# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference<br>183 751 aa/api | **FOR FURTHER ACTION** | See Form PCT/IPEA/416 |
|---|---|---|
| International application No.<br>PCT/EP2015/071462 | International filing date *(day/month/year)*<br>18.09.2015 | Priority date *(day/month/year)*<br>19.09.2014 |
| International Patent Classification (IPC) or national classification and IPC<br>INV. E03F1/00 | | |
| Applicant<br>WAVIN B.V. | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 20 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions).
      ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2).
      ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)).
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3*ter* of Annex C of the Administrative Instructions).

4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 18.07.2016 | 02.12.2016 |


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# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2015/071462

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

| | |
|---|---|
| 1, 2, 4-8, 10-32 | as originally filed |
| 3, 9 | filed with telefax on 08-09-2016 |

**Claims, Numbers**

| | |
|---|---|
| 1-40 | filed with telefax on 08-09-2016 |

**Drawings, Sheets**

| | |
|---|---|
| 1/18-18/18 | as originally filed |

☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-*bis*)):
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:

5. ☐ This report has been established:
   - ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-*bis*) and 70.2(e)).
   - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4*bis* and 70.2(e)).

6. ☒ With regard to top-up searches (Rules 66.1*ter* and 70.2(f)):
   ☒ A top-up search was carried out by this Authority on 21.11.2016 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
      ☐ Additional relevant documents have been discovered during the top-up search.
   ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.

7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* *If item 4 applies, some or all of those sheets may be marked "superseded".*

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 1-40 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | 1-40 |
| | No: | Claims | |
| Industrial applicability (IA) | Yes: | Claims | 1-40 |
| | No: | Claims | |

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1 Reference is made to the following document:

D1: DE-A-10 2009 004 915

2 DE-A-10 2009 004 915 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses (the references applying to this document):

2.1 a plastic infiltration unit comprising:

a top deck 6, 7, 10,

at least one pillar 18, 25 for supporting the top deck 6, 7, 10,

the at least one pillar 18, 25 extending from the top deck 6, 7, 10 (figures 4, 6),

wherein the at least one pillar 18, 25 includes a plurality of compartments (figure 7),

wherein at least one of the compartments is laterally enclosed (figure 7),

wherein the at least one pillar 18, 25 has an internal structure comprising a central compartment 30 surrounded, at least in part, by at least one surrounding compartment (a surrounding compartment formed by a wall-part of outer tube 30 and 2 connecting walls 31) ,and

wherein the top deck 6, 7, 10 and the at least one pillar 18, 25 are produced in one piece*.

2.2 ***Note:** it is evident that the pillars are inserted into each unit during production, whereby a single piece unit is obtained.

2.3 The subject-matter of claim 1 therefore differs from this known plastic infiltration unit in that

the at least one surrounding compartment has a draft angle extending in one direction and

the central compartment has a draft angle extending in the opposite direction,

the central compartment has a draft angle which is substantially zero so that a vertical force is conducted from one unit to another unit when the units are stacked on one another and wherein the top deck,

and is therefore new (Article 33(2) PCT).

2.4 The problem to be solved by the present invention may be regarded as to provide a plastic infiltration unit which exhibits an improvement in its ability to withstand loads, in particular to withstand side loads and a resistance to buckling, without resulting in an increased product weight and cooling time. It is a further object is to reduce production costs, for example, by reducing the complexity of the manufacturing process.

2.5 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

DE-A-10 2009 004 915 nor any of the other available documents discloses or hints to a pillar for a plastic infiltration unit, wherein the draft angles of central and the surrounding compartment(s) have opposite directions.

3 Claim 37, formulated as an independent claim, includes all features of claim 1, and is thus in fact a dependent claim. Since claims 2-40 are all dependent on claim 1, they as such also meet the requirements of the PCT with respect to novelty and inventive step.

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# EPO acting as IPEA

Munich, July 18, 2016

**Our Ref.: 183 751 v9/v3/cwa**
***International Application PCT/EP2015/071462***
***WAVIN B.V.***

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European Design Attorneys

It is requested that the attached set of claims 1-49 is subjected to examination by the International Preliminary Examination Authority.

The amended set of claims is based on invention I identified in the section "Re Item IV", paragraph 2. The remaining claims have been deleted without prejudice.

In detail, amended claims 1-37 correspond to claims 1-37 as originally filed, respectively. Amended claims 38-41 correspond to originally filed claims 57-60, respectively. Amended claims 42-49 correspond to originally filed claims 67-74, respectively. The claims have been renumbered and their dependencies amended accordingly.

No further amendments have been made. Thus, the requirements relating to added subject-matter are met.

In response to the objections "lack of unity of invention" set out in paragraphs 1-8 of the written opinion, we comments as follows:

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It is our view that the amended set of claims meet the requirements of unity of invention.

In paragraph 2 of the Written Opinion, the Search Division identifies invention I as follows:

I. Claims: 1-37, 57 (insofar dependent on claim 1), 58, 59, 60 (insofar dependent on claims 58, 59), 73 and 74 (both insofar dependent on claims 1-35): a plastic infiltration unit characterized by at least one pillar including a plurality of compartments.

