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(54) **Tubular foundation element, assembly and method for installing tubular foundation elements in a ground formation.**

(57) The present invention relates to a tubular foundation element, in particular a pile e.g. a jacket pile, to be installed in a ground formation. The tubular foundation element has at least one open end, typically both ends open, allowing a pile driver with an anvil to be inserted into the tubular foundation element. The tubular foundation element comprises a support at the inside thereof, which support is adapted to transmit energy from the anvil directly to the tubular foundation element, during installation of the tubular foundation element.

Tubular foundation element, assembly and method for installing tubular foundation elements in a ground formation

The present invention relates to a tubular foundation element, in particular a pile *e.g.* a jacket pile, to be installed in a ground formation, the tubular foundation element having at least one open end, typically both ends open, allowing a pile driver with an anvil to be inserted into the tubular foundation element. The present invention further relates to an assembly for installing tubular foundation elements, in particular piles *e.g.* jacket piles, in a ground formation, which assembly comprises a pile driver and an anvil. Further, the present invention relates to a method of installing a tubular foundation element, in particular a pile or a jacket pile, in a ground formation, by means of a pile driver.

It is known that pile driving is done by a hammer with a sleeve, wherein the sleeve is stabbed over the pile. The hammer delivers one or more blows to the pile, thereby driving the pile into the ground formation.

It is an object of the present invention to provide a tubular foundation element which does not require or requires less removal of soil material.

To this end, the presently provided tubular foundation element comprises a support at the inside thereof, which support is adapted to transmit energy from the anvil directly to the tubular foundation element, during installation of the tubular foundation element.

During installation of the tubular foundation element, a driver is placed on the support provided at the inside of the tubular foundation element and the tubular foundation element penetrates the soil material of the ground

formation, in particular an underwater ground formation, and the soil material enters the tubular foundation element. At a predetermined point during driving of the tubular foundation element, the anvil and the support hit the soil material, thereby forcing the soil material to move downwards. As a result, the part of the tubular foundation element above the support contains no or little soil material.

Moreover, the soil material within the tubular foundation element is compressed during installation of the tubular foundation element and, therefore, becomes more dense. If a further element is inserted into the tubular foundation element, for instance a jacket leg of a jacket, grout may be provided around the further element and within the tubular foundation element to provide a fixation of the further element relative to the tubular foundation element. Due to the more dense soil material, mixing of the grout with the soil material may be prevented or reduced and grouting is improved.

It is noted that in the context of the present patent application, the term directly is referred to as without changing direction, and is also referred to as with nothing in between. Thus, the energy transmitted from the anvil to the tubular foundation element does not change direction during transmittal as such.

In a preferred embodiment, the support is provided in the upper half of the tubular foundation element, in particular in the upper quarter of the tubular foundation element. In this respect, ‘upper’ refers to a tubular foundation element which is vertically oriented. In a more specific embodiment, the tubular foundation element has a length in a range from 20 to 120 m, preferably in a range from 40 to 70 m, and the support is placed at a distance from the at least one open end, which distance is in a range from 4 to 10 m, in particular in a range from 6 to 8 m, and/or in a

range from 7% to 30%, in particular in a range from 10% to 25% of the total length of the tubular foundation element. In this embodiment, the upper part of the tubular foundation element, *i.e.* the part above the support, stays clean during installation of the tubular foundation element. In the upper part, a jacket leg may be inserted and fixed with respect to the tubular foundation element by means of grout. Due to the clean upper part of the tubular foundation element, no removal of soil material is required before grouting.

The support may comprise a flange secured to an inner surface of the tubular foundation element. The flange may be secured, *e.g.* welded or bolted, to the inner surface, in particular an inner wall of the tubular foundation element.

The support may be substantially tapered towards the toe of the tubular foundation element in the longitudinal direction thereof. In this respect, 'toe' refers to the lowermost end of the tubular foundation element. Due to the tapered shape of the support towards the toe of the tubular foundation element, the energy delivered via the anvil to the support is transmitted efficiently to the wall of the tubular foundation element.

