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Datasheet for the decision of 13 March 2014

Case Number: T 0614/10 - 3.3.03

Application Number: 04760787.4

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Language of the proceedings: EN

Title of invention:
CABLE WITH FOAMED PLASTIC INSULATION COMPRISING AN ULTRA-HIGH DIE SWELL RATIO POLYMERIC MATERIAL

Patent Proprietor:
COMMSCOPE INC. OF NORTH CAROLINA

Opponent:
Borealis Technology OY

Headword:

Relevant legal provisions:
EPC Art. 56, 114(2)
RPBA Art. 13(1), 13(3), 15(6)

Keyword:
Main request - inventive step (no)
Auxiliary Requests 1 to 4 - Inventive Step (no)
Auxiliary requests 5 and 6 - not admitted to the proceedings

Decisions cited:
T 1207/11, T 1621/09, G 0004/95

Catchword:

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Case Number: T 0614/10 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 13 March 2014

Appellant: (Patent Proprietor)	COMMSCOPE INC. OF NORTH CAROLINA 1100 Commscope Place SE Hickory, NC 28602 (US)
Representative:	Bolinches, Michel Jean-Marie Cabinet Orès 36, rue de St Pétersbourg 75008 Paris (FR)
Respondent: (Opponent)	Borealis Technology OY P.O.Box 330 06101 Porvoo (FI)
Representative:	Salminen, Hannu Borealis Polymers Oy P.O. Box 330 FIN-06101 Porvoo (FI)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 21 January 2010 revoking European patent No. 1625597 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	B. ter Laan
Members:	F. Rousseau
	C. Brandt

Summary of Facts and Submissions

I. The appeal by the patent proprietor lies from the decision of the opposition division posted on 21 January 2010, revoking European patent No. 1 625 597 (application No. 04 760 787.4, which is based on international application PCT/US2004/009708, filed on 30 March 2004 and published as WO 2004/102591).

II. Independent claim 1 of the patent in suit read:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- no more than 20% by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation $DSR(\%)=[(d_s-d_o)/d_o \times 100]$, where d_s is an outer diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D1238, and
- at least one additional polyolefin composition having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568."

III. An opposition had been filed by the opponent (respondent) requesting revocation of the patent in its entirety on the grounds inter alia that its subject-matter lacked novelty and an inventive step (Article 100(a) EPC) and was insufficiently disclosed (Article 100(b) EPC). The documents submitted before the Opposition Division included:
D1: US-A-4 547 328

IV. The decision under appeal was based on the patent as granted (main request) and on an auxiliary set of claims submitted with letter of 16 October 2009. Claim 1 of the auxiliary request differed from claim 1 as granted in that the olefin polymer having an ultra-high die swell ratio (DSR) greater than 55% had been specified to be low density polyethylene.

V. According to the contested decision, the main request did not fulfil the requirements of sufficiency of disclosure because the settings that had to be used for measuring the DSR of some of the polyolefins encompassed by the wording of claim 1 were unknown. As to the subject-matter of the auxiliary request, D1 represented the closest prior art, in particular its samples 1 and 2. The technical problem solved over that disclosure was to provide further foamed cable insulations. The use of an additional polyolefin compound having an oxidative induction time of greater than 15 minutes at 200°C in order to solve the problem was an arbitrary measure that could not contribute to any inventive activity. An inventive step was therefore denied.

VI. On 19 March 2010 the patent proprietor (appellant) lodged an appeal against the decision of the opposition division, the prescribed fee being paid on the same day. With the statement setting out the grounds for the appeal submitted on 20 May 2010, the appellant submitted four sets of claims as their main request, subsidiary requests 1 and 2 and auxiliary request 3.

VII. With their rejoinder of 23 September 2010 the respondent (opponent) submitted inter alia an experimental report D24 and the additional documents

D23 (EP-A-1 308 084) and D25 (EP-A-0 961 295). Arguments on inventive step were given.

VIII. With a letter of 1 August 2011, the appellant submitted an experimental report D26. With the same letter they also submitted a new main request and new subsidiary requests 1 and 2 replacing the previous requests on file. This letter did not contain any argument supporting that the amended features contributed to an inventive step.

IX. In preparation of the oral proceedings, the Board issued a communication dated 31 January 2014 in which the disclosure in the application as filed of the amended lower limit of the concentration range for the polymer having a DSR greater than 55% was questioned (Article 123(2) EPC). It was also pointed out that the appellant had not provided any argument on inventive step with respect to the amended features. Counter-arguments to the respondent's argumentation based on D25 had not been provided either. Therefore, the question arose whether the amendments contained in subsidiary requests 1 and 2 could change any finding with respect to inventive step of the subject-matter of the main request.