Originally filed claims 73 and 74 are identified by the Search Division as falling within invention I. In addition, however, originally filed claims 67-72 are directed to a plastic infiltration unit side plate comprising hinge attachment for detachably mounting the plastic infiltration unit side plate to a plastic infiltration unit according to any of claims 1-35. Originally filed claim 73 is directed to a plastic infiltration unit side plate according to any of claims 67-72. Therefore, it will be agreed that if originally filed claim 72 falls under invention I and originally filed claim 73 is dependent on any of originally filed claims 67-72, the subject-matter of originally filed claims 67-72 also falls under invention I. It is for these reasons that the amended set of claims in addition to originally filed claims 1-37, 57, 58-60, 73 and 74 also include originally filed claims 67-72 which have been renumbered as amended claims 42-47, respectively.

Since originally filed claims 73 and 74 have been searched and originally filed claims 73 and 74 are dependent on originally filed claims 67-72, we are of the view that it may reasonably also be expected that originally filed claims 67-72 have also been searched.

With regard to: "Re item V; reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement", we are of the view that the subject-matter of claim 1 is novel and involves an inventive step over the cited prior art documents. It is noted in paragraph 2.1 that the Examiner is of the view that the subject-matter of claim 1 is not new over D1 and from paragraph 2.3 that the Examiner is of the view that the subject-matter of claim 1 is not new over D2. We do not agree.

With regard to the cited documents, it would appear that the Examiner interprets the claims, in particular, the term "one piece" differently from what is meant, and that the Examiner´s interpretation is ill founded. With respect to the term "one piece" further explanation of the

correct interpretation is to be found in the description, page 3, 3rd paragraph, line 20 and page 9, lines 10-26.

With respect to D1 and D2, we are of the view that neither document discloses a top deck and at least one pillar that are produced in one piece. Further, D1 does not disclose pillars as defined by claim 1. In this connection, please refer to D1, paragraph [0054], which recites:

*"...Beim Zusammensetzen der Versickerbox 1 können beispielsweise zunächst die Stäbe 25 in den unteren Strukturkörper 3 eingesetzt warden, woraufhin der obere Strukturkörper 3 aufgesetzt wird."..".*

Reference is also made to Figure 5 which shows the "Stäbe 25" which are inserted into the "Strukturkörper 3".

With regard to D2, we refer to D2, Figure 2, which clearly shows a separate lattice panels 14a, 14b and vertical cells 121. If it is argued that a lattice panel corresponds to the top deck and a vertical cell corresponds to a pillar, it is our view that D2 does not provide a disclosure of a top deck and at least one pillar that are produced in one piece. In D2, these components are produced separately. The same is true for the "Strukturkörper 3" and the "Stäbe 25" of D1.

Therefore, in our view, the subject-matter of claim 1 is novel over D1 and D2.

Further, starting from, for example D1, and seeking a solution to the problem of achieving a material saving, a reduction in the cooling time, a cost-saving and an optimal use of material and easier handling (refer to the description, page 3, lines 14-16), the skilled person would not arrive at the subject-matter of claim 1 since neither of the cited prior art documents either disclose nor hint at a top deck and at least one pillar that are produced in one piece.

Therefore, the skilled person starting from D1 and seeking a solution to the problem identified above would not arrive at the subject-matter of claim 1 without exercising inventive skill. Therefore, the subject-matter of claim 1 involves an inventive step over the cited prior art documents. The dependent claims are allowable by virtue of their dependency on allowable claim 1. Therefore, the subject-matter of the amended claims involves an inventive step.

However, if the Examiner is not in a position to issue a positive statement for the patentability of claim 1 filed with this reply, then it is requested that timely feedback is given to the Applicant, so that additional arguments and/or further amendments to the main claim can be put to the attention of the Examiner.



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Encl: Amended claims 1-49 (neat and working copy)

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EPO acting as IPEA

Munich, September 8, 2016

**Our Ref.: 183 751 v9/v3/whu**
**International Application PCT/EP2015/071462**
**WAVIN B.V.**

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European Design Attorneys

In response to the written opinion of August 8, 2016, we:

- express gratefulness for the opportunity given to respond before finalizing the examination, and

- herewith file amended description pages 3 and 9 and a new set of claims 1-40 and herewith request these amended description pages and this set of claims to be the basis for further examination by the IPEA.

The newly filed claims are based on previous claims 1-49. Amended claim 1 corresponds to a combination of previous claims 1, 4 and 5. Amended claim 37 also includes the subject-matter of previous claim 4 and 5.

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In response to paragraph 2 of the written opinion, previous claims 42-47 and 48 have been deleted without prejudice. Further, new claim 40 which is based on previous claim 49 has been amended as suggested by the Examiner so that it mentions the features of the plastic infiltration unit side plate as defined in previous claim 42.

The remaining claims have been renumbered and their dependencies amended accordingly.

