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VERIFICATION CERTIFICATE

EUFI29-22003697-VA/EN

Eurofins Expert Services Oy has, in accordance with Chapter 3 of the Finnish Act on the Type Approval of Certain Construction Products (954/2012, amended with Act 1262/2014) and the provisions of the decree given by the Finnish Ministry of the Environment on the approval of certain construction products (555/2013, amended with decree 66/2015), granted the following verification certificate.

Stora Enso Oyj, Salmisaarenaukio 2, 00180 Helsinki, Finland
Glued in rods connections in LVL G by Stora Enso members

Manufacturing location
Punkaharjun Puutaito Oy
Korjaamotie 1a, 58200 Kerimäki, Finland

The product description is provided in Appendix 2 and the conditions for product use are provided in Appendix 3.

The conformity has been assessed in accordance with the evaluation criteria published by the Finnish Ministry of the Environment and provided in the document “Puurakenteiden vetorasitetut ja liimatut terästanko- ja ruuviliittimet”.

The system used for the evaluation and verification of the permanence of the performance level is 1.

The construction product and the related package and documents must be equipped with the verification certificate mark concerning this certificate.

The verified product properties must be presented in connection with the mark in accordance with Appendix 4

This verification certificate has been granted on December 23, 2022 and it is valid until December 22, 2027 at the latest. The language version (EN) has been granted on May 22, 2023. The conditions for validity are provided in Appendix 1.

The validity of the certificate can be checked via the www.sertifikaattihaku.fi service.

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FINAS Finnish Accreditation Service S017 (EN ISO/IEC 17065)

Espoo 22.5.2023

Katja Vahtikari
Manager, Construction Certification

APPENDICES 1. Conditions for Validity
2. Product Description provided by the manufacturer
3. Conditions for Product Use
4. Marking of the Verified Product
5. Design guideline: "*Glued-in rods in LVL G by Stora Enso, Design procedure, V1.0, December 2022*", (confidential appendix)
6. Manufacturing procedure: *"Glued-in rods (GiRs) by Stora Enso LVL G X, Quality control and application guideline for bonding threaded rods, V1.0 December 2022*", (confidential appendix)

REPORTS
1. Initial inspection of the factory production control (FPC) EUFI29-2203697-I1
2. Tension tests of glued-in rod joints with LVL G X by Stora Enso EUFI29-2203697-T1
3. Analysis of glued-in rod joint tests, EUFI29-22003697-T2

Appendix 1: Conditions for Validity

The verification certificate is granted for a fixed period, for no more than five years at a time. If necessary, the approved body may require a periodic review to ensure that the properties of the product correspond with the properties reported by the manufacturer. Products that have been inspected on a consignment-specific basis may only be commissioned after the approved body has issued the verification certificate concerning the consignment in question. (954/2012, section 14)

The verification certificate must be withdrawn if the construction product does not meet the essential technical requirements stipulated in the Finnish Land Use and Building Act or the provisions adopted under it. If the product is included in the scope of application of the CE marking system, the verification certificate expires. (954/2012, section 14)

In addition, the utilization of the verification certificate also requires internal production-related quality control and testing maintained by the manufacturer. The entity responsible for quality control verification verifies the internal quality control by carrying out the related initial inspection, monitoring the quality control continuously, and evaluating and approving the quality control. (954/2012, section 12)
The approved body and entity responsible for quality control verification must inform the manufacturer in writing of any reductions in product quality or safety detected during quality control and demand the manufacturer to modify the construction product within a fixed period to correspond with the verification certificate. (555/1213, section 8)

The approved body that issues verification certificates must withdraw the verification certificate if the importer, manufacturer, or authorized representative does not remedy the deficiencies detected during quality control verification. (954/2012, section 12)

The verification certificate must be withdrawn without delay if the Finnish Safety and Chemicals Agency (Tukes) has prohibited the use of the construction product or ordered the importer, manufacturer, or authorized representative to take measures to remove the product from the market. (954/2012, section 12)

The verification certificate is a public document. A record, which is available via the www.sertifikaattihaku.fi service maintained by Eurofins Expert Services Oy, is kept of the certificates.

Before the verification certificate can be issued, the manufacturer must report the entity responsible for quality control verification to the approved body.

