

【DESCRIPTION】

【Invention Title】

PREFABRICATED STEEL FRAME FOR STEEL-CONCRETE COMPOSITE MEMBER

【Technical Field】

[1] The invention relates to a prefabricated steel frame for a steel-concrete composite member to be used as a line assembly single member by connecting adjacent section steels to each other by a lattice and coupling a form with outer sides of the adjacent section steels.

【Background Art】

[2] A steel-concrete composite member may represent both of strength of a steel material and strength of a concrete in a structure member such as a column or a beam by combining the steel material with the concrete.

[3] For example, a prefabricated composite member is used capable of placing a concrete in a field after coupling a tie bar or a lattice bar with a surface of a section steel. A technology regarding an permanent form for a prefabricated column including a form panel integrally coupled with the prefabricated composite member is disclosed in Korean Patent No. 127,449.

[4] Further, as shown in Fig. 1, a prefabricated column with a rib deck form capable of efficiently supporting lateral pressure of a concrete while improving workability and stability by coupling a bone deck form with an assembly frame by only mechanical coupling without a welding process through compensation of the above registered patent was filed as Korean Patent Application No. 10-2013-122455.

[5] In the application technology, a lattice 12 located at an outer side of a L shape section steel 11 is coupled with a form 13 through a self-drilling screw or a nail N by a

nail gun. Accordingly, since the lattice 12 and the form 13 are bored by applying external force thereto to couple the lattice 12 with the form 13, as shown in Fig. 2, an outer flange 123 of a Z bar being the lattice 12 may be deformed inward due to external force.

[6] Further, as shown in Fig. 1, according to the above application technology, a lateral lattice 12 is formed long in a corner region where the lattices 12 are met with each other. A lattice 12 close to the lateral lattice 12 is coupled with a lateral side of the lateral lattice 12. Accordingly, the lateral lattice 12 protrudes outward from the L shaped section steel 11 to become a cantilever so that the lateral lattice 12 may be drooped downward due to a weight of the form 13. In addition, there is a plurality of partitions at a contact region between adjacent lattices 12 so that the concrete is not sufficiently filled.

【Disclosure】

【Technical Problem】

[7] The present invention provides a prefabricated steel frame for a steel-concrete composite member capable of suppressing bending deformation of an outer flange of a lattice due to external force.

[8] The present invention further provides a prefabricated steel frame for a steel-concrete composite member capable of placing a dense concrete and preventing deformation due to a weight of a form by miniaturizing a lattice region protruding to an outer side of a L shaped section steel while simplifying a specification of a coupling region between adjacent lattices.

【Technical Solution】

[9] In accordance with an aspect of the present invention, there is provided a prefabricated steel frame for a steel-concrete composite member installed at a

steel-concrete composite member used as a column or a beam having a polygonal section, the prefabricated steel frame including: a plurality of L shaped section steels spaced apart from a surface of the steel-concrete composite member by a predetermined distance; lattices including both ends coupled with outer sides of the adjacent L shaped section steels to connect the adjacent L shaped section steels to each other, respectively; and forms coupled with outer sides of the lattices, respectively, wherein each of the lattices includes an inner flange coupled with an outer side of the L shaped section steel, a web vertically bent outward from an end of the inner flange, and an outer flange vertically bent upward or downward from another end of the web to be coupled with the form, and further comprises a reinforcing part provided at one side of the outer flange to suppress bending deformation of the outer flange.

[10] The reinforcing part may be vertically bent inward from another end of the outer flange to extend.

[11] The reinforcing part may include a reinforcing rib provided at a connecting portion between the outer flange and the web.

[12] The form may be coupled with the lattice by a nail, and knurling on an outer peripheral surface of the nail is performed.

[13] The lattice may form miter joint with an adjacent lattice by cutting both ends of the lattice at 45°.

[14] First protrusions may extend at an upper portion and a lower portion of the outer flange in one end of the lattice in a longitudinal direction of the lattice, respectively, a second protrusion may extend at a center of the outer flange in another end of the lattice in a longitudinal direction of the lattice so that the first protrusion and the second protrusion are supported by each other by ends of the outer flanges of the adjacent lattices, respectively.

