

[DESCRIPTION]

[Invention Title]

CONCRETE BONDED-TYPE WATERSTOP AND CONSTRUCTION METHOD

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THEREFOR

[Technical Field]

The present invention relates to a concrete bonded-type waterstop, and more specifically, to a concrete bonded-type waterstop which allows an adhesive and a protective coating agent to be pre-applied to a predetermined position of the waterstop, the waterstop being installed in a construction joint and an expansion joint to secure a waterproof function of an underground concrete structure, and allows concrete to be poured thereto and cured, and a method of constructing the same.

[Background Art]

15 Generally, a concrete structure should have a construction joint and an expansion joint formed thereon due to material characteristics thereof. For example, it is necessary for underground structures, such as a subway and an underpass, to have a construction joint or an expansion joint, and when such a waterproof system does not function properly, water leaks to the construction joint or the expansion joint such that durability of the concrete structure is degraded. Particularly, when leakage of water occurs in the subway, a serious problem in function, such as stoppage of subway service due to the leakage, may occur.

Specifically, in the case of construction of a long or high concrete structure, since the construction cannot be made with one concrete pouring operation, concrete may be intermittently poured and cured. For example, to construct the long and

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high underground concrete structure on the basis of several stages, primary concrete is poured and cured from a reference point to a predetermined height or in a longitudinal direction, and secondary concrete is poured and cured, and thus a construction joint is inevitably formed between the primary concrete and the secondary concrete.

As such, a waterstop is installed on the construction joint formed when the concrete is poured in multiple stages by being fixed to a mold before the concrete is poured, and the concrete is cured with the waterstop so that penetration of groundwater is prevented. A typical structure of the waterstop for a construction joint will be described with reference to FIGS. 1 and 2.

FIG. 1 is a perspective view showing a waterstop for concrete according to a related art, and FIG. 2 is a plan view showing a state in which the waterstop is used when the waterstop for concrete shown in FIG. 1 is vertically constructed.

Referring to FIG. 1, a waterstop 10 for concrete according to the related art includes an expansion part 11 formed in the middle of the waterstop to contract and expand and having a cylindrical shape, wing parts 12 connected to upper and lower portions of the expansion part 11, and angulate protrusion parts 13 formed on both sides of the wing parts 12.

As shown in FIG. 2, the above-described waterstop 10 is fixed to a mold 20 before concrete is poured, and the concrete is cured with the waterstop 10 so as to prevent leakage of groundwater from an intermittent interface, that is, a construction joint (x-x). Thus, leakage of water can be prevented by the protrusion parts 13 and the wing parts 12 of the waterstop.

In the case of the waterstop 10 according to the related art, a plurality of waterstops have been generally connected to be used, and one of the waterstops has

been connected with another waterstop in a conventional fitted manner or through an auxiliary connecting member for connecting both ends of the waterstops.

However, the connection structure of the above-described waterstop according to the related art has disadvantages of weak bonding strength and degradation of workability due to inconvenience of the process of connecting the waterstops.

As the related art for solving the above-described problems, Korean Utility Model Registration No. 20-394986 entitled “Connection Structure of Waterstop for Concrete Structure” is disclosed and will be described with reference to FIGS. 3 and

4.

FIG. 3 is a perspective view showing a state of connection of the waterstops for a concrete structure according to the related art, and FIG. 4 is a cross-sectional view showing a state in which an adhesive is applied to an entire joint portion between the waterstops for a concrete structure shown in FIG. 3.

Referring to FIGS. 3 and 4, each of first and second waterstops 30 and 40 for a concrete structure according to the related art is made of a polyvinyl chloride (PVC) material and is formed in a unit body of a predetermined size, and the first and second waterstops 30 and 40 have soft properties and a wide plate shape and are connected by an adhesive 50.

Further, a main component of the adhesive 50 for connecting the first and second waterstops 30 and 40 is made of butyl rubber or asphalt rubber.

