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Datasheet for the decision of 15 May 2008

Case Number: T 0498/06 - 3.3.03

Application Number: 00926789.9

Publication Number: 1169388

IPC: C08L 23/06

Language of the proceedings: EN

Title of invention:
Polyolefins and uses thereof

Patentee:
TOTAL PETROCHEMICALS RESEARCH FELUY

Opponents:
"Univation Technologies, LLC
"INEOS Manufacturing Belgium NV"
"Borealis Technology OY"
"THE DOW CHEMICAL COMPANY"
"Basell Polyolefine GmbH"

Relevant legal provisions:
EPC Art. 100(c), 123(2)

Relevant legal provisions (EPC 1973):
EPC Art. 100(c), 123(2)

Keyword:
"Opposition grounds - extension of subject-matter (yes)"
"Amendments - added subject-matter (yes)"

Decisions cited:
T 0955/92

Catchword:
-

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Case Number: T 0498/06 **-** 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 15 May 2008

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 15 January 2006 and posted 14 February 2006 revoking European patent No. 1169388 pursuant to Article 102(1) EPC 1973.**

Composition of the Board:

Chairman: R. Young
Members: A. Däweritz
C. Brandt

Summary of Facts and Submissions

I. The grant of European patent No. 1 169 388 in respect of European patent application No. 00 926 789.9, filed on 28 March 2000 as International patent application PCT/EP00/02879, which was published as WO-A-00/060001 on 12 October 2000, and claiming the priority of 30 March 1999 of an earlier application filed in the European Patent Office (99 106 461.9), was announced on 27 November 2002 (Bulletin 2002/48). The patent was granted with twenty-nine claims, including the following claims:

1. A multimodal polyethylene, having a density of from 0.930 to 0.955 g/cm^3 and a shear ratio (SR) of 18 or more and comprising at least 20 % by weight of a high molecular weight fraction, which high molecular weight fraction has:

(a) a density (ρ) of 0.930 g/cm^3 or less; and
(b) a high load melt index (HLMI) of 0.30 g/10 mins or less.

8. A multimodal polyethylene according to any preceding claim, which polyethylene has a value of 2000 hours or more in a full notch creep test.

10. A multimodal polyethylene according to any preceding claim, which polyethylene has a value of 5000 hours or more in a notch pipe test.

11. A multimodal polyethylene according to claim 10, which polyethylene has a value of 10000 hours or more in a notch pipe test.

15. A method for the production of a multimodal polyethylene as defined in any preceding claim, which method comprises mixing a high molecular weight polyethylene fraction as defined in any of claims 1 to 5 with one or more lower molecular weight fractions.

20. A multimodal polyethylene obtainable according to a method as defined in any of claims 15 to 19.

21. A polyethylene pipe comprising a multimodal polyethylene having a density of from 0.930 to 0.955 g/cm^3 and a high molecular weight fraction, which high molecular weight fraction has a density (ρ) and a high load melt index (HLMI), which satisfy the following relationship:

$$\rho \times HLMI \leq 0.37$$

wherein the units of density are g/cm^3 and the units of HLMI are g/10 mins, and the density (ρ) is 0.930 g/cm^3 or less.

22. A pipe according to claim 21, in which the multimodal polyethylene has at least 20 % by weight of the high molecular weight fraction, and the high molecular weight fraction has a high load melt index (HLMI) of 0.40 g/10 mins or less.

23. A pipe according to claim 22, in which the multimodal polyethylene is as defined in any of claims 1 to 14 and 22.

24. A method of pipe installation comprising forming a hole or trench for receiving a pipe and installing a polyethylene pipe as defined in any of claims 21 to 23 in the hole or trench.

25. A method according to claim 24, which method is a no-sand installation method, the pipe being installed in the hole or trench directly in contact with the earth.

26. A method for re-lining a pipe comprising installing a polyethylene pipe as defined in any of claims 21 to 23 in an existing pipe.

27. Use of a multimodal polyethylene having a density of from 0.930 to 0.955 g/cm^3 and comprising a high molecular weight fraction, which high molecular weight fraction has a density (ρ) and a high load melt index (HLMI), which satisfy the following relationship:

$$\rho \times HLMI \leq 0.37$$

wherein the units of density (ρ) are g/cm^3 and the units of HLMI are g/10 mins, wherein the multimodal polyethylene comprises at least 20 % by weight of the high molecular weight fraction and the density (ρ) is 0.930 g/cm^3 or less and the high load melt index (HLMI) is 0.40 g/10 mins or less, in a polyethylene article to provide the article with enhanced creep resistance to stress-cracking as determined by the notch-pipe test (NPT) of EN 33479.

The remaining claims were all dependent. Thus, Claims 2 to 7, 9 and 12 to 14 concerned elaborations of the multimodal polyethylene, Claims 16 to 19 elaborations of the method for producing these polymers and Claims 28 and 29 elaborations of the use.

In this decision, any reference to passages in the patent in suit as granted will be given underlined in squared brackets, eg [Claim 1] or [0001]. References in ***underlined italics*** concern passages in the application as originally filed, eg ***page 1, lines 5 to 10***. "EPC" refers to the revised text of the EPC 2000, the previous version is identified as "EPC 1973".

II. On 4, 26, 26, 27 and 27 August 2003, respectively, five Notices of Opposition by Opponents O-01 to O-05 were filed, in each of which revocation of the patent in its entirety was requested. The oppositions of all Opponents were based on the objections of lack of novelty, lack of inventive step and on the assertion of insufficiency of disclosure. Furthermore, O-04 raised the objection that the subject-matter of the patent in suit extended beyond the content of the ***application***. Correspondingly, reference was made in the oppositions to Articles 100(a), 100(b), 100(c), 52 to 57 and 52(1), 54 and/or 56 EPC 1973, respectively.

In the Notices of Opposition, altogether twenty-four patent documents and publications were cited, supplemented by two experimental reports and one diagram concerning the shear rate (SR) parameter (ie documents E1 to E27). The cited pieces of prior art included

E12: J.Scheirs et al., "PE100 Resins for Pipe Applications: continuing the development into the

21st century", Trends in Polymer Science, Vol.4, 1996, pages 408 to 415,

E13A: AU-A-1998 79962 and

E22: EP-A-0 808 854.

