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Datasheet for the decision of 20 October 2010

Case Number: T 0807/08 - 3.3.03

Application Number: 01107870.6

Publication Number: 1146073

IPC: C08K 3/36

Language of the proceedings: EN

Title of invention:
Rubber composition

Patentee:
THE YOKOHAMA RUBBER CO., LTD.

Opponent:
Bridgestone Corporation

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Novelty - yes - features not disclosed in combination"
"Inventive step - (yes)"

Decisions cited:
T 0292/92, T 0793/93

Catchword:
-

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Case Number: T 0807/08 **-** 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 20 October 2010

Appellant: (Opponent)	Bridgestone Corporation 10-1, Kyobashi 1-chome Chuo-ku Tokyo Japan (JP)
Representative:	Lamb, Martin John Carstairs Marks & Clerk LLP 90 Long Acre London WC2E 9RA (GB)
Respondent: (Patent Proprietor)	THE YOKOHAMA RUBBER CO., LTD. 36-11, Shimbashi 5-chome Minato-ku Tokyo 105-8685 (JP)
Representative:	HOFFMANN EITLE Patent- und Rechtsanwälte Arabellastrasse 4 D-81925 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office dated 24 January 2008 and posted 25 February 2008 concerning maintenance of European patent No. 1146073 in amended form.**

Composition of the Board:

Chairman: A. Däweritz
Members: M. C. Gordon
C. Vallet

Summary of Facts and Submissions

I. Mention of the grant of European Patent No. 1 146 073 in the name of The Yokohama Rubber Co., Ltd. in respect of European patent application No. 01107870.6 filed on 10 April 2001 and claiming a priority date of 11 April 2000 from JP 2000115813 was announced on 22 December 2004 (Bulletin 2004/52) on the basis of 5 claims which read as follows:

1. A rubber composition containing precipitated silica having an aluminum content of 0.01 to 0.24 wt%.

2. A rubber composition containing precipitated silica having an aluminum content of 0.01 to 0.1 wt%.

3. A rubber composition as claimed in claim 1 or 2, wherein a CTAB specific area of the precipitated silica is 130 to 210 m^2/g and a BET/CTAB ratio is 1.3 to 2.0.

4. A rubber composition as claimed in any one of claims 1 to 3, wherein a rubber ingredient in said rubber composition is natural rubber, a diene-based synthetic rubber, or a mixture of these rubbers and carbon black is further contained in an amount of at least 10 parts by weight with respect to 100 parts by weight of the rubber ingredient.

5. A rubber composition as claimed in any one of claims 1 to 4, wherein the rubber ingredient in said rubber composition is a rubber mixture containing at least 60 parts by weight of natural rubber with respect to 100 parts by weight of the rubber ingredient.

II. A notice of opposition to the patent was filed on 21 September 2005 by the Bridgestone Corporation invoking the grounds of opposition pursuant to Art. 100(a) EPC in combination with Art. 54 EPC and Art. 56 EPC (lack of novelty, lack of inventive step).

7 Documents were cited in support of the opposition *inter alia*:

D1: EP-A-983 966
D2: WO-A-95/09127
D4: JP-A-11-228 740 (and D4a - English language translation).

During the course of the opposition proceedings further documents D8-D10 were cited by the parties, *inter alia*

D9: JP-A-6-271 311 and a partial translation thereof (D9'), cited by the opponent with a letter of 21 December 2007.

III. In a decision announced on 24 January 2008 and issued in writing on 25 February 2008 the opposition division held that the patent could be maintained in amended form on the basis of the sole request consisting of 3 claims and filed with a letter dated 5 May 2006.

Claim 1 of this request read as follows:

1. A rubber composition containing precipitated silica having an aluminum content of 0.01 to 0.1 wt.%, wherein a CTAB specific area of the precipitated silica is 130 to 210 m^2/g and a BET/CTAB ratio is 1.3 to 2.0.

Claims 2 and 3 corresponded to claims 4 and 5 as granted.

According to the decision:

(a) D9 was admitted to the proceedings by mutual agreement of the parties. D8 and D10 were not admitted to the proceedings.

(b) *Art. 123(2) EPC:*

The requirements of Art 123(2) EPC were satisfied.

(c) *Art. 54 EPC*

D1 disclosed in claim 13 and paragraphs [13]-[20] rubber compositions containing a precipitated silica having, *inter alia*:

- "an Al_2O_3 content of below 5 wt% (corresponding to 2.6 wt% Al)";
- CTAB area of 80 to 139 m^2/g;
- BET/CTAB ratio of 1.0-1.6.

Although the ranges of D1 partially overlapped with those claimed there was no mention in D1 of a precipitated silica having in combination the features set out in operative claim 1. Similarly the examples and comparative examples of D1 did not employ silicas having simultaneously the features specified in operative claim 1.

The product "Ultrasil VN3" was mentioned in both D1 and D2. However different values of the BET specific area were reported in each document (D1: 125 m^2/g; D2: 170 m^2/g). In agreement with the opponent, the opposition division held it to be unlikely that such a high difference (36%) arose from the use of different measuring methods, thus it was concluded that D1 and D2 referred to different products, despite the identity of name. The same conclusion applied to the product "Perkasil KS 404", likewise mentioned in both D1 and D2 with different BET specific areas reported in each document (D1: 160 m^2/g; D2: 183 m^2/g).

D2 disclosed rubber compositions comprising a precipitated silica having a CTAB area of 140 to 240 m^2/g and, in two different embodiments, BET/CTAB ratios of 1.0 to 1.2 or greater than 1.2. Examples 8, 10 and 11 disclosed addition of 0.3 wt% of aluminium (in the form of sodium aluminate) to the silica, which amount was outside the scope of the operative claims. There was no disclosure of the amount of aluminium actually present in the Al-doped silica and the opponent had not been able to show that the silica of D2

had an Al content falling within the scope of the claim.
The presence of "Perkasil KS 404" in an example of D2 did not disclose the properties of the silica since the aluminium content was not disclosed in D2 and the teachings of D1 (Al content of 0.08 wt% corresponding to Al_2O_3 content of 0.15 wt%) could not be relied upon for this feature (see above).

D4 disclosed a rubber composition having a precipitated silica. In some examples the CTAB and BET/CTAB ratio were within the scope specified for operative claim 1, the Al content was however not disclosed.
D4 disclosed that the silica could be synthesised from a solution of sodium silicate having a content of "at least 0.1 wt% of Al_2O_3 (corresponding to 0.05 wt% of aluminium)"; however this disclosure did not provide any information about the amount of Al in the final product.
Consequently the opposition division acknowledged novelty.