X. In response to the Board’s communication the appellant, with letter of 12 February 2014, submitted a new main request and four auxiliary requests labelled Auxiliary Requests 1 to 4, replacing the requests on file. Arguments concerning inventive step were not provided. The claims 1 of those requests read as follows (amendments compared with the claims as granted indicated in **bold**):

Main Request:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- **15% to less than** 20% by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation DSR(%)=[(d_s-d_o)/d_ox100], where d_s is an outer diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D 1238, said olefin polymer being low density polyethylene, and
- at least one additional polyolefin composition **selected from a medium and/or high density polyethylene**, having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568."

Auxiliary Request 1:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- no more than 20% by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation DSR(%)=[(d_s-d_o)/d_ox100], where d_s is an outer diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D 1238, **said olefin polymer being low density polyethylene**, and

- at least one additional polyolefin composition **selected from a medium and/or high density polyethylene**, having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568, **wherein said at least one additional polymer has a dissipation factor less than 75 micro radians and is a highly stabilized polyolefin including phenolic antioxidants and/or phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer.**"

Auxiliary Request 2:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- **15% to** no more than 20% by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation DSR(%)=[(d_s-d_o)/$d_o$xl00], where d_s is an outer diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D 1238, **said olefin polymer being low density polyethylene**, and
- at least one additional polyolefin composition **selected from a medium and/or high density polyethylene**, having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568, **wherein said at least one additional polymer has a dissipation factor less than 75 micro radians and is a highly stabilized polyolefin including phenolic**

antioxidants and/or phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer."

Auxiliary Request 3:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- **15%** by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation $DSR(\%)=[(d_s-d_o)/d_o x100]$, where d_s is an outer diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D 1238, **said olefin polymer being low density polyethylene**, and
- at least one additional polyolefin composition selected from a medium and/or high density polyethylene, having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568."

Auxiliary Request 4:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- **15%** by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation $DSR(\%)=[(d_s-d_o)/d_o x100]$, where d_s is an outer

diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D 1238, **said olefin polymer being low density polyethylene**, and - at least one additional polyolefin composition **selected from a medium and/or high density polyethylene**, having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568, **wherein said at least one additional polymer has a dissipation factor less than 75 micro radians and is a highly stabilized polyolefin including phenolic antioxidants and/or phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer**."

XI. With letter of 11 March 2014, the appellant submitted two additional sets of claims as Auxiliary Requests 5 and 6. Comments concerning inventive step were not made. Claims 1 of those requests read:

Auxiliary Request 5:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- **15% to** no more than 20% by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation $DSR(\%)=[(d_s-d_o)/d_o x100]$, where d_s is an outer diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D 1238, **said olefin polymer being low density polyethylene**, and

- at least one additional polyolefin composition **selected from a medium and/or high density polyethylene**, having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568, **wherein said at least one additional polymer has a dissipation factor less than 75 micro radians and is a highly stabilized polyolefin including phenolic antioxidants and phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer**."

Auxiliary Request 6:

"1. An electrical communications element comprising a conductor and a surrounding foamed plastic insulation, said foamed plastic insulation comprising
- **15%** by weight of an olefin polymer having an ultra-high die swell ratio (DSR) greater than 55%, determined by the following relation $DSR(\%)=[(d_s-d_o)/d_o x100]$, where d_s is an outer diameter of the extruded material and d_o is an inner diameter of an orifice provided in an extrusion plastometer defined in ASTM D 1238, **said olefin polymer being low density polyethylene**, and
- at least one additional polyolefin composition **selected from a medium and/or high density polyethylene**, having a high thermally accelerated stability defined by an oxidative induction time (OIT) of greater than 15 minutes at 200°C according to ASTM method 4568, **wherein said at least one additional polymer has a dissipation factor less than 75 micro radians and is a highly stabilized polyolefin including phenolic**

antioxidants and phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer."

XII. The respondent filed additional submissions by letter of 13 February 2014.

XIII. The appellant's arguments, in so far as they are relevant for the present decision, can be summarised as follows:

Main Request

a) The closest prior art was represented by D1. The foamed polyethylene blends obtained according to D1 had poor bubble or cell formation leading to fractured cells on the surface of the foamed composition, introducing open sites for water accumulation. The presence of water trapped in the foam affected the electrical performance (attenuation) of coaxial cables thus produced. Accordingly, D1 required the co-extrusion of a solid film member over the expanded foam dielectric which acted as a barrier to the water ingress during the cooling stages and compensated for poor foaming and expansion rates.

b) The compositions according to claim 1 of the main request differed from those of D1 in that they had less than 20% by weight of a low density polyethylene (LDPE) with a DSR greater than 55%, and that they comprised at least one additional polyolefin composition selected from medium and/or high density polyethylene (MDPE and/or HDPE) having an OIT of greater than 15 minutes at 200°C according to ASTM method 4568.

c) Starting from D1, the technical problem to be solved was - as demonstrated by experimental report D26 - to provide foamed plastic insulations having uniform smaller cells of closed nature and superior mechanical resistance, which allowed the foamed insulations to be extruded and foamed without the co-extrusion of a solid layer. The absence of this solid layer was not only an advantage in terms of costs, but it also resulted in lighter communication elements.

d) None of the prior art documents disclosed or suggested that the limitation of the content of an LDPE having a DSR greater than 55% in combination with a specific MDPE and/or HDPE polyolefin would contribute to solve that problem, especially since D1 taught away from using less than 20% LDPE with a DSR superior to 55% and from extruding the compositions without co-extruding a solid layer.

e) Therefore, the subject-matter of the main request was inventive and satisfied Article 56 EPC.

