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**Datasheet for the decision
of 6 February 2009**

Case Number: T 1768/06 - 3.3.03

Application Number: 99102031.4

Publication Number: 0934955

IPC: C08F 2/00

Language of the proceedings: EN

Title of invention:

Polymerization process characterized by a two layer coating against scale formation deposited using a steam carrier

Patentee:

Shin-Etsu Chemical Co., Ltd.

Opponent:

Akzo Nobel N.V.

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Relevant legal provisions (EPC 1973):

-

Keyword:

"Novelty - (yes) "

"Inventive step - (yes) "

Decisions cited:

T 0021/81, T 0231/97

Catchword:

-



Case Number: T 1768/06 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 6 February 2009

Appellant: Akzo Nobel N.V.
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Representative: von Fünér, Nicolai
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 20 September 2006 and posted 4 October 2006 rejecting the opposition filed against European patent No. 0934955 pursuant to Article 102(2) EPC 1973.**

Composition of the Board:

Chairman: A. Däweritz
Members: M. C. Gordon
E. Dufrasne

Summary of Facts and Submissions

- I. Mention of the grant of European Patent No. 0 934 955 in the name of Shin-Etsu Chemical Co. Ltd in respect of European patent application No. 99102031.4 filed on 1 February 1999, published on 11 August 1999 and claiming a priority date of 5 February 1998 from JP 396 0698 was announced on 16 April 2003 (Bulletin 2003/16) on the basis of 12 claims.

Claim 1 read as follows:

"A process for producing a polymer by polymerizing in a polymerization vessel a monomer having an ethylenic double bond, wherein;

said polymerization vessel has a polymer scale preventive coating film on its inner wall surfaces and other surfaces with which the monomer comes into contact during polymerization;

said coating film comprising a first layer formed on said inner wall surfaces and other surfaces and a second layer formed on the first layer;

said first layer being formed by coating a first coating liquid containing a conjugated Π bond-containing compound selected from the group consisting of an aromatic compound having 5 or more conjugated Π bonds and a heterocyclic compound having 5 or more conjugated Π bonds by means of steam as a carrier, and said second layer being formed by coating a second coating liquid on the first layer by means of steam as a carrier; and

said second layer having a surface having a contact angle to water of less than 60° after its surface has been brought into contact with a

solution of mixture of water and a vinyl chloride monomer in a weight ratio of 1:1, at 50°C for 1 hour."

Claims 2 to 12 were dependent claims.

II. An opposition against the grant of the patent was filed on 16 January 2004 by Akzo Nobel N.V.

The grounds of opposition pursuant to Art. 100(a) EPC 1973 (lack of novelty, lack of inventive step) were invoked.

The following documents, *inter alia* were cited by the opponent in support of the opposition:

D1: EP-A-0 458 267

D2: JP-A-55 036 288 (cited in the form of the original document and a translation thereof into English)

During the course of the opposition proceedings the patent proprietor submitted comparative data (with letters dated 24 August 2004 and 30 August 2006).

With respect to D1 the patent proprietor - who is also the proprietor of D1 - submitted that in the examples thereof spray coating had been employed (letter of 24 August 2004) which submission was not challenged.

Further sets of claims forming first to sixth auxiliary requests were filed with a letter dated 17 March 2005. By letter dated 20 July 2006 sets of claims forming amended fifth and sixth auxiliary requests were filed.

III. By a decision announced on 20 September 2006 and issued in writing on 4 October 2006 the opposition division rejected the opposition.

(a) With respect to novelty the decision held that D1 disclosed a method for producing a polymer by polymerising a monomer having an ethylenic double bond in a polymerisation vessel, which vessel had a polymer scale preventive coating on the inner wall surfaces and on other surfaces with which the monomer came into contact during polymerisation. This coating film had two layers. The first layer ("undercoat") was formed by coating a first coating liquid containing a water-soluble anionic dye. Among the permissible dyes were aromatic compounds having more than 5 conjugated Π bonds and heterocyclic compounds having more than 5 conjugated Π bonds.

The second layer had the same components as claimed in (the dependent claims of) the patent in suit.

Thus, as had been agreed by the patent proprietor in its letter dated 24 August 2006 (see section II above) and during the oral proceedings before the opposition division, the chemicals in the layers of D1 were identical to those according to the patent in suit.