(d) *Art. 56 EPC*

The closest prior art was D2 as this related to the same problem as the patent in suit, namely to improve the processability and abrasion resistance of silica reinforced rubber compositions. D1 was more remote since, unlike D2, it did not address abrasion resistance.
Example 12 of D2 - not example 13 as erroneously stated in the decision - employed the silica designated "P8" and was the most relevant part of the teaching thereof. However this did not disclose the aluminium content of the silica

filler.

The examples of the patent in suit showed that, at comparable values of CTAB and BET/CTAB ratio, the processability (Mooney viscosity), abrasion resistance, silica dispersion and viscoelastic properties (tan δ at 60°C) were improved by use of a silica with an aluminium content in the claimed range compared to a silica with a higher aluminium content.

Thus the objective technical problem was to improve these properties of silica-reinforced rubber compositions.

None of the cited documents suggested the claimed solution, i.e. use of a specific silica, in particular having an Al content of 0.01 to 0.1 wt%.

Accordingly an inventive step could be recognised.

IV. A notice of appeal against the decision was filed on 24 April 2008 by the opponent, the prescribed fee being paid on the same day.

V. With a letter dated 6 May 2008 the patent proprietor - now the respondent - requested dismissal of the appeal.

VI. The statement of grounds of appeal was received on 25 June 2008.

Two further documents were cited:

D11: Extracts from the official file of Japanese patent application number 2000-115813, the Japanese equivalent to the patent in suit and translations thereof;

D12: Extract from "Soluble Silicates" (J.S. Falcone Jr, ed. ACS Symposium Series, American Chemical

Society, Washington DC 1982, "Current Regulatory Status of Soluble Silicates", p. 45).

(a) The appellant concluded from the statement of the patent proprietor in the proceedings before the Japanese Patent Office, as shown by D11, that the common general knowledge included a method for the manufacture of hydrous silica from silica powder and that the content of aluminium in the finished product would be the same as in the starting material.

D12 reported the typical Al impurity levels of commercial sodium silicates (50 to 200 ppm). D9 established that hydrous silica was routinely produced from alkali silicate, which in turn could be produced by fusing a silica with soda ash to form cullet and fusing under heating with water. Alkali silicate made in this way was known to have an aluminium content of not more than 0.055 parts by weight Al based on 100 parts of SiO_2.
These documents suggested that hydrous silica for use in reinforcing rubber tyres and having an Al content of less than 0.1 wt% was common general knowledge, which conclusion was consistent with the teachings of D1.

(b) *Art. 54 EPC*

- D2 disclosed rubber compositions containing silica compositions having BET and CTAB/BET values which overlapped with the claimed range;
- The CTAB value of the silica Perkasil KS 404 (designated "PC1" in D2) was 145 m^2/g and hence within the claimed range; The ratio BET/CTAB was 1.26 and hence, when rounded to

one decimal place 1.3, i.e. within the claimed range;

- The Al content of silica "PC1" - Perkasil KS 404 - was not disclosed in D2 but this was taught in D1;
- The discrepancy in the BET values quoted in D1 and D2 did not invalidate this conclusion;
- The opponent was of the view that BET and CTAB/BET values could vary from batch to batch, e.g. as a result of differences in production conditions, storage times etc. In particular the BET value was highly sensitive to changes in conditions;
- The Al content would however remain constant;
- Thus it was understood that the aluminium content quoted in D1 for the commercially available silica composition KS404 would, on the balance of probability, be the same as in the KS404 used in D2;
- Thus D2 taught in example 13 the use of a silica having all the features of operative claim 1;
- Similarly D4 disclosed silicas with CTAB and BET/CTAB values substantially overlapping with the clamed ranges;
- The term "hydrous silicate" employed in D4a was an incorrect translation - the correct term being "hydrous silica";
- D4 disclosed that hydrous silica could be obtained by a method using alkali silicate - such as commercially available sodium silicate - as starting material;

- It was general knowledge that the aluminium content of commercial sodium silicate was normally less than 0.1% based on silica and, as shown by D11 it was also known that this content of Al was retained in the silica produced by the wet method;
- D4 indicated in paragraph [0009] that a solution of sodium silicate containing 0.1-1 wt % alumina - corresponding to 0.055 to 0.55 wt% of Al/silica - could also be employed;
- As the reaction method was the same, this concentration would also be present in the final product;
- The examples of D4 taught silica compositions (having properties of CTAB and BET/CTAB overlapping with those of claim 1 of the patent in suit) and having an Al concentration of less than 0.055% or 0.055-0.55% depending on the starting material which in each case fell within the scope of the silica specified in operative claim 1;
- These silicas were subsequently combined with rubber;
- As explained in production example 1 of D4a these silicas had been prepared from commercial sodium silicate by a method corresponding to that disclosed in D11 and hence would have the same aluminium concentration as the starting product, i.e. a value expected to be less than 0.055 % which to a large extent overlapped with the claimed range;

- As the extent of overlap was very substantial the skilled person could seriously contemplate working in this area;
- Thus D4 taught a silica falling within the scope of claim 1 which consequently lacked novelty.

(c) *Art. 56 EPC*

Either D1 or D2 could serve as the closest prior art.

(i) Based on D2 as the closest prior art the only difference was the content of Al.

- Any commercial silica would inevitably contain some Al - e.g. about 0.055 % which would overlap with the amount specified in claim 1;
- Further in example 8 of D2 3000ppm of Al based on the silica were added during production of the silica corresponding to an amount of 0.3% of Al based on silica;
- There was no evidence of any technical effect arising from a content of Al of 0.01 to 0.1 % as compared to 0.3%. Thus the objective technical problem was simply the provision of another silica composition;
- There was no reason why the skilled person would not employ an Al content as claimed. Accordingly an inventive step could not be recognised.

(ii) D1 could also be taken as the closest prior art even though it did not relate to abrasion resistance, as noted in the decision under appeal (see section III.(d), above) since it had the most technical features in common with the patent in suit.

