

Examiners' Report Paper B 2012 (Electricity/Mechanics)

1. General considerations

It is noted that references in this text beginning with "GL" are to the Guidelines for Examination at the European Patent Office valid at the date of the examination.

1.1. Introduction

This year's paper relates to cooling devices for beverages which employ a zeolite/water adsorption cooling process. Such cooling devices can form a single unit with a beverage container, like the self-cooling barrel of the invention, or can be a separate receptacle for a beverage container, such as that of D1.

The basic components for carrying out the zeolite/water adsorption cooling process are an adsorption chamber containing zeolite, an evaporation chamber containing water and a valve for opening and closing a passage in a wall which separates both chambers. During the adsorption cooling process, water evaporates in the evaporation chamber. Water vapour passes into the adsorption chamber where it is adsorbed by the zeolite and condenses. Consequently, the water remaining in the evaporation chamber freezes to ice and the zeolite in the adsorption chamber heats up. The ice is used for cooling the beverage, whereas the waste heat of the zeolite has to be dissipated into the environment, without heating the beverage.

The basic components and the process per se are known and applied in the invention as well as in prior art coolers (see Figs. 1a and 1b of the application). The invention and the prior art coolers differ, however, with regard to the relative arrangement of these components.

1.2. Prior art

The application describes a prior art self-cooling barrel produced by the applicant, the "Killbenny" (hereinafter referred to as KB). In KB, the adsorption and evaporation chambers are substantially disc shaped both being arranged at the bottom of the barrel. The evaporation chamber is sandwiched between the bottom wall of the liquid container and the adsorption chamber. The zeolite contained in the adsorption chamber is thus arranged at the bottom of the barrel, and the valve controlling the passage between the adsorption and the evaporation chamber protrudes with its handle from the side of the barrel. Several draw-backs of this configuration are identified as follows.

The efficiency of the adsorption cooling process depends on the effective heat exchange surface of the evaporation chamber. In KB, this surface is almost entirely formed by the bottom wall of the container.

Therefore:

- The effective heat exchange surface between the evaporation chamber and the container is relatively small; and
- the waste heat transfer from the hot zeolite depends on the surface on which the barrel stands.

Furthermore,

- the position of the valve handle risks the valve being accidentally opened.

Par. 11 of the description states that the invention aims at improving the efficiency of the adsorption cooling process and the arrangement of the valve.

D1 discloses a barrel cooler which can receive a conventional 20-litre barrel from above. In use, the evaporation chamber is sandwiched between the lower portion of the barrel and the adsorption chamber. Furthermore, both chambers are U-shaped in cross section and extend along the full height of the cooler. This maximises the effective heat transfer surface, achieves a better heat transfer from the hot zeolite to the environment and allows an arrangement of the valve handle in the top portion of the barrel cooler.

D2 discloses a single-use heating and cooling box. The evaporation chamber and the adsorption chamber are arranged vertically side by side to define a cylindrical cooling space and a cylindrical heating space respectively. There is no zeolite at the bottom of the box. The cooling space may contain a beverage which (in use) is cooled by the cold water in the evaporation chamber and the heating space may contain a soup which (in use) is heated by the hot zeolite in the adsorption chamber. Both chambers extend along substantially the full height of the "containers", i.e. the cooling and heating spaces, which enables the arrangement of the valve handle in the top portion of the box.

1.3. The invention as presented in the application as filed

In order to achieve a larger heat exchange surface for cooling the liquid in the container, the effective heat exchange surface of the evaporation chamber is increased with respect to KB by making this surface include at least a part of the side wall of the container. (See description par. 12).

1.4. The challenges of the paper

The main challenges of the paper were to:

(a) Draft an amended independent device claim:

- the subject-matter of which is not only novel, but which also involves an inventive step;
- the subject of which does not extend beyond the content of the application documents as originally filed;
- which has the broadest possible scope. In particular, it should not be unnecessarily limited by the "full height" feature (first part of original claim 6) as hinted at in the client's letter and
- which is clear. In particular, it should overcome the objection with regard to the negative limitation (second part of original claim 6) raised in the communication under point 5.

(b) Adapt the set of remaining dependent claims accordingly.