D1 taught that the method for applying the first coating layer was not particularly limited and included, for example:

- brush coating
- spray coating
- filling the polymerisation vessel with the coating solutions and withdrawal thereof
- the use of automatic coating methods, reference being made in this respect to a number of cited patent documents, one of

which was D2 (see section II above).

D1 similarly taught that the method for applying the second coating solution was not particularly limited, reference being made to the same methods as for the first layer.

Neither for the first nor for the second layer was steam coating directly and unambiguously disclosed in D1. The "automatic coating", which according to the documents cited in D1 could include steam coating, was one of several possibilities. None of the examples of D1 used steam coating for either of the layers; nor was the use of steam coating for both layers simultaneously disclosed. Accordingly the subject matter of claim 1 was novel.

- (b) With regard to inventive step the decision held that D1 constituted the closest state of the art. According to D1 the skilled person had the choice between four coating methods for applying the first layer (see the foregoing paragraph). Similarly with respect to the second layer the skilled person had the choice between the same four methods in order to solve the problem of obtaining a second layer having a surface having a contact angle to water of less than 60° after its surface had been brought into contact with a solution of mixture of water and a vinyl chloride monomer in a weight ratio of 1:1 at 50°C for 1 hour.

D2 taught the advantages of steam coating as being:

- various coating materials could be used;

- since the coating proceeded in the form of a mist all the portions concealed or placed behind in the reactor, which had been difficult to coat could be similarly and uniformly coated.

D2 was however silent about the effect of steam coating on the layer itself. Specifically the coating layer formed by means of steam coating according to the patent in suit was different from the second coating layer formed by means e.g. of spray coating according to D1.

This difference in properties was exemplified in comparative experiments provided by the patent proprietor with a letter of 30 August 2006 (see section II above).

It was held that these data showed that the choice of steam coating had an effect which was not predicted by the teaching of D2.

Further D2 would not be considered by the skilled person to constitute an improvement with respect to D1 since the alleged advantages of steam coating referred to tests made after only the completion of 4 cycles.

Hence the skilled person would not turn to D2 for the solution of the particular problem.

Accordingly it was held that the subject matter of the patent as granted met the requirements of Art. 56 EPC.

- (c) Therefore the opposition was rejected.

IV. A notice of appeal against this decision was filed by the opponent on 23 November 2006, the appeal fee being paid on the same day.

V. The statement of grounds of appeal was received on 9 February 2007.

(a) The objection of lack of novelty with respect to the disclosure of D1 was maintained.

It was emphasised that the chemicals employed to make the first and second layers of the patent in suit were identical to those employed in D1, as had been affirmed by the patent proprietor and the opposition division (see section III.(a) above).

The methods by which the first layer could be applied according to D1 included application by means of steam as a carrier as disclosed in D2, referred to at page 5, lines 26-31 of D1. The second layer could be applied by the same method (D1, page 6, lines 51-54).

Although it was true that the examples of D1 employed spray coating for both layers (cf section II above), the technical teaching of D1 included steam coating, reference being made to the passages on pages 5 and 6 referred to above.

It was also submitted that when having to apply two layers the skilled person would employ the same technique for both, this being technically the most realistic way and hence would be done as a matter of course.

It was further submitted that the contact angle

feature of operative claim 1 was inherent to the teaching of D1 at least as far as the steam coating embodiment was concerned.

The evidence was twofold.

Firstly the patent itself gave no information regarding any special technical measures in order to arrive at said contact angle. The only technical measure discernable was that steam coating should be employed. Since steam coating was already disclosed in D1 the contact angle had to be the inevitable result of the application of steam coating itself and nothing else.

Support for this position was provided by the evidence of the patent proprietors letter of 30 August 2006. These data showed that spray coating resulted in a contact angle of $>60^\circ$ whereas steam coating resulted in contact angles of 55° and 50° .

- (b) Regarding inventive step it was submitted that D1 represented the closest prior art.

The appellant submitted that the formulation of the problem employed in the decision (see section III.(b) above) was incorrect since it included a pointer to the solution (i.e. the contact angle). Apart from this, the contact angle could not be considered as a technical feature that contributed to the solution of the problem since this was nothing but the result of applying steam coating technology.

An objective analysis revealed that the difference between D1 and the subject matter of claim 1 of the patent in suit could be seen to reside in the manner in which the scale preventive layers were applied.

