



VERIFICATION CERTIFICATE

**Product group:
Special extensions for reinforcement bars
VT-BY-EJ-0003-2019**

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

PFEIFER Seil- und Hebetchnik GmbH

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

PH MU + PH-K + PH-MU connection and

PH-MU + PH-A connection

together with reinforcing bar B500B (SFS 1300)

fulfill the criteria published by the Ministry of the Environment for static loads. Properties for fatigue loading have been demonstrated by testing. The certificate of approval covers the connection between reinforcing bars of same size.

The verification certificate covers connection type PH-MU + PH-K+ PH-MU for bar size \varnothing 12, 16, 20, 25 and 32 mm and for fatigue-loaded connections for \varnothing 12, 16, 20, 25. The manufacturing place for the mechanical splices is Pfeifer Seil- und Hebetchnik GmbH Dr.-Karl-Lenz-Strasse 66, 87700 Memmingen, Germany.

This certification certificate has been processed by the Concrete Association of Finland and accepted based on available documents as a sufficient 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 verification certificate was issued on November 28, 2019 and is valid until November 28, 2024, unless there are prior reasons for cancelling the certificate.

M1) The Certificate of Certification has been completed on 3.3.2020. Connection type PH-MU + PH-A is added.

Matti Pentti
Chairman of the board

Tarja Merikallio
Managing director

- ANNEXES .
1. Terms of validity
 2. Manufacturer's product description and certified characteristics
 3. Marking of the certified product

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.

The use of the certificate is subject to the manufacturer's factory production control and testing. The factory production control system is certified by a certifying body carrying out an initial inspection of the manufacturing plant and of factory production control, continuous surveillance, evaluation and approval.

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

The PFEIFER PH-MU reinforcement connection is a system for reinforcement connections and continuations. Reinforcing bars are clamped with threaded sleeves for connection and the bars are connected to each other using a PH-K connection bolt or with PH-A threaded bar. Typical applications for PH-MU products are:

- continuing reinforcement at the construction joint or at the edge of the casting area

The joint transfers the force from one concrete steel to another through threaded sockets and a connecting bolt.

The sockets are secured to the reinforcing steel under factory conditions by hydraulically pressing with a suitable device. The threaded head of the PH-A type bar is produced according to the following steps:

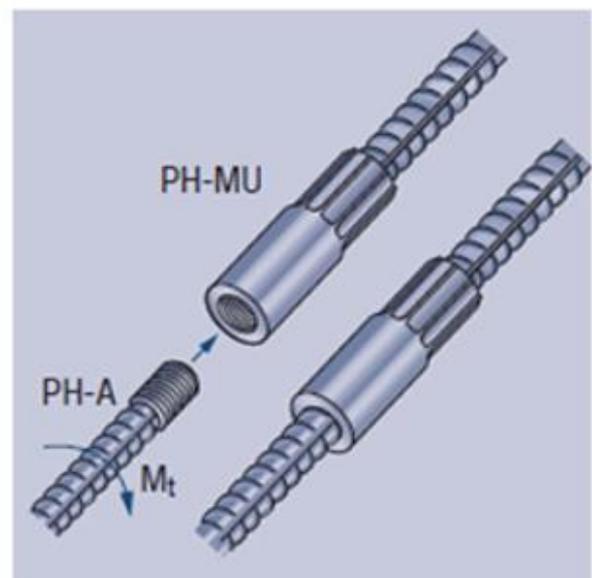
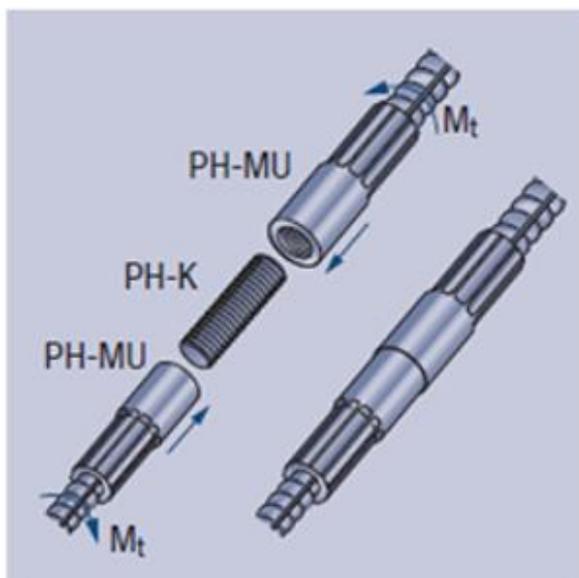
- Forging of bar and pressing end into bigger diameter
- Peeling of the external surface
- Rolling of the thread