In the description, in response to paragraph 3 of the written opinion, some amendments have been made to render the wording in the description consistent with the wording of the claims.

No further amendments have been made. The requirements relating to not adding subject matter are met.

In view of the amendments made to the claims as detailed above, in particular, the deletion without prejudice of previous claims 42-48 and the recasting of previous claim 49, the objections raised in paragraph 2 of the written opinion are moot. The amended set of claims fulfils the requirements of unity of invention.

In view of the comments in paragraph 3 of the written opinion, we have for the benefit of the examination by the IPEA amended pages 3 and 9 so that the description is consistent with a reasonable interpretation of the term "one piece" as cited in the claims. In particular, on page 9, line 16-17, we have amended the description to a side that the plastic infiltration unit 2 according to the invention is produced in a single shot.

In order to yet further distinguish the present invention in structural terms from the prior art, however, amended independent claims 1 and 37 include the subject-matter of originally filed claim 4 and 5.

Originally filed claim 4 and 5 in combination recite that the at least one pillar has an internal structure comprising a central compartment surrounded, at least in part, by at least one surrounding compartment, wherein the at least one surrounding compartment has a draft angle extending in one direction and the central compartment has a draft angle extending in the opposite direction, wherein the central compartment has a draft angle which is substantially zero so that a vertical force is conducted from one unit to another when the units are stacked on one another.

Neither D1 nor D2 disclose these additional features in addition to the feature that the top deck and the at least one pillar are produced in one piece. Indeed, the features defined in the originally filed claim 4 and 5 are those which allow the top deck and the at least one pillar to be produced in one piece, and a vertical transmission of forces within stacked units.

In the written opinion dated January 28, 2016 in paragraph 3, the Examiner objected that the term "draft angle" in originally filed claim 4 could not be understood, and therefore could not distinguish the subject-matter of claims 4 and 5 from the prior art (D1 and D2). We respectfully disagree. The terms used in the claims are those which are to be understood by the person skilled in the art. The term "draft angle" is well-known in the art of plastic infiltration units and is understood by the skilled person. To back up this statement, we enclose a website page that can be found when "draft angles" is googled. This site makes reference to the term "draft angle" without further ado. The skilled person when reading originally filed claim 4 will indeed understand the meaning of such an evidently well known term as "draft angle" and will therefore understand that these features can yet further distinguish the subject-matter amended claims 1 and 37 from the prior art.

For the sake of completeness, D1 and D2 do not disclose a draft angle as recited in amended claims 1 and 37 Thus, the subject matter of amended claims 1 and 37 is novel over the cited prior art documents.

With reference to paragraph 4 of the written opinion, amended claims 1 and 37 involve an inventive step over the cited prior art documents.

Starting from D1: D1 does not disclose a plastic infiltration unit wherein the at least one pillar has an internal structure comprising a central compartment surrounded, at least in part, by at least one surrounding compartment, wherein the at least one surrounding compartment as a draft angle extending in one direction and the central compartment has a draft angle extending in the opposite direction, wherein the central compartment has a draft angle which is substantially zero and wherein the top deck and the at least one pillar are produced in one piece.

In view of these differences between D1 and amended claims 1 and 37, the problem to be solved is not merely the desire to provide an efficient manufacturing process but is one in which the strength of the plastic infiltration unit is maintained (refer to the description, page 3, lines 14-30, and page 5, line 33, page 6, line 2). It is this combined technical effect which is achieved by the present invention. In particular, an efficient manufacturing process is achieved whilst maintaining the strength of the structure. In this way, the plastic infiltration units can be produced in a single shot and produces a structure which has a high compression strength and a lower tendency to buckle under compression loads.

None of the cited prior art documents either alone or in combination disclose nor hint at the combination of features defined by amended claims 1 and 37 Therefore, the subject-matter of these claims involves an inventive step over the cited prior art documents. The dependent claims are allowable by virtue of their dependency on amended independent claims 1 and 37, respectively.

In response to the written grounds in paragraph 4.1 of the written opinion dated August 8, 2016, where the Examiner refers to EP-A-1932975 and WO-A-02/14608 we comment as follows. EP-A-1932975 does not disclose a laterally enclosed compartment. Further, this document also does not disclose the features of originally filed claim 4. WO-A-02/14608 does not disclose a pillar comprising a plurality of compartments. Further, this document also is not disclosed as subject-matter of originally filed claim 4. Therefore, the skilled person starting from D4 and seeking a solution to the problem identified above would not arrive at the subject-matter of amended independent claims 1 and 38 since neither of these documents disclose nor hint that the subject-matter of originally filed claim 4, which has been incorporated into amended claims 1 and38. The present invention does not constitute simply choosing one of several straightforward possibilities since a particular structure is required (as defined in amended claims 1 and 38) which results in a unit produced in one piece. The

structure defined in claims 1 and 37 is not disclosed nor hinted at in the prior art, would therefore not be one of several straightforward possibilities from which the skilled person would choose. Therefore, the subject-matter of the amended claims involves an inventive step over the cited prior art documents.

