VERIFICATION CERTIFICATE

Product group:
Special connections for reinforcement bars
VT-BY-EJ-0005-2021

In accordance with the provisions of Chapter 3 of the Act on Product Approval of Certain Construction Products (954/2012, as amended by 1262/2014), the Finnish Concrete Association has issued a certification certificate to the company

Dextra Manufacturing Co. Ltd

to demonstrate that the Finnish Concrete Association has stated the company's couplers

Fortec+ type A, B, C, D and BD mechanical splice

together with reinforcement B500B (SFS 1300)

fulfill the criteria S*pecial connections for reinforcement bars* published in Finnish by the Ministry of the Environment.

The certificate covers joints between bars of the same size with a bar size of Ø 16, 20, 25, 28, 32 and 36 mm for both static-loaded and fatigue-loaded splices.

The place of manufacture of the connections is Dextra Manufacturing - 191 Chalermprakiat Rama 9 Soi 48, Dokmai, Bangkok 10250 Thailand.

This certificate has been processed by the Concrete Association of Finland and accepted based on available documents as enough explanation of the basic characteristics and use of the product in question. The certified declared basic performance specifications, the product description, and the conditions for using the product are described in the product manual or in the appendices to the certificate.

The company must affix the certification mark to the construction product, documentation or packaging.

This Certificate of Approval was issued on April 19, 2021 and is valid until April 19, 2026, unless prior to that date there is a reason to revoke the Certificate.

Matti Pentti
Puheenjohtaja

Mirva Vuori
Toimitusjohtaja

Appendices 1. Terms of validity
2. Product description and material information
3. Marking and declaring the certified product

FINAS
Finnish Accreditation Service
S043 (EN ISO/IEC 17065)

Annex 1: Terms of validity

The verification certificate is issued for a fixed period, not exceeding five years at a time. Finnish Concrete Association r.y. may, if necessary, require periodic evaluations to ascertain that the characteristics of the product correspond to those declared by the manufacturer.

The certificate is public. The certificate is available on the website of the Finnish Concrete Association r.y. www.betoniyhdistys.fi.

Precondition to the use of the certificate is the manufacturer's internal production quality control and testing. A certified body verifies the internal quality control system by performing an initial inspection, and constantly monitoring it and evaluating and approving it by annual inspections at production sites.

Before issuing the certification certificate, the manufacturer shall notify the Finnish Concrete Association of its quality control certification body and submit to the Finnish Concrete Association the report of the initial inspection of manufacturing plant and of factory production control.

The Concrete Association of Finland and the quality control certifying body shall notify the manufacturer in writing of any deterioration in the quality or safety of the product under quality control and shall require the manufacturer to bring the construction product into conformity with the certification within a specified time.

The Finnish Concrete Association shall withdraw the verification certificate if the importer or the manufacturer or its authorized representative does not rectify the deficiencies found in the quality control certification.

The verification certificate shall be revoked if the construction product does not meet the essential technical requirements in accordance with the Land Use and Building Act or the provisions issued under it.

If the product becomes subject to the CE marking, the certificate will expire.

The certificate of approval shall be withdrawn without delay if the Finnish Safety and Chemical Agency (Tukes) has prohibited the use of the construction product or ordered the importer or the manufacturer or his authorized representative to take measures to withdraw the product from the market.

The certificate holder is responsible for product quality and continuous quality control. The Finnish Concrete Association does not accept any liability for personal or other damage arising from the use, directly or indirectly, of any of the products covered by this certificate.

Partial distribution of the Certification Certificate or any other use of the Finnish Concrete Association's name in advertising is permitted only with the permission of the Finnish Concrete Association.