Auxiliary Request 1

f) The subject-matter of auxiliary request 1 also comprised the features of granted claims 6 and 7. Based on the experimental results summarized in Table 3 of the patent in suit, the technical problem solved by those additional features was to improve the thermally accelerated stress crack resistance of the electrical communication element without having a negative impact on the dissipation factor. Based on a comparison of the foamed insulations used for those experiments that comprised component HDPE-A or HDPE-D, it could be

deduced that the addition of a mixture of anti-oxidant and hindered amine light stabilizers resulted in a 20-fold increase of the thermally accelerated stress crack resistance. The use of the combination of additives defined in claim 1 of auxiliary request 1 in order to achieve that effect was not suggested by any of the prior art documents cited in the present proceedings, including D23 and D25. Furthermore, the effect was surprising since the skilled person expected that the addition of hindered amine light stabilizers would have a negative impact on the dissipation factor. That argumentation was based on information and evidence presented in the patent in suit, namely in paragraphs [0020] to [0023] which included Tables 2 and 3. Hence, those submissions were not belated and therefore should be taken into account when assessing inventive step of the subject-matter of auxiliary request 1. The subject-matter of auxiliary request 1 was therefore inventive.

Auxiliary Request 2

g) The arguments presented in support of an inventive step for the main request and auxiliary request 1 were also valid for auxiliary request 2.

Auxiliary Request 3

h) Auxiliary request 3 had been submitted in reaction to the Board's preliminary opinion that the definition in independent claims 1, 12 and 17 of a range of 15 to less than 20 wt. % defining the concentration of the polymer having a DSR greater than 55% did not appear to comply with the

requirements of Article 123(2) EPC. The arguments in support of an inventive step were essentially the same as those presented for the main request. Moreover, nothing in D1 suggested that an amount of 15 wt.% of the polymer having a DSR greater than 55% resulted in an improvement of the mechanical properties of the foamed communication element and a reduction of the cell size, which effects could be deduced from the application as filed.

Auxiliary Request 4

i) The subject-matter of claim 1 of auxiliary request 4 was inventive for the same reasons as indicated for auxiliary requests 1 and 3.

Auxiliary Requests 5 and 6

j) Auxiliary requests 5 and 6 corresponded to auxiliary requests 2 and 4, respectively, in which the "and/or" in the definition of the combination of stabilizers had been replaced by "and". They aimed at overcoming the Respondents' objection that the definition of the combination of stabilizers was ambiguous. Therefore, those requests did not raise issues that the Board or the other party could not reasonably be expected to deal with. They should therefore be admitted to the proceedings.

XIV. The arguments of the respondent, in so far as they are relevant for the present decision, can be summarised as follows:

Main Request

a) D1 could be seen as the closest prior, in particular Sample 6 of Example 2. Contrary to the appellants' allegations, the presence of a co-extruded solid layer on the foam was not mandatory in D1, in particular in view of the dependent claims and examples. Moreover, the use of such an extra layer was not prohibited by the wording of the present claims.

b) There was no evidence that the subject-matter of the main request provided a technical effect with respect to the closest prior art over the entire breadth of the claim. The experiments reported in D26 did not offer a convincing comparison with D1 since D26 did not properly reflect the possible differences between the claimed subject-matter and D1. Furthermore, D26 was not suitable to investigate the effect of an OIT of greater than 15 minutes at 200°C of the additional polyolefin composition on the foamed insulation. Moreover, the examples of the patent in suit did not show any advantage in terms of thermally accelerated stress crack resistance by having an OIT of greater than 15 minutes.

c) Hence, as no evidence had been provided for a particular advantage, the problem solved over D1 could only be seen as to provide alternative communication elements to those of D1.

d) The choice of an OIT value of greater than 15 minutes was an obvious measure for the reasons provided by the opposition division in the impugned decision. Moreover, the OIT of the HDPE

or MDPE resin was a non-functional parameter which at best had no function at all and could even have a negative effect. In view of established case law such non-functional parameters should be ignored when assessing inventive step. Concerning the difference between 20 wt. % and "not greater than 20 wt. %", that was not sufficient to establish a difference with D1 within the margin of experimental error. It could therefore not contribute to an inventive step. Hence, claim 1 of the main request was obvious in view of D1 so that the main request should be refused for lack of an inventive step.