The invention further relates to a method of installing a tubular foundation element in a ground formation, by means of a pile driver. The method comprises the steps of providing a tubular foundation element with a support at the inside thereof; placing an anvil on the support; placing the driver on the anvil; and driving the tubular foundation element into the ground formation, wherein during installation the support transmits energy from the anvil directly to the tubular foundation element.

The support may be provided in the upper half of the tubular foundation element, in particular in the upper quarter of the tubular foundation element. In this respect, 'upper'

refers to a tubular foundation element which is vertically oriented.

In an embodiment the driver and/or anvil are held by the tubular foundation element during driving thereof.

In a preferred embodiment, the tubular foundation element is placed directly on the ground formation and driven into the ground formation. In a more specific embodiment, the anvil compresses soil material of the ground formation within the tubular foundation element during at least a part of a installing process of the tubular foundation element. Usually, the upper layer of the ground formation, in particular underwater ground formation, has to be excavated before the tubular foundation element may be installed in the ground formation.

Thus, as explained above, the upper part of the tubular foundation element, *i.e.* the part above the support, contains no or little soil material after installation of the tubular foundation element. Therefore, the upper part of the tubular foundation element does not require to be emptied after installation. Further, the soil material within the tubular foundation elements is compressed during installation of the tubular foundation element. Due to the compression of the soil material of the ground formation, the soil material of the ground formation, in particular the upper layer, is more dense after installation.

Due to compression of the soil material during installation, the tubular foundation element may be placed onto the ground formation, in particular a ground formation with a soft upper layer, without excavating the upper layer of the ground formation.

The method may further comprise a step of placing a template having at least two guides for guiding a tubular foundation element on the ground formation, in particular

before the tubular foundation element is placed on the ground formation.

In an embodiment, when the tubular foundation element is installed in an underwater ground formation, water may be relieved from the tubular foundation element, in particular at least from the part between the underwater ground formation and the support, during installation of the tubular foundation element in the underwater ground formation.

The invention further relates to an assembly for installing a tubular foundation element as presently provided, in a ground formation, comprising a pile driver and an anvil, wherein the support at the inside of the tubular foundation element is adapted to transmit energy from the anvil directly to the tubular foundation element, during installation of the tubular foundation element. It is preferred that the pile driver comprises a hydraulic pile driver.

The assembly may comprise a template having at least two guides for guiding a tubular foundation element, which template is to be placed on the underwater ground formation, at least during installing the tubular foundation element.

For the sake of completeness, attention is drawn to the following prior art.

EP 2 312 060 relates to a system and a method for installing tubular foundation elements in an underwater ground formation, the system comprising a hydraulic driver, an anvil and an adaptor for transmitting energy from the anvil to the toe of the foundation element, which adaptor fits inside the tubular foundation element. The inner wall of the foundation element is provided with a support for the adaptor at or near its toe.

CN 201068569 relates to a pile-driving machine, comprising a ram, a pile, an inner sleeve and a hoisting device. The inner sleeve is located in a lower part of the

outer sleeve. The ram can move upwards and downwards within the outer sleeve, thereby directly hitting the inner sleeve. Lugs are projecting from the ram, which lugs strike the top of the outer sleeve to move the outer sleeve downwards.

US 3,824,797 relates to driving long piles into submerged lands with a liquid ram or spear generated in an evacuated tube. In one embodiment, the pile itself is used as at least a portion of the working chamber for generating a water hammer.

JPH0365737 relates to a driving assembly for installing piles in a ground formation.

Aspects of the invention will be explained in greater detail by reference to exemplary embodiments of the invention shown in the drawings, in which:

Figures 1 and 2 illustrate the different stages of installing a tubular foundation element in a ground formation; and

Figure 3 illustrates an installation of a jacket leg in the tubular foundation element of Figures 1 and 2.