Further, as shown in FIG. 4, a cover film 51 of a thin transparent film type is attached to an upper surface of the adhesive 50. In this case, the adhesive 50 and the cover film 51 may be manufactured in a pre-attached state in a manufacturing process or in a separated state to be separately attached in an operation process.

According to the related art, when the first and second waterstops 30 and 40 are installed in the process of constructing the concrete structure, both ends of the first and second waterstops 30 and 40 come into contact with each other, and the adhesive 50 is applied around a joint portion C between the first and second
5 waterstops 30 and 40.

Specifically, the adhesive 50, which has a coating width of 5 to 10 cm and a coating thickness of 3 to 7 mm, is applied to the joint portion C between the first and second waterstops 30 and 40 to couple the first and second waterstops 30 and 40. In this case, the adhesive 50 is applied to completely surround front side parts 31 and
10 41, both side parts 32 and 42, and rear side parts of the first and second waterstops 30 and 40, and the thin transparent cover film 51 is attached to an upper surface of the adhesive 50 so that the first and second waterstops 30 and 40 are connected to each other.

The joint portion C between the first and second waterstops 30 and 40 coated
15 with the adhesive 50 may prevent penetration of groundwater or the like from the outside by the cover film 51 and the characteristics of the adhesive 50, and the constructability of the concrete structure can be improved due to easy connection processes thereof and excellent bonding strength.

However, the waterstop for a concrete structure according to the related art
20 has a structure in which the first and second waterstops 30 and 40 are connected by applying the adhesive 50 and the cover film 51 to the joint portion C between the first and second waterstops 30 and 40.

However, a waterproof system for ensuring a sufficient waterproof performance should be applied to a construction joint or an expansion joint of the
25 underground concrete structure, and in general, various types of waterproof systems

for joints including various types and materials of waterstops, water expandable water-stopping materials, bentonite water-stopping bands, and the like have been used.

5 The waterstop is made of PVC, rubber, copper, or the like, and the waterstop embedded in the concrete should be tightly attached to the concrete to block a flow of water, but a fluid flow path may be formed along an interface due to poor attachment between the concrete and the waterstop, and thus leakage of water often occurs. Thus, the waterstop has just been used to delay the leakage of water by extending a flow path of the water introduced through the construction joint or the
10 expansion joint.

Further, in the case of a waterstop with a water expandable water-stopping material, the water expandable water-stopping material absorbs groundwater and rainwater before concrete is poured so that the water expandable part is pre-expanded before the concrete is poured, and thus there is a problem of lacking functionality.
15 Further, even when the concrete is poured, the water expandable water-stopping material absorbs water or hydrates (specifically, from water contained in concrete) such as to cause disruption in hydration and curing of concrete, and thus the disruption in hydration and curing of concrete causes a problem of failure in the concrete around the water expandable water-stopping material.

20 Further, according to the related art, when a waterstop for a tunnel is fixed to an ethylene copolymer butumen (ECB) or ethylene-vinyl acetate (EVA) waterproof sheet by thermal fusing at a high temperature, the waterproof sheet and the waterstop are damaged so that degradation of a waterproofing function is caused, and thus the problems often occur on many occasions. Conventionally, since the waterstop is
25 bonded to the waterproof sheet by a thermal fusing device at a high temperature,

harmful gas is generated from the waterproof sheet, especially a PVC waterproof sheet, such that a worker frequently inhales the harmful gas, and thus the harmful gas and the like leads to poor working conditions in the field.

However, as another prior art, Korean Patent Registration No. 10-981774
5 entitled “Concrete-Integrated Composite Waterstop” is disclosed and will be described with reference to FIGS. 5 and 6.

FIG. 5 is a perspective view showing an internal structure of a concrete-integrated composite waterstop according to the related art, and FIG. 6 is a cross-sectional view of a state in which the concrete-integrated composite waterstop shown
10 in FIG. 5 is constructed in a tunnel.

