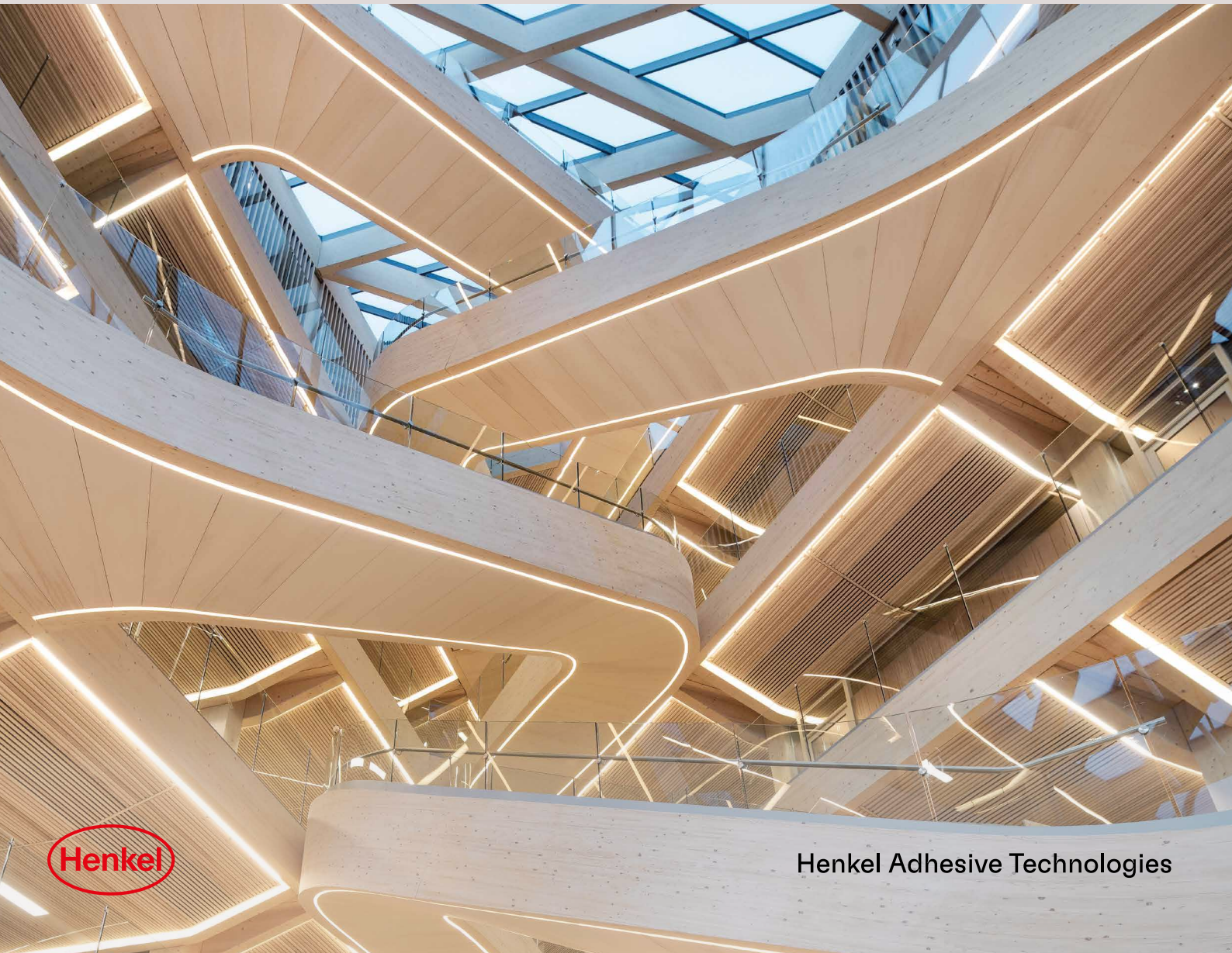
LOCTITE®

ADHESIVE SOLUTIONS THAT ACCELERATE SUSTAINABLE CONSTRUCTION



Henkel

Henkel Adhesive Technologies

CONTENTS

ACCELERATING SUSTAINABLE CONSTRUCTION WITH MASS TIMBER

The global trend towards more environmentally friendly and resource-efficient construction is driven by awareness of climate change, and the need for a step change in the construction industry's CO_2 footprint.

Wood binds CO_2 for the life of the building, making it a sustainable choice. Wood is also renewable and recyclable with outstanding structural properties. Easy to work with, wood blends well with stone, glass or metal materials, and results in healthy indoor air quality.

In modern multi-storey building construction, engineered wood in the form of bonded layers is combined into high performance structural, load-bearing elements. This kind of material, commonly known as **mass timber,** can span long distances and enable unique structural shapes.

Mass timber is used to add storeys to an existing building and for multi-storey apartment blocks, hotels, hospitals, schools, student dormitories, and residential care homes, large factory and warehouse buildings, sport and leisure facilities, industrial and commercial premises, and bridges and towers.

