EP 13 824 584.0

CLAIMS (21.05.2015) 'AMENDED\*

2

15

Claims

1. 2 p A biaxial semi-prefabricated lightweight concrete slab system comprising semi-

prefabricated elements (140), wherein said elements (140) are self-carrying, each incorporating a concrete bottom plate (10) functioning as slab formwork, and further incorporating semi-prefabricated stringer structures (40) being fabricated before said elements (140), said stringer structures (40) comprising a high strength composite zone (60) of reinforced-concrete with a steel arrangement (50) protruding from the concrete surface of said stringer structures (40) towards a bottom reinforcement (30) integrated in said concrete bottom plate (10), said slab system further comprising a final concrete slab (170) acting as a biaxial homogeneous plate with carrying capacity according to the design load on the slab, and said slab system further comprising lightweight material (150) and/ or lightweight members (120) as, but not limited to, hollow volumes, placed in a geometrical cell structure, said slab system being characterised in that said semi-prefabricated stringer structures (40) further comprise a zone (80) with post-tension tendons (90) enabling an optimized effect of post-tension, which is applied after concreting of the elements (140), positioned so in said elements that the stringers (40) and concrete bottom (10) allows for full carrying capacity in one direction over the main span for the final dead load. J 2

A biaxial oomi profabrioatod lightweight oonoroto olab oyotom, oomprioing oomi piefdUiiudleil elements, ulididuleiizeil in llial

y,My>

I |JU

-m

ruiiuliuiiiny as slab fumiwuik, and fuilliei iiiuuipuialiuy seiiii'pief.aUiiu.aleiJ m uui d Uunuili (HO) wrc

uuiiipi isii ly a I liyl i sliei lyll i uuiiipusile zui ib (00) uf i eii ifui ueil-uui iuetc will i «s steel aiiaiiyeiiienl (00) piuliuiliny fiuiu II ie uunuele suifaue uf said sliiuyei

w

1(00), <ui ill

Cl £-\JI 1^7

(00) uuill i

10 pu&lBleii&iuii Lei iUui is (90) eiidUliny jii uplimizeU elTeul uf pu&Weii&iun, vvliiUi

rtiiLUunuits(140),

Uunuits that tliu stiinyus (40) w

vrHpcctr

IdU (170)

15 biaxial liuiiiuyunuuus plalu with uaiiyiny uapauily duuuiUiny lu II iu ilusiyi

luail un the slab, and in that the system uumpiises liylitweiylit iiiemUeis

bliuuluib

20 2. The biaxial semi-prefabricated lightweight concrete slab system according to claim 1,

characterized ^ T by J 2. in LI idt

stringers (40) incorporating the steel arrangement (50) in the lengthwise direction of the stringer structure (40), and where part of a steel arrangement (100) is exposed, in the direction opposite of the extruding steel arrangement 25 (50) relative to the concrete, and prepared for future connections at the top,

enabling a top reinforcement (130) to be welded or otherwise connected to said steel (100)

1. The biaxial semi-prefabricated lightweight concrete slab system according to claim 1-

30 2, characterized ^ T by J 2. in LI idt

stringers (40) with voided areas (110) penetrating the stringer structure (40) perpendicular to lengthwise direction of stringer structure (40)

1. The biaxial semi-prefabricated lightweight concrete slab system according to claim 1-

35 3, characterized ^ T by J 2. trrttrsit

self-carrying semi pre-fabricated elements (140), where said elements (140) are made partly with a material other than concrete.

16

1. The biaxial semi-prefabricated lightweight concrete slab system according to claim 1-
2. characterized ^ Pby J ^ in that

a supporting element (180) with a similar stringer structure (40) acting as end support spanning between permanent vertical structural supports as columns 5 or walls, and supporting the end of the series of the elements (140), and after

final concreting of the system acts as an integrated part of a functional and geometrical unity with the elements (140) creating a biaxial homogeneous slab (170) obtained with no temporary supports.

10 6. The biaxial semi-prefabricated lightweight concrete slab system according to claim 1-

1. characterized 2 P by a J 2 in that

ttwsupporting element (180) with a stringer structure like (40) spanning between permanent vertical structural supports like columns or walls, and supporting the end of series of the semi-prefabricated elements (140), where 15 the stringer (40) or part of the stringer in the elements (140) protrudes out

from said elements (140) so a protruding part (190) of said elements (140) can land on a protruding bottom part (200) of the supporting element (180) thus designed so the bottom surface of said elements (140) has the same level as the bottom surface of the supporting element (200), thus creating a 20 completely flat plate slab with uniform bottom level, and which after placing

joint splice bars across bottom reinforcement (210) and top reinforcing (220), and after a final concreting (160) of the system creates the biaxial homogeneous flat plate slab (170) obtained with no temporary supports.