Referring to FIGS. 5 and 6, the concrete-integrated composite waterstop according to the related art includes a waterstop main body 70, which includes water-stopping members 76 vertically formed on both sides of a shock absorbing part 74 having a valve-type hollow part 74a and formed on one surface of a planar panel part
15 72 in a vertical direction, and a concrete-coupling sealing member 90 provided on one surface of the waterstop main body 70 and integrally attaching the waterstop main body 70 to a surface of concrete 62, and the concrete-coupling sealing member 90 is formed by mixing an acrylic polymer and a filler.

Specifically, in the concrete-integrated composite waterstop according to the
20 related art, as shown in FIG. 5, the waterstop main body 70 includes a rectangular panel part 72, a shock absorbing part 74 having the valve-type hollow part 74a formed on one surface of the panel part 72, that is, a central portion of a surface facing the poured concrete 62 in the vertical direction, a plurality of anchor protrusions 80 formed on both sides of the shock absorbing part 74 in the vertical
25 direction, water-stopping material fixing parts 78 provided to be separate from both

sides of the anchor protrusion 80 and having a water-stopping material fixing hole 78a due to a central portion and an upper portion thereof being open, and a water expandable water-stopping material 76 insertion-fixed into the water-stopping material fixing hole 78a, and the external anchor protrusions 80 are positioned on both sides of the water expandable water-stopping material 76 and provided on one surface of the panel part 72. Further, a head part 82 is provided on a front end portion of the anchor protrusion 80 in an arrow shape, and a pair of catching parts 82a are formed on both sides of the anchor protrusion 80 by the arrow-shaped head part 82.

10 The concrete-coupling sealing member 90 is attached between the shock absorbing part 74 and the anchor protrusion 80 and also attached between the water expandable water-stopping member 76 and the anchor protrusion 80.

 The water expandable water-stopping member 76 expands when coming into contact with water to be in close contact with a contact surface of a structure of the concrete 62 to maintain a sealing pressure so as to completely seal an empty pore and a water path of the joint portion and prevent leakage of water. Rectangular wings are formed on both lower sides of the water expandable water-stopping member 76 to be inserted into the water-stopping material fixing hole 78a formed on the water-stopping material fixing parts 78.

20 Further, as shown in FIG. 6, a composite sheet 94 may be provided on an outer surface opposite to an inner surface provided with a water-stopping material 86 of both surfaces of the panel part 72 of the waterstop main body 70. In the concrete-integrated composite waterstop according to the related art, for example, a shotcrete 61 is first applied to stabilize an excavation surface of a tunnel ceiling immediately after tunnel excavation. A nonwoven fabric 63 and a waterproof sheet

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are installed on a surface of the shotcrete 61. The ECB waterproof sheet or the EVA waterproof sheet is used as a waterproof sheet. The waterstop is attached to the surface on which the waterproof sheet is installed. When the concrete 62 is primarily poured on the shock absorbing part 74 in which the valve-type hollow part 74a of the waterstop main body 70 is formed and cured and is secondarily poured on the remaining part of the valve-type hollow part 74a, the installation of the waterstop on the surface of the concrete 62 is completed. In this state, a lining joint 64 is formed between the primary and secondary poured parts of the concrete 62.

According to the concrete-integrated composite waterstop according to the related art, since a concrete-coupling sealing member is integrated with concrete by organic-inorganic bonding when concrete is poured so as to not come out of a concrete surface, a fine fluid flow path formed while the concrete is poured and cured may be extended, and a fluid flow may be also completely stopped. Further, according to the concrete-integrated composite waterstop according to the related art, a water-stopping effect of a concrete joint, that is, a lining joint part, can be maximized in a tunnel construction, and when the concrete-coupling sealing member is integrated with a concrete surface by organic-inorganic chemical bonding, a water expanding part is more firmly integrated with the concrete surface, and thus the efficiency of water-stopping can be increased.