- In particular D1 taught the need to control the Al level, the CTAB value and the BET/CTAB ratio;
- The "composition of Example 11/Example 1" of D1 was distinguished from operative claim 1 by the "CTAB ratio" (***sic***) of 110 m^2/g and the Al content (0.32%);
- There was no evidence in the patent of any effect arising from these features since:
  - In the examples of the patent in suit the various silicas employed were not sufficiently similar in terms of CTAB and BET/CTAB to permit a valid comparison;
  - Thus the examples could not provide proof of any effect linked to the specified aluminium content;
  - On the contrary the observed differences in the properties of the rubber compositions could just as likely be due to the CTAB and BET/CTAB values.
- Thus the problem was only to provide an alternative to the compositions of D1 and there was no reason not to use an Al level as claimed;
- Further D1 disclosed a number of commercial silica compositions all having the required Al content;
- The subject matter of claim 1 was distinguished from these commercial silicas by the CTAB and BET/CTAB values;
- However D4 taught that silica used in rubber composition should have a BET/CTAB ratio of

1.4-1.8 for good reinforcement and a CTAB value in the range of 175-250 m^2/g;

- Thus the skilled person setting out to improve the reinforcement would employ the CTAB and BET/CTAB values set out in D4 and so arrive at the subject matter of claim 1.

(iii) The combination of D4 and D2 also rendered the subject matter claimed obvious:

- D4 taught that the silica should have a BET/CTAB ratio of 1.4-2.0 to improve the dispersion of silica into the rubber composition, which was required for good reinforcement and
- The CTAB value should be from 170-250 m^2/g;
- Further D2 taught that with a CTAB value of 140-240 m^2/g and a BET/CTAB ratio >1.2 excellent abrasion resistance was obtained;
- Hence D2 taught to use silicas with the claimed CTAB and BET/CTAB ratios to improve reinforcement and/or abrasion resistance and so arrive at the subject matter of the patent in suit.

VII. The patent proprietor, now the respondent, replied with a letter dated 10 November 2008.

Three restructured tables of data taken from the examples of the patent in suit were provided. The respondent/patent proprietor stated that these data had been grouped in the new tables in order to emphasise the effect of differences in Al content, differences in BET/CTAB ratio and differences in CTAB values respectively. The thus restructured data refuted the criticisms of the appellant/opponent that the examples were unsuitable to show superior technical effects (cf

section VI.(c) above). In particular in (new) Table 1 there were no substantial differences between CTAB and BET/CTAB values within the group of examples example 1, 3 and example 4 (comparative) which thus provided a valid basis for comparison.

(a) The object of the patent in suit, as set out in paragraph [0004] was the provision of a silica-containing rubber composition that achieved a reduction in Mooney viscosity and an improvement in abrasion resistance. In the experimental section also the dispersion state and tan δ (60°C) were reported. A favourable balance of these properties was achieved by the rubber composition defined in the claims maintained by the opposition division.

(b) With regard to novelty over D2 the respondent submitted:

- The aluminium content did not follow implicitly from the disclosure of D2, since it was not the inevitable result of the explicit disclosure of D2 (reference being made to T 793/93; 27 September 1995, not published in the OJ EPO);
- The appellant/opponent had failed to explain where D2 clearly and unambiguously taught to combine a BET/CTAB ratio of 1.3 to 2.0 with a CTAB area of 130-210 m^2/g;
- It did not follow from the teachings invoked by the appellant/opponent as representative of the common general knowledge (i.e. D11, D12, D9 and D1- see section VI.(a), above) that the aluminium content of the silica of D2 would inevitably be in the claimed range since these documents disclosed that there

equally existed silica grades having aluminium contents above the maximum permitted by the claim (0.1 wt%);

- Regarding example 13 of D2, in particular the composition containing Perkasil KS 404, it was noted that the BET value reported for this silica in D2 (183 m^2/g) did not match the BET value given for the product of the same name reported in D1 (160 m^2/g);
- This demonstrated that the properties of this product varied from batch to batch and that it could not be concluded that the product batch used in D2 would have the same aluminium content as reported in D1;
- Further it was easily seen that even minor changes in the BET value would result in a product having a BET/CTAB ratio outside the claimed range.
- Thus a rubber composition as claimed was not clearly and unambiguously derivable from the disclosure of D2.

With regard to novelty over D4:

- Although D4 disclosed the preparation of the silica, the aluminium content in the product obtained was not reported;
- It was not the case - as allegedly shown by D11 - that it was general knowledge that the aluminium content of precipitated silica prepared by the wet method would be the same as in the starting sodium silicate solution;
- Even if this were assumed to be the case it would not mean that the combination of

features as specified in operative claim 1 was disclosed in D4;

- Based on the description of D4 a selection would be needed as there was no teaching to combine specifically the lower part of the CTAB range, i.e. 170-210 m^2/g with the aluminium containing embodiments;
- More importantly, D4 disclosed for the use of aluminium silicate as starting material a very broad possible Al content, i.e. 0.055 to 0.55 wt% and failed to teach to combine CTAB values of 170-210 m^2/g with an Al content of 0.055 to 0.1 wt%.

(c) With regard to inventive step the respondent/patent proprietor concurred with the findings of the opposition division that D2 represented the closest prior art since this document addressed the same problems as the patent in suit, namely the processability (Mooney viscosity) and also sought to improve the abrasion resistance of the compositions.

D1 did not qualify as the closest prior art since it did not address abrasion resistance, did not discuss the dispersion state of silicas and employed silicas with a very high Al content. D4 evaluated heat build up, storage modulus and rolling resistance. Thus D1 and D4 represented a less promising springboard towards the invention than did D2.

With respect to D2:

- Example 13 of D2, referred to by the opposition division, did not make use of silica P8 (see section III.(d) above);
- Example 12 of D2 however employed silica "P8" having an aluminium content of 0.3 wt%;
- The claimed subject matter differed from this by the lower aluminium content (0.01-0.1 wt%);
- This feature, together with the specified CTAB and BET/CTAB values provided the rubber composition with a favourable balance of Mooney viscosity, dispersion state, abrasion resistance and tan δ (60°C).
- This improvement was apparent from the restructured tables of results provided. These showed - contrary to the criticism of the appellant/opponent (see section VI.(c).(ii), above) - that the examples of the patent in suit were indeed suitable to demonstrate superior technical effects;
- Thus it was justified to formulate the objective technical problem with respect to D2 as being to provide a rubber composition having lower Mooney viscosity, better dispersibility, greater abrasion resistance and lower tan δ (60°C);
- This was not rendered obvious by any of the documents on file;
- Although D1 disclosed silica grades with Al contents in the claimed range these were comparative products. In any case, none of the examples of D1 fulfilled the CTAB and

BET/CTAB requirements. Also D1 did not evaluate abrasion resistance;

- D4 provided no information on the Al content and hence failed to teach that a particular Al content should be used in combination with specific BET/CTAB and CTAB values;
- The examples of the patent in suit established that the combination of specific CTAB values with a low Al content was not arbitrary. This teaching could not be derived from D4;
- D2 taught away from the claimed invention since a comparative example thereof showed that a silica having CTAB and BET/CTAB values at least close to the claimed ranges (Perkasil KS 404, designated "PC1" in D2) was not suitable to achieve lower Mooney viscosity.