In practice, installation of a jacket, *e.g.* for a wind turbine, starts with installing a number a jacket piles in a ground formation, *e.g.* an underwater ground formation. After installing the jacket piles, jacket legs of the jacket are placed within the jacket piles. A jacket leg extends in the upper part of a jacket pile. Grout may be added to the jacket pile, in particular the upper part of the jacket pile, in order to fixate the jacket leg with respect to the jacket pile.

To this end, Figure 1 shows an embodiment of a tubular foundation element 1, in this embodiment a jacket pile 1 which might be installed in an underwater ground formation 4. The tubular foundation element 1 is placed on the surface of the underwater ground formation 4 and is held by a guide 3

of a template 6. In this example, the jacket pile 1 has a circular cross-section and a diameter in the range from 1.5 to 3.5 m.

The jacket pile 1 is provided with a support, in this embodiment a flange 2 provided at an inner wall of the jacket pile 1. The flange 2 is attached to the inner wall of the jacket pile 1 by, *e.g.* welding, bolting, or any suitable manner to attach the flange 2 to the inner wall of the jacket pile 1.

In an embodiment, the flange 2 may be provided with openings (not shown) in order to let water out from the lower part of the jacket pile 1 below the flange 2. It is therewith prevented that the water pressure within the lower part of the jacket pile 1 exceeds a predetermined value as a result of driving the jacket pile 1 by means of the driver 4, in particular a hydraulic driver, which driver delivers blows to the flange 2. In this embodiment the blows are delivered directly to an upper side, *i.e.* top surface of the flange 2.

In other embodiments, openings (not shown) might be provided in the tubular foundation element 1 and/or in an anvil 8 to let water out from the lower part of the tubular foundation element 1 below the support 2.

As can be seen in Figure 3, when the jacket pile 1 is installed in the underwater ground formation 4, the flange 2 is below the surface of the underwater ground formation 4.

As can be seen in Figure 2, a driver 7 with an anvil 8 is placed on top of the support 2, such that energy is transmitted from the anvil 8 directly to the tubular foundation element 1, during installation of the tubular foundation element 1. The driver 7 and the anvil 8 deliver blows to the flange 2 and therewith to the tubular foundation element 1 to install the tubular foundation element 1 in the underwater ground formation 4. At a predetermined point during

installing of the tubular foundation element 1, the flange 2 and the anvil 8 reach the surface of the underwater ground formation 4.

Installing of the tubular foundation element 1 continues and the flange and in particular the anvil 8 delivering blows to the flange 2 of the tubular foundation element 1 deliver blows to the soil material within the tubular foundation element. As a result, the soil material 5 within the tubular foundation element 1 is compressed and becomes more dense, at least the soil material directly below the anvil 8 and the flange 2.

It is noted that the driver 7 with the anvil 8 can be hosted by a hoisting device such as a crane (not shown), which crane is for example placed on a surface vessel, such as a jack-up barge (not shown). The driver may be a hydraulic driver, *e.g.* one out of the IHC Hydrohammer S-series connected to a power pack on board of a surface vessel (not shown).

In practice the length B of the legs of the jacket in Figure 3 may be 5 m. In the installed state, the tubular foundation element 1 may extend a distance D above the surface of the underwater ground formation 4, which distance D in this example is 1.5 m. The length C is in this example in a range from 4 to 10 m, in particular in a range from 6 to 8 m, and/or in a range from 7% to 30%, in particular in a range from 10% to 25% of the total length of the tubular foundation element 1.

Due to the anvil 8 with the driver 7 forcing the soil material to move downwards during driving of the tubular foundation element 1, it is not required to empty the part of the tubular foundation element 1 above the flange 2 after installation. As a result of compressing the soil material within the tubular foundation element 1, the soil material is more dense and is a good match for the grout used to fixate

the jacket leg 9 relative to the jacket pile 1, *i.e.* grouting is improved.

In this embodiment, the jacket leg 9 comprises welding beads 10, which may contribute to the fixation of the jacket leg 9 to the tubular foundation element 1. The jacket leg 9 is inserted partly into the tubular foundation element 1 as indicated with arrow A.