The technical effects of applying scale preventive layers by means of steam as a carrier instead of via spray coating, as set out in paragraphs [0014] and [0017] of the patent in suit included:

- the coating was applied as a uniform and thin layer;
- surfaces standing within the dead angle from the spray nozzle were also coated;
- no drying step was necessary; and
- improvement in the quality of the polymer product.

Accordingly the objective technical problem was how to apply the scale preventive coating solutions according to D1 in a uniform and thin layer while also surfaces standing within the dead angle from the spray nozzle were coated and drying steps were unnecessary and the quality of the polymeric product was improved.

Thus the question to be answered was whether there was anything in the prior art that would prompt the skilled person to apply the scale preventive coating solutions according to D1 on the walls of a polymerisation vessel using steam as a carrier.

D1 contained a reference to D2 for applying both coatings employing steam as a carrier. For this reason alone the skilled person would readily combine D1 with D2 with no need for further motivation.

Thus any newly described effects which might be obtained by applying the coating liquids of D1

using the technique of D2 were merely bonus effects. An unexpected bonus effect did not confer inventiveness on an obvious solution (with reference to the decisions T 21/81 - OJ EPO 1983, 015 - and T 231/97 of 21 March 2000, not published in the OJ EPO).

The idea behind D2 was to find an improved method for applying the scale preventive coating layers on the walls of a polymerisation vessel compared to spray coating. Further D2 taught that since the coating proceeded in the form of a mist all concealed portions, i.e. those difficult to reach could be uniformly coated. Further advantages described in D2 were shorter time for forming the coating since no drying steps were needed, improved prevention of adhesion of polymer scales and that fewer coloured particles were mixed into the polymer obtained.

VI. The patent proprietor, now the respondent replied with a letter dated 21 June 2007.

With respect to the contention of the appellant that the skilled person would as a matter of course employ steam also for coating the second layer it was submitted that in most cases when a first liquid was mixed with a second coating liquid sedimentation occurred. Accordingly it was recommended that mixing of two liquids should be avoided.

In the examples of the patent in suit the second liquid was applied using steam as a carrier by means of the same application apparatus as that employed for application of the first coating layer by steam. This was in fact less preferable and currently two

application apparatuses were used, one for each liquid despite the complications this entailed.

During the course of the development of the method of the patent in suit the inventors had attempted to employ spray coating for the application of the second layer to avoid troubles which might arise by mixing of two liquids within the single application apparatus. Thus it was not natural for the skilled person to employ the steam coating method for application of the second coating liquid even if this method had been employed for the application of the first coating liquid.

D2 disclosed the use of steam or superheated steam to form a film or layer of a coating material on the inner surface of a polymerisation reactor, but was entirely silent about "a second coating layer". Only the formation of one coating layer was described in D2.

The respondent included further data to supplement that submitted with the letter of 30 August 2006 (see section II above). These data referred to the fish eyes, luminosity and coloured particles and showed that these aspects were improved by the claimed process.

- VII. On 21 November 2008 the Board issued a summons to attend oral proceedings.
- VIII. Oral proceedings were held on 6 February 2009.
- (a) With regard to novelty the appellant presented a summary of the objections raised in the written procedure. In particular it was emphasised that the materials employed for the coating layers according to D1 were within the scope of those

specified according to the operative claim 1. D1 disclosed that the same coating method could be employed for both layers and, via the reference to D2, that steam coating was disclosed. It was emphasised that the skilled person would as a matter of course employ the same coating method for both layers. It would be technically complicated and hence counter-intuitive to employ different methods for each layer.

With respect to the contact angle it was submitted that this was inherent and an automatic consequence of applying the teachings of D1. It was argued that the patent in suit contained no disclosure of a method in order to ensure that this contact angle was attained. This was confirmed by the evidence of the patent proprietor of 30 August 2006 which showed that the specified contact angle was a consequence of applying the coatings by the steam method.

The respondent acknowledged that the specification of the coating materials in operative claim 1 encompassed those of D1.

With respect to the coating method it was submitted that although D1 contained an implicit disclosure of employing steam coating there was no explicit disclosure thereof. Further it was disputed, this implicit disclosure notwithstanding, that D1 even envisaged steam coating since all the methods explicitly disclosed in D1 related to "wet coating" as indicated by references to a drying step. No drying step was however required with steam coating. Accordingly it was clear that, despite the reference to D2, D1 did not in fact

encompass steam coating. Further, it was not possible to subsume the reference to D2 under any of the methods mentioned specifically in D1. Regarding the teaching of D1 with respect to the second layer the explicit teaching of D1 did not refer to D2 in this context.