In the course of the opposition proceedings, nine further documents were submitted by the parties (E28 to E36; cf. the list of documents on pages 12 and 13 of the decision under appeal), including

E35: ISO 13479 "Polyolefin pipes for the conveyance of fluids - Determination of resistance to crack propagation - Test method for slow crack growth on notched pipes (notch test) ("First edition 1997-05-01") and

E36: S.H. Beech et al., "Accelerated Laboratory Tests to Predict the Resistance to Slow Crack Growth of High Performance Polyethylene Pipe Resins", Proceedings, 1997 International Symposium, "Plastic Piping Systems for Gas Distribution - Technologies to Reduce Gas-Industry Costs and Enhance Reliability", pages 205-214.

The Patent Proprietor disputed, in its letter dated 21 June 2004, all the arguments of the Opponents, considered the grounds for opposition invoked by the Opponents as unfounded and requested that the oppositions be rejected and that the patent in suit be maintained as granted or, in the alternative, on the basis of an Auxiliary Request filed therewith.

Apart from additional arguments against the Patent Proprietor's view concerning the objections hitherto raised by the Opponents, this Auxiliary Request was additionally objected to under Article 123(2) EPC 1973 by O-01 and O-05 (letters dated 14 October 2004 and

8 November 2004, respectively) and - after a summons to oral proceedings had been issued on 3 March 2005 - also by O-03 (letter of 3 November 2005).

In preparation of the scheduled oral proceedings, further comments on the issues of the case were submitted by O-01, O-04 and O-05 in letters dated 22, 25 and 28 November 2005, respectively. Moreover, the above Auxiliary Request was replaced by the Patent Proprietor by six new Auxiliary Requests (letter dated 25 November 2005). In a further letter dated 20 January 2006, three additional Auxiliary Requests were filed by the Patent Proprietor to be inserted as new Second to Fourth Auxiliary Requests after the operative First Auxiliary Request (the Auxiliary Requests will be addressed herein below as "Auxiliary Request 1" etc. instead of "First Auxiliary Request" etc.). Auxiliary Requests 2 to 6 of 25 November 2005 were, nevertheless, maintained and refiled by the Patent Proprietor at the oral proceedings on 25 January 2006 as renumbered Auxiliary Requests 5 to 9.

At the oral proceedings, the Main Request was dealt with at first with regard to the grounds for opposition according to Articles 100(c) and 100(b) EPC 1973. After deliberation the Opposition Division gave the decision adverse to the request and informed the parties that Auxiliary Requests 1 to 7 would share the fate of the Main Request.

In view of these facts and findings, the Patent Proprietor was given the choice between continuation on the basis of the remaining Auxiliary Requests 8 and 9 or to file a new Auxiliary Request. After a break granted by the Opposition Division, the Patent

Proprietor replaced Auxiliary Request 8 on file by a new one and maintained Auxiliary Request 9.

In view of the amendments in Claim 1 of the new request, including a restricted density range in its line 2 of from 0.945 to 0.955 g/cm^3, the Opponents raised an additional objection under Article 123(2) EPC.

The two remaining requests were subsequently dealt with and decided. The issues considered with regard to Auxiliary Request 8 were the requirements of Articles 123, 84 and 54 and Rule 57a EPC 1973, those concerning Auxiliary Request 9 were the requirements of Article 123(2) EPC 1973. When the decision on the latter request was announced, the Patent Proprietor submitted a new Auxiliary Request 10, for which the decision was also given by the Opposition Division.

Since all requests on file had been dealt with, the final decision, which formed the basis for this appeal, was announced.

III. The reasons for the above decision, now under appeal, were issued in writing on 14 February 2006.

(1) Whilst accepting therein, that the claims of the Main Request, ie the set of claims as granted, fulfilled the requirements of Article 123(2) EPC 1973, the Opposition Division found that the so-called NPT test, which was to be used to measure a parameter defining the subject-matter of its Claims 10, 11 and 27 to 29, had not been disclosed in a manner sufficiently clear and complete to enable a skilled worker to carry out the claimed subject-matter (Article 100(b) EPC).

(2) This reason also formed the basis for the failure of Auxiliary Requests 1 to 7. Furthermore, Auxiliary Request 8 was found to be not novel, because Example 3 of E22 was considered to fulfil the requirements of Claim 1 of this request, and Auxiliary Request 9 was held not to comply with Article 123(2) EPC 1973. This finding was also held valid for Auxiliary Request 10.

(3) Consequently, the patent in suit was revoked, because neither the Main Request nor any one of the operative auxiliary requests had been found to comply with the requirements of the EPC.

IV. On 6 April 2006, a Notice of Appeal was filed against this decision by the Patent Proprietor/Appellant. The prescribed fee was paid on the same date.

(1) In the Statement of Grounds of Appeal, received on 20 June 2006, the Appellant disputed all the reasons for the revocation of the patent in suit and, therefore, maintained its Main Request aiming at the rejection of the oppositions, ie the maintenance of the patent in suit as granted. Thus, the Appellant disputed (i) the arguments in the decision under appeal concerning the measuring procedure NPT mentioned in [Claim 27] ("of EN 33479") and asserted that this method was "equivalent to the standard ISO 13479" (E35) and (ii) also those of the Opponents concerning the SR value in [Claim 1].

(2) Additionally, the Appellant referred to six new sets of claims forming six new auxiliary requests which were to replace all the previous auxiliary requests. No copies were, however, enclosed. They were submitted by the Appellant with a further letter dated 5 July 2006. Only those claims contained in these Auxiliary Requests,

which played a role in the appeal proceedings, are quoted herein below.

(3) Claim 1 of Auxiliary Request 1 read as follows:

"1. A polyethylene pipe comprising a multimodal polyethylene having a density of from 0.945 to 0.955 g/cm^3 and a shear ratio (SR) of 18 or more and comprising at least 45 % by weight of a high molecular weight fraction, which high molecular weight fraction has:

(a) a density (ρ) of 0.925 g/cm^3 or less; and

(b) a high load melt index (HLMI) of less than 0.30 g/10 min,

in which multimodal polyethylene both the density (ρ) and the high load melt index (HLMI) of the high molecular weight fraction satisfy the following relationship

$$\rho \times HLMI \leq 0.37$$

wherein the units of density are g/cm^3 and the units of HLMI are g/1O min."