(c) Write a reasoned letter of reply

- explaining the basis for the amendments of the claim, in particular with regard to any possible intermediate generalisation,
- addressing the clarity objection raised in the communication, and

- arguing that the subject-matter of the amended independent claim is new involves an inventive step in the light of the available prior art.

1.5. The marking scheme

Answer papers were marked on a scale of 0 to 100 marks:

For the claims: Max. 35 marks, min. 0 marks.

30 marks were available for the independent device claim.

5 marks were available for the dependent claims.

For the argumentation: Max. 65 marks, min. 0 marks.

Unless otherwise stated, the individual marks referred to in the various sections of this document apply to the example solution.

Although the marking scheme is divided into separate sections such as the marks awarded for claims and marks awarded for argumentation, the answer paper as a whole was considered and the scheme reflects this.

Where the choice of independent claim of an answer paper has the consequence that specific parts of the argumentation for the example independent claim are not appropriate, the number of marks that are deducted from the claim may reflect the number of marks achievable in the argumentation for that particular claim.

For example: an answer paper having an independent claim which is unnecessarily limited with respect to the example solution independent claim (see section 2) by the feature "the evaporation chamber extending along substantially the full height of the container", may be awarded 21 fewer marks compared to the example solution. Of these, 15 marks are deducted in the section 2.5 "unnecessary limitations" and 6 marks are not available in the argumentation section "source of amendments", since the "full height" feature has not been omitted, and argumentation relating to this feature is therefore not appropriate (see section 4.2.1).

Where however the choice of independent claim of an answer paper has the consequence that additional argumentation is appropriate compared to the example independent claim, additional marks may be awarded for such argumentation.

For example: an answer paper having an independent claim which is broader than the example solution independent claim (see section 2) because it does not include the feature (g1) - "the second wall comprises a bottom wall of the container", loses marks for the claim in section 2.2.2, but may gain additional marks in the argumentation section 4.2.1a.

2. Independent claim (up to 30 marks)

See Section 5 for an example amended claim set.

A single independent device claim was expected. Generally it is noted that the marks awarded for an independent claim reflect the degree to which the claim achieves protection for the applicant's invention in its broadest possible scope.

2.1 Example feature set for an independent claim

The following is a list of features for a claim and is not arranged in the two-part form. The list is based on original claim 1. Added features are underlined; an indication of the origin of the added features in the original application is given in square brackets. The features are provided with references (a) to (g), which will be used in this document.

- (a) A self-cooling barrel (30) comprising
- (b) a container (40) for liquid to be cooled,
- (c) an evaporation chamber (34) containing water,
- (d) an adsorption chamber (32) containing a zeolite, wherein
 - (d1) the adsorption chamber (32) has a U-shaped cross section and surrounds the evaporation chamber (34) [claim 5]
 - (d2) the zeolite is arranged only at the side of the barrel [claim 6 and paragraph 13 of the description],
- (e) a first wall (35) separating the adsorption chamber (32) and the evaporation chamber (34),
- (f) a valve (36) arranged to open and close a passage in the first wall (35), and
- (g) a second wall (38) for separating the evaporation chamber (34) and the liquid to be cooled, wherein
 - (g1) the second wall (38) comprises a bottom wall of the container (40) [claim 4]
 - (g2) the second wall comprises at least part of a side wall of the container (40).

2.2 Amendments not supported by the application as originally filed (Art. 123(2) EPC)

2.2.1 Amendments giving rise to potential Art. 123(2) / 123(3) trap (-20 marks)

Any independent claim which includes subject-matter having no basis in the original disclosure of the application and which could not be deleted in post grant proceedings without broadening the scope of the claim is considered in this section.

2.2.2 Other amendments falling under Art. 123(2) EPC (-10 marks)

Any independent claim having subject-matter that extends beyond that of the application as originally filed, but which could be made compliant with Art. 123(2) EPC in post-grant proceedings without offending against Art. 123(3) EPC, is considered in this section.