According to the related art, the waterstop used in a construction joint or an expansion joint of a concrete underground structure has no or low bonding strength with concrete and includes an uneven part, such as a rib and the like, formed thereon to increase bonding strength. As such, when the bonding strength is low or the uneven part is formed, there is a problem in that a passage, through which groundwater penetrates into an interface between the waterstop and concrete, is

highly likely to be formed. For example, the waterstop invented to solve a problem is applicable only to a lining part of a tunnel and has a problem in that it is difficult to apply to a construction joint or an expansion joint of another concrete underground structure such as an underground continuous wall.

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(Patent Document 1) Korean Patent Registration No. 10-981774 (Filed on Mar. 12, 2008), Title of invention: “Concrete-Integrated Composite Waterstop”

(Patent Document 2) Korean Utility Model Registration No. 20-394986 (Filed on Jun. 29, 2005), Title of invention: “Connection Structure of Waterstop for
10 Concrete Structure”

(Patent Document 3) Korean Utility Model Registration No. 20-179241 (Filed on Dec. 4, 1999), Title of invention: “Composite Waterstop for Concrete Expansion Joint”

(Patent Document 4) Korean Utility Model Registration No. 20-291118
15 (Filed on Jun. 26, 2002), Title of invention: “Waterstop Mounted with Fixing Wing”

(Patent Document 5) Korean Laid-open Patent Application No. 2013-9684 (Published on Jan. 23, 2013), Title of invention: “Double-Sided Pressure Sensitive Adhesive Sheet”

(Patent Document 6) Korean Patent Registration No. 10-1285144 (Registered
20 on Jul. 5, 2013), Title of invention: “Pressure Sensitive Adhesive and Method of Manufacturing the Same”

(Patent Document 7) Korean Patent Registration No. 10-665671 (Registered on Dec. 29, 2006), Title of invention: “Method of Constructing Finishing Material with Pressure Sensitive Adhesive Layer and Construction Structure Thereof”

25 [Disclosure]

[Technical Problem]

The present invention is directed to providing a concrete bonded-type waterstop which allows a surface of a waterstop to be completely bonded to concrete after the concrete is poured by applying an adhesive and a protective coating agent to
5 a predetermined position of the surface of the waterstop, the waterstop being installed in a construction joint and an expansion joint to secure a waterproof function of an underground concrete structure so as to completely block a water leakage path, and a method of constructing the same.

The present invention is directed to providing a concrete bonded-type
10 waterstop which allows a waterstop to be completely bonded to concrete so as to significantly increase waterproof performance of a concrete underground structure.

[Technical Solution]

One aspect of the present invention provides a concrete bonded-type waterstop which includes concrete poured and cured in multiple stages so that a
15 concrete structure is formed and an expansion joint or a construction joint is formed, a waterstop which is a waterstop for an expansion joint or a waterstop for an expansion joint and which is installed in the expansion joint or the construction joint of the concrete to block a water leakage path when the concrete structure is constructed, an adhesive layer which is formed by pre-applying an adhesive to a
20 predetermined position of the waterstop and which reacts with the concrete when the concrete is poured to form a continuous coupling so that the waterstop and the concrete integrally move, and a protective coating layer which is formed by coating the adhesive layer with a protective coating agent and which is provided to protect the adhesive layer from weathering factors or external foreign materials before the
25 concrete is poured, wherein a surface of the waterstop is completely bonded to the

concrete after the concrete is poured and cured so as to completely block the water leakage path.

The adhesive to be pre-applied to the adhesive layer may be a pressure-sensitive adhesive (PSA) or a synthetic adhesive.

5 The PSA may be any one selected from among natural rubber adhesives, thermoplastic rubber adhesives, acrylic adhesives, hot melt adhesives, silicone adhesives, and the like, including a rubberized asphalt which is a styrene-isoprene-styrene, styrene-ethylene/butylene-styrene, butyl, and other rubber-based adhesives.

10 The protective coating agent with which the protective coating layer is coated may be acrylate, hydrated fine cement elements, or geotextile.

When the waterstop is a waterstop for an expansion joint, the adhesive may be applied to a surface of the waterstop for an expansion joint except for a central expansion part.