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**Encs:**

Amended description pages 3 and 9 (marked up and clean versions)

New set of claims 1-40 (clean version)

Website page that can be found when the wording "draft angles" is googled

resulting in an increased product weight and cooling time. It is a further object is to reduce production costs, for example, by reducing the complexity of the manufacturing process.

In accordance with one aspect of the invention, there is provided a plastic infiltration unit comprising:
a top deck, at least one pillar extending from the top deck, wherein the at least one pillar includes a plurality of compartments, wherein at least one of the compartments is laterally enclosed, and wherein the top deck and the at least one pillar are produced in one piece.

In this way, a material saving is achieved. This results in a reduction in the cooling time, a cost saving, an optimal use of material and easier handling due to the lower weight of the infiltration unit. Further, the plastic infiltration unit of the present invention produced can have an increased pillar height (in the z direction). In particular, the plastic infiltration unit produced in a single shot has an increased height that effectively load bears. This results in a reduction in production costs. The plastic infiltration unit of the present invention also exhibits an increased functionality in terms of the volume of water that can be handled and an high strength requiring less materials.

A further advantage of the present invention including at least one pillar, is that it has been found that a pillar structure has a higher compression strength and a lower tendency to buckle under compression loads.

According to a further aspect of the invention, there is provided a plurality of plastic infiltration units, arranged

Fig. 1 shows a plastic infiltration unit according to an embodiment of the invention. The plastic infiltration of the present invention may be arranged with one or more other plastic infiltration units to form an assembly. Fig. 2 shows a side view of the plastic infiltration unit of Fig. 1. Fig. 3 shows an underside view of the plastic infiltration unit of Fig. 1. Fig. 4 shows a top view (bird´s eye view) of a plastic infiltration unit of Fig. 1. In particular, Fig. 4 shows an upper surface of the plastic infiltration unit.

According to an embodiment of the invention, the plastic infiltration unit 2 comprises a top deck 4 and at least one pillar 6 extending from the top deck 4. The at least one pillar 6 includes a plurality of compartments 8, 10 (Fig. 5). The plastic infiltration unit 2 is weld free. For example, it is made by injection molding preferably from thermoplastic material. The plastic infiltration unit 2 according to the invention is produced in a single shot. In this way, an efficient manufacturing process is achieved. At least one of the compartments 10 is laterally enclosed, that is, at least one of the compartments is enclosed around its perimeter. In other words, at least one of the compartments is not open from a sideways direction. In this way, the plastic infiltration unit is able to withstand a sideload effectively. Further, the top deck 4 and the at least one pillar 6 are produced in one piece. In this way, an efficient manufacturing process is achieved.

In the embodiment shown in Fig.1, the unit 1 includes six pillars. Other numbers of pillars are envisaged, for example, two, three or four, or more.

The at least one pillar 6 extends from the top deck 4 in a longitudinal direction 12 (Figs. 1, 2 and 6). The plurality

Amended Claims

1 A plastic infiltration unit comprising:
a top deck,
at least one pillar for supporting the top deck, the at least one pillar extending from the top deck,
wherein the at least one pillar includes a plurality of compartments, wherein at least one of the compartments is laterally enclosed, wherein the at least one pillar has an internal structure comprising a central compartment surrounded, at least in part, by at least one surrounding compartment, wherein the at least one surrounding compartment has a draft angle extending in one direction and the central compartment has a draft angle extending in the opposite direction, wherein the central compartment has a draft angle which is substantially zero so that a vertical force is conducted from one unit to another unit when the units are stacked on one another and wherein the top deck and the at least one pillar are produced in one piece.

2 A plastic infiltration unit according to claim 1, wherein the plurality of compartments are hollow columns extending in a longitudinal direction, and arranged with respect to one another to form the pillar.

3 A plastic infiltration unit according to claim 1 or claim 2, wherein the at least one pillar extends from the top deck in a longitudinal direction and the plurality of compartments extend along the longitudinal axis through the length of the pillar.

4 A plastic infiltration unit according to any preceding claim, wherein the at least one pillar has a proximal end and a distal end with respect to the top deck, and further comprises an intermediate portion located between the proximal end and the distal end.

5 A plastic infiltration unit according to claim 4, wherein the proximal end comprises a socket and the distal end comprises a foot and a rim disposed adjacent to the foot and extending around the pillar.

6 A plastic infiltration unit according to any preceding claim, wherein a first plastic infiltration unit is for stacking with a second plastic infiltration unit according to any preceding claim, wherein in a stacked arrangement the foot of the first plastic infiltration unit is received in the first plastic infiltration unit.

7 A plastic infiltration unit according to claim 6, wherein in the stacked arrangement, the rim defines a contact area between the first and second plastic infiltration units, so that a vertical force exerted on the first plastic infiltration unit is conducted directly to the second plastic infiltration unit.

8 A plastic infiltration unit according to any preceding claim, wherein the plurality of compartments are open at at least one of said ends in a longitudinal direction of the pillar.