It was the development of high-performance adhesives that marked the beginning of today's mass timber industry.

CONSTRUCTION MATERIAL

Ever since the launch of Henkel Engineered Wood's LOCTITE HB polyurethane (PUR) adhesives in 1988, its one-component and two-component adhesive systems have been essential to the fabrication of high-performance mass timber.

One part of the success is the range of patented and certified adhesive systems. The other is a workforce of industry experts, some of whom joined in 2011 with the acquisition of PURBOND AG. The specialized knowledge acquired over many years is shared with customers and partners in detailed technical advice.

Henkel Engineered Wood is also nurturing future talent, hiring young, highly motivated employees to collaborate with more experienced colleagues to further develop adhesives technology and address new challenges.

GLOBAL MARKET TRENDS

As established mass timber producers in Europe grow and increase capacity, Henkel Engineered Wood teams support ramp-up and optimization of advanced production plants, providing best-in-class application engineering.

In the fast-growing North American mass timber market, early adopters are intent on efficiency improvements, while others are switching to formaldehyde-free Loctite HB technology as a replacement for less sustainable formaldehyde adhesives.

Henkel Engineered Wood team is actively driving know-how also in other regions. **In China and Latin America**, the team's activities include application and certification support.

In Australia and New Zealand, where LOCTITE HB adhesives are widely used in signature timber projects, our Henkel local team is continuously working on expanding the range of certified products for diverse applications.

LOCTITE® PRODUCT PORTFOLIO

Mass timber manufacturers have a range of LOCTITE HB adhesive systems at their disposal to produce high-performance mass timber products.

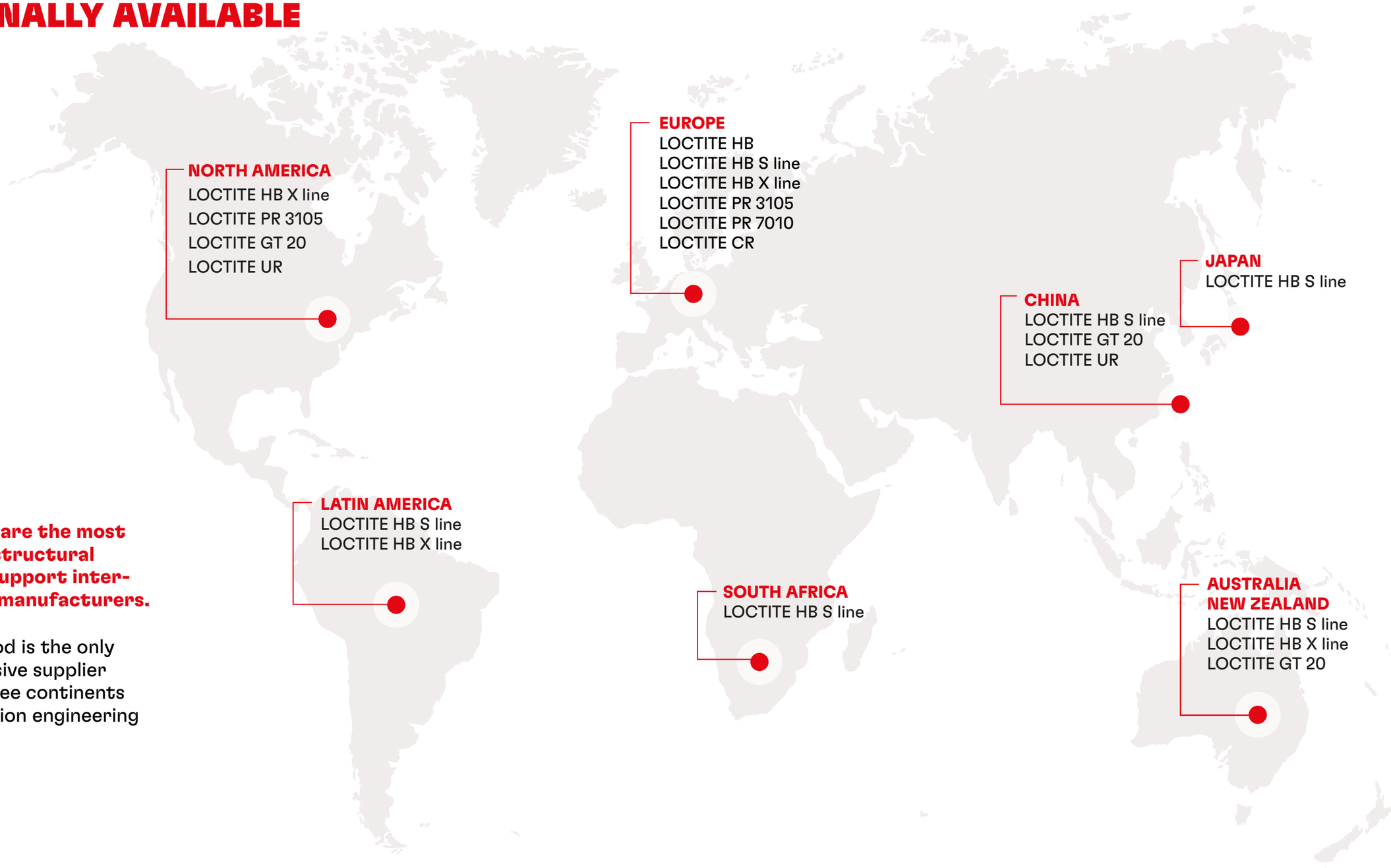
In addition to the classic LOCTITE HB S, there is now LOCTITE HB X line. Launched in 2018 to meet stringent heat and fire-resistance standards in North America, HB X is approved in Europe, Australia, New Zealand, and Latin America.