Auxiliary Request 1

e) Claim 1 was not clear, since its language was ambiguous as to whether the presence of the hindered amine light stabilizer was mandatory.

f) The claims covered foamed insulations with almost 0 % of the high DSR component. As shown by experimental report D24 in which various blends had been tested, the claims covered embodiments that did not solve the problem underlying the invention. Moreover, the dissipation factor of the additional polyolefin was a non-functional parameter since, according to the experimental results of the patent in suit, it did not necessarily produce acceptable results. There was no evidence that it contributed to any advantageous effect. Furthermore, a low dissipation factor was generally desired for insulation materials anyway, as shown by D25. Thus, the technical problem solved over D1 was to

be formulated in the same manner as for the main request.

g) Phenolic antioxidants, phosphite stabilizers and hindered amine stabilizers were well known in the art and their use was obvious to the person skilled in the art in view of D23. In addition, D25 taught that HDPE needed to be stabilized in order to achieve long term thermal stabilization.

h) Therefore, auxiliary request 1 should also be refused for lack of an inventive step.

Auxiliary Requests 2 to 4

i) The arguments with respect to inventive step were essentially the same as those submitted for the main request and auxiliary request 1. In addition, the claimed subject-matter of auxiliary requests 3 and 4 lacked an inventive step in view of the disclosure in D1 of a foamed insulation comprising 15 wt. % high DSR LDPE. The need of improving the adhesion of the foamed insulation to the conductor or to diminish the cell size of the foam was not disclosed in the application as filed. The problem sought to be solved according to the latter was unrelated and concerned the improvement of the thermally accelerated stress crack resistance. Hence, the improvement meant to be demonstrated by D26 could not be used for formulating the problem solved over D1. Moreover, the use of a specific OIT of the additional polyolefin in comparison to that of D1 did not provide any inventive step. None of those requests was therefore allowable.

Auxiliary Requests 5 and 6

j) Auxiliary request 5 and 6 could have been submitted at an earlier stage of the procedure because the objection of lack of clarity they were meant to address had been raised as early as September 2010. They were late filed and should not be admitted to the proceedings.

XV. The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the claims of the Main Request, or alternatively on the basis of the claims of any of Auxiliary Requests 1 to 4, all submitted with letter of 12 February 2014, or on the basis of any of Auxiliary Requests 5 or 6, both submitted with letter of 11 March 2014.

XVI. The respondent requested that the appeal be dismissed.

XVII. At the end of the oral proceedings, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

Main Request

Amendments (Article 123(2) EPC)

2. The respondent submitted that claim 1 of the main request contained subject-matter extending beyond the content of the application as filed. In view of the negative conclusion in respect of inventive step as set

out in points 3 to 15 below, a decision of the Board on this issue is unnecessary.

Inventive step (Article 56 EPC)

3. Closest state of the art

3.1 The patent in suit is directed to electrical communication elements comprising a conductor and a surrounding foamed plastic insulation. Similar electrical communication elements are disclosed in D1 which was indicated as background art in paragraph [0002] of the patent in suit. The Board agrees with both parties that in the present case the electrical communication elements described in D1, in particular that obtained in sample No. 6 of Example 2, represent the closest state of the art.

3.2 D1 discloses a method for producing a foamed plastic insulator comprising the steps of preparing a plastic material comprising low density polyethylene having a melt flow swelling ratio of at least 55% adding a chemical and/or inert gas blowing agent to said plastic material, extruding a mixture of said plastic material and said blowing agent over a conductor, and foaming said mixture to produce foamed insulation layer (claim 1). The plastic material used in D1 is selected from high density polyethylene (HDPE), medium density polyethylene (MDPE), low density polyethylene (LDPE), polypropylene (PPr) and butyl rubber, or a mixture of at least two materials. The mixture includes 20% by weight of resin or more, which has a melt flow swelling ratio of 55% or more (D1, column 3, lines 28-35). It is undisputed that the parameter melt flow swelling ratio used in D1 has the same meaning as the DSR used in the patent in suit (D1, column 2, lines 55 to 67).

Sample No. 6 according to Example 2 of D1 (column 4, Table 3 and foot note) concerns a foamed plastic insulated wire obtained with a resin mixture consisting of 20 wt.% LDPE (DSR of 67.2%), 40 wt.% HDPE (DSR of 45.0%) and 40 wt.% PPr (DSR of 21.2%). Following extrusion and foaming at an expansion degree of 63.3% a foam with a cell diameter of 50 µm or less is obtained. At the oral proceedings it was acknowledged by the appellant that the tests carried out in accordance with Example 2 of D1 did not involve the co-extrusion of a solid layer, in line with claim 2 of D1, according to which that additional layer is only a preferred, not an obligatory, embodiment of claim 1.

4. Problem and solution

4.1 According to the patent in suit (paragraph [0003]), the aim was to provide electrical communication elements having a superior combination of low dissipation factor and high thermally accelerated stress crack resistance. In view of D1, the appellant defined the problem underlying the patent in suit as to provide foamed plastic insulations having uniform smaller cells of closed nature and superior mechanical resistance, which allowed the foamed insulations to be extruded and foamed without the co-extrusion of a solid layer.