9 A plastic infiltration unit according to any preceding claim, wherein the at least one pillar includes a side

wall which defines an outerfacing surface of the plurality of compartments.

10 A plastic infiltration unit according to any preceding claim, wherein the top deck extends in a plane and a longitudinal direction of the at least one pillar is substantially perpendicular to the plane of the deck.

11 A plastic infiltration unit according to any preceding claim, wherein the top deck includes an upper facing surface and a lower facing surface and at least a part of the at least one pillar extends from the lower facing surface, wherein the at least one pillar is arranged to be interconnectable with an upper facing surface of a second infiltration unit to form a stack of infiltration units.

12 A plastic infiltration unit according to any preceding claim, wherein the at least one pillar extends in a longitudinal direction and has a longitudinal axis, and wherein the at least one pillar includes a central compartment extending along the longitudinal axis and at least one additional compartment extending in the longitudinal direction.

13 A plastic infiltration unit according to claim 12, wherein the at least one additional compartment surrounds at least a part of the central compartment.

14 A plastic infiltration unit according to claim 12 or 14, wherein the central compartment and the at least one additional compartment are concentric around the longitudinal axis.

15 A plastic infiltration unit according to any of claims 12-14, wherein the at least one additional compartment includes a plurality of surrounding compartments disposed around the central compartment.

16 A plastic infiltration unit according to any preceding claim, wherein the pillar is integratably formed in the top deck so that an upper end of the pillar forms a part of the top deck into which a lower end of a second pillar is insertable.

17 A plastic infiltration unit according to any of claims 1-16, wherein the central compartment is formed so that a vertical force exerted on a first pillar in a first plastic infiltration unit is conducted directly to a second pillar in a second plastic infiltration unit when the first plastic infiltration unit is stacked on the second plastic infiltration unit by inserting a distal end of the first pillar into a proximal end of the second pillar.

18 A plastic infiltration unit according to claim 17, wherein the first pillar is an upper pillar and the second pillar is a lower pillar with respect to one another, wherein the first pillar has a contact area for contact with the lower pillar and the lower pillar has a contact area for contact with the contact area of the upper pillar, wherein the contact area of the upper pillar overlaps with the contact area of the lower pillar, so that a vertical force exerted on the upper pillar is conducted directly to the lower pillar.

19 A plastic infiltration unit according to any preceding claim, wherein the pillar has a substantially quadrilateral cross section.

20 A plastic infiltration unit according to any preceding claim, wherein the pillar has a substantially square cross section.

21 A plastic infiltration unit according to any preceding claim, wherein the pillar has a substantially constant cross section along its length at least up to a foot of the pillar.

22 A plastic infiltration unit according to any preceding claim, wherein the pillar is laterally, fully enclosed.

23 A plastic infiltration unit according to any preceding claim, wherein the pillar is provided with perforations.

24 A plastic infiltration unit according to any of claims 1-23, wherein the surrounding compartments are arranged to withstand a side load, wherein the side load is substantially perpendicular to a vertical load.

25 A plastic infiltration unit according to any preceding claim, wherein the plurality of compartments are defined by at least one wall, wherein in at least one of the intermediate portion and the proximal portion the at least one wall has a thickness which is substantially constant in the longitudinal direction.

26 A plastic infiltration unit according to any preceding claim, wherein the at least one pillar has a substantially quadrilateral (square) cross section, the central compartment has a substantially cross shaped cross section and the surrounding compartments share at least one internal wall with the central compartment.

27 A plastic infiltration unit according to any of claims 1-26, wherein at least one of the surrounding compartments is joined to another of the surrounding compartments along its length by a wall portion, wherein the wall portion forms one wall of the central compartment.

28 A plastic infiltration unit according to any preceding claim, wherein the at least one pillar has a plurality of corner, wherein the corners of the at least one pillar are rounded.

29 A plastic infiltration unit according to any of claims 1-28, wherein the surrounding compartments have at least one rounded outerwall to prevent snagging of equipment on the at least one pillar.

30 A plastic infiltration unit according to any of claims 1-29, wherein the surrounding compartments include at least one groove extending in a longitudinal direction in an outer wall to prevent vertical buckling of the pillar.

31 A plastic infiltration unit according to any of claims 1-30, wherein the surrounding compartments and the central compartment share at least one internal wall



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Received at the EPO on Sep 08, 2016 18:29:01. Page 11 of 20

portion, wherein the at least one shared internal wall portion extends in at least one of an arc and a segmented arc between two points on an outer surface of the pillar to provide rigidity to the pillar.

32 A plastic infiltration unit according to claim 31, wherein at least one wall of the central compartment is provided with at least one hole for allowing liquids to drain from the plastic infiltration unit when the plastic infiltration unit is in storage.

33 A plastic infiltration unit according to any preceding claim, wherein the plastic infiltration unit is weld free.

34 A plurality of plastic infiltration units according to any preceding claim, arranged in use to form a stack of plastic infiltration units, wherein in the stack, the at least one pillar of the at least one plastic infiltration unit is oriented in a downward direction, and wherein the top deck of a second plastic infiltration unit forms a base plate of a first plastic infiltration unit arranged above the second plastic infiltration unit in the stack.