Another aspect of the present invention provides a method of constructing a
15 concrete bonded-type waterstop which includes a) forming an adhesive layer by pre-applying an adhesive to a predetermined position of a waterstop which is a waterstop for an expansion joint or a waterstop for a construction joint, b) forming a protective coating layer by coating the adhesive layer with a protective coating agent to protect the adhesive layer from weathering factors or foreign materials before concrete is
20 poured, c) installing the waterstop, on which the adhesive layer and the protective coating layer are formed, on a mold which allows the concrete to be poured therein and cured, d) pouring and curing the concrete in the mold on which the waterstop, on which the adhesive layer and the protective coating layer are formed, is installed, and
e) completely bonding the concrete and a surface of the waterstop to completely
25 block a water leakage path, wherein the surface of the waterstop is completely

bonded to the concrete after the concrete is poured and cured so that the water leakage path is completely blocked.

The waterstop on which the adhesive layer and the protective coating layer are formed in operations a) and b) may be pre-manufactured in a factory.

5 [Advantageous Effects]

According to the present invention, a concrete bonded-type waterstop allows a surface of the waterstop to be completely bonded to concrete after concrete is poured by applying an adhesive and a protective coating agent to a predetermined position of the surface of the waterstop, wherein the waterstop is installed in a construction joint and an expansion joint to secure a waterproof function of an underground concrete structure so as to completely block a water leakage path, thereby maximizing a water-stopping effect.

According to the present invention, waterproof performance of a concrete underground structure can be significantly increased by the concrete bonded-type waterstop in which concrete and the waterstop are completely bonded to each other, thereby reducing maintenance costs of water leakage and minimizing delay of a subsequent process.

[Description of Drawings]

FIG. 1 is a perspective view showing a waterstop for concrete according to a related art.

FIG. 2 is a plan view showing a state in which the waterstop is used when the waterstop for concrete shown in FIG. 1 is vertically constructed.

FIG. 3 is a perspective view showing a state in which waterstops for a concrete structure according to a related art are connected with each other.

FIG. 4 is a transverse cross-sectional view showing a state in which an adhesive is applied to an entire joint portion of the waterstop for a concrete structure shown in FIG. 3.

FIG. 5 is a perspective view showing an internal structure of a concrete-
5 integrated composite waterstop according to a related art.

FIG. 6 is a cross-sectional view of a state in which the concrete-integrated composite waterstop shown in FIG. 5 is constructed in a tunnel.

FIG. 7 is a vertical cross-sectional view showing a concrete bonded-type waterstop according to an embodiment of the present invention.

10 FIG. 8 is an electron micrograph showing an interface between a waterstop and concrete in the concrete bonded-type waterstop according to the embodiment of the present invention.

FIG. 9 is a view showing a case in which a waterstop for an expansion joint is a concrete bonded-type waterstop according to an embodiment of the present
15 invention.

FIG. 10 is a view showing a case in which a waterstop for a construction joint is a concrete bonded-type waterstop according to an embodiment of the present invention.

FIG. 11 is a flow chart of a method of constructing a concrete bonded-type
20 waterstop according to an embodiment of the present invention.

[Modes of the Invention]

Hereinafter, embodiments of the present invention that are easily performed by those skilled in the art will be described in detail with reference to the accompanying drawings. However, the embodiments of the present invention may
25 be implemented in several different forms and are not limited to the embodiments

described herein. In addition, parts irrelevant to description will be omitted in the drawings to clearly explain the embodiments of the present invention. Similar parts are denoted by similar reference numerals throughout this specification.

Throughout the specification, when a portion “includes” an element, the
5 portion may include the element or another element may be further included therein, unless otherwise described.

[Concrete Bonded-type Waterstop 100]

FIG. 7 is a vertical cross-sectional view showing a concrete bonded-type waterstop according to an embodiment of the present invention, and FIG. 8 is an
10 electron micrograph showing an interface between a waterstop and concrete in the concrete bonded-type waterstop according to the embodiment of the present invention.