4.2 As the solution to that problem, the patent in suit proposes the communication element according to claim 1.

4.3 In order to demonstrate that the claimed communication element with foamed plastic insulation achieved the desired improved mechanical resistance, the appellant relied upon a comparison of two foamed insulations provided in experimental report D26. The properties

(foam density, air test, mechanical bond, cell count and cell size) of a foam according to claim 1 of the main request - which was obtained from a blend of HDPE-A and LDPE 3 (indicated to have the same meaning as in Table 2 of the patent in suit) in a weight ratio of 85/15 - are compared with those of a foam obtained from a HDPE-A/ LDPE 3 blend in a 75/25 weight ratio. The latter foam is meant to represent the teaching of D1.

4.4 However, the example meant to represent D1 is not a repetition of the foamed plastic insulation according to Sample 6 of Example 2, since the composition of the foam and its cell size are different. Whereas the ternary blend employed in sample 6 of Example 2 of D1 contains 20 wt.% LDPE, 40 wt.% HDPE and 40 wt.% PPr, the comparative example of D26 merely uses a binary blend comprising 25 wt.% LDPE and 75 wt.% HDPE. As to the cell diameter, it is indicated to be 50 µm or less in Table 3 of D1, whereas the comparative example of D26 leads to a cell size of 79.2 µm. Hence, the comparison offered by the appellant in experimental report D26 does not allow any direct conclusion concerning the influence of a lower amount of a LDPE having an ultra-high die swell ratio (DSR) greater than 55%, namely of 15% to less than 20% by weight, on the properties of the foamed plastic insulation of Sample 6 of Example 2, in particular its mechanical properties.

4.5 Regarding the presence of smaller cells in the foam as well as a better mechanical bond compared to the comparative example of D26, it is not in dispute that a reduction of the LDPE 3/HDPE-A weight ratio from 25/75 to 15/85, within the specific context employed for those examples, results in a better mechanical bond as well as more numerous and smaller cells, i.e. a better distribution of the cells within the foam. Whether the

same effect would be observed when comparing blends of the same components LDPE 3 and HDPE-A having weight ratios of 20/80 and 15/85, respectively, is however unknown. There is no evidence that a further decrease of the amount of LDPE with high DSR in the blend from 25 to 15% by weight would provide a further improvement in terms of mechanical properties, size and distribution of the foam in the context of the comparison of D26.

4.6 Furthermore, in the absence of any indication of which interaction between the characteristics of the foamable plastic composition or foamed plastic insulation in experimental report D26 causes the effects shown in the specific context of that report, there is no reason to expect that the same effects would necessarily be obtained in a different context, in particular that of the closest prior art, which differs in many aspects from that used in D26. For example the DSR values of the HDPE and LDPE components in Sample 6 of Example 2 of D1 are 45.0% and 67.2%, respectively. However, the DSR value of the HDPE-A in D26 is unknown and that of LDPE 3 is 77%, i.e. much higher than that used in Sample 6 of Example 2 of D1. In addition, the comparative example of D26 does not contain a PPr component with a DSR value of 21.2%. Moreover, the foaming conditions, in particular the type and amount of foaming agent, have not been shown to be the same in experimental report D26 and the closest prior art D1. In these circumstances, even if D26 showed a technical effect, an extrapolation of any such effect to a different context, such as that of Sample 6 of Example 2 of D1, is, in the absence of further evidence or a technical explanation, speculative and cannot be accepted.

4.7 Finally, the communication elements according to claim 1 encompass embodiments with a foamed plastic insulation comprising slightly less than 20% by weight LDPE with high DSR, i.e. embodiments that differ from Sample 6 of Example 2 of D1 in the use of a slightly or even infinitesimally lower amount of LDPE with high DSR, for which the existence of a discernible improvement of the properties over D1 lacks any credibility.

4.8 Since alleged but unsupported advantages cannot be taken into consideration in respect of the determination of the problem underlying the invention (see Case Law of the Boards of Appeal of the European Patent Office, 7th edition, 2013, I.D.4.2) and in the present case the alleged advantages of improved mechanical properties, foam size and uniformity lack any experimental support, the problem to be solved by the patent in suit needs to be reformulated.

4.9 Consequently, in the light of the teaching of document D1 the problem underlying the patent in suit can only be seen in providing further communication elements comprising foamed insulation.

5. Obviousness

5.1 It remains to be decided whether or not the proposed solution to the problem defined above is obvious in view of the state of the art.

5.2 The claimed subject-matter differs from composition No. 6 of Example 2 of D1 not only in the amount of LDPE with high DSR, but also in the requirement that the MDPE and/or HDPE should have an OIT of greater than 15 minutes as 200°C according to ASTM 4568.

5.3 In the absence of any argument, let alone any evidence for a functional interdependence between the use of less than 20 wt.% LDPE with high DSR and a medium and/or high density polyethylene having a high OIT, it has to be established whether each of those two features, taken singly, was derivable from the prior art in an obvious way (Case Law of the Boards of Appeal of the EPO, 7th edition, 2013, I.D.9.2.2).