Examples:

- (1) An independent claim having features a, b, c, d2, e, f, g1 and g2 but missing feature d1. In summary, a claim defining a self cooling barrel... the zeolite is arranged only at the side of the barrel... the second wall comprises a bottom wall of the container, but the adsorption chamber is not defined as being U-shaped (- 10 marks) and surrounding the evaporation chamber (- 10 marks): (total deduction - 20 marks).
- (2) An independent claim having features a, b, c, d1, d2, e, f and g2 but missing feature g1. In summary, a claim defining a self cooling barrel having a U-shaped adsorption chamber... the zeolite is arranged only at the side of the barrel, but the second wall is not defined as comprising a bottom wall of the container. (-10 marks).
- (3) An independent claim having features a, b, c, d1, e, f and g2 but missing features d2 and g1, further defining that the zeolite can be arranged to be only at the side of the barrel. As in example 2, the second wall is not defined as comprising a bottom wall of the container. (-10 marks).

Note to examples (2) and (3), which lack feature (g1):

In a self-cooling barrel according to the single embodiment of the invention (Fig. 3), the adsorption chamber has a U-shaped cross section, the zeolite is arranged only at the side of the barrel and the second wall of the container comprises at least part of a side wall of the container and a bottom wall of the container.

Par. 13 first refers to the dependent claims in which an adsorption chamber having a U-shaped cross section is always linked with the feature that the second wall of the container further comprises a bottom wall of the container (original claims 4 and 5).

Par. 13 further includes the statement that “preferably the adsorption chamber has a U-shaped cross section and surrounds the evaporation chamber so that... - the zeolite can be arranged to be only at the side of the barrel”. This statement defines a preferable characteristic of the adsorption chamber, namely that it can accommodate zeolite in such a way that the zeolite is only at the side of the barrel. This statement does not form a direct and unambiguous disclosure of a self-cooling barrel having an adsorption chamber with a U-shaped cross section surrounding the evaporation chamber, wherein zeolite is arranged only at the side of the barrel and wherein the (second) wall for separating the evaporation chamber and the liquid to be cooled might not comprise a bottom wall of the container.

Furthermore, there is no basis for the combination of U shaped without the second wall including the bottom wall of the container (examples 2 and 3) in the claims nor in the remainder of the description or Figures of the application as filed.

See also note in part 4.2.1 of this document.

Note to example (3):

Claims using the term zeolite “can be” arranged...see also inventive step, part 2.4 below.

2.3 Lack of novelty (-20 marks)

2.3.1 Novelty with respect to KB

The self-cooling barrel KB does not have features d1 and d2 (a U-shaped adsorption chamber surrounding the evaporation chamber, with zeolite arranged only at the side of the barrel).

2.3.2 Novelty with respect to D1

D1 discloses a cooler for a barrel, not a self-cooling barrel. Furthermore, this barrel cooler does not comprise feature (d2) per se (zeolite only at the side).

2.3.3 Novelty with respect to D2

D2 discloses a self-cooling box, not a self-cooling barrel. Furthermore, this box does not comprise feature (d1) per se (neither a U-shaped adsorption chamber nor an adsorption chamber surrounding the evaporation chamber).

2.3.4 Independent claim 1 lacking novelty (-20 marks)

An independent claim directed to a self-cooling barrel can only lack novelty with regard to KB since neither D1 nor D2 disclose self-cooling barrels.

Example:

An independent claim having the features of original claim 1 and those of any of original claims 2 to 4 and 8.

2.4 Lack of inventive step (-15 marks)

An independent claim whose subject-matter is considered to lack inventive step in the light of the available prior art lost 15 marks.

Examples:

As indicated in the communication (point 3), an independent claim which does not contain feature d2 risks lacking an inventive step in view of an obvious combination of KB and D1.

An independent claim having features a, b, c, d1, e, f, and g2 but missing feature g1, wherein the feature d2 is replaced by a feature defining the adsorption chamber as being such that “the zeolite can be arranged to be only at the side of the barrel”. In summary, a claim defining a self-cooling barrel having... an adsorption chamber having a U-shaped cross section... so that the zeolite can be arranged to be only at the side of the barrel, ... (- 15 marks).

Note: The claim defines a characteristic of the adsorption chamber, namely that it accommodate zeolite in such a way that the zeolite is only at the side of the barrel. It does not define where the zeolite is, therefore the scope of the claim is equivalent to that of original claim 5. Such a claim lacks inventive step for the same reasons as were given in the communication point 3. See also point 2.2.2 of this document.