Annex 2 Product description and material information

2.1 Overview of reinforcement connection system

Dextra Manufacturing Co. Ltd. Fortec+ reinforcement connection is a threaded coupling system for reinforcement. The coupler transfers the force from one rebar to another via a straight connection between the threaded reinforcing bars and the threaded coupler. Typical applications for Fortec+ products are:

- Continuing reinforcement in the work sequence or at the edge of the casting area
- continuing reinforcement from one element to another

In the manufacture of the splice, the reinforcing bars are cut and the cross-sectional area of the bar head is increased to a larger diameter than the original diameter by cold working. The cold-formed head is threaded and tested by a tensile test with a force corresponding to 90% of the yield strength of the reinforcing bar. The bars are threaded either at the factory or on site with machines delivered by Dextra Manufacturing Co. Ltd.

The couplers are manufactured at the factory and fixed to the reinforcing bars on site. The place of manufacture of the couplers is Dextra Manufacturing – address 191 Chalermprakiat Rama 9 Soi 48, Dokmai, Bangkok 10250 Thailand.

Dimensions and tolerances of coupler parts:

Fortec+ Standard Assembly instruction No.23 Rev.00_fi
Fortec+ Position type B Assembly instruction No.24 Rev.00_fi
Fortec+ Position type C Assembly instruction No.25 Rev.00_fi
Fortec+ Position type D Assembly instruction No.26 Rev.00_fi
Fortec+ Position type BD Assembly instruction No.27 Rev.00_fi
Manufacturing drawings (confidential)

Types of connection covered by the certificate:

Fig 1 – Fortec+ type A

Fig 2 – Fortec+ type B

Fig 3 – Fortec+ type C

Fig 4 – Fortec+ type D

Fig 5 – Fortec+ type BD

2.2 Materials used for mechanical connections

Properties of coupler

The batch-specific material is indicated in the material certificates.

Couplers	Standards
A, B, C ja D	20 GB/T 699 and S20C GB/T 699
BD	45 GB/T 8162
Lock nuts	45 GB/T699 and 45 GB/T 8162
Reinforcement bars B500B	SFS 1300 and SFS EN 10080

2.3 Strength and ductility of reinforcement splice

Fortec+ reinforcement joints have been tested and found to comply with the criteria S*pecial connections for reinforcement bars* specified by the Ministry of the Environment.

The strength and toughness of couplers between bars of the same size have been demonstrated by testing the reinforcement splice with reinforcing bars type B500B to fulfill following values:

- The yield strength of the at least equal to that of the nominal yield strength joined bars.
- The ultimate force F_m of the spliced bar at least 5% greater than the nominal yield force of the unspliced bar
- The ultimate force F_m of the spliced bar is> 95% of the measured maximum force F_m of the unspliced bar
- Tensile yield strength, ultimate strength and ratio between ultimate strength and yield strength at least 1,08 for B500B.
- Percentage total elongation at ultimate tensile force, $F_m \geq 5$ %.

Slip under static forces

The slip across the mechanical splice between reinforcing bars of same size has been demonstrated by testing for bars of type B500B for sizes Ø 16, Ø 20 , Ø 25, Ø 28, Ø 32 and Ø 36 mm. The slip across the joint between different size reinforcing bars size has been demonstrated by testing for bars of type B500B.

Slip is measured with a force at least $0,7R_{eH}$ (R_{eH} = nominal yield strength of the bar)

- The tested joints meet the slip requirement ≤ 0,1 mm.

Properties under high-cycle fatigue loading

The fatigue load resistance of a joint between bars of the same size has been demonstrated by testing for reinforcement type B500B and dimensions sizes Ø 16, Ø 20 , Ø 25, Ø 28, Ø 32 and Ø 36 mm.

- The tested reinforcement joints can withstand at least 2 million cycles at a stress range of $2\sigma_a$ = 60 MPa with a maximum stress of $0{,}6 \times f_{yk}$.

2.4 Durability

The thickness of the protective concrete cover and the distance between the Fortec+ joints shall be determined by the environmental exposure class and the design in accordance with *SFS-EN 1992-1-1 and the Finnish National Annex.*

2.5 Resistance to fire

The reinforcement connections shall have a concrete cover thickness corresponding to that specified for the reinforcement of the concrete structure concrete cover. If the fire resistance of the reinforcement joint is judged to be insufficient, the thickness of the concrete cover must be increased.