5.4 Thermal stabilization of olefin compositions is common practice, in particular in the field of communication elements, which was not disputed by the appellant. Furthermore, the specific choice of a lower limit of 15 minutes at 200°C according to ASTM method 4568 for defining the oxidative induction time and therefore the thermal stability of the olefin has not been demonstrated to be related to any technical effect. This threshold, defining a degree of thermal stability, therefore has to be regarded as a mere arbitrary choice that cannot contribute to an inventive step. As regards the second difference, for the skilled person merely seeking to provide a further communication element, it was obvious to vary - in the present case possibly even to an only insignificant degree - the amount of the LDPE component having a high DSR.

5.5 The appellant's argument that the communication element of D1 required a solid layer co-extruded on the foamed insulation cannot be followed as it is neither supported by the teaching of D1 in so far as Sample No. 6 of Example 2 is concerned, nor is it relevant because the definition of the subject-matter of present claim 1 does not exclude the presence of such a layer.

5.6 Consequently, the skilled person, starting from Sample 6 of Example 2 of D1 and wishing to provide further

communication elements comprising foamed insulation, would have been guided by the available prior art to insulation elements that fall within the ambit of present claim 1. Thus, present claim 1 contains embodiments that are obvious in view of the prior art.

6. As a result, the appellant's main request is not allowable for lack of an inventive step pursuant to Article 56 EPC.

Auxiliary Request 1

7. Claim 1 of auxiliary request 1 differs from that of the main request in that (i) the amount of LDPE having a high DSR is defined to be "no more than 20% by weight" instead of "15% to less than 20% by weight" and (ii) the additional polymer has a dissipation factor less than 75 micro radians and is a highly stabilized polyolefin including phenolic antioxidants and/or phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer.

8. Inventive step

8.1 The considerations concerning inventive step with respect to the main request are not affected by the indication of an amount of "no more than 20% by weight" for the LDPE having a high DSR, as this concentration range encompasses the corresponding range defined in claim 1 of the main request.

8.2 The appellant argued that amended claim 1 involved an inventive step because the combination of antioxidants/ stabilizers now being defined provided an unexpected thermally accelerated stress crack resistance of the electrical communication element without having a

negative impact on the dissipation factor. In support, they referred to the experimental evidence provided in paragraphs [0020] to [0023] of the patent in suit, in which Tables 3 and 2 summarize the results of the thermally accelerated stress crack resistance test and the materials used for those tests, respectively. The appellant also relied on a synergistic effect of the phenolic antioxidant and the phosphite co-stabilizer, as well as on the argument that the addition of hindered amine light stabilizers did not have a negative impact on the electrical attenuation despite the skilled person’s expectations or prevailing theory.

8.2.1 The above line of argument concerning the contribution of the specific additional polyolefin composition to an inventive step was presented for the very first time during the oral proceedings before the Board. The question therefore arises whether it should be admitted to the proceedings.

8.2.2 Article 12(2) RPBA, first sentence, provides that the statement of grounds of appeal shall contain a party's complete case, all facts, arguments and evidence relied on needing to be expressly specified. According to Article 13(1) RPBA it is at the Board's discretion to admit any amendment to the appellant's case after it has filed its statement of grounds of appeal. In this context, also the admission of a new argument brought forward in the appeal proceedings that would have the effect of amending the case of the party, may be subject to the exercise of discretion by the Board, even if the argument is based on evidence and facts already in the proceedings - in particular if it is presented without any reasonable explanation or justification regarding its late submission (see T 1207/11, Reasons point 4, as well as T 1621/09,

referred to in the Case Law, *supra*, IV.C.1.4.4. b), fifth paragraph).

8.2.3 Throughout the appeal proceedings the appellant had maintained claims in which the additional polymer was restricted to one having a dissipation factor less than 75 micro radians and being a highly stabilized polyolefin including phenolic antioxidants and/or phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer. However, no arguments had been provided explaining why those restrictions rendered the claimed subject-matter inventive, despite an argued objection for lack of an inventive step raised by the respondent and the Board, in its communication, noting the absence of any counter-arguments by the appellant. The only argument provided by the appellant for admitting their new submissions in respect of inventive step was that those submissions were based on experimental results and indications present in the patent specification, for which reason the new submissions should be admitted.

8.2.4 In decision G 4/95 it is recalled that opposition appeal proceedings are primarily a written procedure (Reasons 4 c)), which principle is enshrined in Articles 12, 13 and 15 RPBA. In principle, oral proceedings are held at a point in time when the written submissions of all parties, including the written presentation of facts and evidence by all parties, are complete. Amendments to a party's case sought to be made after oral proceedings have been arranged, should not be admitted if they raise issues which the Board or the other party cannot reasonably be expected to deal with without adjournment of the oral proceedings (Article 13(3) PRBA).