2.5 Unnecessary limitations (-10 to -15 marks per feature)

An unnecessary limitation in an independent claim is a feature which is not necessary for defining the client's invention in its broadest scope and consequently disadvantages the client; e.g. one or more preferred embodiments of the invention are excluded from protection. Between 10 and 15 marks were deducted in this section for each unnecessary limitation.

Examples:

- (1) An independent claim having all features of original claim 6 including the extension of the evaporation chamber along substantially the full height of the container. (-15 marks)

The client explains in his letter that this feature is not necessary for obtaining a highly efficient adsorption cooling process.

It is clear from the wording ("If furthermore") and the content of par. [013] of the description, that this feature does not belong to the group of features relating to the special configuration of the adsorption chamber and that it contributes to the solution of an additional problem, namely related to the position of the valve, (see also "basis for amendments", point 4.2.1, below).

- (2) An independent claim having additionally any of the features of original claims 2, 3, 7 and 8 which are known from the prior art (-10 marks each).

Example not considered as an unnecessary limitation:

A claim having the features of the example independent claim and further defining any inherent effects of these features is not considered to be unnecessarily limited. E.g. "a self-cooling barrel...wherein the adsorption chamber has a U-shaped cross section and surrounds the evaporation chamber so that: *the adsorption chamber insulates the evaporation chamber* and the zeolite is arranged only at the side of the barrel, *from where heat can be efficiently dissipated into the ambient air so that the efficiency of the adsorption cooling process is independent of the temperature, structure and material of the support on which the barrel stands*" (no marks deducted in this section, see under clarity, part 2.6).

2.6 Lack of clarity / conciseness (up to -10 marks per issue)

Between 5 and 10 marks may be deducted for a lack of clarity issue.

Examples:

- (1) An independent claim comprising the negative limitation of original claim 6 ("no zeolite is arranged at the bottom of the barrel") despite the objection in the

communication. (-10 marks). The expression "zeolite free" is considered to be equivalent to this example (- 10 marks). However, where such an expression is merely a qualification of a positive expression, no marks are deducted, e.g. "the zeolite is arranged only at the side of the barrel so that no zeolite is arranged at the bottom of the barrel" (no marks deducted).

- (2) Claiming a self-cooling barrel in use (- 5 marks).
- (3) A claim defining a barrel in terms of its relative "efficiency" e.g. efficiently dissipating heat from the side of the barrel (- 5 marks).
- (4) A claim defined in terms of the "efficiency" of the adsorption cooling process (- 5 marks).

2.7 Formal matters (up to -4 marks)

For an answer paper having an independent claim according to the example solution it is considered appropriate to use the two-part form. Thus, such an independent claim having a one-part form, or a two-part form of claim which is not consistent with any single prior art disclosure, lost 2 marks.

Example:

A claim having a pre-characterising portion directed to a "self cooling barrel.... having a U-shaped adsorption chamber...". The only self-cooling barrel in the available prior art is KB, but this barrel does not have a U-shaped adsorption chamber. (-2 marks).

For missing or very incomplete reference signs in the claims, 2 marks were lost.

2.8 Inferior solutions (up to 15 marks available)

An independent claim which is considered to be an inferior solution is a claim which: offers a less favourable scope of protection for the client than the example solution claim, for example because it is contrary to the client's wishes; misses at least one feature of the example independent claim; has at least one feature that is not in the example independent claim; and is new and arguably not obvious with respect to the available prior art. This year, no examples of an inferior solution have been identified.

3. Dependent claims (up to 5 marks available)

Generally it is noted that the marks awarded for a dependent claim reflect how challenging the claim is to draft and the degree to which the claim offers a fall-back position for the client, taking into consideration the independent claim and the prior art.

Important aspects to consider are:

- clarity, e.g. consistency of terminology with the independent claims; and
- claim structure: a set of dependent claims having a good structure offers the client an appropriate set of fall-back options whilst being concise and having claims with correct back references.

See Section 5 for an example set of dependent claims.

3.1 Maintaining appropriate original dependent claims (up to 5 marks)

It is expected that appropriate dependent claims from the originally filed claims are maintained.