In response, the appellant in particular disputed the submissions with respect to the significance of the discussion of "wet" coating methods put forward by the respondent. In particular D1 was directed to the skilled person who would realise that the disclosures with respect to a drying step would not apply in the case that the method of D2 (steam coating) was employed. The absence of an explicit reference to D2 in the context of the second step was irrelevant since this referred to the discussion of the methods employed for the first step which discussion did include an explicit reference to D2. It was emphasised that simple technical logic dictated using the same coating technique for both steps.

After a break for deliberation the Board announced its decision that the subject matter of claim 1, and consequently of the dependent claims was novel (Art. 54 EPC).

- (b) With regard to inventive step the appellant submitted that D1 was the closest prior art. This related to two-layer coatings which were designed to be effective in those cases where single layer coatings were inadequate. D1 disclosed various methods for applying the coating

including steam coating. This was not explicitly mentioned in D1 but was disclosed in D2 to which D1 made reference.

It was submitted that D2, which related to steam coating, referred on page 6 to three US patent documents which were directed to spray coating methods. D2 explained that steam coating entailed a number of benefits compared to spray coating. The aim was to prevent scale build up on the reactor. One disadvantage of spray coating was incomplete coating of those parts of the reactor which were "hidden", which problem was successfully addressed by the use of steam coating. The patent had the same aim as D2 and likewise acknowledged the deficiencies of spray coating and that these could be overcome by using steam coating. In paragraph [0016] the patent explained that a single layer applied by steam coating exhibited a number of deficiencies. In the light of this the skilled person would consider the teaching of D1 relating to a double layer as leading to increased robustness. Thus it was obvious to employ a two layer coating and apply this by steam.

The respondent concurred that D1 represented the closest prior art and that the components employed in the layers thereof were within the scope of the corresponding features of operative claim 1. The distinguishing feature with respect to D1 was the manner of coating (use of steam rather than spray). The comparative examples of 24 August 2004 (see section II above) and further data submitted with the rejoinder to the statement of grounds of

appeal (see section VI above) confirmed that this resulted in reduced scale build up and correspondingly improved properties of the polymer. Consideration of the teachings of D2 - the advantages and disadvantages of which process were discussed in paragraphs [0013]-[0016] of the patent in suit (reference being made to the corresponding Japanese Patent Publication (kokoku) No. 1-5044) - showed that there remained scope for improvement in the prevention of reactor scale build up. There was no teaching in D2 that steam coating had any benefits in particular in the light of the results of the invention according to the patent in suit which showed effective prevention of scale after 200 or 250 batches in the reactor. On the contrary D2 showed that only 4 batches were possible between reactor inspections. Further the effects demonstrated with respect to the contact angle could not have been predicted on the basis of the disclosure of D2.

The appellant dismissed the significance of the fact that according to D2 an inspection was carried after only 4 batches since according to the teaching on page 18 of (the English translation of) D2 many cycles were possible. D2 explicitly referred to the problem of polymer on the side of the reactor becoming detached and contaminating the polymer in the reactor. D2 emphasised that the use of steam coating resulted in a "molten mist" which coated all parts of the reactor. The skilled person would realise that this would not be possible with spray coating. All the effects shown by the respondent were the

natural consequence of producing an effective coating. It was a matter of routine to evaluate the quality of the polymer and the results of such analysis could not contribute to an inventive step.

The respondent emphasised that in the light of the number of batches disclosed in D2 it would not be obvious that applying the coating composition of D1 by steam would result in an improvement in scaling prevention. The average number of runs in the examples of D1 was 24 compared to 4 in D2.

- IX. The appellant (opponent) requested that the decision under appeal be set aside and that the European Patent No. 934 955 be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed or, in the alternative, that the decision under appeal be set aside and that the patent be maintained on the basis of one of the auxiliary requests 1 to 4 filed with letter dated 17 March 2005, or one of the auxiliary requests 5 to 6 filed with letter dated 20 July 2006.

Reasons for the Decision

1. The appeal is admissible.
2. *The patent in suit, the technical aims*
 - 2.1 The patent in suit relates to a polymer production process that can prevent polymer scales from adhering to the inner wall of the polymerisation vessel and can

produce a polymer having a good quality. The process employs a monomer having an ethylenic double bond (patent, paragraph [0001]).