Claim 1 of Auxiliary Request 2 differed therefrom only by the designation of features (a) and (b) addressed therein as features (c) and (d), respectively.

Both of these auxiliary requests contained also independent claims to the methods of [Claims 24 and 26] (section I, above). Thus, Claim 3 of each of these requests read as follows:

"3. A method of pipe installation comprising forming a hole or trench for receiving a pipe and installing a polyethylene pipe in the hole or trench, which method is a no-sand installation method, the pipe being

installed in the hole or trench directly in contact with the earth, said pipe comprising a multimodal polyethylene having a density of from 0.930 to 0.955 g/cm^3 and a high molecular weight fraction, which high molecular weight fraction has a density (ρ) and a high load melt index (HLMI), which satisfy the following relationship

$$\rho \times HLMI \leq 0.37$$

wherein the units of density are g/cm^3 and the units of HLMI are g/1O min, and the density (ρ) is 0.930 g/cm^3 or less."

Furthermore, Claim 4 of each of these requests related to a method for re-lining a pipe, wherein a polyethylene pipe, specified in the same way as in Claim 3, above, was installed in an existing pipe.

(4) Apart from an apparent typing error in Auxiliary Request 3 ("p" instead of "ρ" in the equation), the wording of the above Claim 3 formed also Claim 1 of each of Auxiliary Requests 3 and 4. Claim 2 in each of these requests corresponded to the above Claim 4.

(5) Claim 1 of each of Auxiliary Requests 5 and 6 had the following wording:

"1. A method of pipe installation comprising forming a hole or trench for receiving a pipe and installing a polyethylene pipe in the hole of trench, which method is a no-sand installation method, the pipe being installed in the hole or trench directly in contact with the earth, said pipe comprising a multimodal polyethylene having a density of from 0.945 to 0.955 g/cm^3 and a high molecular weight fraction, which high molecular weight fraction has a density (ρ) and a

high load melt index (HLMI), which satisfy the following relationship

$$\rho \times HLMI \leq 0.37$$

wherein the units of density are g/cm^3 and the units of HLMI are g/10 min, and the density (ρ) is less than 0.925 g/cm^3, the high load melt index of the high molecular weight fraction is less than 0.30 g/10 min, and the multimodal polyethylene comprises at least 45 % by weight of said high molecular weight fraction."

As in the higher-ranking requests, this claim was followed in each of Auxiliary Requests 5 and 6 by a method Claim 2 to the re-lining of a pipe, which included the same limitations of the multimodal polyethylene as Claim 1 of these requests.

(6) The subject-matter of [Claim 27] (section I, above) and [Claims 28 and 29] appendant thereto, ie the use claims, had been deleted from all the new Auxiliary Requests.

(7) Furthermore, the Appellant gave a detailed list of the amendments in the claims of the above new Auxiliary Request 1 (on page 4 of the Statement), explained the respective differences between the auxiliary requests and presented, on this basis, its view concerning the requirements of Articles 123(2), 123(3), 83 and 84 and Rule 57a EPC 1973. Moreover, it also gave its opinion on the questions of novelty and inventive step.

V. By contrast, the Respondents maintained their initially raised objections under Articles 100(a), 100(b) and 100(c) EPC 1973 in their respective letters dated 20 October 2006, 23 January "2006" (received on 25 January 2007) and 15 April 2008 (O-01), 25 October

2006 and 14 April 2008 (O-03), 3 November 2006 (O-02) and 9 January 2007 and 15 April 2008 (O-04), respectively.

(1) Thus, it was argued by the Respondents that the ***application*** had referred only to stress crack resistance of the polyethylene (***Claim 29***) and to two different tests for grading this property (***page 7, paragraphs 2 and 4***), namely the full notch creep test (FNCT) and the notch pipe test (NPT). In view of these facts, the Respondents argued that the definition in [Claim 27] referring to an "enhanced creep resistance to stress-cracking as determined by the notch-pipe test (NPT) of EN 33479" would amount to a violation of Article 123(2) EPC 1973, because creep resistance was an independent feature of a pipe not depending on stress-crack resistance. Nor did the ***application*** disclose, in the Respondents' opinion, that the creep resistance could be determined by the NPT test (see also O-03's letter of 25 October 2006, Nos. 2.1 to 2.6, in particular Nos. 2.3 and 2.5).

(2) Apart from this objection under Article 123(2) EPC 1973, the Respondents took the view that EN 33479 had not been available to the public. Thus, they argued that they had had no access to EN 33479, which fact would justify the objection under Article 100(b) EPC 1973 as already raised in the oppositions. The Appellant had only provided a copy of E35 allegedly being equivalent to EN 33479 (Statement of Grounds of Appeal, page 2, third last paragraph), whilst it could have easily provided a copy thereof. Hence, the Appellant had not, according to the Respondents, discharged the burden of proof for its allegation.

(3) An additional objection under Article 123(2) EPC 1973 was furthermore raised in regard to the amended range of density of the multimodal polyethylene as defined in Claim 1 of each of Auxiliary Requests 1, 2, 5 and 6 (0.945 to 0.955 g/cm^3). Whilst it was accepted (eg in the letter of Respondent O-03 of 25 October 2006, Nos. 2.7 to 2.11) that on ***page 6, paragraph 4, last line*** a preferred range of from 0.930 to 0.955 g/cm^3 had been disclosed, the Respondents unanimously took the view that the replacement of the lower limit of this range by the second of two upper limits defined in the other sentence in the same paragraph of the description violated Article 123(2) EPC 1973. These upper limits of this parameter were "0.955 g/cm^3"(or less), and "0.945 g/cm^3" (or less), respectively. This did not, in the Respondents' opinion, amount to a valid basis for the above amendment in the claim (cf. also the letters of Respondent O-02 of 3 November 2006, page 3, penultimate paragraph, and of Respondent O-04 of 9 January 2007, page 12, paragraph 2).

(4) Furthermore, the Respondents asserted again lack of novelty and lack of inventive step of the different aspects covered by the claims in respect of the disclosures in a number of cited documents.

(5) In their respective submissions during the written appeal proceedings, the parties filed additional documents E37 to E49 (here consecutively renumbered, where appropriate). However, these documents have turned out not to be relevant for this decision.