[15] A concrete flow hole may be is formed at a region in which the web of the lattice is cut at 45°.

[16] The form may include a rib deck plate obtained by bending a metal plate to alternately form a ridge and a groove, a direction of the groove may be coupled parallel to a longitudinal direction of the steel-concrete composite member, and a ridge region of the rib deck plate may be vertically bent at a corner region of the steel-concrete composite member.

[17] The form may include a flat thin plate which is coupled with an inner side of the rib deck plate to bend a metal plate to alternately form the ridge and the groove.

[18] The prefabricated steel frame for a steel-concrete composite member may further include an inclined material 14 including one end coupled between the L shaped section steel and the lattice and another end coupled between an adjacent L shaped section steel and the lattice.

[19] The prefabricated steel frame may be configured by connecting a plurality of prefabricated steel frames to each other, a L shaped section steel 11' of one side prefabricated steel frame and a L shaped section steel 11'' of another side prefabricated steel frame connect outer sides of the L shaped section steels 11' and 11'' to each other by a connection plate 15, and the lattice 12 may be coupled with the L shaped section steel at the outer side of the connection plate 15.

【Advantageous Effects】

[20] The present invention has following effects.

[21] First, bending deformation of an outer flange can be suppressed by providing a reinforcing part at one side of a lateral flange of a lattice.

[22] Second, deformation due to a lattice region protruding to an outer side of a section steel can be prevented and a dense concrete can be placed in a coupling region of an adjacent lattice by cutting both ends of the lattice at 45° so that the lattice simply forms miter joint with the adjacent lattice.

[23] Third, deformation in an end of an outer flange can be prevented by forming a first protrusion and a second protrusion at one end and an opposite end of an outer flange of a lattice and meshing the first protrusion of an adjacent flange with the second protrusion of the adjacent flange.

[24] Fourth, web deformation of the lattice can be minimized by forming a concrete flow hole in an end of a lattice which is cut at 45°.

[25] Fifth, a concrete paste may be prevented from being leaked due to a coupling region of a member corner by vertically bending a ridge of a rib deck plate form at the member corner.

[26] Sixth, transport and lifting burdens can be reduced and a flat member surface can be configured by configuring a form with a lightweight while maintaining the stiffness by coupling a flat plate at an inner surface of a rib deck plate.

[27] Side sway of a prefabricated steel frame can be prevented by providing an inclined material having one end and an opposite end which are located between a section steel and a lattice and between an adjacent section steel and the lattice, respectively.

[28] Sixth, inference between a connection plate and a lattice may be prevented at a connection region of the prefabricated steel frame and deformation of a L shaped section steel and buckling of the connection plate may be prevented by connecting an outer surface of a L shaped section steel of an adjacent prefabricated steel frame to the connection plate and locating the lattice plate at an outer surface of the connection plate.

【Brief Description of the Drawings】

[29] Fig. 1 is a perspective view illustrating an example of a prefabricated steel frame for a steel-concrete composite member according to the related art.

[30] Fig. 2 is an enlarged cross sectional view taken along a region A shown in Fig. 1.

[31] Fig. 3 is a plan view illustrating an example of a prefabricated steel frame for a steel-concrete composite member according to an embodiment of the present invention.

[32] Fig. 4 is a perspective view illustrating another example of a prefabricated steel frame for a steel-concrete composite member according to an embodiment of the present invention.

[33] Fig. 5 is an enlarged cross sectional view taken along a region B shown in Fig. 4.

[34] Fig. 6 is a perspective view illustrating an example of a lattice.

[35] Fig. 7 is a perspective view illustrating another example of a lattice.

[36] Fig. 8 is a perspective view illustrating a coupled relationship between adjacent lattices.

[37] Fig. 9 is a plan view illustrating a part of the prefabricated steel frame for a steel-concrete composite member where an example of a form is shown.

[38] Fig. 10 is a perspective view illustrating another example of the form.