Example for an answer paper having the example independent claim:

Dependent claims based on claims 2, 3, 6, 7 and 8 as originally filed would be appropriate. (1 mark per claim provided that its back reference is correct)

3.2 Other dependent claims offering a useful fall-back (up to 3 marks)

Up to 3 marks in total were available for one or more additional dependent claims which offer a useful fall-back position or positions, provided the total of 5 marks for the dependent claims was not exceeded. To be awarded marks such a claim must be clear and compliant with Art. 123(2) EPC. The dependent claims appropriate for achieving fall-back positions may depend on the independent claim (see the following examples).

Examples:

- (1) For an answer paper having an independent claim to a self-cooling barrel which extended beyond the original disclosure because at least one of the features d1 and g1 was missing or incomplete, dependent claims to these features would offer important fall-back options for the applicant (1 mark per claim).
- (2) For an answer paper having an independent claim to a self-cooling barrel which was not new with regard to KB because feature d2 was missing or incomplete, a dependent claim to this feature would offer an important fall-back option for the applicant (up to 3 marks).

3.3 Other dependent claims not considered to offer a useful fall-back (0 marks)

It is noted that the features of these claims are known from the prior art and that the skilled person would include these features in the invention defined in the independent claim without making an inventive step. However, this is not an indication that the same feature would not be a limitation when present in an independent claim.

Examples:

- (1) The layer (13) being made of spongy material (0 marks)
- (2) The valve having a valve handle (0 marks)
- (3) All features of conventional barrels mentioned in par. [006] of the description, such as a filling neck (0 marks)

4. Letter of reply to the EPO (up to 65 marks available)

4.1 General remark

It is noted that the examples for sections of a letter of reply given in the following are, unless otherwise stated, appropriate for the example claim set. For an answer paper having a different claim set, the letter of reply may differ and the answer paper is considered accordingly.

4.2 Source of amendment showing Art. 123(2) EPC Compliance (14 marks)

The amendments made in the claims are to be identified and a basis for them in the application as filed is to be indicated. Brief explanations may be necessary (see GL E-II,1).

4.2.1 Independent Claim (12 marks)

12 marks were available for indicating and explaining a basis for the independent claim. For the example independent claim, these marks were awarded according to the following scheme:

2 marks for appropriately stating the claims /parts of the description /drawings used as a basis for the claim;

4 marks for explaining the basis for the feature (d2) (replacing the negative limitation "no zeolite arranged at the bottom of the barrel" and/or arguing why the zeolite is actually disclosed as being arranged only at the side of the barrel);

6 marks are available for explaining the basis for omitting the feature of original claim 6, Par. 13 and Fig. 3 that "the evaporation chamber extends along substantially the full height of the container".

Example:

- (a) New claim 1 is based on original claims 1, 4, 5 and 6 (2 marks).
- (b) In order to overcome the clarity objection raised under point 5 of the communication, the negative limitation "there is no zeolite at the bottom of the barrel" of former claim 6 has been replaced by the positive feature "zeolite is arranged only at the side of the barrel" (in addition 2 marks are awarded for this statement under clarity, see section 4.3). In Par. [013] third sentence of the description, the expression regarding zeolite "can be arranged to be only at the side of the barrel" is used. FIG. 3 shows an embodiment of the invention in which Zeolite 31 is arranged only at the side of the barrel. (4 marks)
- (c) The basis for omitting the feature of claim 6 that the evaporation chamber "extends along substantially the full height of the container" is as follows:
 - i) The feature is not presented in the description as being essential for the configuration of the adsorption chamber or for the arrangement of the zeolite. In par. 13 the expression "if furthermore" implies that the "full height" feature is an optional further feature with respect to there being no zeolite arranged at the bottom of the barrel (3 marks).

ii) The feature is not indispensable for carrying out the invention. The effect of increasing the efficiency of heat dissipation into the ambient air (par. 13) is achieved by not having zeolite at the bottom of the barrel, which does not depend on the height of the evaporation chamber (2 marks).

iii) Removal of the feature requires no real modification of the remaining features of the invention, since it would merely require a change in position of the valve (1 mark).

4.2.1a Additional Marks (up to 6 Marks)

Answer papers having an independent claim in accordance with examples 2 or 3 of point 2.2.2, have marks deducted due to non-compliance with Art. 123(2) EPC. In contrast to the example solution, a claim not including feature (g1) requires additional justification in this section. Only for these answer papers, up to 6 additional marks were available for justifying a basis for the independent claim not including the feature (g1), provided the total marks for indicating and explaining a basis for the independent claim did not exceed 12 marks.

