 2 to 7 of an adapted description, also filed at the oral proceedings of 16 February 2012; and
- drawing figures 1 to 3a and 3b of the patent specification.

VII. The proprietor's arguments relevant to this decision may be summarised as follows:

Document D1 constitutes the closest prior art. The objective problem as formulated in the contested decision oversimplifies the situation. The invention aims at simplifying the outdoor termination according to D1, providing a termination that requires less effort for mounting, obviates the need for high precision parts to establish a good seal at the top and bottom of the termination and achieves a reduced cost, lower risk of discharge and reduces sensitivity to thermal influences. E1 does not deal with these issues.

Even if the person skilled in the art were to try combining D1 and E1, he would replace both the liquid insulation and the solid particles of D1 with the compressible silicone-gel forming composition of E1 and so would not arrive at all of the features of the invention.

In view of the feature that the insulating compound is pressed into the insulator body, claim 1 as maintained by the opposition division is not rendered obvious by the prior art. D1 does not disclose how the insulation is filled. E1 only discloses to inject a mixture of gel-forming insulating liquid and compressible microspheres. Combining these two teachings would not lead the skilled person to the claimed solution of inserting solid particles in a first step and pressing in an insulating compound in a second step.

Claim 1 of the fifth auxiliary request is further not obvious, there being no suggestion in the prior art to press an insulating compound with a filling pressure

that continuously increases with increasing filling duration.

VIII. The opponent's arguments relevant to this decision may be summarised as follows:

The subject-matter of claim 1 of the patent and of the first auxiliary request lacks an inventive step *inter alia* in view of document D1 combined with document E1. Starting from D1 as closest prior art, the objective problem as set out in the contested decision is correctly formulated. E1 considers this problem and solves it using a silicone based filler that forms a gel. It would be obvious to use such a gel in the termination of D1.

Claim 1 as maintained by the opposition division should not have been admitted into the opposition proceedings during the oral proceedings. Furthermore it offends Article 123(2) EPC because the concept "pressed" has been picked out of context from the description and combined with the other features of claim 1. Furthermore, it does not involve an inventive step, it being obvious to press the insulating compound into the insulator body.

Claim 1 of the fifth auxiliary request also offends Article 123(2) EPC. Furthermore, it lacks an inventive step because it would be evident to the skilled person when injecting a fluid into a termination that the resistance due to gravity will increase as the level of fluid rises, and it would be obvious to compensate for this by constantly increasing the filling pressure.

Reasons for the Decision

1. The appeal is admissible.

2. Main Request

2.1 The subject-matter of claim 1 of the patent is distinguished over D1 only by the features c3 and c4 (i.e. that the insulating compound is a cross-linked gel material selected from the group consisting of silicone gel and cross-linked polybutene). This is not disputed.

In the contested decision, the opposition division considered that the technical effect achieved by these features was higher viscosity and concluded that the underlying objective problem was to avoid leakage of the insulating fluid (see reasons for the decision, point B5).

The proprietor argues that this oversimplifies the situation and considers that the invention aims at simplifying the outdoor termination according to D1, providing a termination that requires less effort for mounting and obviating the need for high precision parts to establish a good seal at the top and bottom of the termination (see grounds for appeal, point 3).

Document D1 does not indicate any need for high precision parts to establish a good seal and claim 1 of the patent does not specify that such parts are absent from the device. Furthermore, the Board can find no basis for the supposition that a termination according to claim 1 of the patent would require less effort to mount than that of D1. Hence, it would not be appropriate to take account of such alleged effects

when formulating the technical problem objectively. It seems quite evident that a gel material as claimed would be less prone to leakage than the insulating fluid of D1. The Board thus concurs with the objective problem as formulated in the contested decision, namely to avoid leakage of the insulating fluid.

2.2 With this objective problem in mind, it would be obvious for the skilled person to consider document E1 as it deals inter alia with the problem of leakage of liquid insulating fillers in HV terminations (see paragraphs [0002], [0005] and [0033]).

E1 proposes to use a filler which consists of a silicone-based composition that includes hollow compressible microspheres. The composition is injected into a termination in a liquid state and then cured to a gel state (paragraph [0025]). According to paragraph [0039] of E1, the termination is free from filler leakage problems (see also paragraph [0014]).