[39] Fig. 11 and Fig. 12 are perspective views illustrating other examples of a part of the prefabricated steel frame for a steel-concrete composite member according to the present invention.

【Best Mode】

[40] In order to achieve the above objective, a prefabricated steel frame for a steel-concrete composite member according to the present invention is installed at a

steel-concrete composite member used as a column or a beam having a polygonal section, and includes a plurality of L shaped section steels spaced apart from a surface of the steel-concrete composite member by a predetermined distance; lattices including both ends coupled with outer sides of the adjacent L shaped section steels to connect the adjacent L shaped section steels to each other, respectively; and forms coupled with outer sides of the lattices, respectively, wherein each of the lattices includes an inner flange coupled with an outer side of the L shaped section steel, a web vertically bent outward from an end of the inner flange, and an outer flange vertically bent upward or downward from another end of the web to be coupled with the form, and further includes a reinforcing part provided at one side of the outer flange to suppress bending deformation of the outer flange.

[41] Hereinafter, exemplary embodiments of the present invention will be described in detail. It will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

[42]

[43] Fig. 3 is a plan view illustrating an example of a prefabricated steel frame for a steel-concrete composite member according to an embodiment of the present invention, Fig. 4 is a perspective view illustrating another example of a prefabricated steel frame for a steel-concrete composite member according to an embodiment of the present invention, and Fig. 5 is an enlarged cross sectional view taken along a region B shown in Fig. 4.

[44] As shown in Fig. 3 to Fig. 5, a prefabricated steel frame for a steel-concrete composite member according to the present invention is installed at a steel-concrete composite member 1 used as a column or a beam having a polygonal section, and includes a plurality of L shaped section steels 11 spaced apart from a surface of the

steel-concrete composite member 1 by a predetermined distance; lattices 12 including both ends coupled with outer sides of the adjacent L shaped section steels 11 to connect the adjacent L shaped section steels 11 to each other, respectively; and forms 13 coupled with outer sides of the lattices 12, respectively, wherein each of the lattices 12 includes an inner flange 121 coupled with an outer side of the L shaped section steel 11, a web 122 vertically bent outward from an end of the inner flange 121, and an outer flange 123 vertically bent upward or downward from another end of the web 122 to be coupled with the form 13, and further includes a reinforcing part 124 provided at one side of the outer flange 123 to suppress bending deformation of the outer flange 123.

[45]

[46] The present invention relates to a prefabricated steel frame for a steel-concrete composite member to be used as a column member or a beam member by combining a steel material with a concrete. Although accompanying drawings show an example of a column member, the present invention is applicable to a beam member.

[47] The L shaped section steels 11 are disposed at corners of the steel-concrete composite member 1, respectively, and are spaced apart from a surface of the steel-concrete composite member 1 by a predetermined distance to ensure a coating thickness having a predetermined size.

[48]

[49] Both ends of the lattice 12 are coupled with outer sides of adjacent L shaped section steels 11 to connect the adjacent L shaped section steels 11 with each other so that the L shaped section steels 11 are integrated in one. Further, since the lattice 12 is coupled with the L shaped section steel 11 so that stiffness of the prefabricated steel frame is increased, deformation of the prefabricated steel frame is

minimized upon transport and installation.

[50] A plurality of lattices 12 are spaced apart from each other in a longitudinal direction of the steel-concrete composite member 1. The lattice 12 may be coupled with the L shaped section steel 11 by a scheme such as rivet joint, bolt joint, and welding. However, in a case of the bolt joint, the prefabricated steel frame may be manufactured only depending on a mechanical assembly.

[51] The lattice 12 includes an inner flange 121 coupled with an outer side of the L shaped section steel 11, a web 122 vertically bent outward from an end of the inner flange 121, and an outer flange 123 vertically bent upward or downward from another end of the web 122 to be coupled with the form 13, and has a substantial z shape, and further includes a reinforcing part 124 configured to suppress bending deformation of the outer flange 123 provided at one side of the outer flange 123.