35 A system comprising a plurality of plastic infiltration units according to any preceding claim, arranged in use to form a stack, wherein the plurality of plastic infiltration units are stacked in a vertical direction one on top of the other, the system further comprising a single base plate having at least one socket for receiving a pillar, wherein the single base plate is disposed at the base of the stack and is arranged in

use to receive in the at least one socket at least one pillar of a second plastic infiltration unit, and wherein the top deck of a second infiltration unit forms a base plate for a first infiltration unit disposed above the first infiltration unit and so on.

36 A plastic infiltration system for deployment underground comprising a plastic infiltration unit according to claim 1 and a plastic base plate according to of claim 37, wherein the at least one pillar of the plastic infiltration unit is received at the receiving location of the plastic base plate.

37 An assembly comprising at least two plastic infiltration units, including a first plastic infiltration unit and a second plastic infiltration unit, wherein each plastic infiltration unit comprises a top deck, at least one pillar for supporting the top deck, the at least one pillar extending from the top deck, wherein the at least one pillar includes a plurality of compartments, wherein at least one of the compartments is laterally enclosed, wherein the at least one pillar has an internal structure comprising a central compartment surrounded, at least in part, by at least one surrounding compartment, wherein the at least one surrounding compartment has a draft angle extending in one direction and the central compartment has a draft angle extending in the opposite direction, wherein the central compartment has a draft angle which is substantially zero so that a vertical force is conducted from one unit to another unit when the units are stacked on one another and wherein the top deck and the at least one pillar are produced in one piece.

38 An assembly according to claim 37, wherein the at least one pillar of the first plastic infiltration unit is insertable into the top deck of the second plastic infiltration unit.

39 An assembly according to claim 37or claim 38, further comprising a plastic base plate comprising: at least one receiving portion for receiving at least one pillar of the second plastic infiltration unit at a receiving location, the receiving portion comprising a socket and a shoulder portion disposed at a region surrounding at least a part of the socket, wherein the shoulder portion is formed so that the thickness (height)of the plastic base plate is increased in the region surrounding at least a part of the socket, so that bending load on the base plate is at least partly taken by the pillar of the plastic infiltration unit when it is located at the receiving location.

40 A plastic infiltration unit according to any of claims 1 to 39 further comprising a plastic infiltration unit side plate comprising a hinge attachment for detachably mounting the plastic infiltration unit side plate to the plastic infiltration unit, the plastic infiltration unit side plate further comprising a plurality of flow guiding structures arranged to allow a fluid to flow with the aid of gravity through to the side plate.

**REIVINDICACIONES**

1. Una unidad de infiltración de plástico, caracterizada porque comprende: una cubierta superior, por lo menos un pilar para sostener la cubierta superior, el por lo menos un pilar se extiende desde la cubierta superior, en donde el por lo menos un pilar incluye una pluralidad de compartimentos, en donde por lo menos uno de los compartimentos está encerrado lateralmente, en donde en por lo menos un pilar tiene una estructura interna que comprende un compartimento central rodeado, por lo menos en parte, por al menos un compartimento circundante, en donde el por lo menos un compartimento circundante tiene un ángulo de desmoldeo que se extiende en una dirección y el compartimento central tiene un ángulo de desmoldeo que se extiende en la dirección opuesta, en donde el compartimento central tiene un ángulo de desmoldeo el cual es sustancialmente cero de modo que una fuerza vertical se conduce de una unidad a otra unidad cuando las unidades son apiladas una sobre otra y en donde la cubierta superior y el por lo menos un pilar se producen en una pieza.

2. Una unidad de infiltración de plástico de conformidad con la reivindicación 1, caracterizada porque la pluralidad de compartimentos son columnas huecas que se extienden en una dirección longitudinal, y están dispuestas una con respecto a otra para formar el pilar.

3. Una unidad de infiltración de plástico de conformidad con la reivindicación 1 o la reivindicación 2, caracterizada porque el por lo menos un pilar se extiende desde la cubierta superior en una dirección longitudinal y la pluralidad de compartimentos se extienden a lo largo del eje longitudinal a través de la longitud del pilar.

4. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el por lo menos un pilar tiene un extremo próximo y un extremo distal con respecto a la cubierta superior, y comprende además una porción intermedia localizada entre el extremo próximo y el extremo distal.

5. Una unidad de infiltración de plástico de conformidad con la reivindicación 4, caracterizada porque el extremo próximo comprende un receptáculo y el extremo distal comprende una pata y una pestaña dispuesto adyacente a la pata y que se extiende alrededor del pilar.

6. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque una primera unidad de infiltración de plástico es para el apilamiento con una segunda unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, en donde en una disposición apilada la pata de la primera unidad de

infiltración de plástico es recibida en la segunda unidad de infiltración de plástico.