Whilst there may be no single disclosure in E1 which explicitly states that the leakage problem can be solved just by using an insulating material that forms a gel, the Board is convinced that the skilled reader would realise that this is the case from the disclosure of E1 as a whole. In particular, E1 aims to provide a filler that has improved compressibility in order to be applicable within a wide functioning temperature range without requiring compensating volumes (paragraph [0011]) and that has no filler leakage problems, so as to eliminate the need for monitoring equipment (paragraph [0014]). It is stated in paragraph [0017] that the hollow compressible micro-spheres used in the filler composition provide the desired compressibility. There is no suggestion that the micro-spheres

contribute to solving the leakage problem, so the skilled person would infer that this must be solved by the other characteristic of the filler, namely the fact that it forms a gel. Indeed this would seem rather self-evident. Thus, the skilled person would learn from E1 that a problem of leakage of insulation material in an HV termination can be solved by using an insulating material that forms a gel.

- 2.3 Applying this knowledge to the disclosure of document D1 it would be a routine matter for the skilled person to replace the insulating fluid of D1 with a silicone based composition that forms a gel after filling.
- 2.4 The Board is not convinced by the proprietor's argument that the skilled person combining the teachings of D1 and E1 would replace the solid granules of D1 with compressible hollow microspheres as disclosed in E1. The solid particles are used in D1 to bring cost savings due to the lower cost per unit volume of the granules compared to that of the insulating fluid (see page 2, lines 23 to 27). There is no suggestion that the hollow microspheres of E1 serve this purpose, so there would be no reason for the skilled person to discard the solid particles of D1 and the cost savings associated therewith. Rather, it would be obvious to combine the cost-savings of solid particles with the leakage prevention achieved by using an insulation that forms a gel.
- 2.5 The Board concludes that the subject-matter of claim 1 of the patent is obvious in view of the prior art disclosed in documents D1 and E1, and thus does not involve an inventive step, Article 56 EPC. Hence, the Board cannot accede to the proprietor's main request.

3. **First Auxiliary Request**

Claim 1 of the first auxiliary request differs from claim 1 of the patent only by the deletion of the phrase "characterized in that". The Boards considers that claim 1 of the first auxiliary request does not involve an inventive step, the reasons set out above for the main request applying mutatis mutandis. Hence, the Board cannot accede to the proprietor's first auxiliary request.

4. **Second Auxiliary Request**

4.1 Concerning the opponent's argument that claim 1 as maintained by the opposition division should not have been admitted during the first instance oral proceedings, the board notes that this claim was filed in response to the decision, taken at those oral proceedings, to admit the late filed document E4. In view of this the Board sees no reason to fault the manner in which the opposition division exercised its discretion in admitting the amended claim 1 into the opposition procedure.

4.2 The subject-matter of method claim 1 of the second auxiliary request differs from the disclosure of D1 by the following features:

- the insulating compound is a cross-linking capable gel material selected from the group consisting of silicone gel and cross-linking polybutene (features c3, c4, d3, d4);
- the insulating compound is not just inserted, but pressed into the insulator body (part of feature d2); and
- the cross-linking capable gel material is caused to cross-link to form a cross-linked gel material

in said insulator body after being filled into said insulator body (feature d5).

- 4.3 In its decision on the main request, the Board has already found that starting from D1 it would be obvious in view of E1 to use a cross-linking capable gel material as the insulating compound.

As to the feature that the cross-linking takes place after filling, this is known from document E1, where the composition is injected in a liquid state and is then cured (see paragraph [0025]). Not least in view of this disclosure, the Board considers that it would be obvious for the skilled person combining D1 and E1 to arrange for the cross-linking to take place after filling.

As to the question, whether it would be obvious to insert the insulating compound into the insulator body by pressing it, the Board notes that document D1 does not give any indication of how the insulating material (silicone oil) might be inserted into the insulator body. Given that document E1 discloses to inject the dielectric filler composition, the Board considers that it would be obvious for the skilled person to use this technique when combining D1 and E1. The Board can see no distinction between "injecting" and "pressing" in the present context.

- 4.4 The proprietor argues that even if the skilled person were to combine the teachings of D1 and E1, a number of options would exist for filling the insulator with solid granules and a gel-forming material. For example, the solid particles and gel-forming material could be mixed together before filling as is taught in E1 for the compressible microspheres. Also, the gel-forming

material could be poured in from the top rather than pressed in.