VIII. On 23 July 2010 the Board issued a summons to attend oral proceedings to be held on 20 October 2010.

IX. The appellant/opponent made a further submission with a letter dated 20 September 2010.

(a) With respect to the novelty objection based on D4:

- There was significant overlap between the preferred ranges of CTAB and BET/CTAB disclosed in D4 and those specified in claim 1 of the patent in suit;
- The respondent/patent proprietor had not answered the argument that the aluminium content was directly derivable from the starting materials, and consequently also fell within the ambit of claim 1, although

the same logic had been applied in its submissions in the corresponding Japanese case.

(b) With respect to inventive step and the comparative data of the patent:

- The case law required that comparative data be obtained using samples wherein only a single parameter was changed (with reference ***inter alia*** to T 292/92, 6 September 1996, not published in the OJ EPO);
- The percentage difference in the numerical results between the comparative and inventive examples in the patent was on average no greater than the percentage difference between the various parameters in the examples; further no error figures were quoted;
- As a consequence the comparative data were meaningless;
- The large degree of overlap in CTAB and BET/CTAB ratio between D4 and the values in claim 1 of the patent in suit meant that the only difference between D4 and claim 1 was the Al content which was not entirely clear in D4;
- Both D1 and D2 disclosed a common commercial material - Perkasil KS 404 which had an Al content within the claimed range;
- Thus there was no inventive skill in using a common commercial material in combination with surface areas known from D4 to be advantageous.

X. Oral proceedings were held on 20 October 2010.

(a) With respect to novelty the appellant/opponent submitted essentially that there was considerable overlap between the disclosures of D2 and D4 and the subject matter claimed, in particular:

- D2 disclosed a CTAB value in the range of 140-240 m^2/g and a ratio of BET/CTAB of 1.21 to 1.4, both of which values overlapped to a large extent with the range specified in claim 1;
- D4 disclosed a CTAB value in the range of 180-230 m^2/g, which again overlapped to a large extent with the claimed range. The ratio BET/CTAB ranged from 1.4 to 2.0 and lay fully within the scope of operative claim 1;
- As followed from D9, D11 and D12 the aluminium content in the compositions of D2 and D4 would inevitably be in the claimed range;
- Example 12 of D2 employed Perkasil KS 404 which, as shown by D2, had the CTAB and BET/CTAB values required by the claims and as shown by D1 had an Al content in the required range.

The respondent/patent proprietor submitted:

- D9 and D12 were not prior art which could be taken as indicative of standard general knowledge. D12 referred to typical impurity levels of common silicates in the US in the context of "Current Regulatory Status of Soluble Silicates" (publ. 1982). Not all SiO_2 fulfilled these requirements. D9 was

not a textbook but a patent document pertaining to a particular alleged invention;

- Moreover D11 was a submission by the patent proprietor in parallel Japanese proceedings and consequently not prior art;
- Consequently none of D9, D11 and D12 could be considered as fulfilling the conditions to be considered as relevant prior art;
- Nor did the respondent/patent proprietor accept that there was a direct link between the Al content in the silicate starting material and the Al content in the precipitated silica that depended on the precipitation conditions;
- Evidence advanced by the appellant/opponent with respect to the aluminium content in the silicas of D2 and D4 fell far short of the required standard, i.e. 100% likelihood with no credible alternatives;
- Even if it were accepted - despite there being only a very minor overlap - that the Al content disclosed in D4 corresponded to that in the final product this still would not establish lack of novelty since there was no clear link between this content of Al and the required CTAB and BET/CTAB values;
- Regarding the properties of Perkasil KS 404 - employed in example 12 of D2 - the respondent/patent proprietor observed that the CTAB and BET/CTAB values disclosed in D1 and D2 - for the same named product - were different. Consequently it could not be assumed, despite the identity of name, that this was the same product. Consequently it

was not possible to combine the values of the aluminium content from D1 with the CTAB and BET/CTAB values disclosed in D2;

- The position of the appellant/opponent that the CTAB and BET/CTAB values would be subject to variation whereas the Al content would remain constant was dismissed as unsupported speculation.

After deliberation the Board announced that the subject matter claimed was novel.

(b) With regard to inventive step the appellant/opponent submitted:

- According to the patent in suit the technical problems to solve were to provide a silica having good dispersibility in rubber compositions and which provided compositions with good processability and abrasion resistance;
- Either D2 or D4 could be considered to serve as the closest state of the art as they both considered the same technical problem as the patent in suit;
- In both cases there was considerable overlap between the disclosed CTAB and BET/CTAB values and those specified in operative claim 1;
- The aluminium content was not disclosed but it could be inferred that at least in some cases, e.g. "PC1" (Perkasil KS 404) of D2 this was in the claimed range;
- Regarding the examples of the patent in suit it was recalled that, according to the case

law, in presenting comparative data it was required that only a single parameter be changed between examples;

- The majority of the examples of the patent in suit did not satisfy this requirement since multiple factors were changed;
- Further some of the differences in the properties measured were very minor and there was no indication of the measurement error;
- Whilst it was possible to make a comparison between example 3 and comparative example 1 and accepting that, despite small differences, the values of BET/CTAB ratio and CTAB could be considered to be the same, and thus that these examples differed only in the Al content the obtained results would have been expected since:
- Comparative example 1 had a value of Al content far above anything in the prior art and demonstrated poor dispersibility;
- This poor dispersibility could however result from a change in the pore volume, the significant effect of which on dispersibility was known from D4;
- Since it had not been confirmed that the pore volume between these two examples had not inadvertently been changed it was not possible to conclude that the difference in the dispersibility (Example 3 - "very good", Comparative Example 1 "poor") was due solely to the aluminium content;

- Other examples of the patent in suit provided a more valid comparison of difference in CTAB and BET/CTAB values, namely example 11 and example 16 (comparative) with ratios of 1.50 and 1.10 respectively. The results showed only a small difference in dispersibility, whilst the Mooney and tan δ (60°C) values were better for the comparative composition than for that according to the claims;
- Thus the comparisons of the respondent/patent proprietor were ambiguous and, since it was not assured that there had been no change to the pore volume, did not allow any conclusions to be reached as to the effect of the Al content;
- Thus the only problem that had been solved was to provide an obvious alternative to the compositions known from D2 and D4.