7. Una unidad de infiltración de plástico de conformidad con la reivindicación 6, caracterizada porque en la disposición apilada, la pestaña define un área de contacto entre la primera unidad de infiltración de plástico y la segunda unidad de infiltración de plástico, de modo que una fuerza vertical ejercida sobre la primera unidad de infiltración de plástico es conducida directamente a la segunda unidad de infiltración de plástico.

8. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque la pluralidad de compartimentos están abiertos en por lo menos en uno de los extremos en una dirección longitudinal del pilar.

9. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el por lo menos un pilar incluye una pared lateral la cual define una superficie orientada hacia afuera de la pluralidad de compartimentos.

10. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque la cubierta superior se extiende en un plano y una dirección longitudinal del por

lo menos un pilar es sustancialmente perpendicular al plano de la cubierta.

11. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque la cubierta superior incluye una superficie orientada hacia arriba y una superficie orientada hacia abajo y por lo menos una parte del por lo menos un pilar se extiende desde la superficie orientada hacia abajo, en donde el por lo menos un pilar se dispone para ser interconectable con una superficie orientada hacia arriba de una segunda unidad de infiltración para formar una pila de unidades de infiltración.

12. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el por lo menos un pilar se extiende en una dirección longitudinal y tiene un eje longitudinal, y en donde el por lo menos un pilar incluye un compartimento central que se extiende a lo largo del eje longitudinal y por lo menos un compartimento adicional que se extiende en la dirección longitudinal.

13. Una unidad de infiltración de plástico de conformidad con la reivindicación 12, caracterizada porque el por lo menos un compartimento adicional rodea por lo menos una parte del compartimento central.

14. Una unidad de infiltración de plástico de conformidad con la reivindicación 12 o 14, caracterizada porque el compartimento central y el por lo menos un compartimento adicional son concéntricos alrededor del eje longitudinal.

15. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 12-14, caracterizada porque el por lo menos un compartimento adicional incluye una pluralidad de compartimentos circundantes dispuestos alrededor del compartimento central.

16. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el pilar se forma integralmente en la cubierta superior de modo que un extremo superior del pilar forme una parte de la cubierta superior en la cual es insertable un extremo inferior de un segundo pilar.

17. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 1-16, caracterizada porque el compartimento central se forma de modo que una fuerza vertical ejercida sobre un primer pilar en una primera unidad de infiltración de plástico sea conducida directamente a un segundo pilar en una segunda unidad de infiltración de plástico cuando la primera unidad

de infiltración de plástico es apilada sobre la segunda unidad de infiltración de plástico al insertar un extremo distal del primer pilar en un extremo próximo del segundo pilar.

18. Una unidad de infiltración de plástico de conformidad con la reivindicación 17, caracterizada porque el primer pilar es un pilar superior y el segundo pilar es un pilar inferior uno con respecto al otro, en donde el primer pilar tiene una área de contacto para el contacto con el pilar inferior y el pilar inferior tiene un área de contacto para el contacto con el área de contacto del pilar superior, en donde el área de contacto del pilar superior traslapa con el área de contacto del pilar inferior, de modo que una fuerza vertical ejercida sobre el pilar superior sea conducida directamente al pilar inferior.

19. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el pilar tiene un corte transversal sustancialmente cuadrilateral.

20. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el pilar tiene un corte transversal sustancialmente cuadrado.

21. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones

anteriores, caracterizada porque el pilar tiene un corte transversal sustancialmente constante por toda su longitud por lo menos hasta una pata del pilar.

22. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el pilar está encerrado lateralmente por completo.

23. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el pilar está provisto con perforaciones.

24. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 1-23, caracterizada porque los compartimentos circundantes se disponen para resistir una carga lateral, en donde la carga lateral es sustancialmente perpendicular a una carga vertical.

25. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque la pluralidad de compartimentos es definida por al menos una pared, en donde en por lo menos una de la porción intermedia y la porción próxima a la por lo menos una pared tiene un espesor el cual es sustancialmente constante en la dirección longitudinal.

26. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el por lo menos un pilar tiene una corte transversal sustancialmente cuadrilateral (cuadrado), el compartimento central tiene un corte transversal de forma sustancialmente cruzada y los compartimentos circundantes comparten por lo menos una pared interna con el compartimento central.

27. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 1-26, caracterizada porque por lo menos uno de los compartimentos circundantes es unido a otro de los compartimentos circundantes por toda su longitud por una porción de pared, en donde la porción de pared forma una pared del compartimento central.

28. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque el por lo menos un pilar tiene una pluralidad de esquinas, en donde las esquinas del por lo menos un pilar son redondeadas.

29. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 1-28, caracterizada porque los compartimentos circundantes tienen por lo menos una pared exterior redondeada para prevenir el enganche del equipo en el por lo menos un pilar.

30. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 1-29, caracterizada porque los compartimentos circundantes incluyen por lo menos una muesca que se extiende en una dirección longitudinal en una pared exterior para prevenir el colapso vertical del pilar.

31. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 1-30, caracterizada porque los compartimentos circundantes y el compartimento central comparten por lo menos una porción de pared interna, en donde la por lo menos una porción de pared interna compartida se extiende en por lo menos uno de un arco y un arco segmentado entre dos puntos en una superficie exterior del pilar para proporcionar rigidez al pilar.

32. Una unidad de infiltración de plástico de conformidad con la reivindicación 31, caracterizada porque por lo menos una pared del compartimento central está provista con por lo menos un agujero para permitir que los líquidos drenen de la unidad de infiltración de plástico cuando la unidad de infiltración de plástico está en almacenamiento.

33. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, caracterizada porque la unidad de infiltración

de plástico está libre de soldaduras.

34. Una pluralidad de unidades de infiltración de plásticos de conformidad con cualquiera de las reivindicaciones anteriores, dispuestas en el uso para formar una pila de unidades de infiltración de plástico, caracterizada porque en la pila, el por lo menos un pilar de la por lo menos una unidad de infiltración de plástico está orientada en una dirección descendente, y en donde la cubierta superior de una segunda unidad de infiltración de plástico forma una placa base de una primera unidad de infiltración de plástico dispuesta arriba de la segunda unidad de infiltración de plástico en la pila.

35. Un sistema que comprende una pluralidad de unidades de infiltración de plástico de conformidad con cualquiera de las reivindicaciones anteriores, dispuestas en el uso para formar una pila, caracterizado porque la pluralidad de unidades de infiltración de plástico se apilan en una dirección vertical una sobre la parte superior de la otra, el sistema comprende además una placa base individual que tiene por lo menos un receptáculo para recibir un pilar, en donde la placa base individual se dispone en la base de la pila y se dispone en el uso para recibir en el por lo menos un receptáculo por lo menos un pilar de una segunda unidad de infiltración de plástico, y en donde la cubierta superior de una segunda unidad de

infiltración forma una placa base para una primera unidad de infiltración dispuesta arriba de la primera unidad de infiltración y así sucesivamente.

36. Un sistema de infiltración de plástico para el despliegue subterráneo que comprende una unidad de infiltración de plástico de conformidad con la reivindicación 1 y una placa base de plástico de conformidad con la reivindicación 37, caracterizado porque el por lo menos un pilar de la unidad de infiltración de plástico es recibido en la ubicación de recepción de la placa base de plástico.

37. Un ensamblaje que comprende por lo menos dos unidades de infiltración de plástico, que incluyen una primera unidad de infiltración de plástico y una segunda unidad de infiltración de plástico, caracterizado porque cada unidad de infiltración de plástico comprende una cubierta superior, por lo menos un pilar para sostener la cubierta superior, el por lo menos un pilar se extiende desde la cubierta superior, en donde el por lo menos un pilar incluye una pluralidad de compartimentos, en donde por lo menos uno de los compartimentos está encerrado lateralmente, en donde el por lo menos un pilar tiene una estructura interna que comprende un compartimento central rodeado, por lo menos en parte, por al menos un compartimento circundante, en donde el por lo menos un

compartimento circundante tiene un ángulo de desmoldeo que se extiende en una dirección y el compartimento central tiene un ángulo de desmoldeo que se extiende en la dirección opuesta, en donde el compartimento central tiene un ángulo de desmoldeo el cual es sustancialmente cero de modo que una fuerza vertical sea conducida de una unidad a otra unidad cuando las unidades son apiladas una sobre otra y en donde la cubierta superior y por lo menos el pilar se producen en una pieza.

38. Un ensamblaje de conformidad con la reivindicación 37, caracterizado porque el por lo menos un pilar de la primera unidad de infiltración de plástico es insertable en la cubierta superior de la segunda unidad de infiltración de plástico.

39. Un ensamblaje de conformidad con la reivindicación 37 o la reivindicación 38, caracterizado porque comprende además una placa base de plástico que comprende: por lo menos una porción de recepción para recibir por lo menos un pilar de la segunda unidad de infiltración de plástico en una ubicación de recepción, la porción de recepción comprende un receptáculo y una porción de resalto dispuesta en una región que rodea por lo menos una parte del receptáculo, en donde la porción de resalto se forma de modo que el espesor (la altura) de la placa base de plástico se incremente en la región que rodea por

lo menos una parte del receptáculo, de modo que la carga de flexión sobre la placa base sea tomada por lo menos parcialmente por el pilar de la unidad de infiltración de plástico cuando se localice en la ubicación de recepción.

40. Una unidad de infiltración de plástico de conformidad con cualquiera de las reivindicaciones 1 a 39, caracterizada porque comprende además una placa lateral de la unidad de infiltración de plástico que comprende una unión articulada para montar de manera separable la placa lateral de la unidad de infiltración de plástico a la unidad de infiltración de plástico, la placa lateral de la unidad de infiltración de plástico comprende además una pluralidad de estructuras de guía de flujo dispuestas para permitir que fluya un fluido corra con la ayuda de la gravedad a través de la placa lateral.