Referring to FIG. 7, a concrete bonded-type waterstop 100 according to the embodiment of the present invention includes concrete 110, a waterstop 120, an
15 adhesive layer 130, and a protective coating layer 140.

The concrete 110 is poured and cured in multiple stages to form a concrete structure so that an expansion joint or a construction joint is formed.

The waterstop 120 is installed in the expansion joint or the construction joint of the concrete 110 to block a water leakage path when a concrete structure is
20 constructed. In this case, the waterstop 120 may be a waterstop for an expansion joint or a waterstop for a construction joint.

The adhesive layer 130 is formed by pre-coating a predetermined position of the waterstop 120 with an adhesive and reacts with the concrete 110 when the concrete 110 is poured so as to form a continuous coupling so that the waterstop 120
25 and the concrete 110 integrally move. The continuous coupling may prevent

infiltration water from leaking along an interface between the concrete 110 and the waterstop 120. Generally, the adhesive is mainly provided in the form of a rubber-based or acryl-based polymer dissolved in a suitable solvent. For example, when the waterstop 120 is coated with the adhesive and is pushed at a predetermined pressure to come into contact with the concrete 110, the solvent evaporates and the waterstop 120 and the concrete 110 are firmly bonded to each other as time elapses.

The adhesive according to the embodiment of the present invention may be a pressure-sensitive adhesive (PSA) or a synthetic adhesive that is pre-applied to the waterstop 120, the concrete 110 is poured on the adhesive and cured, and thus the waterstop 120 and the concrete 110 are firmly bonded to each other. For example, the PSA may be selected from among natural rubber adhesives, thermoplastic rubber adhesives, acrylic adhesives, hot melt adhesives, silicone adhesives, and the like, including a rubberized asphalt which is a styrene-isoprene-styrene, styrene-ethylene/butylene-styrene, butyl, and other rubber-based adhesive but is not limited thereto.

The protective coating layer 140 is formed by coating the adhesive layer 130 with a protective coating agent and may protect the adhesive layer 130 from weathering factors or external foreign materials before the concrete 110 is poured. In this case, the coating agent applied to the protective coating layer 140 may use acrylate, hydrated fine cement elements, geotextile, or the like but is not limited thereto.

In other words, in the concrete bonded-type waterstop 100 according to the embodiment of the present invention, the adhesive is pre-applied to a surface of the waterstop 120 so that the adhesive layer 130 is formed, and the surface of the

adhesive layer 130 is coated with a protective coating agent so that the protective coating layer 140 is formed.

In the concrete bonded-type waterstop 100 according to the embodiment of the present invention, an adhesive agent and a protective coating agent are sequentially applied to a surface of the waterstop 120, the waterstop 120 and the concrete 110 are completely bonded by an adhesive applied to the surface of the waterstop 120 after the concrete 110 is poured and cured so that the adhesive layer 130 and the protective coating layer 140 are formed, and thus a flow of water through an interface between the waterstop 120 and the concrete 110 can be completely blocked.

Meanwhile, a technique of applying the PSA and the protective coating agent according to the embodiment of the present invention is used for a pre-applied-type waterproof sheet, and in this case, the concrete and the waterproof sheet are completely bonded to each other by a pressure sensitive adhesive to completely block a flow of water (Lateral Migration: test by ASTM D5385 modified) through an interface.

It will be apparent to those skilled in the art that the concrete bonded-type waterstop 100 according to the embodiment of the present invention may be applied to generally manufactured waterstops of all types and materials which are in use.

Meanwhile, FIG. 9 is a view showing a case in which a waterstop for an expansion joint is a concrete bonded-type waterstop according to an embodiment of the present invention, and FIG. 10 is a view showing a case in which a waterstop for a construction joint is a concrete bonded-type waterstop according to an embodiment of the present invention.

As shown in FIGS 10A to 10C, a waterstop 120b for a construction joint has a flat shape and a rib-installed shape, but as shown in FIGS. 9A to 9C, a waterstop 120a for an expansion joint has an expansion part formed in the center portion of the waterstop in an O, □, ◻, or U shape because the waterstop 120a moves
5 corresponding to contraction and expansion of the concrete structure according to a temperature. Therefore, the adhesive applied to a surface of the waterstop 120a for an expansion joint should be applied to a portion except the central expansion part.