8.2.5 In order to assess the appellant's new submissions properly, it would first be necessary to establish whether the alleged improvement in terms of thermally accelerated stress crack resistance has been credibly demonstrated. For the first time in the proceedings that would require an analysis of the examples summarized in Tables 2 and 3 of the patent in suit - on which the appellant based their submissions -, namely a comparison of the insulations comprising HDPE-D or HDPE-A, respectively, and a further comparison of the insulations comprising HDPE-C and HDPE-B, respectively. It is noted that the antioxidant contained in the HDPE-A or HDPE-B component is specified in Table 2 "Comments", namely Irganox 1010 and 1076, respectively (see also paragraph [0020]), whereas the additional additives used for the HDPE-C or HDPE-D component are defined in Table 2 as a “combination AO/HAL Stab Package”; the compounds and their amounts used for this “package” are however not specified. In view of the last sentence of paragraph [0020] and paragraph [0021] of the patent in suit, the "package" could be seen as a blend of Irganox 1010 phenolic antioxidant, Irgafos 168 phenolic antioxidant phosphite blend, Chimassorb 944 or Tinuvin 622 hindered amine light stabilizer and calcium stearate. This first raises the question which hindered amine light stabilizer is in fact used in the particular examples of Table 2: according to paragraph [0021] the HALS additive is either Chimassorb 944 or Tinuvin 622. This also raises the question whether a comparison between examples using component HDPE-B and component HDPE-C could provide any indication concerning the alleged effect, since the compared compositions appear to contain different primary anti-oxidants, namely Irganox 1076 and Irganox 1010, respectively. Moreover, the same question would have to be posed for the comparison - made by the appellant -

of the insulations containing either the HDPE-A component or the HDPE-D component which components contain different amounts of antioxidants. Therefore, the experimental data provided in the patent in suit do not allow any immediate conclusion as to the effect of the claimed combination of additives on the thermally accelerated stress crack resistance. Consequently, the question whether the synergistic effect mentioned in paragraph [0020] of the patent in suit is credibly demonstrated at least for the combination of specific additives used in the examples of the patent in suit, would require further investigation. Moreover, the Board would have to assess whether the existence of any effect brought about by the specific combination of additives used in the experimental part of the patent in suit, could be reasonably expected to be obtained also for other combinations of stabilizers falling under the general definition provided in present claim 1.

8.2.6 Apart from the above, accepting the appellants' belated argument that a combination of antioxidants/stabilizers provided an unexpected thermally accelerated stress crack resistance of the electrical communication element without having a negative impact on the dissipation factor, would mean that the question of obviousness of the claimed combination of additives in order achieve such effect would be debated for the first time at the oral proceedings before the Board. This would in particular require assessing, for the first time, the relevance of the argument that the skilled person's expectation or prevailing opinion was indeed that the addition of hindered amine light stabilizers would have a negative impact on the electrical attenuation.

8.2.7 It follows from the above that a thorough analysis of the above issues could not reasonably take place in the framework of the oral proceedings before the Board. There are no special circumstances justifying a postponement of the oral proceedings and therefore, in the exercise of its discretion under Rule 13(1) RPBA, the Board refuses to allow the Appellants' line of argument - that the combination of antioxidants/ stabilizers provided an unexpected thermally accelerated stress crack resistance of the electrical communication element without having a negative impact on the dissipation factor - to the proceedings.

8.3 In the absence of any element indicating that a particular technical effect occurs within and due to the selected numerical range defining the dissipation factor and in the absence of any argument by the appellant in that respect, the Board concludes that the problem effectively solved over D1 is not influenced by the restricted definition of the additional polyolefin composition. Therefore, the problem effectively solved remains the same as for the main request: to provide further communication elements comprising foamed insulation.

9. The use of a combination of phenolic antioxidant, phosphite and hindered amine light stabilizer for stabilizing polyolefins is generally suggested in paragraph [0151] of D23. Those stabilizers (phosphites, hindered phenols and hindered amines) are also recommended in paragraph [0024] of D25 for thermal stabilization of polyethylene insulation presenting low dissipation (see D25, paragraphs [0003] and [0025]). Hence, adding the additives defined in present claim 1 to the polyolefinic component of D1 that does not have high DSR, in order to achieve thermal stabilization of

that component while keeping a low dissipation factor, was suggested to the skilled person by the prior art. Moreover, in the absence of any technical effect occurring within and due to the selected numerical range defining the dissipation factor, the Board can only conclude that the upper limit of 75 micro radians is arbitrary and therefore an obvious choice for the skilled person. Thus, it must be concluded that the choice of the additional polyolefin composition defined in claim 1 of auxiliary request 1 cannot contribute to an inventive step.

10. Consequently, the subject-matter of claim 1 of auxiliary request 1 is merely the result of multiple arbitrary choices lying within the routine activity of the skilled person faced with the problem of providing further communication elements comprising foamed insulation. The subject-matter of claim 1 of auxiliary request 1 therefore does not involve an inventive step within the meaning of Article 56 EPC. Auxiliary request 1 is therefore not allowable.