As a further result, the compressed soil material is more dense. Due to the more dense soil material, mixing of the grout and the soil material is prevented or reduced, which leads to a reliable fixation of the jacket leg to the tubular foundation element 1.

Further advantages of the tubular foundation element as presently provided are as follows. The tubular foundation element 1 is installed in the ground formation by driving within the tubular foundation element 1. As a result thereof, the tubular foundation element 1 acts as a noise reducing element. As a further result, the diameter of the tubular foundation element 1 is not enlarged during driving. Thus the tubular foundation element 1 may be installed without additional structural elements at the outside of the foundation element and/or without adjusting the guide 3 of the template 6.

A further advantage is a low centre of gravity due to the pile driver 7 being inserted in the tubular foundation element 1 during driving thereof.

Moreover, since the anvil 8 is placed on the support 2 during driving of the tubular foundation element 1, energy delivered to the support by, *i.a.* the anvil 8 is transmitted to the wall of the tubular foundation element. The transmitted energy is in particular transmitted downwards, *i.e.* via the wall of the tubular foundation element 1, in particular from the support 2 towards the toe of the tubular foundation

element. As a result, the part of the tubular foundation element 1 contributing to the generation of noise is reduced.

It should be appreciated, however, that these embodiments may not be construed as limiting the scope of protection for the present invention.

It is noted that the drawings are schematic, not necessarily to scale and that details that are not required for understanding the present invention may have been omitted. The terms "upward", "downward", "below", "above", and the like relate to the embodiments as oriented in the drawings, unless otherwise specified. Further, elements that are at least substantially identical or that perform an at least substantially identical function are denoted by the same numeral.

The invention is not restricted to the above-described embodiments, which can be varied in a number of ways within the scope of the claims. It is, for example possible that a noise mitigation system is used during installing of the tubular foundation element. The noise mitigation system comprises a tubular sleeve, which can be placed around the tubular foundation element during driving thereof. The tubular sleeve reduces the noise produced during driving of the tubular foundation element. The noise mitigation system may be used in combination with a template as described above.

In a further embodiment, the tubular foundation element is composed of multiple parts, in particular cylindrical parts, which are placed on top of each other. One of the parts comprises a support, which might have a length in a range from 5-25 cm, in particular in a range from 10 to 15 cm.

Conclusies

1. Buisvormig funderingselement, in het bijzonder een paal bijv. een jacketpaal, dat geïnstalleerd dient te worden in een grondformatie, waarbij het buisvormige funderingselement ten minste één open uiteinde heeft, in het algemeen beide uiteinden open, zodat een hei-inrichting met een slagplaat in het buisvormige funderingselement ingevoerd kan worden, en **met het kenmerk dat** het buisvormige funderingselement aan de binnenzijde daarvan een ondersteuning omvat, welke ondersteuning is ingericht voor het overdragen van energie van de slagplaat direct naar het buisvormige funderingselement, gedurende installatie van het buisvormige funderingselement.

2. Buisvormig funderingselement volgens conclusie 1, waarbij de ondersteuning is gelegen in de bovenste helft van het buisvormige funderingselement, in het bijzonder het bovenste kwart van het buisvormige funderingselement.

3. Buisvormig funderingselement volgens conclusie 1 of 2, waarbij het buisvormige funderingselement een lengte heeft in een bereik van 20 t/m 120 m, bij voorkeur in een bereik van 40 t/m 70 m, en waarbij de ondersteuning op een afstand van het ten minste ene open uiteinde is geplaatst, waarbij de afstand in een bereik is van 4 t/m 10 m, in het bijzonder in een bereik van 6 t/m 8 m, en/of in een bereik van 7% t/m 30%, in het bijzonder in een bereik van 10% t/m 25% van de totale lengte van het buisvormige funderingselement.

4. Buisvormig funderingselement volgens conclusie 1, 2 of 3, waarbij de ondersteuning een flens omvat die is bevestigd aan een binnenoppervlak van het buisvormige funderingselement.