The respondent/patent proprietor submitted:

- D2 was a better starting point for the assessment of inventive step, the difference being the aluminium content;
- The comparative data on file, in particular example 1/example 4 (comparative) and example 3/comparative example 1 showed that this resulted in improvements in viscosity and abrasion resistance;
- The other series of examples also supported this conclusion;
- Regarding the effect of the porosity on dispersibility, example 2 and example 7

(comparative) showed that - despite a large difference in the BET/CTAB ratio - the dispersibility and Mooney viscosity were approximately the same. This proved that differences arising from the aluminium content were not due to hidden or undetected differences in porosity. Similarly example 1/example 4 (comparative) showed that despite only a minor difference in BET there was a large difference in Mooney viscosity; this provided further confirmation that the differences between example 1 and example 4 (comparative) were not due to the BET/CTAB ratio;

- In any case the submissions of the appellant/opponent regarding the influence of porosity on the properties of the rubber were pure speculation - no supporting data or counter experiments had been submitted (this statement was not contradicted by the appellant/opponent);
- With respect to D2 it was incorrect to rely on the composition containing silica PC1 (Perkasil KS 404) as closest prior art since this was a comparative example;
- The arguments based on D4 relied on a highly selective interpretation of the teaching thereof;
- In any case D4 failed to discuss properties such as dispersibility and hence this document could not serve as the closest prior art;

- The overlap between the subject matter claimed and the teachings of D2 or D4 was small;
- The data of the patent in suit showed that it was necessary that all three features be in the claimed range in order to obtain the reported effects.

(c) After it had been established that the parties did not wish to make any submissions, the debate was closed and the requests established.

XI. The appellant/opponent requested that the decision under appeal be set aside and that European Patent no. 1 146 073 be revoked.

The respondent/patent proprietor requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Art. 123(2) EPC*

No objections were raised in respect of the requirements of Art. 123(2) EPC. Nor does the Board have any concerns of its own in this respect.

3. *Art. 54 EPC*

3.1 *D2 (WO-A-95/09127)*

D2 is directed to a precipitated silica. In the examples this is combined with a rubber composition.

3.1.1 According to page 10 the silica has a CTAB value of 140-240 m^2/g, preferably 140 to 225 m^2/g, the most preferable values being from 150 to 200 m^2/g, which falls fully within the range specified in operative claim 1.
The ratio of BET/CTAB is, as disclosed on page 11 in one variant from 1.0 to 1.2, i.e. entirely outside the claimed range, or in another embodiment from 1.21 to 1.4, which overlaps the claimed range in the region of 1.3 to 1.4.

3.1.2 There is no disclosure in D2 explaining in general which of the disclosed values of CTAB are to be employed with which of the two different disclosed ranges of BET/CTAB ratio.

3.1.3 With regard to aluminium, D2 discloses on page 7 that this can be added during the preparation of the silica in order to reduce the viscosity of the suspension prior to atomisation. The amount of aluminium to employ is however not disclosed.

Only example 8 of D2 discloses a silica where the value of CTAB and the BET/CTAB ratio are both in the claimed range (CTAB 149 m^2/g, BET 200 m^2/g, ratio of these 1.34). This example discloses that aluminium is added to the silica in the final stages of the preparation, the amount added being 3000 ppm with respect to silica, i.e. 0.3 wt% which is above the maximum specified in operative claim 1 (i.e. 0.1 wt%).
The amount of aluminium remaining in the silica after final processing is not disclosed.
Accordingly D2 fails to disclose a silica having an amount of aluminium in the claimed range.

3.1.4 In example 12 of D2 a - comparative - silica designated "PC1" is employed. This is the product "Perkasil KS 404".
According to Table 1 this has a CTAB of 145 m^2/g and a BET of 183 m^2/g, which yields a BET/CTAB ratio of 1.26.
The aluminium content is not disclosed in D2.

3.1.5 D1 (EP-A-983 966) refers to "Perkasil KS 404" (Page 10 and page 13, example 8) and discloses:

- An alumina content of 0.15 wt% - corresponding to 0.079 wt% aluminium;
- An N_2 surface area (i.e. BET) of 160 m^2/g and a CTAB surface area of 160 m^2/g, and consequently
- a BET/CTAB ratio of 1.

It is conspicuous that these surface areas and the ratio thereof are different from those reported for - nominally the same product - in D2.

3.1.6 In view of this the Board shares the concerns expressed by the respondent/patent proprietor - set out in the rejoinder to the statement of grounds of appeal (see section VII.(b), above) and at the oral proceedings (see section X.(a), above) as to whether the designation "Perkasil KS 404" employed in D1 and D2 actually relates to the same product in both cases.

3.1.7 In particular the Board also notes that the teachings of D1 and D2 are separated by a period of ca 5 years, D1 having a priority date of 3 September 1998 whereas D2 has priority dates of 29 September 1993 and 12 August 1994. This aspect reinforces the uncertainty whether the silicas employed in these teachings are identical.

3.1.8 The appellant/opponent argued in this connection that whilst the aluminium content would remain fixed, the surface area was liable to change under production or storage conditions (cf submissions made in the statement of grounds of appeal- section VI.(b) above). However no evidence has been advanced in support of this contention.

3.1.9 Accordingly the Board finds no basis on which to conclude that the products disclosed in D1 and D2 under the name "Perkasil KS 404" are in fact the same, and therefore is unable to arrive at any conclusions other than that there exists no information in the cited documents relating to the aluminium content of the product of this name reported in D2.

3.1.10 Regarding the submissions made with respect to the "common general knowledge" relating to the Al level in silicas, allegedly represented by the teachings of D9, D11 and D12 (see sections VI.(a), VII.(b) and X.(a), above) the Board considers that none of these documents can be considered as representative of common general knowledge. D9 is a patent document, the teaching of which is related to a particular method for producing a hydrous silicate and its disclosure must be considered in the context of that invention only. D12 is concerned with regulatory matters for silicates and discloses "typical" impurity levels of non-identified sodium silicates and fails to discuss the preparation of silica therefrom or the properties of such silica. D11 is an extract from correspondence in proceedings before the Japanese Patent Office relating to the Japanese patent application corresponding to the patent in suit. This document contains extracts from two

pieces of correspondence, an official communication bearing a date of 2 February 2005 and a response thereto, bearing a date of 17 March 2005. Thus simply in view of the dates of this correspondence D11 cannot qualify as prior art. In any case this document does not represent a technical teaching representative of common general knowledge and does not contain any reference to such a teaching, but is simply restricted to pleadings and submissions in the context of that particular case.