Auxiliary Request 2

11. Claim 1 of auxiliary request 2 differs from that of the main request only in that the amount of 20% by weight of the olefin polymer having a high DSR is excluded and the additional polymer has a dissipation factor less than 75 micro radians and is a highly stabilized polyolefin including phenolic antioxidants and/or phenolic antioxidant - phosphite blends as well as a hindered amine light stabilizer. Accordingly, the considerations and the conclusions drawn for auxiliary request 1 which deal with the question of whether the use of said additional polyolefin composition involves an inventive step, equally apply to auxiliary request

2, with the consequence that the latter is not allowable for lack of an inventive step of the subject-matter of claim 1 (Article 56 EPC).

Auxiliary Request 3

12. Claim 1 of auxiliary request 3 differs from that of the main request only in that (i) the amount of LDPE having a high DSR is defined to be 15% by weight instead of 15% to less than 20% by weight.

12.1 As shown in above points 4.3 to 4.7, the comparison offered by the appellant in experimental report D26 does not allow any direct conclusion concerning the influence of the amount of LDPE having a high DSR on the properties of the foamed plastic insulation. The allegation of an improvement is furthermore contradicted by the teaching of Samples 5 and 6 of Example 2 of D1, according to which lowering the amount of olefin polymer having a high DSR from 20 wt.% to 15 wt.% results in increased cell size and worse bonding of the foamed insulation to the conductor.

12.2 The application as filed does not contain any information that an amount of LDPE having a high DSR of 15% by weight would result in a smaller cell size and an increased mechanical bond between the conductor and the foamed insulation. Nor is there any disclosure that the problem underlying the patent in suit had originally disclosed an improvement of those properties. Page 1, lines 14-20 and page 2, lines 6-7, 11-13 and 29-30 and Table 3 of the application as filed, cited by the appellant in this respect, merely indicate the need to enhance the dimension stability and mechanical strength of the cable so as to avoid the necessity for an additional solid polymer layer or

skin, mechanical crush resistance being addressed on page 2, lines 12-13. According to the application as filed, D1 teaches a foam with a cell structure that is 50 microns or less (page 1, lines 12-14), whereas the cell size obtained with the claimed subject-matter is typically less than 200 microns, preferably smaller than 100 microns (page 5, lines 4-5 and page 2, lines 11-13). An indication of the cell size obtained with the foamed insulations of the exemplified embodiments of the patent in suit is not provided. It therefore follows from the above that the alleged reduction of cell size and improvement of mechanical bond between the conductor and the foamed insulation cannot be taken into account for formulating the technical problem solved over the disclosure of D1.

12.3 Consequently, the problem solved by the subject-matter of claim 1 of auxiliary request 3 over D1, in particular Sample 6 of Example 2, can only be defined in the same way as for the main request, i.e. to provide further communication elements comprising foamed insulation.

13. From the problem effectively solved over D1 as established above, it follows, regardless of whether cell size is reduced or insulation bonding to conductor is improved, that the reduction of the amount of olefin polymer having a high DSR from 20 wt.% to 15 wt.%, which step is disclosed in D1 (Sample 5 of Example 2, Table 3, column 4), would be regarded as a feasible, and therefore obvious solution.

14. Therefore, also claim 1 of auxiliary request 3 lacks an inventive step and has to be refused (Article 56 EPC).

Auxiliary request 4

15. Claim 1 of auxiliary request 4 differs from that of auxiliary request 1 in that the amount of olefin polymer having a high DSR is defined to be 15% by weight instead of 15% to no more than 20% by weight. For the same reasons as given for auxiliary request 3, that difference cannot render the subject-matter claimed in auxiliary request 4 inventive. Therefore, auxiliary request 4 is not allowable (Article 56 EPC).

Auxiliary requests 5 and 6

16. Auxiliary requests 5 and 6 were submitted on 11 March 2014, i.e. 2 days before the oral proceedings. They represent an amendment to the appellant's case which may be admitted and considered at the Board's discretion as stipulated by Article 13(1) RPBA. According to the appellant, auxiliary requests 5 and 6 correspond to auxiliary requests 2 and 4, respectively, in which the term "or" of the feature "phenolic antioxidants and/or phenolic antioxidant– phosphite blends as well as a hindered amine light stabilizer" has been deleted. There is no justification for such an amendment at such a late stage of the proceedings since the objection of lack of clarity concerning the definition of the combination of stabilizers which it aims at overcoming, had already been made in point 6.2 of the respondent's letter of 23 September 2010. Moreover, that amendment does not change the reasoning for not accepting late arguments given in relation to auxiliary request 1. The amendments introduced in claim 1 of any of auxiliary request 5 and 6 have not been shown to result in claims that immediately overcome the existing objection under Article 56 EPC regarding auxiliary requests 2 and 4 (points 10 and 13 above,

repectively). Since auxiliary requests 5 and 6 were submitted in the absence of a proper justification and are *prima facie* not allowable, those requests are not admitted to the proceedings (Article 114(2) EPC in conjunction with Article 13(1) RPBA).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman

B. ter Heijden B. ter Laan

Decision electronically authenticated