VI. Oral proceedings were held on 15 May 2008.

(1) Initially, a complete list of the cited documents was handed out to the parties. Then the Chairman opened

the oral proceedings, summarised the relevant facts as appearing from the file and asked the parties for their requests, which, according to the written submissions, had been as follows:

Whilst the Respondents had unanimously requested that the appeal be dismissed, the Appellant had requested that the decision under appeal be set aside and that the patent in suit be maintained on the basis of [Claims 1 to 29] (Main Request) or, in the alternative, on the basis of one of the six Auxiliary Requests as submitted with the letter dated 5 July 2006, ie Auxiliary Request 1 (Claims 1 to 20), Auxiliary Requests 2 or 3 (each containing Claims 1 to 18), Auxiliary Request 4 (Claims 1 to 16), Auxiliary Request 5 (Claims 1 to 14) or Auxiliary Request 6 (Claims 1 to 12), (cf. sections IV(1) to IV(5), above).

Respondents IV and V had further requested that, if inventive step became an issue in these proceedings, the case be remitted to the Opposition Division for further prosecution.

(2) At this stage, the Respondents confirmed their above requests, whereas the Appellant informed the Board that it withdrew Auxiliary Requests 1, 3 and 5, renumbered the remaining Auxiliary Requests 2, 4 and 6 and submitted corrected versions thereof as Auxiliary Requests 1, 3 and 4. Thus, in Claim 1 of this new Auxiliary Request 1 (previous Auxiliary Request 2; section IV(3), above), the two lines relating to "(c) a density ..." and to "(d) a ... (HLMI) ..." had been amended to "(a) ..." and "(b) ...", respectively. Furthermore, the Appellant filed a new Auxiliary Request 2 comprising only the unamended Claims 1 and 2

of the previous Auxiliary Request 2 (above), and a new Claim 3, reading as follows:

"3. A method of pipe installation comprising forming a hole or trench for receiving a pipe and installing a polyethylene pipe in the hole or trench, which method is a no-sand installation method, the pipe being installed in the hole or trench directly in contact with the earth, said pipe being a pipe according to claim 1 or 2."

Moreover, the method claims to the re-lining of a pipe (Claims 4 and 2, respectively, cf. sections IV(3), IV(4) and IV(5), above) were deleted from all the operative Auxiliary Requests. Consequently, the claims on the copies of these requests as submitted by the Appellant at the hearing had consecutively been renumbered where necessary.

(3) In the further course of the hearing, the Appellant additionally filed an amended version of the new Auxiliary Request 1 and two amended versions ("amended" and "twice amended") of the new Auxiliary Request 3 and withdrew the new Auxiliary Request 2.

In Auxiliary Request 1 (amended), Claim 10, which had been appendant to Claim 3 and which had referred to a total density of 0.945 g/cm^3 or less, was deleted in reply to an objection of violation of Rule 80 EPC, raised by the Respondents.

The dependent claim to the same feature in Auxiliary Request 3 (ie Claim 8) was also deleted for the same reason from the new Auxiliary Request 3 (amended).

Moreover, in reply to a further objection under this Rule (cf. also Respondent O-04's letter of 9 January 2007, page 12, penultimate paragraph), the dependency of Claim 3 of Auxiliary Request 3, which related to the SR feature, the minimum amount of the high molecular weight fraction and its HLMI, as defined in [Claim 1], was corrected from "any of the preceding claims" to "according to claim 2" in its "twice amended" version.

Furthermore, in each of these amended versions of Auxiliary Requests 1 and 3, the numbering of all claims following the deleted claim was adapted accordingly.

None of Respondents raised formal objections against the consideration and discussion of these new requests.

(4) In summary, this decision deals, as a consequence of these changes in the Appellant's requests, with the Main Request, Auxiliary Requests 1, 3 and 4 as defined above, with Auxiliary Request 1 as amended once and with two amended versions of Auxiliary Request 3, all Auxiliary Requests as filed at the oral proceedings.

(5) The discussion about the Main Request focused on the wording in the last two lines of [Claim 27] concerning "the article with enhanced creep resistance to stress-cracking as determined by the notch-pipe test (NPT) of EN 33479". In essence, both sides reiterated their previous arguments submitted in writing.

Whilst the Appellant only referred to its written submissions of 16 April 2008 (wherein the question of identity of "DIN EN 33 479" and "DIN EN ISO 13479" had been addressed with regard to the objection under Article 100(b) EPC) and its arguments presented during the opposition proceedings, the Respondents referred,

in particular, to the wording used in the ***application*** itself to describe the property in question: ***page 1, lines 3 and 4*** ("stress-crack resistance"), ***page 2, last paragraph*** ("to increase the stress-crack resistance" and "especially high stress-crack resistance") and ***page 6, last paragraph*** ("The stress-crack resistance of the polyethylene of the present invention can be graded with reference to the full notch creep test (FNCT) and/or the notch pipe test (NPT)"). They pointed out that the ***application*** as such and in particular ***Claim 29*** had been silent about creep resistance and that this property was not even mentioned in any one of the three examples, let alone, that there had been any comparison available, which would have demonstrated an enhancement of this property as referred to in [Claim 27]. Thus, even in the context of the asserted "superior stress-crack resistance, as reflected in the FNCT test results" of ***Examples 1, 2 or 3*** in the ***last paragraph on page 17***, and the " NPT times", no indication as to "an enhanced creep resistance" had been given.

The Respondents saw their position, that "stress-crack resistance" and "creep resistance to stress-cracking" were different features, also supported by literature. Thus, they referred to E12, page 408, right column, last sentence of the first complete paragraph: "PE100 resins are thus high-density polyethylene (HDPE) grades characterized by exceptionally high environmental stress-crack resistance, good resistance to rapid stress crack propagation (RCP) and very high creep resistance." and E13A, page 10, lines 12 to 16, wherein reference was made to "a better compromise between the resistance to crack propagation (slow crack propagation and rapid crack propagation) and the creep resistance in comparison with the known compositions of the prior

art.". In E36, page 207, right column, paragraph 2, creep of developing fibrils was only considered to be related to slow crack growth as the main mechanism governing the stress crack performance of the polymer. Even in the ***application***, creep had only been referred to in the context of the FNCT (***page 7, paragraph 2***), as opposed to the description of the NPT in ***paragraph 4*** of that page. Hence, the Respondents concluded that there was no direct and unambiguous link to be found in the ***application*** between, on the one hand, stress-crack resistance as measured in the NPT and, on the other hand, the "creep" behaviour of the polymer composition.