3.1.11 Accordingly the subject matter of operative claim 1 is novel with respect to the disclosure of D2, example 8, in particular the product Perkasil KS 404 due to the specified content of aluminium.

3.2 *D4 (JP-A-11-228740, page and line references refer to the English language translation D4a).*

3.2.1 D4 discloses a rubber composition containing a silica having a CTAB surface area of 170-250 m^2/g, which overlaps with the upper end of the range specified in the operative claim, and a BET/CTAB ratio of 1.4-2.0, which is entirely within the claimed range.

3.2.2 The preparation of the silica is discussed in paragraph [0009] of D4, starting from alkali silicate, whereby sodium silicate is explicitly mentioned. The final sentence of this paragraph reads:
"Also a solution of sodium silicate containing Al_2O_3 at a concentration of 0.1-1.0% by weight Al_2O_3/SiO_2.".
The meaning of the sentence is obscure since it fails to explain what purpose the "solution of sodium silicate" serves or what operation is performed therewith.
Assuming, for the sake of argument and in favour of the

appellant/opponent (cf section VI.(b), above), that this can be interpreted as meaning that a solution of sodium silicate having this content of Al_2O_3 can be employed in the preparation of the silica then it is necessary to examine the information that this statement would provide about the content of aluminium in the final silica.

3.2.3 There is no disclosure in D4 as to the extent to which the aluminium present in the starting sodium silicate will be incorporated in the final silica obtained. Assuming, in favour of the appellant/opponent and despite the absence of any explicit teaching in this regard, that incorporation is quantitative, i.e. 100%, then the weight percentage of Al present in the final silica would range, as set out in the statement of grounds of appeal from 0.055-0.55 wt% which overlaps with the upper limit of the claimed range.

3.2.4 However there is no disclosure in D4 regarding which contents of aluminium are to be employed with which CTAB surface area which, as noted above according to the disclosure of D4, only partially overlaps with the range specified in the operative claim.

3.2.5 The examples of D4 (Table 1-1 starting on page 23 and continuing to page 24 of the translation D4a) disclose a number of silicas having CTAB and BET/CTAB values within the claimed range (Example 1, 3, 4, comparative example 2). However the Al content of these silicas is not reported. Nor has it been shown that it would be possible, based on information given in the preparation examples of D4, unambiguously to derive this information.

3.2.6 Accordingly D4 fails to disclose the aluminium content of the silicas, let alone the combination of a specific value of the CTAB area and the Al content. Consequently

D4 fails to anticipate the subject matter of the operative claims.

3.3 It is therefore concluded that the subject matter claimed is novel and that accordingly the requirements of Art 54 EPC are satisfied.

4. *The patent in suit, the technical problem*

4.1 According to paragraph [0001] of the patent in suit the technical problem addressed is to provide a rubber composition having improved processability and abrasion resistance.
In particular according to paragraph [0004] the object is to achieve:

- a reduction in Mooney viscosity;
- an improvement in abrasion resistance.

4.2 In paragraph [0008] it is explained that it has been found that, as the content of aluminium in the precipitated silica is reduced below a certain threshold, inclusion of silica in the rubber improves and the Mooney viscosity falls, meaning an improvement in processability. Further the abrasion resistance is improved.

4.3 The examples of the patent in suit employ four different rubber compositions and 11 different silicas, designated A-1 to A-11 of which five (A-1, A-2, A-3, A-5, A-6) fall within the scope of the claims.

4.4 Together with the response to the statement of grounds of appeal the respondent/patent proprietor provided tables of the data given in the patent in suit, which

were stated to be restructured so as to highlight the effects of the aluminium content, the CTAB value and the BET/CTAB ratio (see section VII, above).
These tables are reproduced below:

I. Comparative Experiments relating to Aluminum Content

Example No.	Ex. 1	Ex. 3	Ex. 4 (Comp.)	Ex. 12	Ex. 13 (Comp.)
Silica	A-1	A-3	A-4	A-3	A-4
Al content (wt.%)	0.01	0.1	**0.24**	0.1	**0.24**
BET/CTAB	1.60	1.60	1.70	1.60	1.70
CTAB (m^2/g)	150	147	149	147	149
Rubber Formulation	1	1	1	2	2
Results					
Mooney viscosity	79	82	83	73	74
Dispersibility	VG	VG	G	G	F
Abrasion resistance (index)	110	108	106	106	104
tanδ (60°)	0.146	0.148	0.15	0.155	0.157

Example No.	Ex. 3	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3	Comp. Ex. 4
Silica	A-3	A-10	A-11	A-10	A-11
Al content (wt.%)	0.1	**0.6**	**0.6**	**0.6**	**0.6**
BET/CTAB	1.60	1.59	**1.10**	1.59	**1.10**
CTAB (m^2/g)	147	148	148	148	148
Rubber Formulation	1	1	1	2	2
Results					
Mooney viscosity	82	88	88	79	79
Dispersibility	VG	P	P	P	P
Abrasion resistance (index)	108	100	100	104	100
tanδ (60°)	0.148	0.15	0.147	0.157	0.154

Note: values outside the claimed range are marked in bold figures.

II. Comparative Experiments relating to BET/CTAB ratio

Example No.	Ex. 2	Ex. 7 (Comp.)	Ex. 11	Ex. 16 (Comp.)
Silica	A-2	A-7	A-2	A-7
Al content (wt.%)	0.02	0.02	0.02	0.02
BET/CTAB	1.60	**1.10**	1.60	**1.10**
CTAB (m^2/g)	148	148	148	148
Rubber Formulation	1	1	2	2
Results				
Mooney viscosity	80	79	71	70
Dispersibility	VG	VG	G	G
Abrasion resistance (index)	110	102	108	102
tanδ (60°)	0.146	0.143	0.153	0.15

Example No.	Ex. 5	Ex. 8 (Comp.)	Ex. 14	Ex. 17 (Comp.)
Silica	A-5	A-8	A-5	A-8
Al content (wt.%)	0.1	0.1	0.1	0.1
BET/CTAB	2.00	**2.15**	2.00	**2.15**
CTAB (m^2/g)	130	130	130	130
Rubber Formulation	1	1	2	2
Results				
Mooney viscosity	72	74	63	65
Dispersibility	VG	G	G	F
Abrasion resistance (index)	103	100	104	99
tanδ (60°)	0.15	0.153	0.159	0.161

Note: values outside the claimed range are marked in bold figures.