2.6 Use of the product

Fortec+ couplers are used as a general joint for the connection of reinforcing bars of the same thickness. The ends of the connection bars are machined either on site at Dextra Manufacturing Company Ltd. deliver on the machinery and equipment in accordance with the written instructions. In order to ensure the quality of the production on site, the quality control certifier carries out an initial inspection of the production before the start of production.

2.7 Storage and transport

In dry conditions.

2.8 Installation

Fortec+ couplers are installed according to the Assembly instruction listed in section 2.1. The connections are tightened with wrench using predetermined tightening torques provided in the Assembly instructions.

2.9 Test reports

EUFI29-20005325-T1
EUFI29-20005325-T2
EUFI29-20005325-T3
EUFI29-20005325-T4
EUFI29-20006320-T2
EUFI29-20006320-T1
EUFI29-20006203-T2
EUFI29-20006203-T1

Annex 3. Marking and declaring the certified product

The certification body shall use a mark on the certificate of approval which distinguishes it from other voluntary certificates issued by the approval body.

The manufacturer shall affix the verification certificate (model below) the reinforcement connector, packaging or documentation. The numeric code that appears on the marking is on the front page of this certificate. The verification certificate marking is provided to the customer as a separate file.

The manufacturer shall declare the structural properties of the Fortec+ reinforcement joint by a method appropriate to its business model.

The properties are to be stated in the documentation supplied with the product.

Allekirjoitustosite

SignSpace-palvelussa tehty allekirjoitus
Päiväys: 2021-04-20 15:33:51 (EET)
Tarkistuskoodi: XIV1TOAER5W2CISF6ZQPTIQVGMK1AMZZSGJ7N
XQBHKSUE1CH9NKJJ6G7KT0TUFYP6OZHL5CBYXSILFXUU8TFVNTS
QANDGIAAU3NNAN2OB1SAZBBJD5QU45VKB1ZZ64UP

VT-BY-EJ-0005-2021 Dextra English.pdf (6 sivua)

on allekirjoitettu sähköisesti SignSpace-palvelussa osana useamman dokumentin sisältävää kokonaisuutta, johon kuuluu seuraavat dokumentit:

VT-BY-EJ-0005-2021 Dextra.pdf (6 sivua)
VT-BY-EJ-0005-2021 Dextra English.pdf (6 sivua)

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Allekirjoituksen tyyppi: **Sähköinen allekirjoitus**
Tunnistamistapa: **Kevyt**
Varmenteen haltija: **Platform of Trust Oy**
Varmenteen liikkeellelaskija: **Digi- ja väestötietovirasto**

Mirva Vuori

Allekirjoitettu 2021-04-19 18:47:33 (EET)

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Varmenteen liikkeellelaskija: **Digi- ja väestötietovirasto**

Matti Pentti

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Dokumentin allekirjoittaja(t) on tunnistettu palvelussa seuraavasti

SignSpace® on sähköisen allekirjoittamisen palvelu, jonka tarjoaa SignSpace, Platform of Trust Oy, Business ID 2980005-2, Tarvonsalmenkatu 17 B, 02600 Espoo, Finland.

Tähän dokumenttiin liitetty allekirjoitus on eIDAS asetuksen (N°910/2014) mukainen sähköinen allekirjoitus.

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- Tarkistajalla tulee olla käytettävissään allekirjoitettu asiakirja sähköisessä muodossa.
- Asiakirja voi olla yksi PDF-tiedosto, jonka lopussa on allekirjoitussivu, tai yhden tai useamman tiedoston ja näihin liittyvän PDF-muotoisen allekirjoitussivun kokonaisuus.
- Tarkistaja avaa www.signspace.fi/verification-fi.html sivuston.
- Tarkistaja lataa palveluun allekirjoitetun asiakirjan allekirjoitussivuineen ja saa tiedon palvelun tekemien tarkistusten tuloksista.