Moreover, the use of the word "graded" (cf. the quotation in the second paragraph of this section, above, of the last paragraph of ***page 6***) would mean nothing more than "tested", ie it was no indication for an enhancement of the property as worded in the body of [Claim 27]. Nor would this claim contain any reference to a pipe but only to an article.

The Appellant commented on these submissions only by stating that each patent document would provide its own definitions, instead of relying on academic literature. Moreover, the passage in E36, page 207, right column, as referred to above, would show that creep and stress-crack related to the same property, and NPT would clearly refer to a pipe test, which would, therefore, show that the article mentioned in [Claim 27] could only be a pipe.

(6) Since no party wanted to comment thereon any further, the debate was closed with regard to the Main Request, and the hearing was interrupted for deliberation on this request.

(7) When the hearing was resumed, the parties were given the decision that the Main Request was refused.

(8) The further discussion about the Auxiliary Requests focused on the question of whether their respective Claim 1 complied with Article 123(2) EPC.

(9) The Appellant asserted that Claim 1 of Auxiliary Request 1 was derived from [Claims 1, 2 and 5] and [0028].

(10) The amendment of the density range on the basis of the description was seen by the Respondents as a justification for the full examination of the claim under all Articles and Rules of the EPC. Hence the further discussion focused essentially on this amended range. In particular, the Respondents reiterated their previous arguments (section V(3), above).

(11) According to the Respondents, only the formation of a narrower range by combining an upper limit of a general range with the lower limit of a preferred range had been allowed in the case law already cited in their written submissions. Therefore, the Respondents took the view that a preferred upper limit ("0.945 g/cm^3 or less") could not form the lower limit of the new range of "0.945 to 0.955 g/cm^3"), but it could rather be used only for replacing eg "0.955 g/cm^3 or less". These arguments were disputed by the Appellant who referred to decision T 955/92 of 26 September 1995, No. 4 of the reasons (not published in OJ EPO).

(12) In another argument the Respondents relied on the wording of ***page 6, paragraph 4*** which formed the basis for [0028] mentioned by the Appellant. The Respondents

put emphasis on the fact that in this paragraph the density values had been disclosed for "the final polyethylene comprising both the HMWF and lower molecular weight fractions". In Claim 1, however, the density range was used to define the "multimodal polyethylene" as comprised in the claimed pipe. In their view, the final polyethylene was not identical to the multimodal polyethylene, because it could comprise further components, as eg shown in [Examples 1 to 3], where mention was made of "final bimodal resin" (*page 14, line 4 from below*), "final blue bimodal product" (*page 15, line 8 from below*), "final black bimodal product" and "final compound" (*page 16, lines 9 and 2 from below*). Thus, in the tables of each of [Examples 1 and 2] the density was given for a "bimodal blue compound", in [Example 3], however, for a "bimodal black compound", each of which comprised additives, in particular a blue or carbon-black pigment. Whilst, undisputed by the Respondents, the Appellant stated that the addition of blue pigment would not change the density of the compound, the Respondents pointed out that the density of the black compound of [Example 3] would clearly differ from that of the polyethylene itself due to the addition of 2.0 to 2.5 % by weight of carbon-black. Hence, it was not clear which density had been meant on *page 6*, ie the density of polyethylene itself or that of polyethylene comprising further components such as pigments and/or additives, ie the density of a polymer compound.

The information given in the *application* in this respect would, in any case, be inconsistent in itself. Thus, Claim 1 of the request had been worded by combining particulars disclosed in the context of the polymer *per se* and particulars disclosed only in the

context of the pipe, further compounded by the density of the "final polyethylene" derived from ***page 6***. Thus, the particulars of the "high density multimodal polyethylene" were the shear ratio of ≥18, the presence of ≥20 (preferably ≥45) % by weight of HMWF with a density of ≤0.930 (preferably ≤0.925) g/cm^3, and an HLMI of ≤0.30 g/10 min) as disclosed in ***Claims 1, 2 and 5***. The particulars of the pipe included the presence of a high density multimodal polyethylene defined only by the relationship $\rho \times HLMI \leq 0.37$ of the density ρ (of ≤0.930 g/cm^3) and the HLMI of the HMWF (preferably being ≤0.40 g/10 min in accordance with the relationship $0.925 \times 0.40 = 0.37$), which preferably was comprised in the polyethylene in an amount of ≥20 % by weight. These particulars could be found in ***Claims 23 and 24***.

The Respondents further argued on the basis of these above features that, in Claim 1 of Auxiliary Request 1, the minimum amount of HMWF in the polyethylene was increased from 20 to 45 % by weight, whilst, at the same time, the density of this fraction was reduced from ≤0.930 to ≤0.925 g/cm^3. In the Respondents' view, the combination of these two changes must have resulted in a reduction of the total density of the polymer. However, the claim required that this feature complied with a range further limited to its upper end, ie excluding the preferred range of "0.945 g/cm^3 or less" as disclosed on ***page 6***. These requirements would not fit together and would, therefore at the same time, create new information or added matter. It followed therefrom that the claim violated Article 123(2) EPC.

(13) The Appellant disputed these arguments and pointed out that in each of [Examples 1 and 2] the total density had been 0.949 g/cm^3, ie fulfilled the

requirement of the claim, and that their blue compound had the same density as the virgin composition (without the pigment). The three [examples] would fall within the scope of Claim 1, and would thus show that its subject-matter, though being restricted, was nevertheless feasible. It would also be clear to the person skilled in the art that in view of the required relationship of ρ and HLMI (0.30 × 0.925 = 0.2775, ie <0.37), features (a) and (b) in the claim were superfluous. They had not, however, been deleted in order to avoid any violation of one or the other provision, Article or Rule, of the EPC.

In the further discussion, the Appellant argued that "the final polyethylene" was different from the (final) compounds in the ***examples*** and "when it (ie the polymer) comes out of the reactor, there is nothing else". Hence there would be no uncertainty about the meaning of the density on ***page 6***.