The concrete bonded-type waterstop 100 according to the embodiment of the present invention can significantly increase durability and waterproof performance of
10 a concrete structure by securing complete water-stopping performance in a construction joint or an expansion joint of the concrete structure, can reduce maintenance costs of water leakage and can also prevent a subsequent process from being delayed due to maintenance.

[Method of Constructing Concrete Bonded-type Waterstop]

15 FIG. 11 is a flow chart of a method of constructing a concrete bonded-type waterstop according to an embodiment of the present invention.

Referring to FIG. 11, in the method of constructing a concrete bonded-type waterstop according to the embodiment of the present invention, first, an adhesive is pre-applied to a predetermined position of a waterstop for a construction joint or a
20 waterstop for an expansion joint so that an adhesive layer 130 is formed (S110). In this case, the adhesive may be a pressure-sensitive adhesive (PSA) or a synthetic adhesive. For example, the PSA may be a rubberized asphalt, which is a styrene-isoprene-styrene, styrene-ethylene/butylene-styrene, butyl (copolymer of isobutylene containing isoprene) and other rubber-based adhesives but is not limited thereto.

Next, the adhesive layer 130 is coated with a protective coating agent so that a protective coating layer 140 is formed (S120). In this case, the protective coating layer 140 may be provided to protect the adhesive layer 130 from weathering factors or external foreign materials before the concrete 110 is poured, and in this case, the
5 coating agent applied to the protective coating layer 140 may be acrylate, hydrated fine cement elements, geotextile, or the like.

The waterstop 120 on which the adhesive layer 130 and the protective coating layer 140 are formed is installed on a mold (not shown) in which the concrete 110 is poured and cured (S130). In this case, the waterstop on which the adhesive layer
10 and the protective coating layer are formed may be pre-manufactured in a factory. The concrete 110 is poured in the mold on which the adhesive layer 130 and the protective coating layer 140 are formed and cured (S140). In this case, the adhesive layer 130 reacts with the concrete 110 when the concrete 110 is poured so as to form a continuous coupling so that the waterstop 120 and the concrete 110 integrally move.

15 The concrete 110 and a surface of the waterstop 120 are completely bonded to each other to completely block a water leakage path (S150). Therefore, the concrete 110 is completely bonded to a surface of the waterstop 120 after the concrete 110 is poured and cured so as to completely block a water leakage path. Since the shape of the concrete bonded-type waterstop 100 and a construction
20 method thereof according to the embodiment of the present invention are the same as those of the conventional waterstop, a separate special technique and manpower are not required, and thus conventional manpower and a conventional construction method may be used.

Further, the adhesive is used instead of ribs to increase bonding strength with the concrete, and the number of ribs and a distance between the ribs installed on the waterstop are reduced, and thus quality of densely poured concrete can be secured.

The above description is only exemplary, and it should be understood by those skilled in the art that the invention may be performed in other concrete forms without changing the technological scope and essential features. Therefore, the above-described embodiments should be considered only as examples in all aspects and not for purposes of limitation. For example, each component described as a single type may be realized in a distributed manner, and similarly, components that are described as being distributed may be realized in a coupled manner. The scope of the present invention is defined not by the detailed description but by the appended claims and encompasses all modifications or alterations derived from the meanings, scope, and equivalents of the appended claims.