4.2.2 Dependent Claims (up to 2 marks)

2 marks were available for stating correctly and completely the basis for each of the dependent claims of an answer paper.

For the example set of claims:

Claims 2 to 6 are based on original claims 2, 3 and 6 to 8, respectively. (2 marks)

4.3 Clarity (up to 2 marks)

The examiner objected to original claim 6 because of a lack of clarity (see communication, point 5). Answer papers should include a response to this point. It is noted that a response to this objection may for example be presented in combination with an argument for justifying the basis for the amendment.

Examples:

- (1) In order to overcome the clarity objection raised under point 5 of the communication, the negative limitation "there is no zeolite at the bottom of the barrel" of former claim 6 has been replaced in present claim 1 by the positive feature "zeolite is arranged only at the side of the barrel" (2 marks).
- (2) In order to overcome the clarity objection raised under point 5 of the communication, present claim 4, which is based on former claim 6, no longer contains the negative limitation "there is no zeolite at the bottom of the barrel". (2 marks)

4.4 Novelty of the independent claim (up to 2 marks)

The examiner objected to original claim 1 because of a lack of novelty in the light of KB. Provided that the independent claim as amended was to a self-cooling barrel, it was sufficient to justify why the subject-matter of the claim was new with respect to

KB only. It is sufficient to mention one feature of the independent claim that is not disclosed in KB. It is noted that a response to this objection may for example be presented in combination with an argument for justifying inventive step.

Examples:

- (1) Claim 1 is novel with respect to KB because the zeolite is arranged only at the side of the barrel, whereas in KB the zeolite is arranged at the bottom of barrel. (2 marks).
- (2) Claim 1 is novel with respect to KB because the feature the “zeolite is arranged only at the side of the barrel” is not known from KB. (2 marks)
- (3) The subject-matter of claim 1 is new. It differs from KB by the features of the characterising portion (in addition 1 mark under "identifying differing features", see point 4.5.2, below). In KB, the adsorption chamber is disk-shaped and the zeolite is arranged only at the bottom of the barrel. (2 marks)

4.5 Inventive step argumentation for the independent claim (up to 47 marks)

It is appropriate to provide arguments which are structured to follow the problem solution approach (see GL C-IV, 11.5).

4.5.1 Identifying the closest prior art (6 marks)

In selecting the closest prior art, the first consideration is that it should be directed to a similar purpose or effect as the invention, or at least belong to the same or a closely related technical field as the claimed invention (see GL C-IV, 11.5.1).

Stating the closest prior art (1 mark)

For stating an item of prior art as being the closest prior art in a consistent manner with the two-part form of the independent claim, 1 mark is available.

For the example independent claim, KB is considered to represent the closest prior art; for a clear statement to this effect, 1 mark is available.

The barrel cooler of D1 and the heating and cooling box of D2 are considered to be clearly less relevant. For a statement identifying D1 or D2, no marks are awarded.

Arguments justifying the choice of closest prior art (5 marks)

Discussing KB (2 marks), discussing D1 (1 Mark), discussing D2 (2 marks).

Example (for the example independent claim):

Closest prior art is KB. (1 mark)

Being the only self-cooling barrel cited, it has the same purpose as that of the invention, and is therefore the most promising starting point for an obvious development leading to the invention. Furthermore, like the invention it comprises a liquid container and the chambers have a “sandwich” structure. (2 marks)

D1 does not show a self-cooling barrel, but a barrel cooler, separate from a barrel.
(1 mark)

D2 discloses a box having a self-cooling part for liquid to be cooled, and a self-heating part for liquid to be heated. Therefore it is not a self-cooling barrel as such. The box according to D2 is structurally different to the present invention since it does not have “sandwiched” chambers with the adsorption chamber surrounding the evaporation chamber. (2 marks)

4.5.2 Formulation of the objective technical problem (11 marks)

The next stage is to establish in an objective way the technical problem to be solved (GL C-IV, 11.5.2). This requires the steps of:

- (1) identifying, in terms of features, the difference between the claimed invention and the closest prior art, i.e. the distinguishing features of the claimed invention (1 mark);
- (2) stating the technical effects or the advantages of the difference (4 marks); and
- (3) formulating a problem which is solved by these technical effects (6 marks).