Dimensions and tolerances of connection parts

Dimensions: Annex 1: Technical Instructions: Pfeifer PH Reinforcement Continuity System 08/2019
Annex 2: Drawings of joints (confidential)

Type of connection covered by the verification certificate

PFEIFER PH MU – reinforcement connection system with PH-K connecting bolt and PH-A threaded bar.



2.2 Materials used for connectors

Properties of connector materials (standards, strength values, composition)

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

Part	Materialnumber	Marking	Standard
PH-MU:	1.0580+N	E355+N	EN 10305-1
PH-K bolt:		8.8	DIN 976
PH-A reinforcement steel:		B500B	SFS 1300 / SFS-EN 10080

2.3 Load resistances

The PH-MU reinforcement joint meets the requirements of the evaluation principles of the verification certificate *Special Extensions for Reinforcement bars* published by the Ministry of the Environment.

The strength and toughness of joints between reinforcement bars of the same size have been demonstrated by testing.

- The yield strength of the joint is at least equal to that of the extended reinforcement bar
- The maximum force F_m of the extended bar is at least 5% greater than the nominal yield force of the non-extended bar
- The maximum force F_m of the extended bar is $> 95\%$ of the measured maximum tensile force F_{max} of the non-extended bar
- Tensile yield strength, maximum tensile strength and tensile/yield strength ratio meet the requirements of SFS 1330
- Percentage total elongation at maximum tensile force Agt is at least 5,0 %

PFEIFER PH reinforcement joints are designed, tested and approved for static loads and fatigue loads.

Table 1. Static load resistance PH-MU + PH-K +PH-MU

Tyyppi	Kestävyys N_{Rd}
PH-MU 12	49,2 kN
PH-MU 16	87,4 kN
PH-MU 20	136,6 kN
PH-MU 25	213,4 kN
PH-MU 32	349,7 kN

Taulukko 2. Static load resistance PH-MU + PH-A

Tyyppi	Kestävyys N_{Rd}
PH-A 12	49,2 kN
PH-A 16	87,4 kN
PH-A 20	136,6 kN
PH-A 25	213,4 kN

Fatigue resistance has been tested for reinforcing joints PH-MU + PH-K + PH-MU with bar diameters $\varnothing 12$, $\varnothing 16$, $\varnothing 20$ and $\varnothing 25$. The testing has been carried out in accordance with the certification criteria and ISO 15835-1. Reinforcement connections are capable to withstanding at least 2 million cycles within a stress range of $2\sigma_a = 60$ MPa at a maximum stress of $0,6 \times f_{yk}$.

2.4 Durability

The concrete cover and the distance between the PH-MU connections shall be determined by the exposure classes and the design working life in accordance with the requirements of the standards.

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 connections

The PH-MU joint is used as a general joint to connect reinforcing bars of the same size.

The ends of connected bars do not need to be worked on site. The joint manufacturer cuts the extension ends with a hydraulic cutter before pressing the sockets. The manufacturer clamps the sockets to the ends of the rods.

2.7 Storage ja transport

Stored in dry conditions.

2.8 Installation of connections

The PH reinforcement joint shall be installed in accordance with the installation instructions in the Technical Instructions Pfeifer PH Reinforcement Continuity System 08/2019.

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 PH reinforcement joint by a method appropriate to its business model.

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