25 7. The biaxial semi-prefabricated lightweight concrete slab system according to claim 6,

characterized in that

the supporting element (180) with a stringer structure (40), 2 f acts J 2 as end

support spanning between permanent vertical structural supports like columns or walls, where the tendons (90) are placed with varying vertical 30 position within the supporting element (180).

8. A Method for producing a biaxial semi-prefabricated lightweight concrete slab system, comprising semi-prefabricated elements, according to patent claim 1-7, comprising the steps of:

35 a. placing the steel arrangement (50) in a specially designed formwork,

where part of the steel arrangement (100) can be placed to extend downwards to the formwork so part of the steel arrangement (100) will be exposed after concreting;

5

10

15

20

25

17

1. pouring the high strength concrete (60) up to a certain part of the final height of the stringer (40), normally approximately 20 % but not limited to this;
2. if the first pouring of concrete leaves space, pour the traditional concrete (70) to a height lower than the upper side of the steel arrangement (50), thus leaving steel protrude (50, 80) from the concreted part (60) of the stringer (40). After the concrete is hardened, the stringer (40) can be stored for later use;
3. placing the stringer (40), semi-prefabricated according to step a to c, but with bottom side up, together with one or more tendons (90), either on spacers, or directly above the bottom reinforcement (30);
4. pouring a layer of concrete gently and skilfully distributed, thus covering bottom reinforcement (30) and part of the stringer structure (40), including but not limited to the part (50,80,90) extending downwards from the stringer body (40), thereby obtaining the semi-prefabricated element (140);
5. lightweight members (120), as but not limited to hollow spheres, is positioned above the concrete bottom (10) either before or after the post­tensioning of the elements (140), where after the top reinforcement (130) is attached;
6. the semi-prefabricated element (140) is post-tensioned by post tensioning the tendons (90) already placed in the concrete (10, 70), thereby obtaining a semi-prefabricated lightweight element (140) with sufficient strength to act as self-carrying scaffolding;
7. elements (140) are placed in their final position at the building site;
8. concrete is poured upon the elements (140) in order to obtain a biaxial lightweight concrete slab.

9. A Method for producing a biaxial semi-prefabricated lightweight concrete slab 30 system, comprising semi-prefabricated elements, according to patent claim 1-7, comprising the steps of

a. placing the steel arrangement (50) in a specially designed formwork, where part of the steel arrangement (100) can be placed to extend downwards to the formwork so part of the steel arrangement (100) will be exposed after concreting;

5

10

15

20

25

18

1. pouring the high strength concrete (60) up to a certain part of the final height of the stringer (40), normally approximately 20 % but not limited to this;
2. if the first pouring of concrete leaves space, pour the traditional concrete (70) to a height lower than the upper side of the steel arrangement (50), thus leaving steel protrude (50, 80) from the concreted part (60) of the stringer (40). After the concrete is hardened, the stringer (40) can be stored for later use;
3. placing the stringer (40), semi-prefabricated according to step a to c, but with bottom side up, together with one or more tendons (90), either on spacers, or directly above the bottom reinforcement (30);
4. placing lightweight members (120), as but not limited to hollow spheres, above the bottom reinforcement (30) where after the top reinforcement (130) is attached or welded to the steel (100) extruding from the stringer structures (40);
5. lowering this connected reinforcement (30, 130), the stringers (40) and the lightweight members (120) directly into concrete already poured on a formwork bed, thus letting the concrete covering bottom reinforcement (30) and part of the stringer structure (40), including but not limited to the part (50, 80, 90) extending downwards from the stringer body (40), thereby obtaining the semi-prefabricated lightweight element (140);
6. the semi-prefabricated element (140) is post-tensioned by post tensioning the tendons (90) already placed in the concrete (10,70), thereby obtaining a semi-prefabricated lightweight element (140) with sufficient strength to act as self-carrying scaffolding;
7. elements (140) are placed in their final position at the building site;
8. concrete is poured upon the elements (140) in order to obtain a biaxial lightweight concrete slab.