It is explained starting at paragraph [0002] of the patent that in processes for producing polymers by polymerising monomers in polymerisation vessels a problem exists that polymers may adhere to internal surfaces of the polymerisation vessel in the form of scales. These scales may result in a decrease in yield of the polymer, a decrease in cooling capacity of the polymerisation vessel and a lowering of the product quality when the polymer scales become detached and mix with the polymer products. Much labour is required to remove the polymer scales. Further since the polymer scales contain unreacted monomers there is a risk of exposure of operators thereto.

2.2 In paragraphs [0005]-[0008] of the patent it is taught that in order to address the problem of preventing polymer scale build up on the inside of reactors it is known to coat the inside of surface of the reactor, stirrers etc. Both one and two layer coating processes are known.

In particular so-called "two stage" coating processes are employed when the one-stage coating proves inadequate (patent, paragraph [0007]).

Spray coating is usually employed as the coating method in view of productivity and operability (patent, paragraph [0008]).

However when this method is adopted the surfaces of baffles and stirring blades that face the inner wall of the polymerisation vessel are located within the "dead angle" with respect to the spray nozzles. Consequently these "blind" surfaces are inadequately coated, making

it difficult to obtain a uniform coating. If sufficient coating solution is employed to ensure that these "blind" surfaces are coated then excessive coating will be applied to the exposed surfaces. This leads to an uneven coating and to parts having a larger thickness of coating than is necessary (patent, paragraph [0011]).

The fact that repeated coating is employed can lead to those parts of the film with larger thickness becoming detached and contaminating the polymerisation mixture. Further, spraying requires a drying step which requires time and so reduces productivity (paragraph [0012], sections (1) and (3) of the patent in suit).

2.3 The patent proposes in paragraphs [0013] and [0014], as a means to eliminating these disadvantages to use steam as a carrier ("steam coating" in the terminology of the patent).

In this connection, as noted by the respondent during the oral proceedings before the Board (see section VIII.(b) above), the patent refers in paragraphs [0013]-[0016] to D2.

According to the patent in suit steam coating has a number of advantages (paragraph [0014]):

- a thin and uniform coating film is produced using a small amount of the coating liquid;
- coating can be attained also on those parts which are "blind"/hidden, i.e. standing within the "dead angle" from the spray nozzle;
- no drying step is necessary.

Steam coating however also has a number of disadvantages (patent paragraph [0016]):

- scale deposition at the gas/liquid phase interface can be insufficiently prevented;
- this leads to accumulation of scale with repetition of polymerisation runs around the gas/liquid interface which can peel off the inner surfaces of the polymerisation vessel and be incorporated in the polymer to cause formation of fisheyes;
- the scale preventive agent is coated repeatedly on the inner surface as polymerisation runs are repeated, leading to a gradual increase in thickness. Part of this may become detached and become incorporated in the polymer product to cause coloured particles.

2.4 Accordingly the object of the invention is to provide a polymerisation process which (paragraph [0017] of the patent):

- can shorten the time for coating to improve productivity;
- can improve the effect of preventing adhesion of polymer scales;
- reduce the amount of polymer contamination and so
- improve the quality of the polymeric products.

This problem is stated to be solved by the subject matter of claim 1 (patent paragraph [0018]).

2.5 In the examples of the patent a "batch" is defined as an 8 step operation commencing with coating of the reaction vessel and concluding with washing the inside of the reaction vessel with water following the polymerisation and removal of the polymer (patent paragraph [0161]).

The examples of the patent and those submitted subsequently demonstrate the following:

After a total of 200 or 250 batches the level of scale build up on various parts of the reactor (liquid phase, vicinity of gas/liquid boundary, stirring blades and baffles) is at the level of a maximum of 3g/m^2 after 200 batches, rising to a maximum of 7g/m^2 after 250 batches (Tables 7 and 9 of the patent).

In contrast the comparative examples show in the worst case (comparative example 104 employing spray coating and a single coating layer) a build up of 250 g/m^2 after only 10 batches.

According to the evidence submitted with the letter of the patent proprietor of 24 August 2004 (the rejoinder to the notice of opposition) the reduction in scale build up is directly linked to the manner in which the coating is applied. This evidence constituted two pairs of experiments, designated 101/I and II/105 respectively each pair employing a different combination of coating compounds for the first and second layers. Experiments I and 105 employed spray coating and hence were comparative experiments. These examples showed a build up of 21 g/m^2 and 10 g/m^2 respectively on the baffles. Experiments 101 and II of this report are inventive examples and show that in the case of applying the coating by steam the maximum level of build up is 1 g/m^2 (on the baffles).