(14) In reply to these arguments, the Respondents added that neither [Example 1] nor [Example 3] complied with Claim 1. Thus, in [Example 1] the density ρ of the HMWF was 0.927 g/cm^3 (ie exceeding the limit in the claim: 0.925 g/cm^3), and in [Example 3], HLMI = 0.40 g/10 min exceeded another limit of the claim, ie that of feature (b), now requiring a value of <0.30 g/10 min.

The exclusion of the HLMI value of 0.30 g/10 min itself from the claim was also considered by the Respondents as being not justified in view of the disclosure in the ***application***.

The Respondents concluded that there was no direct and unambiguous disclosure for the density range in line 2 of Claim 1 derivable from the ***application***.

(15) After a short interruption for deliberation of the Board, which gave the Appellant the opportunity to amend its Auxiliary Request 1 (section VI(3), above), and after a final deliberation on both versions of Auxiliary Request 1, both versions of the request were refused for lack of compliance with Article 123(2) EPC.

(16) As a consequence of this decision, the Appellant withdrew Auxiliary Request 2.

(17) At the beginning of the consideration of Auxiliary Request 3, the claims were amended by the Appellant twice (section VI(3), above) in order to overcome the Rule 80 EPC objections of the Respondents.

In substance, both sides agreed that everything had been said with regard to the question of Article 123(2) EPC in the discussion about Auxiliary Request 1. Each side maintained its previous position to this issue.

Consequently, the decision was given that all versions of Auxiliary Request 3 were refused.

(18) Since the situation for Auxiliary Request 4 appeared to be the same, the Appellant was asked whether it maintained this request. At this point, the Appellant asked for permission by the Board to file a further Auxiliary Request, which it had apparently already prepared. However, in view of the late stage of the proceedings and with regard to the Rules of Procedure of the Boards of Appeal, the Chairman informed the Appellant that it could not be invited to

file further requests. Consequently, the Appellant maintained Auxiliary Request 4.

Respondent O-03 pointed out that in addition to the comments already given with regard to Auxiliary Request 1, it was noteworthy that Claim 1 of this request incorporated features of the multimodal polyethylene as had been defined in [Claim 1], except for the shear ratio which was only mentioned in Claim 2.

This gave rise to a short discussion about the content of [0026] (***page 6, paragraph 2***) and of [0023] (***page 5, penultimate paragraph***) as far as a shear ratio (SR) was concerned, because it was in dispute whether the SR as disclosed there was a property of the multimodal polyethylene or of the HMWF thereof.

When the parties expressed their respective opinions that everything to Article 123(2) EPC had been said, the debate was closed on Auxiliary Request 4 and after final deliberation of the Board this request was also refused and the final decision was announced.

VII. The final requests of the parties had been as follows:

The Appellant requested that the decision under appeal be set aside and that patent in suit be maintained on the basis of Claims 1 to 29 as granted (Main Request) or, in the alternative, on the basis of one of the Auxiliary Requests filed during the oral proceedings, ie the "First Auxiliary Request" (Claims 1 to 17), the "First Auxiliary Request (amended)" (Claims 1 to 16), the "Third Auxiliary Request" (Claims 1 to 15), the "Third Auxiliary Request (amended)" (Claims 1 to 14), the "Third Auxiliary Request (twice amended)" (Claims 1

to 14) or the "Fourth Auxiliary Request" (Claims 1 to 11).

The Respondents requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. In the present case, each of the operative requests on file had been contested on the basis of Art 100(c) EPC. Before the other grounds for opposition could be dealt with (ie the issues of Articles 100(a) and 100(b) EPC), the allowability of the claims of each request had to be established with regard to the above objection under Article 100(c) EPC (and optionally Articles 123(2) and 123(3) EPC), if possible.

Main Request

3. As pointed out by the Respondents (sections V(1) and VI(5), above) the wording of [Claim 27] had been amended before grant, as already objected to in the Notice of Opposition of O-04 (page 3) under Article 100(c) EPC 1973.

3.1 The claim in question had been based on ***Claim 29*** and ***page 5, paragraph 2***, which related the use of a multimodal polyethylene "in a polyethylene article to provide the article with resistance to stress-cracking".

3.1.1 The multimodal polymer, as defined in ***Claim 1*** and as further explained on ***page 4, lines 7 to 13***, was "suitable for use in a pipe" (***line 8*** of that page) and

could be used for the article (*Claim 30*), which was preferably a polyethylene pipe (*Claim 31*).

3.1.2 The stress-crack resistance is referred to in the description as a property of the polyethylene which could be graded (tested) in two tests, the FNCT (full notch creep test) and/or the NPT (notch pipe test) (*page 6, last paragraph*). On *page 7, paragraphs 2 and 4*, some further information about these two tests was given. Finally in the last paragraph on *page 17*, it was stated that the claimed resins displayed "superior stress-crack resistance, as reflected in the FNCT test results ... In particular, pipes formed from these resins display excellent properties, having very high NPT times.".

3.1.3 It is evident from the two paragraphs on *page 7*, that the FNCT was carried out with a simple test equipment "being usually set-up for a tensile creep test" (cf. E36, page 212, Fig. 2 and page 208, paragraph 2) and using square section bars, whereas the NPT was a test wherein pressure was applied to a notched pipe.

3.2 In [Claim 27], reference was, however, made to the use of the multimodal polyethylene "in a polyethylene article to provide the article with enhanced creep resistance to stress-cracking as determined by the notch-pipe test (NPT) of EN 33479".

3.2.1 The Respondents repeatedly argued in the course of these appeal proceedings that this wording contained information extending beyond the content of the *application* as referred to in sections 3.1 to 3.1.3, above (sections V(1) and VI(5), above). In particular, they pointed out, that "creep resistance to stress-cracking" as referred in [Claim 27] was not identical

to "resistance to stress-cracking" or "stress-crack resistance" as used in the application, they referred to E12, E13A and E36 (cf. section VI(5), above) and argued that, furthermore, no comparison was available to demonstrate an enhancement of the creep resistance.

3.2.2 None of these detailed arguments was convincingly refuted by the Appellant. The argument (as presented once at the hearing before the Opposition Division; Minutes: Item 2.1) that, according to E36, page 207, right column, the resistance to creep was the main mechanism governing the stress crack performance of the polymer and resistance to slow crack growth and hence to stress-crack resistance as such, does not convincingly invalidate the Respondents' arguments.