5. Buisvormig funderingselement volgens één van de voorgaande conclusies, waarbij de ondersteuning in hoofdzaak

taps toeloopt in de richting van de teen van het buisvormige funderingselement in de longitudinale richting daarvan.

6. Buisvormig funderingselement volgens één van de voorgaande conclusies, waarbij het buisvormige funderingselement twee open uiteinden heeft.

7. Werkwijze voor het installeren van een buisvormig funderingselement, in het bijzonder een paal of een jacketpaal, in een grondformatie, door middel van een hei-inrichting, **gekenmerkt door**

het verschaffen van een buisvormig funderingselement met een ondersteuning aan de binnenzijde daarvan,

het plaatsen van een slagplaat op de ondersteuning,

het plaatsen van de hei-inrichting op slagplaat, en

het heien van het buisvormige funderingselement in de grondformatie, waarbij gedurende installatie de ondersteuning energie direct van de slagplaat naar het buisvormige funderingselement overdraagt.

8. Werkwijze volgens conclusie 7, waarbij de ondersteuning is verschaft in de bovenste helft van het buisvormige funderingselement, in het bijzonder in het bovenste kwart van het buisvormige funderingselement.

9. Werkwijze volgens conclusie 7 of 8, waarbij de hei-inrichting en/of de slagplaat worden gehouden door het buisvormige funderingselement gedurende het heien daarvan.

10. Werkwijze volgens één van de conclusies 7-9, waarbij het buisvormige funderingselement direct op de grondformatie wordt geplaatst en daarna wordt geïnstalleerd in de grondformatie.

11. Werkwijze volgens één van de conclusies 7-10, waarbij de slagplaat grondmateriaal van de grondformatie binnen het buisvormige funderingselement samendrukt gedurende ten minste een deel van een installatieproces van het buisvormige funderingselement.

12. Werkwijze volgens één van de conclusies 7-11, verder omvattende een stap van het op de grondformatie plaatsen van een template dat ten minste twee geleiders heeft voor het geleiden van een buisvormig funderingselement, in het bijzonder voordat het buisvormige funderingselement op de grondformatie wordt geplaatst.

13. Werkwijze volgens één van de conclusies 7-12, waarbij water wordt ontlast vanuit het buisvormige funderingselement, in het bijzonder ten minste vanuit het deel tussen een grondformatie en de ondersteuning, gedurende het heien van het buisvormige funderingselement in een onderwater grondformatie.

14. Assemblage voor het installeren van een buisvormig funderingselement volgens één van de conclusies 1-6, in een grondformatie, omvattende een hei-inrichting en een slagplaat, en **met het kenmerk dat** de ondersteuning aan de binnenzijde van het buisvormige funderingselement is ingericht energie vanaf de slagplaat direct naar het buisvormige funderingselement over te dragen, gedurende installatie van het buisvormige funderingselement.

15. Assemblage volgens conclusie 14, verder omvattende een template dat ten minste twee geleiders heeft voor het geleiden van een buisvormig funderingselement, welk template geplaatst dient te worden op de onderwater grondformatie, ten minste gedurende het installeren van het buisvormige funderingselement.