The supplementary evidence submitted with the rejoinder to the statement of grounds of appeal (see section VI above) shows that the polymers prepared in the reactor

after steam coating exhibited improved properties (lower number of fish eyes and coloured particles, higher brightness) than the polymers which had been prepared in reactors where the coating had been applied by spraying.

2.6 This evidence therefore demonstrates that the technical aims of the patent in suit (see section 2.4 above) are achieved by the subject matter of the claims.

3. *The prior art*

3.1 D1 (EP-A-458 267) relates, like the patent in suit, to anti-scale coatings for reactor vessels employed for the polymerisation of ethylenically unsaturated monomers.

3.1.1 As noted in the decision under appeal, and agreed by the patent proprietor (see sections III.(a), and VIII.(a) above) the coating materials employed in D1 are encompassed by the claims of the patent as granted.

3.1.2 Regarding the means for applying the first coating D1 discloses on page 5 in the section entitled "Formation of the first coating" that the first coating solution is applied to the inner walls of a polymerisation vessel and then dried at temperatures from room temperature to 100°C. The method for applying the coating solution is stated to be "not particularly limited" (D1, page 5, lines 26ff) and "includes" (i.e. is not limited to), for example brush coating, spray coating, the method of filling the vessel with the coating solution followed by withdrawal thereof and "automatic coating methods" as disclosed in five

Japanese patent applications. These are referred to only by their numbers. There is however no discussion of their teachings. This list is further extended to an unspecified extent by means of the term "etc" (D1, page 5, line 31).

3.1.3 The disclosure of the method of application of the second coating in D1 is at a similar level of non-restrictive generality as that relating to the first layer. In this connection D1 discloses (page 6, lines 51ff) that the method is "not particularly limited" and that the coating "can be" applied by the same methods as for the first coating, including the "automatic coating methods". However in contrast to the discussion of the first coating layer, no documents are cited in respect of the "automatic coating methods".

3.1.4 The examples of D1 do not specify the manner in which the coatings are applied. The patent proprietor - who is also the proprietor of D1 - submitted in its response to the Notice of Opposition (letter of the proprietor dated 24 August 2004, page 3) that spray coating was employed.

According to the examples of D1 a number of polymerisation batches ("runs" in the terminology of D1) were carried out. Each "run" commenced with coating of the reaction vessel and concluded with the step of washing the vessel with water. In contrast to the "batch" of the patent (see section 2.5 above) in each "run" of D1, subsequent to the step of withdrawing the polymer, and before carrying out the washing step, the amount of polymer scale depositing on the inner wall of the vessel was determined.

The examples report the number of "scale prevented

runs" which according to page 11, line 25 of D1 was the number of runs that could be repeated before the amount of polymer scale exceeded 1 g/m².

The examples of D1 showed that the maximum number of "scale prevented runs" possible was 38 (Table 3, example 208).

- 3.2 One of the documents cited in D1 in respect of the "automatic coating methods" is Kokai 36288/1980, i.e. D2 (see section II above).
- 3.2.1 According to claim 1 thereof D2 relates to a method for applying a coating solution to the inner surfaces of a reactor by the action of steam as a carrier.
- 3.2.2 On page 7 of the English language translation of D2 it is taught that the coating material can be applied in the form of a molten mist to the surfaces of the reactor. On page 8 of the translation it is taught that since the coating proceeds in the form of a mist all the portions concealed or placed behind in the reactor, which have been difficult to coat, can be similarly and uniformly coated. It is also taught that it is not necessary that the coating surfaces are dried before the polymerisation materials are added. There is however no disclosure in D2 of multiple coating layers. The examples thereof employ a single coating layer.
- 3.2.3 According to page 18 the use of steam means that "many" polymerisation cycles can be performed without opening the reactor between cycles. It is not necessary to re-coat the surfaces of the reactor when performing many cycles, although it is preferable to recoat whenever charging is performed.

3.2.4 According to the examples of D2, coating is however performed prior to each polymerisation charge. The reactor is inspected after only 4 such "cycles".

4. *Novelty*

As noted above, according to the process of claim 1 of the patent in suit both layers are applied by steam coating.