[52] When a form 13 and a lattice 12 to be described below are coupled with each other by a self-drilling screw or a nail N through a nail gun, the reinforcing part 124 prevents an outer flange 123 of the lattice 12 from being deformed inward due to external force.

[53] As shown in Fig. 5, the reinforcing part 124 may be vertically bent inward from another end of the outer flange 123 to extend.

[54] In addition, the nail N coupling the lattice 12 with the form 13 may increase a bonding force between the form 13 and the lattice 12 by horizontally or obliquely forming a saw tooth on an outer peripheral surface of the nail N or performing knurling on the outer peripheral surface of the nail N to be uneven.

[55]

[56] The form 13 is coupled with an outer side of the lattice 12. The form 13 may include a permanent form. The form 13 may be released

after concrete curing.

[57] The form 13 serves as a bracing to suppress the bending deformation of the prefabricated steel frame.

[58] It is preferable that the form 13 is provided by factory bond. The present invention is not limited thereto. In some cases, the form 13 may be provided by field bond.

[59] The steel-concrete composite member 1 may be manufactured by placing a field concrete in the prefabricated steel frame.

[60]

[61] Fig. 6 is a perspective view illustrating an example of a lattice.

[62] As shown in Fig. 6, the reinforcing part 124 may include a reinforcing rib provided at a connecting portion between the outer flange 123 and the web 122.

[63] The reinforcing rib may protrude inward by welding a separate rib or by pressing a corner of a Z shaped section steel.

[64]

[65] Fig. 7 is a perspective view illustrating another example of a lattice.

[66] As shown in Fig. 7, in the present invention, the lattice 12 simply forms miter joint with the adjacent lattice by cutting both ends of the lattice 12 at 45°.

[67] When the both ends of the lattice 12 are cut at 45°, an inner flange 121 and an outer flange 123 of the lattice 12 have a straight line and the web 122 forms an inclined surface.

[68] Accordingly, the deformation of the lattice 12 due to a weight of the form 13 attached to an outer side of the lattice 12 may be minimized by miniaturizing the lattice 12 region protruding to an outer side of the L shaped section steel 11 to become a cantilever.

[69] Moreover, since a connecting region between the adjacent lattices 12 may be simply configured, the concrete may be densely placed.

[70]

[71] Fig. 8 is a perspective view illustrating a coupled relationship between adjacent lattices.

[72] As shown in Fig. 8, first protrusions 125 extend at an upper portion and a lower portion of the outer flange 123 in one end of the lattice 12 in a longitudinal direction of the lattice 12, respectively. A second protrusion 126 extends at a center of the outer flange 123 in another end of the lattice 12 in a longitudinal direction of the lattice 12 so that the first protrusion 125 and the second protrusion 126 may be supported by each other by ends of the outer flanges 123 of the adjacent lattices 12, respectively.

[73] Although the reinforcing part 124 is included, an end of the outer flange 123 of the lattice 12 allows a lower portion and both surfaces to form a free end. Accordingly, as shown in Fig. 7, a region forming the free end may be modified inward due to external force.

[74] Accordingly, the present invention may prevent an end of the outer flange 123 from being modified by configuring the first and second protrusions to have a corresponding shape at both ends of the outer flange 123 of the lattice 12, and by engaging an outer flange 123 located at one end of the lattice 12 and an outer flange 123 located at another end of the lattice 12.

[75]

[76] In this case, as shown in Fig. 8 and Fig. 9, a concrete flow hole 127 may be formed at a region in which the web 122 of the lattice 12 is cut at 45°.

[77] Concrete flow may be degraded in a corner coating region of the steel-concrete composite member 1 due to interference between the L shaped

section steel 11 and the lattice 12.

[78] Accordingly, deformation of the web 122 at a cut region is minimized and an end concrete may be prevented from being insufficiently filled at a corner of the steel-concrete composite member 1 by forming the concrete flow hole 127 at a region cut at 45°.

[79]

[80] Fig. 9 is a plan view illustrating a part of the prefabricated steel frame for a steel-concrete composite member where an example of a form is shown.