III. Comparative Experiments relating to CTAB Surface Area

Example No.	Ex. 6	Ex. 9 (Comp.)	Ex. 15	Ex. 18 (Comp.)
Silica	A-6	A-9	A-6	A-9
Al content (wt.%)	0.1	0.1	0.1	0.1
BET/CTAB	1.30	1.30	1.30	1.30
CTAB (m^2/g)	210	**220**	210	**220**
Rubber Formulation	1	1	2	2
Results				
Mooney viscosity	105	109	96	100
Dispersibility	VG	F	G	F
Abrasion resistance (index)	105	101	104	100
tanδ (60°)	0.175	0.18	0.17	0.175

Note: values outside the claimed range are marked in bold figures.

4.5 From the first of these tables the following conclusions can be drawn concerning the aluminium content:

4.5.1 The pair of examples with the smallest change in parameters other than Al content is the pair example 3/comparative example 1 (first set of data, lower

table). Between this pair of examples the BET/CTAB and CTAB values differ by only one unit in the least significant position whereas the aluminium content differs by 0.5 wt% (Example 3, 0.1 wt%, comparative example 1 0.6 wt%).

4.5.2 Based on these examples it appears that the lower aluminium content, i.e. at the upper limit permitted by claim 1 results in:

- Lower Mooney viscosity (82 instead of 88);
- Better dispersibility (VG compared to P);
- Improved abrasion resistance (108 instead of 100).

4.5.3 The same tendency is apparent from other example pairs. For example examples 1 or 3 and example 4 (comparative) (nb: corresponding to former (inventive) Example 4 - not to the original "Comparative Example 4"). Examples 1 and 3 employ a BET/CTAB ratio of 1.60 whereas example 4 (comparative) has a value of 1.70, i.e. higher than either of the examples according to the claims.

4.5.4 The CTAB values of examples 1 and 3 are in one case higher than that of the comparative example (150 in example 1) and in the case of example 3 lower (147), whereby comparative example 4 has a value of 149.

4.5.5 The aluminium content is 0.01 in example 1, 0.1 in example 3 and 0.24 in comparative example 4, i.e. these examples demonstrate the lower and upper limits of the claimed range for aluminium content respectively whereas the comparative example employs a content 0.14 wt % units above the maximum permitted by the claim.

4.5.6 The properties reported for examples 1 and 3 compared to example 4 (comparative) are in their tendency identical to those noted above for example 3 and example 4 (comparative), namely that compositions with an Al content within the claimed range compared to a composition with an Al content above the permitted maximum results in:

- Lower Mooney viscosity (79 or 82 compared to 83);
- Better dispersibility (VG (twice) compared to G);
- Improved abrasion resistance (110 or 108 compared to 106).

4.5.7 Similar tendencies as a function of the aluminium content are apparent from the other examples of the patent in suit, independently of the variations in the surface area.

4.6 The appellant/opponent at the oral proceedings doubted that the results relating to the aluminium content would be due solely to this feature and speculated that the porosity properties of the filler must have changed, without this having been detected by the patent proprietor (see section X.(b), above). However:

- The appellant/opponent has at no time advanced any data of its own in support of these contentions, which must thus be regarded as unsupported assertions;
- In any case and as explained above, analysis of the data provided by the patent proprietor shows that even where variation of the porosity of the silica did occur there were - consistently and independently thereof - a number of effects linked to the aluminium content.

Thus the postulate of the appellant/opponent is inconsistent with and contradicted by the only available data, namely that in the patent in suit.

4.7 The data of the examples gathered in the second of the above tables indicate that the ratio of BET/CTAB also exerts an effect on the properties of the rubber. Thus from the first row - example 2/ example 7 (comparative) and example 11/ example 16 (comparative) which differ in the BET/CTAB ratio it is apparent that a ratio of 1.10, i.e. below the minimum specified, compared to a ratio of 1.60, leads to poorer abrasion resistance. The effects on Mooney viscosity are however such that the comparative examples show lower values than the examples according to the claims.
The example pairs example 5/example 8 (comparative) and example 14/example 17 (comparative) show properties of compositions with silicas either with values of the ratio at the upper limit of the claimed range (2.0) or slightly above (2.15). These examples show that maintaining the ratio in the claimed range provides improved abrasion resistance and also improves the processability (better dispersibility, lower Mooney viscosity).

4.8 Finally from the third table it can be derived that if the upper limit of CTAB is exceeded the compositions exhibit worse (higher) Mooney viscosity, poorer abrasion resistance and poorer dispersibility.

4.9 Accordingly in the light of these data it is credible that all of the features specified in the claim exert an effect on the properties of the resulting composition, in particular abrasion resistance and

processability (indicated by the dispersibility and Mooney viscosity).
While it is correct, as argued by the appellant/opponent (see sections VI.(c), IX.(b) and X.(b), above), that due to the fact that in most examples more than one parameter was varied it is not possible unequivocally to assign an effect to a particular parameter these data nevertheless allow it to be concluded that the **combination** of the three parameters is significant and that the combination of the claimed values thereof exerts an effect on the properties of interest identified in the patent in suit in the context of the problem to be solved.

4.10 The opponent has provided no counter-evidence and has thus failed to discharge its burden of proof with respect to its assertions concerning an absence of any technical effect arising from the claimed subject matter.

4.11 Accordingly it can be concluded that the problem as set out in the patent in suit has been credibly solved by the claimed measures.

5. *The closest prior art*
According to the appellant/opponent either D2 or D4 could serve as the closest prior art.