4.1 D1 does not specify the coating method to be employed for either of the steps, beyond giving a number of alternatives (see section 3.1.2 above). Steam coating is not explicitly mentioned in D1. The reference to D2 mentions only the number of the document; no discussion of the content thereof is provided in D1.

Accordingly D1 fails to disclose explicitly that steam coating is to be employed.

4.2 Further D1 does not contain any discussion with respect to the relationship between the method to be employed for the two coating steps. In particular there is no teaching or discussion of whether the same method is to be employed for both steps.

Accordingly D1 fails to disclose - even implicitly - that the same coating method is to be employed for both coating steps.

4.3 Accordingly it is concluded that the subject-matter of claim 1 of the patent as granted is novel.
Since the remaining claims are dependent on claim 1

this conclusion applies *mutatis mutandis* to the subject-matter thereof.

4.4 As pointed out in section 3.2.2 above, D2 discloses a method employing only a single layer.

4.5 The patent in suit therefore meets the requirements of Art. 54 EPC.

5. *Inventive Step*

5.1 By common consent among the parties, the closest prior art is represented by the disclosure of D1. The Board is satisfied that this is correct since, as is apparent from the discussion of the patent in suit in section 2 and that of D1 in section 3.1 above, D1 is concerned with the same technical aims as the patent in suit, namely the reduction in build up of polymer on the inner parts of the polymer reaction vessel.

5.2 As is apparent from the discussion of the patent in section 2.5 the amount of deposit build up in the claimed process is such that acceptable polymer quality is still obtained after up to 250 batches have been prepared in the reactor. According to the teaching of D1 however the maximum number of batches that can be carried out before the level of scale build up exceeds the threshold deemed acceptable is only 38.

5.3 Accordingly the technical problem to be solved with respect to the teaching of D1 may be formulated as being to increase the number of batches (runs) that can be carried out before a lowering of product quality

- resulting from contamination by the polymer scales, and to reduce the need of labour to remove the polymer scales (patent paragraph [0003]- see also section 2.1 above).
- 5.4 As follows from the discussion of D1 in section 3.1 above this document does not disclose or suggest the use of steam coating for either of the coating steps. Nor does D1 contain any other teaching that would lead the skilled person to expect that the above formulated technical problem would be solved by employing steam coating for the two layers.
- 5.5 Therefore while according to the disclosure of D1 steam coating could be used for applying either or both of the coating layers, it would not be obvious in the light of the disclosure of D1 to do so. It therefore follows that the subject matter of operative claim 1 is not obvious in the light of the disclosure of D1.
- 5.6 Regarding the question of whether the skilled person would consider the combination of the teachings of D1 and D2 in order to solve the above formulated technical problem, as noted above the examples of D1 report up to 38 "scale prevented runs". Although D2 states (translation, page 18, lines 5-7) that "many cycles" can be performed, the examples, which in general are construed to relate to the preferred embodiments, report only 4 cycles before inspection of the reactor - i.e. almost a factor of 10 smaller than the maximum number of cycles reported in D1. Further, the examples of D2 only present a comparison between a (single layer) steam-coated reactor and a

non-coated reactor. Accordingly the teachings of D2 do not provide the skilled person with any information relating to technical effects arising from the use of steam coating as compared to other known coating methods e.g. those mentioned explicitly on page 5 of D1 (see section 3.1.2 above), let alone teach that steam coating might confer benefits compared to other coating methods.

In any case in view of the reported number of runs carried out before inspection (4) there is no disclosure in D2 that would lead the skilled person to expect that the maximum number of 38 "scale prevented runs" reported in D1 could even be maintained, let alone exceeded by the use of steam to apply the reactor coatings, as is demonstrated by the examples of the patent in suit. Hence there was no reason for the skilled person to combine the teachings of D1 and D2 with a view to solving the above formulated technical problem.

5.7 Accordingly it is concluded that the subject matter of claim 1 is founded on an inventive step. This conclusion applies *mutatis mutandis* to the subject matter of the dependent claims.

5.8 In view of the foregoing conclusion that it is not obvious to employ steam coating for the application of both layers, and in particular not obvious to combine the teachings of D1 and D2 the arguments advanced by the appellant with respect to bonus effects in the Statement of Grounds of appeal do not arise (see section V.(b) above).

5.9 The patent in suit therefore meets the requirements of Art. 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

A. Däweritz