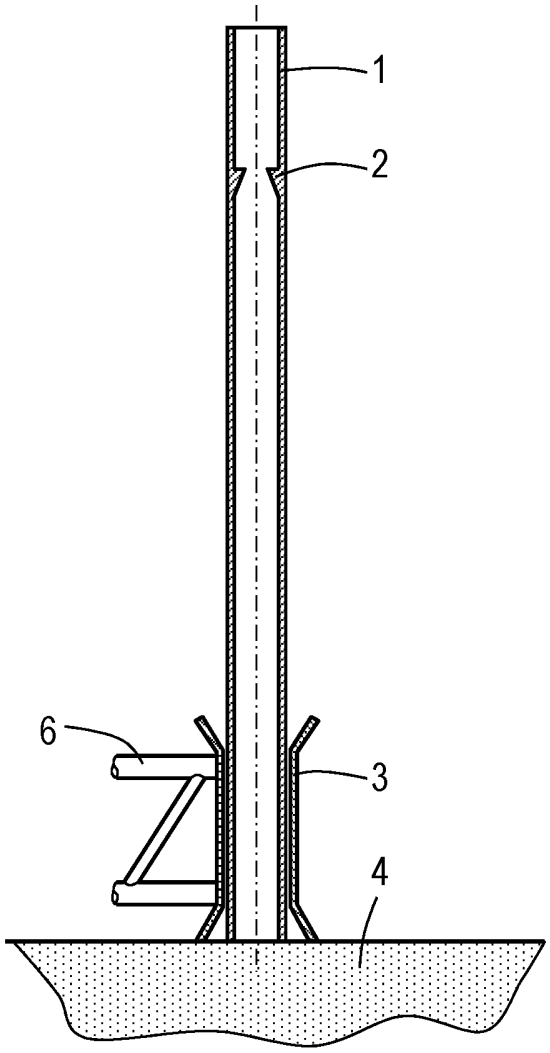

Fig.1

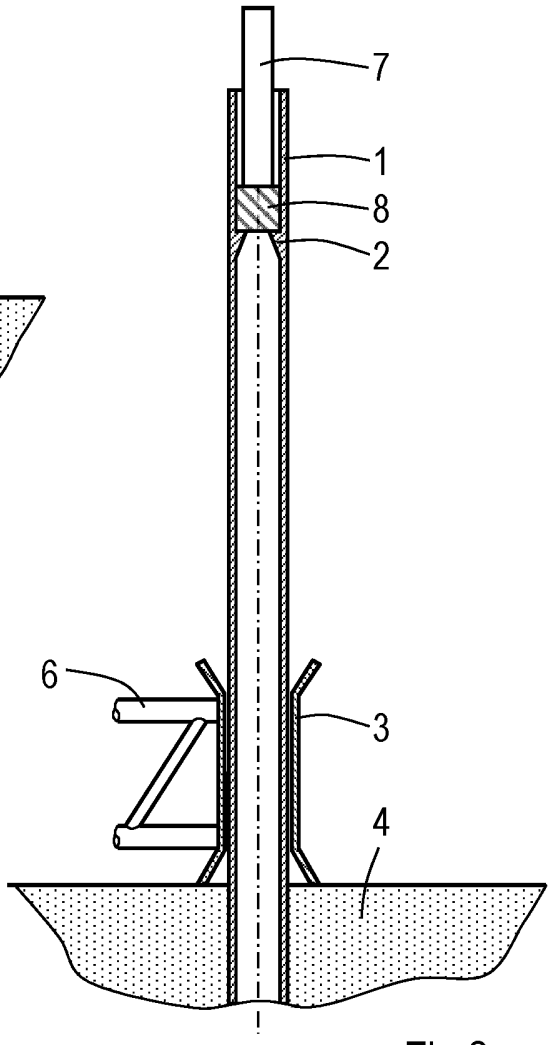

Fig.2

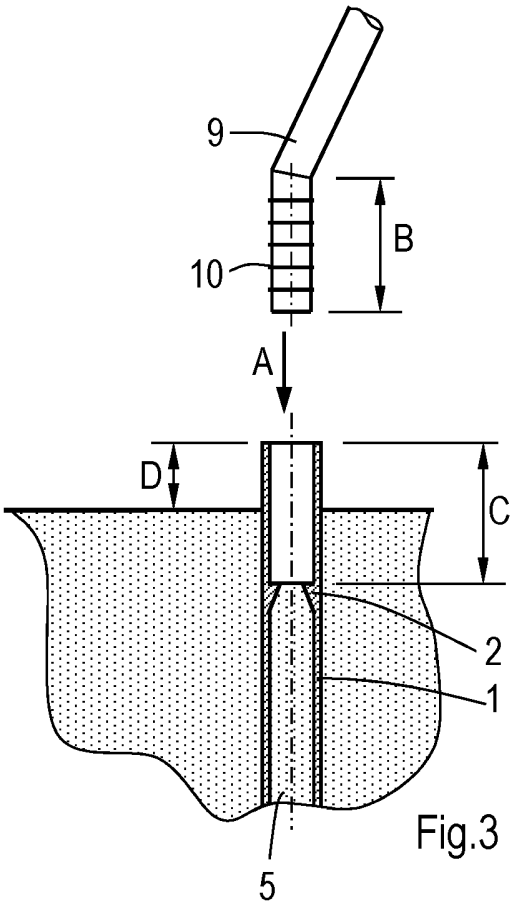

Fig.3

ABSTRACT

The present invention relates to a tubular foundation element, in particular a pile e.g. a jacket pile, to be installed in a ground formation. The tubular foundation element has at least one open end, typically both ends open, allowing a pile driver with an anvil to be inserted into the tubular foundation element. The tubular foundation element comprises a support at the inside thereof, which support is adapted to transmit energy from the anvil directly to the tubular foundation element, during installation of the tubular foundation element.

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	NL 20880-AA/mv
Nederlands aanvraag nr. **2012858**	Indieningsdatum **22-05-2014**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **IHC Holland IE B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **20-09-2014**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN 62833**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

E02D5/28 **E02D7/02**

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**E02D**

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III.	☐	**GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES**	(opmerkingen op aanvullingsblad)
IV.	☐	**GEBREK AAN EENHEID VAN UITVINDING**	(opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2012858

A. CLASSIFICATIE VAN HET ONDERWERP
INV. E02D5/28 E02D7/02
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
E02D

Onderzochte andere documentatie dan de mimimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	EP 2 312 060 A1 (IHC HOLLAND IE BV [NL]) 20 april 2011 (2011-04-20) * het gehele document * -----	1-15

☐ Verdere documenten worden vermeld in het vervolg van vak C.

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
14 oktober 2014	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Geiger, Harald

Formulier PCT/ISA/201 (tweede blad) (Januari 2004)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2012858

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
EP 2312060 A1	20-04-2011	AU 2010305820 A1	03-05-2012