3.2.3 Thus, E12 refers to environmental stress-crack resistance, to resistance to rapid crack propagation and to creep resistance as separate properties. E13A goes even further when it speaks of a compromise between (on the one hand) the resistance to crack propagation (slow crack propagation and rapid crack propagation) and (on the other hand) creep resistance. Moreover, E36 (published in 1997) investigating the resistance to slow crack growth and reviewing methods for characterising this property (cf. its Abstract) focused on the development of the FNCT. For comparative purposes, two other tests were also considered, ie the NPT, which "was refined by the 'Notch test Group' an Ad-Hoc Group of ISO/TC 138/SC4 ... and is currently being published as an International Standard, ISO 13479:1997, [4]", and yet another test called PENT (polyethylene notch test) (page 206, paragraph 2 ***et seq.*** and page 208, last paragraph). On page 207, left column, lines 11/12, some similarity was conceded with regard

to the FNCT and the PENT and in the discussion of the results (page 209 et seq.), the same ranking of the times to failure was found for a given material in each of these tests (right column, lines 11 to 14).

Whilst it has not been disputed that stress-cracking included different mechanisms such as slow and rapid crack propagation, it is, however, clear for the Board from the above pieces of prior art and from the ***application*** itself (***pages 7 and 17***, as mentioned above), that the FNCT and the NPT were quite different tests and that the art acknowledged creep resistance as not being a feature having the identical meaning as "stress crack resistance" or "resistance to stress-cracking", although it appears to be accepted as an indicator for one failure mechanism which may occur within the phenomenon of environmental stress-cracking. Whilst, according to ***page 17***, "superior stress-crack resistance" in the ***examples*** was reflected in the FNCT test results, the "high NPT times" were only linked to "excellent properties" of the pipes, in general (section 3.1.2, above). This does not, in the Board's view and as argued by the Respondents, amount to the disclosure of an enhancement of the creep resistance (section VI(5), above, paragraph 2).

The present situation is similar to a chemical case, just to give an example for the sake of argument, wherein reference has been made in its text to olefins, in general, without disclosing appropriate individual examples for this generic group of compounds, and wherein it is, therefore, impossible to restrict the case to propylene in order to exclude, for whatever reason, ethylene.

3.3 In view of these facts, arguments of the parties and findings, the Board has come to the conclusion that [Claim 27] refers to an ***aliud*** and, therefore, contravenes Article 123(2) EPC.

3.4 Since a decision can only be made on a request as a whole and because the ground for opposition according to Article 100(c) EPC prevails, the Main Request must therefore be refused.

Auxiliary Request 1

4. This Auxiliary Request was objected to with regard to the density of the multimodal polyethylene amended to "0.945 to 0.955 g/cm^3" in Claim 1. Since the same amendment is also contained in Claim 1 of Auxiliary Request 4, the following considerations are also valid for Auxiliary Request 4.

4.1 The Appellant relied on the disclosure on [0028] (***page 6, paragraph 4***) as providing the basis for this amendment (section VI(9), above).

4.1.1 By contrast, the Respondents argued that an upper limit of "0.945 g/cm^3 or less" as disclosed in that paragraph could not be used as the lower limit of the range of from "0.945 to 0.955 g/cm^3", (see sections V(3) and VI(11), above), which was disputed by the Appellant who referred to Decision T 955/92 (above).

4.1.2 In that decision, the Board had taken the view that in a claim wherein "The lower limit of the range disclosed in granted claim 3 is thereby taken as the higher limit in the amended claim. Such a conversion in meaning of a range limit is normally acceptable under Article 123(2)

EPC because by defining a preferred range the remaining, non-preferred range, is implicitly disclosed as well."

Whilst in the present situation the upper and lower limits are reversed in comparison with the situation described in the first sentence of the above quotation, the Board concurs with the finding of that Board in its second sentence, because (i) it has never been disputed by the present Respondents, that either of the range of 0.930 to 0.955 g/cm^3 and the value of 0.945 g/cm^3 had originally been disclosed, or (ii) the previous range of 0.930 to 0.955 g/cm^3 has not been extended beyond its original scope by the replacement of the old value of 0.930 by the new limit of 0.945 g/cm^3. Hence, in the Board's opinion, the finding expressed in the second sentence of the above quotation is directly valid here.

4.1.3 Besides this objection under Article 123(2) EPC, the Respondents asserted that the claim would lack clarity due to this amendment. The Board cannot see any reason for concurring with this view, because 0.945 g/cm^3 had undisputedly been a valid value originally disclosed, irrespective of whether it had been the upper or lower limit of the parameter or of whether it now forms the upper or lower limit of a further restricted range of the same parameter.

4.2 However, a second, more general objection was also raised against the density range as introduced prior to grant into the definition of the "multimodal polyethylene" comprised in the pipe of Claim 1. This objection was, in the Respondents' view, applicable to each version of each Claim 1 of all still operative (cf. section VI(4), above) Auxiliary Requests, irrespective of whether they related to the pipe ***per se*** as in

Auxiliary Request 1 or to the method of its installation as in Auxiliary Requests 3 and 4.

4.2.1 This second objection boils down to the question of whether "the final polyethylene comprising ...", as referred to in paragraphs 4 and 5 of ***page 6*** ([0028] and [0029]) is identical to the "multimodal polyethylene" of Claim 1 (in any one of the still operative requests), so that, if this question can be answered in the affirmative, the particulars disclosed on ***page 6*** can be accepted as forming a proper basis (in the sense of Article 123(2) EPC) for the definition of the "multimodal polyethylene" in Claim 1 of eg this request.

4.2.2 In the first place, the meaning of "final polyethylene comprising" as used in the ***application*** has to be assessed. The expression can be found on ***page 6*** in the two paragraphs, already mentioned in section 4.2.1, above, concerning density and HLMI, respectively.

Furthermore, the penultimate sentence of ***page 6, paragraph 2*** and ***page 8, last line*** relate to "(t)he SR value of the final polyethylene", and in the ***examples***, mention is made of "the final bimodal resin" in ***Example 1*** (***page 14, line 4 from below***), "the final blue bimodal product" in ***Example 2*** (***page 15, line 8 from below***), "the final black bimodal product" and "the final compound" in ***Example 3*** (***page 16, lines 9 and 2 from below***, respectively).