Examples:

The subject-matter of claim 1 differs from KB by the features of the characterising portion. (1 mark)

The self-cooling barrel according to claim 1 differs from that known from KB in that:
- the adsorption chamber (32) has a U-shaped cross section and surrounds the evaporation chamber (34) and
- the zeolite is arranged only at the side of the barrel (1 mark.)

The technical effects of these differences are

- (A) the U-shaped adsorption chamber insulates the evaporation chamber from the environment; (1 mark)
- (B) heat can be freely dissipated from the zeolite at the side of the barrel into ambient air independently of any support surface; (1 mark)
- (C) allows a barrel to be stacked on top of another barrel during the adsorption cooling process without heating the other barrel; (1 mark)
- (D) the overall height of the barrel can be reduced since there is no zeolite layer at the bottom of the barrel. (1 mark)

The objective technical problem can therefore be formulated as:

increasing the efficiency of the adsorption cooling process (effects A and B); (4 marks) whilst facilitating the operation of stacked barrels and their handling (effects C and D). (2 marks)

4.5.3 Arguments in support of inventive step (30 marks)

Arguments should support the features of the independent claim, they should be convincing and well structured. In order to obtain full marks in this section, arguments which fully answer the question as to why the skilled person, knowing the teaching of the prior art as a whole, would not arrive at the claimed subject-matter must be presented (GL C-IV, 11.5.3). Such arguments can be structured to consider the following aspects:

- Would the skilled person arrive at the subject-matter of the claim by considering the teaching of the closest prior art on its own?
- Would the skilled person consider combining the teaching of the closest prior art with that of other prior art documents in order to solve the objective technical problem?
- If the skilled person were to combine the teaching of the closest prior art with other items of prior art, would they arrive at the subject-matter of the claim?

Example:

The following example arguments are for KB as the closest prior art. Note that where D1 or D2 has been chosen as the starting point, the arguments may be structured differently and other arguments may apply.

Considering KB on its own (6 marks)

A person skilled in the art does not find any hint in KB alone for the solution according to the invention. On the contrary, KB suggests solutions to the objective problem which are different to those of the invention (2 marks).

With regard to the first aspect of the problem, KB follows an approach which leads away from the proposed solution: Instead of optimising the waste heat transfer, KB aims at making efficient use of the available cooling capacity by cooling only the liquid at the bottom of the container which is the first to be discharged. Consequently KB suggests to arrange the cooling unit, including the zeolite, at the bottom of the barrel, not at its side (2 marks).

An obvious way of solving the second aspect of the problem would be to drill ventilation holes in the top portion of the barrels in order to enhance the heat dissipation from the hot zeolite in a stack of KB barrels. This is a different approach from that of the invention (2 marks).

Considering KB in combination with D1 (8 marks)

In order to solve the first aspect of the problem D1 teaches to use a particular configuration of the adsorption chamber. If the teaching of KB and D1 were combined, the combination would result in a self-cooling barrel having a U-shaped, adsorption chamber surrounding an evaporation chamber. However this would not lead to the subject-matter of claim 1 which additionally comprises the feature that "the zeolite is arranged only at the side of the barrel" (4 marks).

D1 does not give any motivation to omit the zeolite at the bottom of the cooler. The height up to which the cooler can extend is limited by the discharge opening of an

inserted barrel. Therefore most of the zeolite has to be arranged at the bottom of the cooler in order to achieve sufficient cooling capacity (2 marks).

Considering the second aspect of the problem, D1 teaches a completely different solution, namely to provide a cooling unit which is separate from the barrel. The person skilled in the art would therefore not modify KB in the light of D1 in order to solve this part of the problem (2 marks).

Considering KB in combination with D2 (12 marks).

A person skilled in the art would not combine KB with D2 in order to find a solution for the first aspect of the problem since this aspect is not mentioned in D2 which rather focuses on achieving low production costs.

Even if the skilled person were to combine the teaching of KB and D2, the combination would not lead to the subject-matter of claim 1 (2 marks).

In order to increase the efficiency of the cooling process, D2 would teach to cover the sides of the KB barrel with a thermally insulating jacket. This does not correspond to the claimed solution (2 marks).