		CA 2776840 A1	21-04-2011
		CN 102667001 A	12-09-2012
		DK 2312060 T3	02-01-2013
		EP 2312060 A1	20-04-2011
		JP 2013507551 A	04-03-2013
		US 2012201612 A1	09-08-2012
		WO 2011045345 A1	21-04-2011

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN62833	22.05.2014		NL2012858

International Patent Classification (IPC)
INV. E02D5/28 E02D7/02

Applicant
IHC Holland IE B.V.

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ 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 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 application
- ☐ Box No. VIII Certain observations on the application

	Examiner
	Geiger, Harald

Application number

WRITTEN OPINION

NL2012858

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing:

   ☐ contained in the application as filed.

   ☐ filed together with the application in electronic form.

   ☐ furnished subsequently for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	
	No:	Claims	1-15
Inventive step	Yes:	Claims	
	No:	Claims	1-15
Industrial applicability	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

Item V

re ind. claims 1, 7, and 14

Closest prior art document **D1** (= EP 23 12 0 60) discloses

"Buisvormig funderingselement (Fig. 1, 2), in het bijzonder een paal 2 bijv. een jacketpaal, dat geïnstalleerd dient te worden in een grondformatie, waarbij het buisvormige funderingselement ten minste één open uiteinde heeft, in het algemeen beide uiteinden open, zodat een hei-inrichting 4 met een slagplaat 8 in het buisvormige funderingselement ingevoerd kan worden, en het buisvormige funderingselement aan de binnenzijde daarvan een ondersteuning9 omvat, welke ondersteuning is ingericht voor het overdragen van energie van de slagplaat direct naar het buisvormige funderingselement, gedurende installatie van het buisvormige funderingselement."

Therefore, claim **1** is not new over the prior art.

The same reasoning applies for the method of claim **7,** and for the subject matter of claim **14.**

re dependent claims 2-6, 8-13 and 15

These claims do not comprise any features which would be considered new an inventive, when added to the features of claim 1, 7, or 14.

Therefore, these claims are also not new.