In the Board's view, the expressions used in ***Examples 2 and 3*** clearly relate to compounds of the multimodal polyethylene additionally comprising pigment and additives as mentioned in the second paragraphs of both examples. In ***Example 1***, the bimodal resin was prepared by "chemical blending", ie by two-stage polymerisation

in two reactors in series (cf. *page 8, paragraph 3*) as opposed to physical blending (cf. *page 8, paragraph 2*) as in *Examples 2 and 3*. *Example 1* then continues "The final bimodal resin was formulated...".

This wording in the description of the procedure carried out in *Example 1* and referring, at first, to the preparation of the "bimodal resin" by sequential polymerisation and then to the formulation of "the final bimodal resin" can, in the Board's view, only concern two separate process steps. In other words, the "final bimodal resin" clearly and unambiguously refers to the product obtained after the extrusion steps described in the paragraph bridging *pages 14 and 15*, in which the blue pigment and standard additives were blended into the bimodal resin.

This finding is also in line with the disclosure of the SR and HLMI values of "the final polyethylene" on *pages 6 and 8*, respectively (sections 4.2.1 and 4.2.2, above). As shown in the right-most columns of *Tables 1 to 3*, the respective SR and HLMI values of the final compounds included at least the respective pigments.

4.2.3 In view of these findings, the Board has come to the conclusion that the expression "the final polyethylene comprises" is not limited to the exclusive presence of the HMWF and lower molecular weight fractions as referred to in *paragraphs 4 and 5 on page 6*, but rather includes any optional additives such as pigments etc. formulated into the multimodal polyethylene.

4.2.4 This conclusion is also in line with the wording of Claim 1, which relates to "A polyethylene pipe comprising a multimodal polyethylene ...", but not to "A polyethylene pipe consisting of the final

polyethylene" (the latter polyethylene optionally containing additives, eg pigments, as in the ***examples***).

The wording as used in the claim, thus, clearly refers to a composition of the pipe which comprises (i) the multimodal polyethylene (having a certain composition and showing certain properties) plus (ii) any conceivable additives as optional components (not explicitly mentioned in the claim).

4.2.5 This leads directly to the conclusion that the description on ***page 6*** defining the density for the "final polyethylene", does not, as shown above, define a property of the multimodal polyethylene ***per se*** as originally defined on ***page 4, lines 9 to 13*** and in ***Claim 1***, but, as expressed in eg ***Example 3***, a property of a "final compound" or "final black bimodal product" which may contain additives, eg a pigment. Consequently, the insertion of the above density range into Claim 1 before grant provided additional information (by redefining the meaning of the density on ***page 6***) and thereby created an ***aliud*** extending beyond the content of the application as initially filed.

4.2.6 With regard to the SR parameter, it should be noted that on ***page 6, paragraph 2***, apparently two different features are mentioned, firstly, the SR of the HMWF and, secondly, the SR of the "final polyethylene", as assessed above. By contrast, the SR as defined in ***Claim 1*** clearly refers, thirdly, to a property of the "multimodal polyethylene".

4.3 In summary, the Board takes the view, therefore, on the basis of the above considerations and findings, that the incorporation of the density range of 0.945 to 0.955 g/cm^3 as a property of the "multimodal

polyethylene" into Claim 1 is not based on the density as disclosed on page 6, paragraph 4, and, consequently, contravenes Article 123(2) EPC.

4.4 As addressed in section VI(3), above, an amended version of this request was filed during the oral proceedings before the Board. However, Claim 1 of this amended version was identical to Claim 1 of the previously filed version. Therefore, the above considerations and findings are equally valid for both versions of Auxiliary Request 1.

4.5 Since Claim 1 does not comply with the requirements of the EPC and the request can only be decided on as a whole, Auxiliary Request 1 and Auxiliary Request 1 (amended) are refused.

Auxiliary Request 3

5. In view of the withdrawal of Auxiliary Request 2 (sections VI(3) and VI(16), above), the next request to be considered has been Auxiliary Request 3.

5.1 Claim 1 of this request, as initially filed at the oral proceedings, relates to a method of pipe installation directly corresponding to Claim 3 of Auxiliary Request 1 (section VI(2) in conjunction with sections VI(1), IV(4), IV(3) and IV(2), all as above).

5.2 Like Claim 1 of Auxiliary Request 1 and as indicated in section 4.2, above, this method claim also includes a range defining the density of the multimodal polyethylene comprised in the pipe, which, however, ranges (as in [Claims 1 and 21]) from 0.930 to 0.955 g/cm^3. Consequently, the second objection

mentioned in section 4.2, above, is also valid for Claim 1 of this Auxiliary Request.

5.3 Irrespective of the difference in the lower limit of the density range at issue, all the considerations and findings set out in sections 4.2.1 to 4.3, above, are also valid for this Auxiliary Request.

5.4 Moreover, with regard to the two amended versions, which were filed during the oral proceedings, it must be stated that none of the amendments carried out in those amended versions has changed the situation concerning Claim 1 of this request.

5.5 Consequently, the Board's view in section 4.3 and the conclusion in section 4.5, both as above, are equally valid for each of the three versions of Auxiliary Request 3. Therefore, Auxiliary Request 3, Auxiliary Request 3 (amended) and Auxiliary Request 3 (twice amended) are refused.

Auxiliary Request 4

6. Claim 1 of Auxiliary Request 4 relates to a method of pipe installation similar to the method of Claim 1 of Auxiliary Request 3 (section 5.1, above), however, with some additional restrictions.

6.1 The restriction, which concerns the decisive amendment of Claim 1 in comparison with the initial ***claims***, resides in the definition of the density of the multimodal polyethylene comprised in the pipe. This amendment is identical to the one considered above in connection with Claim 1 of Auxiliary Request 1, ie the insertion of the density of from 0.945 to 0.955 g/cm^3.

6.2 Therefore, all the considerations and findings set out in sections 4 to 4.3, above, are also valid for this Auxiliary Request.

6.3 Consequently, the Board's view in section 4.3 and the conclusion in section 4.5, both as above, are equally valid for Auxiliary Request 4. Therefore, Auxiliary Request 4 is refused.

7. Since none of the requests of the Appellant on file prevails, the decision under appeal cannot be set aside as requested by the Appellant. Rather, the decision under appeal revoking the patent in suit must be upheld.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier R. Young