

Durability statement for LOCTITE-PURBOND Adhesives

LOCTITE-PURBOND adhesives for Engineered Wood Elements

LOCTITE-PURBOND adhesives have ever since been evaluated for the use in all three service classes, mainly considering glulam as target application. Since the introduction of the first commercially available 1C PUR adhesive in 1994 – PURBOND HB 110 – thousands of cubic meters of load-bearing wood elements have been produced using this technology. Therefore, in addition to the many accelerated durability tests specified by the standards, a hugh pool of practical experience could be gathered meanwhile.

Compliance to standard durability requirements

LOCTITE-PURBOND adhesive are classified as Typ I adhesive for the use service classes 1, 2 and 3. They are certified according to the relevant standards for use in structural applications. These standards include a range of durability tests or so called *accelerated aging tests*. Such tests are designed to predict the durability and the long-term performance of adhesives.

- EN 301 and EN 302-2, delamination test
- EN 301 and EN 302-1, tension shear test after various climatic treatments
- EN 391, Method A and Method B, delamination test
- EN 14080, Annex C, longterm creep tests under varying climate conditions
- AS/NZS 4364:2010 and AS/NZS 4364:1996, delamination and shear tests after various climatic treatments
- JAS OE-4, delamination test of finger joints (boil-dry and vacuum-pressure)
- JAS Cond B&C, delamination and shear tests

Durability of the LOCTITE-PURBOND glueline

LOCTITE-PURBOND adhesives are formulated for the most part with high-performance raw materials from Bayer MaterialScience AG. These so called prepolymers are based on polyether polyols and diisocyanatodiphenylmethane and are terminated with moisture reactive isocyanate groups. The adhesives also contain catalysts and other additives. When an adhesive so formulated is applied to wood, it reacts with moisture from the substrate or the ambient air to form a durable and inert polyether-based polyurethane-polyurea system. Once cured, LOCTITE-PURBOND products are resistant to hydrolysis, oxidation and thermal or microbial degradation.

Long-term experience with durability

Over the years, Purbond has not only subjected all their adhesives to the necessary strength- and durability tests called up by the relevant certification bodies and standards, but also installed additional long-term durability and in-service trials. These trials have produced evidence that LOCTITE-PURBOND adhesives used in glulam beams (1) perform on the same level as the established formaldehyde-based adhesives under constant load in terms of deflection and creep, and (2) resist long-term full exposure to the weather. (1) is proven by an ongoing comparative full-scale 4-point bending test on glulam beams loaded at a bending stress level of 14 MPa (1,2 MPa shear stress), which were installed at MPA University, Stuttgart, Germany in 1992. This test is still ongoing. (2) is supported by a study on a fully exposed 20-year-old beam showing that the adhesive layer blocked the advancement of microbiological decay of the exposed wood. Additionally, EMPA (Swiss Federal Laboratories for Materials Testing and Research) conducted a status assessment of LOCTITE-PURBOND-adhesive joints in fully exposed timber bridges⁽¹⁾. The bridges were at the time of assessment between 6 and 12 years in service. The results of the inspections showed no signs of delamination and degradation.

With thousands of engineered wood structures bonded with LOCTITE-PURBOND adhesives, being in service across Europe since the early nineties, and with the backing of the above mentioned evidence of performance under the current standard requirements as well as in ongoing long-term trials, we herewith confirm that LOCTITE-PURBOND adhesives are reliable and save to be used for bonding engineered wood products for use in all service conditions including service class 3.

Henkel-Purbond, June 2015

¹ A. Fischer, K. Richer (2004), Inspection of 1KPUR / PRF bond lines at selected timber bridges in Grindelwald / Be (CH), Walde / Ag (CH) and Gross Biebrau (D), EMPA Dübendorf.