These arguments failed to convince the Board. In particular, the Board considers that when filling a termination with the solid particles of D1 and a liquid insulation that forms a gel after insertion, as known from E1, the disclosure in E1 to mix compressible microspheres with the liquid insulation before injecting the mix would not lead the skilled person to do the same with the solid particles of D1 because these, with a diameter of 0.5 to 8 mm (see page 2, lines 13 to 15), are an order of magnitude larger than the compressible microspheres of E1 (diameter 50 μm to 100 μm , see claim 3) and solid rather than compressible. Injecting such a mixture would not be the same as injecting the mixture of E1. Hence, the Board considers it would be obvious to insert the solid particles first and then to fill the interstices with liquid insulation as taught in D1. As to the method of filling the liquid, there is no suggestion in D1 or E1 to fill the termination by pouring-in from the top. Filling by injection as suggested by E1 seems to be a well known technique in this field (cf. paragraph [0011] of the patent). The Board can see no reason for the skilled person to digress from the technique suggested in E1.

- 4.5 Concluding, the Board finds that the subject-matter of claim 1 of the second auxiliary request is obvious in view of the prior art disclosed in documents D1 and E1, and thus does not involve an inventive step, Article 56 EPC. Hence, the Board cannot accede to the proprietor's second auxiliary request.

5. Fifth Auxiliary Request

- 5.1 Claim 1 of the fifth auxiliary request includes the feature that the insulating compound is pressed into the insulator body, which was present in the claim as maintained by the opposition division, and the further feature that "the filling pressure is continuously increased with increasing filling duration".
- 5.2 The subject-matter of the fifth auxiliary request represents an amendment to the proprietor's case in the sense of Article 13 of the Rules of Procedure of the Boards of Appeal. As such, its admission is subject to the Board's discretion. The Board notes that:
- the claims of the request were originally filed with the letter of 2 November 2011, i.e. more than two months before the oral proceedings;
 - the new subject-matter is not particularly complex; and
 - the amendment may be considered as a further limitation of a feature ("pressed") that underlaid the opposition division's decision to maintain the patent in amended form and that was already central to the discussions in the appeal (converging request).

In view of these considerations the Board decided to admit the fifth auxiliary request.

- 5.3 As regards the question of whether the amendments according to the fifth auxiliary request are allowable under Article 123(2) EPC the Board notes that in paragraph [0081] of the published application (see EP 1 170 846 A1) an embodiment of the filling method is described in which "It is only necessary to use a pressure ...". According to the description of this

embodiment, "the filling pressure is continuously increased with increasing filling duration". Thus, there is a literal disclosure of the amendment in the application as filed.

The opponent has argued that the features discussed above have been "cherry picked" from the description, omitting other features that were disclosed in combination with them, in particular (see paragraph [0081], emphasis added):

"However, it must still be guaranteed that there is a good wetting of the particles 3.1 by the insulation fluid 3.2, in particular if a cross-linking capable gel is used as the insulation fluid, and that there is a appropriate displacement of air from the places between the filling particles 3.1. Thus, the filling time must be sufficiently long, e.g. 30 to 60 minutes."

The Board considers that the above statements refer to inherently desirable characteristics, specified in a rather open-ended way, and that the skilled reader would not regard them as being inextricably linked to the features of pressing the insulating compound with a filling pressure that continuously increases with increasing filling duration. As such, their omission from claim 1 does not contravene Article 123(2) EPC.

- 5.4 None of the available prior art documents discloses to press an insulating compound with a filling pressure that continuously increases with increasing filling duration. According to paragraph [0081] of the published application, this continuously increasing pressure is used because the flow resistance of the particles inside the insulator body continuously increases with increasing filling duration. It seems to

the Board that this would lead to a constant steady filling of the termination.

The opponent has argued that it would be evident to the skilled person when injecting a fluid into a termination that the resistance due to gravity will increase as the level of fluid rises, and it would be obvious to compensate for this by constantly increasing the filling pressure. The Board can find no support for this argument in the cited prior art. Furthermore, it seems that any increase in resistance due to gravity would be relatively small, so the Board is not convinced that the skilled person would a priori see a need to compensate for it. Furthermore, in that case it would apparently have been sufficient to inject the fluid under an uncontrolled but sufficiently high pressure.

- 5.5 Concluding, the Board finds that the subject-matter of claim 1 of the fifth auxiliary request is not obvious in view of the cited prior art and thus considers it to involve an inventive step, Article 56 EPC. The subject-matter of dependent claims 2 to 7 therefore also involve an inventive step. Consequently, the Board accedes to the proprietor's fifth auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal 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 following documents:
 - Claims 1 to 7 of the fifth auxiliary request filed at the oral proceedings of 16 February 2012
 - Description: pages 2 to 7 of the adapted description filed at the oral proceedings of 16 February 2012
 - Drawings: figures 1 to 3a and 3b of the patent specification.

The Registrar:

The Chairman:



C. Moser

M. Ruggiu

Decision electronically authenticated