<Description of symbols>

100: CONCRETE BONDED-TYPE WATERSTOP
110: CONCRETE
120: WATERSTOP
130: ADHESIVE LAYER
140: PROTECTIVE COATING LAYER

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[CLAIMS]

[Claim 1]

A concrete bonded-type waterstop comprising:

concrete (110) poured and cured in multiple stages so that a concrete
5 structure is formed and an expansion joint or a construction joint is formed;

a waterstop (120) which is a waterstop (120a) for an expansion joint or a
waterstop (120b) for an expansion joint and which is installed in the expansion joint
or the construction joint of the concrete (110) to block a water leakage path when the
concrete structure is constructed;

10 an adhesive layer (130) which is formed by pre-applying an adhesive to a
predetermined position of the waterstop (120) and which reacts with the concrete
(110) when the concrete (110) is poured to form a continuous coupling so that the
waterstop (120) and the concrete (110) integrally move; and

a protective coating layer (140) which is formed by coating the adhesive layer
15 (130) with a protective coating agent and which is provided to protect the adhesive
layer (130) from weathering factors or external foreign materials before the concrete
(110) is poured,

wherein a surface of the waterstop (120) is completely bonded to the concrete
after the concrete (110) is poured and cured so as to completely block the water
20 leakage path.

[Claim 2]

The concrete bonded-type waterstop of claim 1, wherein the adhesive to be
pre-applied to the adhesive layer (130) is a pressure-sensitive adhesive (PSA) or a
synthetic adhesive.

25 [Claim 3]

The concrete bonded-type waterstop of claim 2, wherein the PSA is any one selected from among natural rubber adhesives, thermoplastic rubber adhesives, acrylic adhesives, hot melt adhesives, silicone adhesives, and the like, including a rubberized asphalt which is a styrene-isoprene-styrene, styrene-ethylene/butylene-styrene, butyl, and other rubber-based adhesives.

[Claim 4]

The concrete bonded-type waterstop of claim 1, wherein the protective coating agent with which the protective coating layer (140) is coated is acrylate, hydrated fine cement elements, or geotextile.

10 [Claim 5]

The concrete bonded-type waterstop of claim 1, wherein, when the waterstop (120) is a waterstop (120a) for an expansion joint, the adhesive is applied to a surface of the waterstop (120a) for an expansion joint except for a central expansion part.

[Claim 6]

15 A method of constructing a concrete bonded-type waterstop, the method comprising:

a) forming an adhesive layer (130) by pre-applying an adhesive to a predetermined position of a waterstop (120) which is a waterstop (120a) for an expansion joint or a waterstop (120b) for a construction joint;

20 b) forming a protective coating layer by coating the adhesive layer with a protective coating agent to protect the adhesive layer (130) from weathering factors or foreign materials before concrete (110) is poured;

c) installing the waterstop (120), on which the adhesive layer (130) and the protective coating layer (140) are formed, on a mold which allows the concrete to be
25 poured therein and cured;

d) pouring the concrete (110) in the mold on which the waterstop (120), on which the adhesive layer (130) and the protective coating layer (140) are formed, is installed and curing the concrete (110); and

e) completely bonding the concrete (110) and a surface of the waterstop (120)
5 to completely block a water leakage path,

wherein the surface of the waterstop (120) is completely bonded to the concrete after the concrete (110) is poured and cured so that the water leakage path is completely blocked.

[Claim 7]

10 The method of claim 6, wherein the adhesive to be pre-applied to the adhesive layer (130) in operation a) is a pressure-sensitive adhesive (PSA) or a synthetic adhesive.

[Claim 8]

The method of claim 7, wherein the PSA may be any one selected from
15 among natural rubber adhesives, thermoplastic rubber adhesives, acrylic adhesives, hot melt adhesives, silicone adhesives, and the like, including a rubberized asphalt which is a styrene-isoprene-styrene, styrene-ethylene/butylene-styrene, butyl, and other rubber-based adhesives.

[Claim 9]

20 The method of claim 6, wherein the protective coating agent with which the protective coating layer (140) is coated in operation b) is acrylate, hydrated fine cement elements, or geotextile.

[Claim 10]

The method of claim 6, wherein when the waterstop (120) in operation a) is a
25 waterstop (120a) for an expansion joint, the adhesive is applied to a surface of the

waterstop (120a) for an expansion joint except for a central expansion part, and the waterstop on which the adhesive layer and the protective coating layer are formed in operations a) and b) are pre-manufactured in a factory.