[81] As shown in Fig. 9, the form 13 includes a rib deck plate 131 obtained by bending a metal plate to alternately form a ridge 131a and a groove 131b. A direction of the groove 131b is coupled parallel to a longitudinal direction of the steel-concrete composite member 1. A ridge 131a region of the rib deck plate 131 may be vertically bent at a corner region of the steel-concrete composite member 1.

[82] The rib deck plate serves as a form of a member by closing a lateral side or the lateral side and a bottom surface of the member.

[83] When the rib deck plates are met with each other at a corner region of the member, coupling between ends is not easy and a concrete paste may be leaked through a weak part during concrete placement.

[84] Accordingly, as shown in Fig. 9, corners of the steel-concrete composite member 1 are formed by removing a connecting part in which the rib deck plates are met with each other from the corner region of the member and by vertically bending and extending the ridge 131a.

[85]

[86] Fig. 10 is a perspective view illustrating another example of the form.

[87] As shown in Fig. 10, the form 13 may include a flat thin plate 132

which is coupled with an inner side of the rib deck plate 131 to bend a metal plate to alternately form the ridge 131a and the groove 131b.

[88] In a case of the form 13 including the rib deck plate 131 and the thin plate 132, stiffness of the form 13 may be maintained and transport and lifting burdens due to a light weight can be reduced.

[89] Since the form 13 may be manufactured by joining the thin plate 132 with the rib deck plate 131 by tag welding, the manufacture is simple. Since the form 13 has a light weight, a form unit may be enlarged. Accordingly, a construction efficiency of the form 13 is increased.

[90] In addition, since a flat thin plate 132 is coupled with an inner surface of a rib deck plate, an outer surface of the steel-concrete composite member 1 may be planarized.

[91]

[92] Fig. 11 is a perspective view illustrating another example of a part of the prefabricated steel frame for a steel-concrete composite member according to the present invention.

[93] As shown in Fig. 11, the present invention may further include an inclined material 14 includes one end coupled between the L shaped section steel 11 and the lattice 12 and another end coupled between an adjacent L shaped section steel 11 and the lattice 12.

[94] When the form is line-attached or field-attached to a frame, side sway may occur in the prefabricated steel frame due to external force such as a construction weight.

[95] Accordingly, the present invention prevents side sway by attaching the inclined material 14 to connect the adjacent L shaped section steel 11.

[96]

[97] Fig. 12 is a perspective view illustrating another example of a part of the prefabricated steel frame for a steel-concrete composite member according to the present invention.

[98] As shown in Fig. 12 in the present invention, the prefabricated steel frame is configured by connecting a plurality of prefabricated steel frames to each other. A L shaped section steel 11' of one side prefabricated steel frame and a L shaped section steel 11'' of another side prefabricated steel frame connect outer sides of the L shaped section steels 11' and 11'' to each other by the connection plate 15. The lattice 12 is coupled with the L shaped section steel at the outer side of the connection plate 15.

[99] When upper and lower adjacent prefabricated steel frames or left and right adjacent prefabricated steel frames are connected to each other by the connection plate 15, interference may occur between the connection plate 15 and the lattice 12.

[100] Accordingly, the interference between the lattice 12 and the connection plate 15 is prevented by installing the connection plate 15 between the lattice 12 and the L shaped section steel.

[101] The lattice 12 prevents deformation in ends of the L shaped section steels 11' and 11'' of the prefabricated steel frame and fixes the connection plate 15 at an outer side to prevent the buckling of the connection plate 15.

[102] When the connection plate 15 is thick, the web 122 of the lattice 12 attached to an outer side of the connection plate 15 is aligned with an outer level of the outer flange 123 of another lattice 12 by reducing a length of the web 122 of the lattice 12.

【Industrial Applicability】

[103] According to the prefabricated steel frame for a steel-concrete composite member of the present invention, since the L shaped section steel is coupled with the lattice so that stiffness of the prefabricated steel frame is increased, the deformation of the prefabricated steel frame can be minimized upon transport and installation. The present invention can place a dense concrete and prevent deformation due to a weight of a form by miniaturizing a lattice region protruding to an outer side of a L shaped section steel while simplifying a specification of a connecting part between adjacent lattices.