The holder of the verification certificate is responsible for product quality and continuous quality control. When granting this verification certificate, Eurofins Expert Services Oy does not assume any liability for personal injuries or other damages that are caused by the direct or indirect use of the product related to this verification certificate.

The use of the names “Eurofins Expert Services Oy” or “Eurofins” in any other form in advertisements, as well as the partial distribution of this verification certificate, is only permitted with the written authorization of Eurofins Expert Services Oy.

Appendix 2: Product description

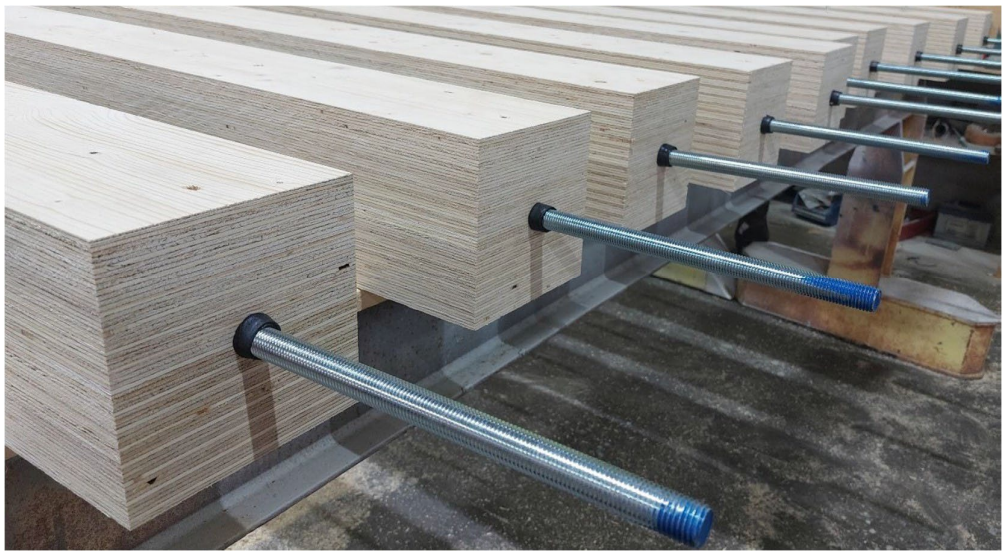

Table 2-1. Materials used in the Glued in rods connections in LVL G by Stora Enso members

No	Materials	Type / class	Standard
1.	Block glued LVL posts, beams and slabs used in load bearing structures	LVL G X by Stora Enso ETA 20/0291 Eurofins Product Certificate Nro EUFI29-20000564-C	EAD 130337-00-0304
2.	Adhesive	Thickness class of the adhesive bondline $t_B = 2\ t_b = 2$mm → Drill hole diameter = diameter of the steel rod + 2mm 2-component epoxy Hilti HIT-RE 500 V4 ETA-20/0834 2-component polyurethane Loctite CR821 Purbond DIBt AbZ Z-9.1-896	EN17334:2021 EN 17334:2021 EAD 130006-00-0304 EN 17334:2021 EAD 130006-00-0304
3.	Steel rods - Threaded rod 6-30mm - Ribbed rod 6-30mm - Threaded rod, stainless steel, 6-30mm	 4.8, 5.6, 5.8 or 8.8 A500HW (SFS 1215) 45, 50 or 60	 EN ISO 898-1 EN 10080 EN ISO 3506-1

Appendix 3: Conditions for Product Use

The verified performance levels for meeting the basic product requirements are as described in the table below. As the provided requirements are minimum requirements, it is permissible to use materials with a higher performance level.

The verification of the permanence of the performance is made according to the method 3a or 3b described in the chapter 3.1.1 of the evaluation criteria.

The verification certificate does not cover connections, which are subjected to temperatures over 50 °C or dynamic loads over long period of time.

Table 3-1. Verified basic requirements of the product

1. Durability	The connections are completed according to plans prepared by the manufacturer for a specified construction project. The design is made according to the design procedure in the appendix
2. Fire resistance	The fire resistance of the connection (R) is estimated with calculations, based on complete fire protection, taking into account the thermal conductivity of the connectors and the thermal durability of the adhesive.
3. Service life	The service life of the building component is usually estimated to be 50 years. When needed, the load bearing structures can be designed for a 100 year service life.