5.1 D2 is directed to precipitated silica and its use as a reinforcing agent in elastomers. The requirement that this can be easily incorporated into rubber is emphasised (page 1, first and third paragraphs).
In the following paragraph it is explained that for optimum reinforcement it is necessary that the silica

be as finely divided as possible and also be homogeneously distributed. This requires the filler to be readily incorporated into the matrix and also to disagglomerate readily into a fine powder.
However, it is explained in the fifth paragraph, due to strong mutual affinity silica particles have a strong tendency in elastomer matrices to become agglomerated which impairs the reinforcement properties. Further these interactions, it is explained in the following paragraph, also tend to increase the viscosity and consistence of the mixtures, rendering their use difficult.
Thus the problem addressed by D2 was to provide a filler which, while having a relatively large particle size, was readily dispersed (D2 page 2 first paragraph).
According to page 10 line 3ff of D2 this problem is solved by provision of a silica having a CTAB specific surface area of between 140 and 240 m^2/g, most preferably between 150 and 200 m^2/g, or in a second mode of realisation (page 10 line 15ff) a most preferable surface of between 150 and 225 m^2/g.
The ratio of BET/CTAB is either from 1.0 to 1.2 or from 1.21 to 1.4 (page 11 line 10ff).

According to the passage bridging pages 12 and 13 of D2 such silicas provide compositions having a good compromise of properties, in particular a good performance in tyres, providing good strength and in general good abrasion resistance.

5.2 D4 relates according to the title to rubber composition and tyres employing this.
In paragraph [0001] (references relate to the English language translation D4a) it is explained that the aim

is to provide a rubber composition providing excellent balance between wear resistance, wet road gripping performance, low heat build up and excellent dry road running performance.
According to the discussion in paragraph [0003] the disadvantage of known "hydrous silicate", i.e. hydrous silica (as submitted by the appellant/opponent - section VI.(b), above - and not disputed by the respondent/patent proprietor the term "hydrous silicate" in D4 is a mistranslation of hydrous silica) is that the storage modulus is small, providing tyres with poorer running performance than carbon black filled tyres. Although this can be addressed by increasing the amount of the silica or the surface area, this impairs the low heat build up property.
Hence the aim of D4 was to provide a silica providing high storage modulus and low heat build up.
This is solved according to D4 by providing a silica having a BET/CTAB ratio of 1.4 to 2.0 and a CTAB of 170-250 m^2/g (claim 1, paragraph [0005]).
D4 explains on pages 6 and 7 that maintaining the BET/CTAB ratio in this range optimises the dispersibility of the silica, by preventing excess dispersion (which occurs at values of the ratio below 1.4 - page 7 lines 5-10) whilst simultaneously restricting the tendency of the particles to aggregate during kneading, so preventing penetration of the rubber into the particles, and leading to inadequate reinforcement (ensured by maintaining the maximum value of the ratio at 2.0 - D4 page 7 lines 10-16).

5.3 D4, although including considerations of the incorporation of the silica focuses on the properties of the rubber compositions when in use rather on the

ease of formulation. Also insofar as D4 refers to abrasion resistance, expressed as wear resistance, this is only in the context of one of a number of properties the balance of which has to be optimised (in paragraph [0004]). There is however, in contrast to the patent in suit, no explicit focus on abrasion resistance. This property is not even considered in the examples of D4.

5.4 The only one of these documents specifically to address processability, i.e. the ease of compounding, as indicated by the Mooney viscosity and to mention explicitly the abrasion resistance is D2.
Accordingly D2 has to be taken as representing the closest state of the art.

6. *The objective technical problem compared to D2*
The technical problem to be solved with respect to D2 can thus be seen in the provision of a rubber composition having improved processability and improved abrasion resistance (cf paragraph [0008] of the patent in suit).
As shown by the examples of the patent in suit, discussed above, the features as specified in the claims, in particular the specific combination of the aluminium content, the CTAB specific area of the precipitated silica and the BET/CTAB ratio have been credibly shown to result in an improvement of these properties.
Accordingly the technical problem as set out in paragraph [0008] of the patent in suit can be adopted as the objective technical problem to be solved.

7. *Inventive Step (Art. 56 EPC)*
It remains to be decided whether for a person skilled

in the art the solution to the above problem as defined in the operative claims was obvious having regard to the documents relied upon by the Appellant.

As explained in section 3.1, above, D2 fails to direct the skilled person to the surface area properties (CTAB and BET/CTAB ratio) specified in operational claim 1. Although the most preferred range for CTAB in D2 (page 10, line 8 - 150 to 200 m^2/g) lies entirely within the specified range of operative claim 1 the disclosed values for the BET/CTAB ratio either lie entirely outside the claimed range (1.0-1.2, D2 page 11 line 11) or overlap only with the lower end of the range (1.21-1.4, D2 page 11 line 14). Thus D2 fails to provide any pointer to the specific combination of porosity values required by operative claim 1.
Further D2 is silent as to the aluminium content of the silicas employed and contains no recognition that this feature might exert any effect on the relevant properties of the silica, in particular abrasion resistance and ease of workability.

Accordingly D2 on its own provides no pointers to the claimed subject matter.

Nor can this gap be filled by recourse to other documents.
D1 addresses in its introduction (paragraph [0002]) the aspect of good dispersibility of silica and discloses in claim 1 and paragraph [0013] as its invention a silica having:

- An alumina content of from 0.2 to 5.0 wt% (corresponding to 0.1-2.6 wt% Al, i.e. the lower limit of this range coincides with the upper

limit of the range permitted according to operative claim 1);

- In one embodiment having a CTAB surface area of 80-139 m^2/g (paragraph [0015]), which overlaps with the lower part of the range as claimed and;
- a BET surface area of 80-180 m^2/g giving a possible ratio of from 0.57 to 2.25, which is broader than the range specified in operative claim 1.

Although D1 does discuss the question of ease of dispersibility, no analysis is given as to the influence on this of the surface properties of the silica beyond the specification of the preferred ranges. Further D1 is silent as to abrasion properties.

D4, as noted above is focussed on the use properties of rubber blends in tyres. It explains that maintaining the surface properties of the silica in particular ranges is important to ensure the required dispersion properties. In particular it is necessary that the BET/CTAB ratio be between 1.4 and 2.0, i.e. within the claimed range and that the CTAB surface area be in the range of 170-250 m^2/g, which clearly extends beyond the upper end of the claimed range.

D4 however does not contain:

- Any teaching directing the skilled person to the combination of CTAB and BET/CTAB values required by operative claim 1;
- Any consideration of the processability;
- Any discussion of abrasion resistance;
- Any recognition of an influence of the aluminium content on any of the properties.

No other document provides any teaching which can fill

this gap.

Accordingly there is no teaching in the prior art that would guide the skilled person to the selection of the particular combination of surface properties and aluminium content as specified in the operative claims for any reason, let alone specifically to solve the problem of optimising processability and abrasion resistance.

Accordingly the subject matter claimed is not obvious. The subject matter of the operative claims therefore satisfies 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