Although D2 shows zeolite that is only arranged at the side of a liquid container, a person skilled in the art would not transfer this feature to KB for the following reasons. The liquid container in D2 is a heating space in direct contact with the adsorption chamber. Providing zeolite at the side of the liquid container of KB in a corresponding way would result in the liquid in the container being heated during an adsorption cooling process (2 marks).

Regarding the second aspect of the problem, D2 teaches to stack several boxes, however not during operation, but during transport. If the teaching of KB and D2 were combined, the combination would not result in the subject-matter of claim 1 (2 marks).

D2 teaches to arrange the valve handle in a recess in a thermally insulating layer. Such an arrangement could also be applied to a KB barrel modified to comprise a thermally insulating jacket (see above). This would also not lead to the subject-matter of claim 1 (2 marks).

Furthermore, D2 might suggest to the skilled person to protect the top portions of the KB barrels with an insulating layer when several barrels are stacked in use, in order to avoid heat transfer from the hot zeolite at the bottom of an upper barrel to the top portion of a lower barrel. Again, such a combination of KB and D2 results in a solution which is different to that of claim 1 (2 marks).

Considering KB in combination with D1 and D2 (4 marks).

This year, since the objective problem contains two different aspects, exceptionally it is appropriate to consider the combination of KB, D1 and D2 (GL C-IV, 11.6).

Example:

The combination of KB, D1 and D2 would not obviously lead the skilled person to the subject-matter of claim 1.

D2 might help in overcoming the prejudice of D1 that the evaporation chamber and the adsorption chamber cannot extend higher than the discharge opening. D2 might thus suggest to extend both chambers of a combined KB-D1 barrel substantially along the full height of the container, including the option of providing the valve in the top portion of the barrel.

Furthermore, the adsorption chamber according to D2, has a simple cylindrical structure and no U-shaped cross section. Consequently zeolite is arranged only at the side of the container. When additionally transferring this simple structure to the combined KB-D1 barrel, the subject-matter of claim 1 would however not be directly obtained: without further modification, the resulting adsorption chamber would be cylindrical, not U-shaped in cross section.

It is concluded that the invention defined in claim 1 involves an inventive step.

5. Example set of claims

1. A self-cooling barrel (30) comprising
 - a container (40) for liquid to be cooled,
 - an adsorption chamber (32) containing a zeolite (31),
 - an evaporation chamber (34) containing water,
 - a first wall (35) separating the adsorption chamber (32) from the evaporation chamber (34),
 - a valve (36) arranged to open and close a passage in the first wall (35), and
 - a second wall (38) for separating the evaporation chamber (34) from the liquid to be cooled, the second wall (38) comprising a bottom wall and at least part of a side wall of the container (40) characterised in that the adsorption chamber (32) has a U-shaped cross section and surrounds the evaporation chamber (34), and the zeolite is arranged only at the side of the barrel (30).
2. A self-cooling barrel (30) according to claim 1, comprising a layer (33) of hygroscopic material for storing the water, the layer (33) being arranged in the evaporation chamber (34) on the second wall (38).
3. A self-cooling barrel (30) according to claim 1 or 2, comprising a wire mesh (39) for holding the zeolite at a distance from the first wall (35), the wire mesh (39) being arranged in the adsorption chamber (32).
4. A self-cooling barrel (30) according to any one of the preceding claims, wherein the evaporation chamber (34) extends along substantially the full height of the container (40).
5. A self-cooling barrel (30) according to claim 4, wherein the valve (36) is arranged in the top portion of the barrel (30).

6. A self-cooling barrel (30) according to any one of the preceding claims, where the top portion and bottom of the barrel (30) have corresponding structures configured so that a plurality of such barrels can be stably stacked on top of each other.

EXAMINATION COMMITTEE I

Candidate No. _____

Paper B (Electricity/Mechanics) 2012 - Marking Sheet

Category		Maximum possible	Marks awarded	
Claims	Independent	30		
	Dependent	5		
Arguments	Basis for Amendments	14		
	Clarity	2		
	Novelty	2		
	Inventive Step	47		
Total		100		

Examination Committee I agrees on marks and recommends the following grade to the Examination Board:

PASS
(50-100)

COMPENSABLE FAIL
(45-49)

FAIL
(0-44)

28 June 2012

Chairman of Examination Committee I