Design

The connections are designed according to the manufacturers design procedure ”*Glued-in rods in LVL G by Stora Enso, Design procedure, V1.0, December 2022”*. When the product is exported, the structures are designed according to local conditions and their requirements.

Manufacturing

The production and quality control guidelines ”*Glued-in rods (GiRs) by Stora Enso LVL G, Quality control and application guideline for bonding threaded rods, V1.0 December 2022*” defined by the manufacturer are followed in the different stages of the manufacturing process.

The manufacturing method “*Bypass method*” can be used with both adhesive types and all steel rods. The manufacturing method ”*Direct injection method*” is limited to be used in end grain joint with the glue type Hilti HIT-RE 500 V4, rod M20 5.8, bond length 400-600mm and hole diameter 22 mm.

The manufacturer must define the dimensional tolerances in such a way, that after the installation all declared performance levels are achieved. The tolerances must be covered by the quality control and they must be described in the assembly guide provided to the customer.

During the gluing of the rods, the moisture content of the wood may exceed the lowest designed moisture content of the structure in maximum by 3 %-units. The end grain surfaces shall be coated to prevent moisture transfer by using e.g. epoxy paint.

The manufacturing methods must be chosen in planned and purposeful manner. Moving, turning and positioning of the structural components must be done in such way, that the structures are not damaged. A specific movement plan must be prepared for large and heavy structural components.

The manufacturer’s internal production and quality control instructions are to be followed in the different manufacturing stages. The quality control system and procedures must be suitable for

the manufacturing method. The manufacturer must recognize the key processes and make notes of the key quality control actions, so that the auditor can confirm the quality control procedures are taking place.

The qualifications of the personnel must be defined in the quality control system. The qualifications do not need to be proven with personal certificates or specific education schemes, as long as they can be verified to be adequate for the task in practice.

The permitted materials used in the manufacture are listed in appendix 2. If other materials are to be used, the provider of the verification certificate must review the conditions for their use.

Deliver and storage on site

The structural component must be transported to the customer protected from the weather conditions and mechanical damage. Damage to the component must be prevented during transport and loading. When needed, a specific transportation plan must be prepared for large and heavy structural components.

The manufacturer must provide the customer appropriate instructions for the storage and protection of the product.

Use

The manufacturer must provide the customer installation, lifting and usage guides that are fit for purpose. Specific attention must be placed on the connections between individual structural components as well as to the connections with other parts of the structure.

Appendix 4: Marking of the Verified Product

The approved body must equip the verification certificate with a mark that can be used for distinguishing the verification certificate from other voluntary certificates granted by the approved body. The manufacturer must equip the construction product and the related package and documents (555/2013, section 7) with the mark.

The products certified according to verification criteria " **Puurakenteiden vetorasitetut ja liimatut terästanko- ja ruuviliittimet”** must be marked and their performance must be declared as follows (numbering refers to the verification criteria):

- Identity of the manufacturer
- The mark used in the verification certificates granted by the Eurofins Expert Services Oy, which also includes the name of Eurofins Expert Services Oy and identifies the specific product certificate
- Information that specifies the product identity, such as the number of the structural component, customer and delivery number, building site and date of manufacture
- The intended end use of the building product and use class
- Service life, if shorter than 50 years

The building product/structural product is to be marked with verification mark similar to the one in the image. The numerical identifier that will be included in the mark is presented at the top of this verification certificate. The verification certificate mark will be delivered to the client in a separate file.

Installation and maintenance instructions, as well as the verification certificate including the product related performance levels, are to be delivered in connection with the product

RAKENTAMINEN eurofins VARMENNUSTODISTUS EUFI29-2203697-VA	Stora Enso Oyj Salmisaarenaukio 2 00180 Helsinki, Finland
Product	Glued-in rods for timber connections LVL G X by Stora Enso
Identification of the structural component	LVL G X by Stora Enso structural component, which includes glue-in rod connections, identification details of the customer (e.g. purchase order)

Intended use and use class	Load bearing structure, use class 1 or 2, EN1995-1-1:2004
Service life	*If calculated to increased loads, can be declared.* Service life of the structure is 50 or 100 years