[CLAIMS]

[Claim 1]

A prefabricated steel frame for a steel-concrete composite member installed at a steel-concrete composite member used as a column or a beam having a polygonal section, the prefabricated steel frame comprising:

a plurality of L shaped section steels 11 spaced apart from a surface of the steel-concrete composite member 1 by a predetermined distance;

lattices 12 including both ends coupled with outer sides of the adjacent L shaped section steels 11 to connect the adjacent L shaped section steels 11 to each other, respectively; and

forms 13 coupled with outer sides of the lattices 12, respectively,

wherein each of the lattices 12 comprises an inner flange 121 coupled with an outer side of the L shaped section steel 11, a web 122 vertically bent outward from an end of the inner flange 121, and an outer flange 123 vertically bent upward or downward from another end of the web 122 to be coupled with the form 13, and further comprises a reinforcing part 124 provided at one side of the outer flange 123 to suppress bending deformation of the outer flange 123.

[Claim 2]

The prefabricated steel frame for a steel-concrete composite member of claim 1, wherein the reinforcing part 124 is vertically bent inward from another end of the outer flange 123 to extend.

[Claim 3]

The prefabricated steel frame for a steel-concrete composite member of claim 1, wherein the reinforcing part 124 comprises a reinforcing rib provided

at a connecting portion between the outer flange 123 and the web 122.

[Claim 4]

The prefabricated steel frame for a steel-concrete composite member of claim 1, wherein the form 13 is coupled with the lattice 12 by a nail N, and knurling on an outer peripheral surface of the nail N is performed.

[Claim 5]

The prefabricated steel frame for a steel-concrete composite member of claim 1, wherein the lattice 12 forms miter joint with an adjacent lattice 12 by cutting both ends of the lattice at 45°.

[Claim 6]

The prefabricated steel frame for a steel-concrete composite member of claim 5, wherein first protrusions 125 extend at an upper portion and a lower portion of the outer flange 123 in one end of the lattice 12 in a longitudinal direction of the lattice 12, respectively, a second protrusion 126 extends at a center of the outer flange 123 in another end of the lattice 12 in a longitudinal direction of the lattice 12 so that the first protrusion 125 and the second protrusion 126 are supported by each other by ends of the outer flanges 123 of the adjacent lattices 12, respectively.

[Claim 7]

The prefabricated steel frame for a steel-concrete composite member of claim 5, wherein a concrete flow hole 127 is formed at a region in which the web 122 of the lattice 12 is cut at 45°.

[Claim 8]

The prefabricated steel frame for a steel-concrete composite member of

claim 1, wherein the form 13 comprises a rib deck plate 131 obtained by bending a metal plate to alternately form a ridge 131a and a groove 131b, a direction of the groove 131b is coupled parallel to a longitudinal direction of the steel-concrete composite member 1, and a ridge 131a region of the rib deck plate 131 is vertically bent at a corner region of the steel-concrete composite member 1.

[Claim 9]

The prefabricated steel frame for a steel-concrete composite member of claim 1, wherein the form 13 comprises a flat thin plate 132 which is coupled with an inner side of the rib deck plate 131 to bend a metal plate to alternately form the ridge 131a and the groove 131b.

[Claim 10]

The prefabricated steel frame for a steel-concrete composite member of claim 1, further comprising an inclined material 14 including one end coupled between the L shaped section steel 11 and the lattice 12 and another end coupled between an adjacent L shaped section steel 11 and the lattice 12.

[Claim 11]

The prefabricated steel frame for a steel-concrete composite member of claim 1, wherein the prefabricated steel frame is configured by connecting a plurality of prefabricated steel frames to each other, a L shaped section steel 11' of one side prefabricated steel frame and a L shaped section steel 11'' of another side prefabricated steel frame connect outer sides of the L shaped section steels 11' and 11'' to each other by a connection plate 15, and the lattice 12 is coupled with the L shaped section steel at the outer side of the

connection plate 15.