Both HB S and HB X are adapted to each customer's production requirements, with timing accurate to the minute. Customers opt for a particular adhesive product, or even an individually customized bonding agent.

A tailored approach saves costs and ensures the highest levels of safety and reliability.

Additionally, the product portfolio includes two-component polyurethane systems for special applications such as glued-in-rods and wood-concrete connections.

PROFESSIONAL ADHESIVE SOLUTIONS – INTERNATIONALLY AVAILABLE



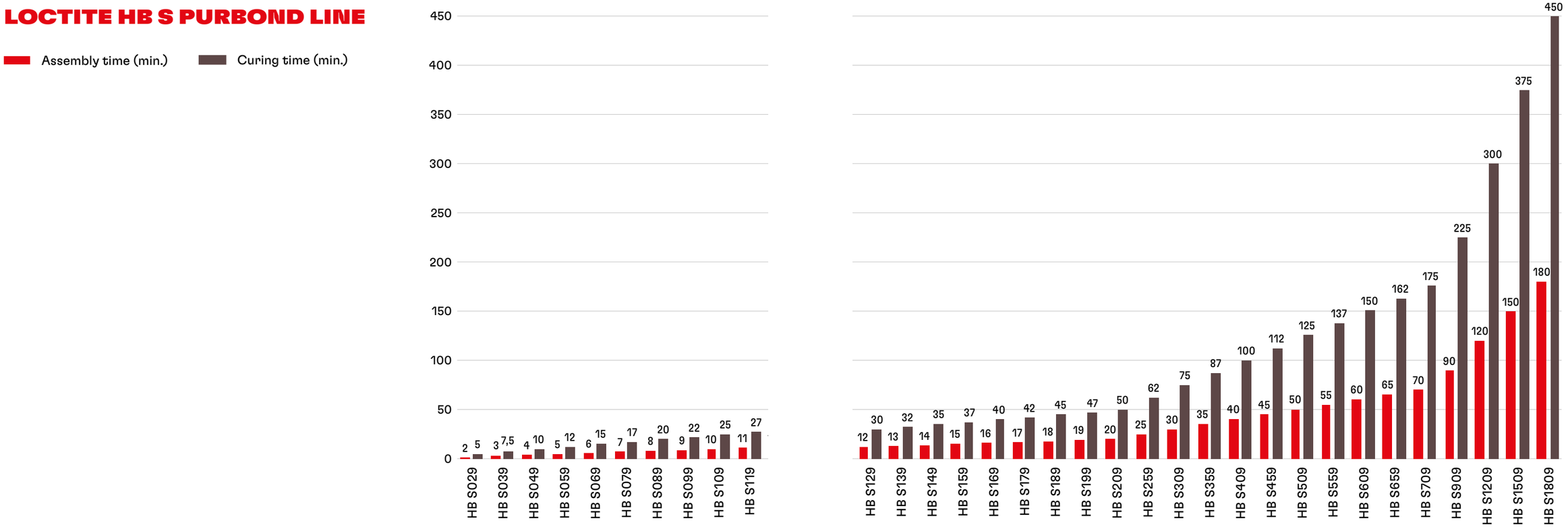
LOCTITE HB solutions are the most widely certified PUR structural adhesive systems to support international mass timber manufacturers.

Henkel Engineered Wood is the only mass timber PUR adhesive supplier with production on three continents and top-notch application engineering know-how.

KEY FACTS
LOCTITE® ADHESIVE SOLUTIONS FOR MASS TIMBER INDUSTRY

- LOCTITE HB adhesives ensure accurate, maintenance-free and clean application.
- Highly versatile, LOCTITE HB adhesives are certified for the complete range of face- and edge-bonding applications and finger-jointing.
- LOCTITE HB adhesives are applied in precisely accurate amounts thanks to specially developed, patented application technologies.
- With LOCTITE HB adhesives, even complex structural members, such as bow trusses can be produced quickly and cost-effectively.
- LOCTITE HB adhesives are solvent-free and formaldehyde-free. As one-component adhesives, handling and processing are easy and safe, meeting the most stringent requirements for a healthy indoor air quality.
- Cold pressing means LOCTITE HB adhesive systems save energy.
- Collaboration with industrial partners, such as Covestro AG, as well as research institutes, academia, and customers, leads to product co-development and innovative solutions.

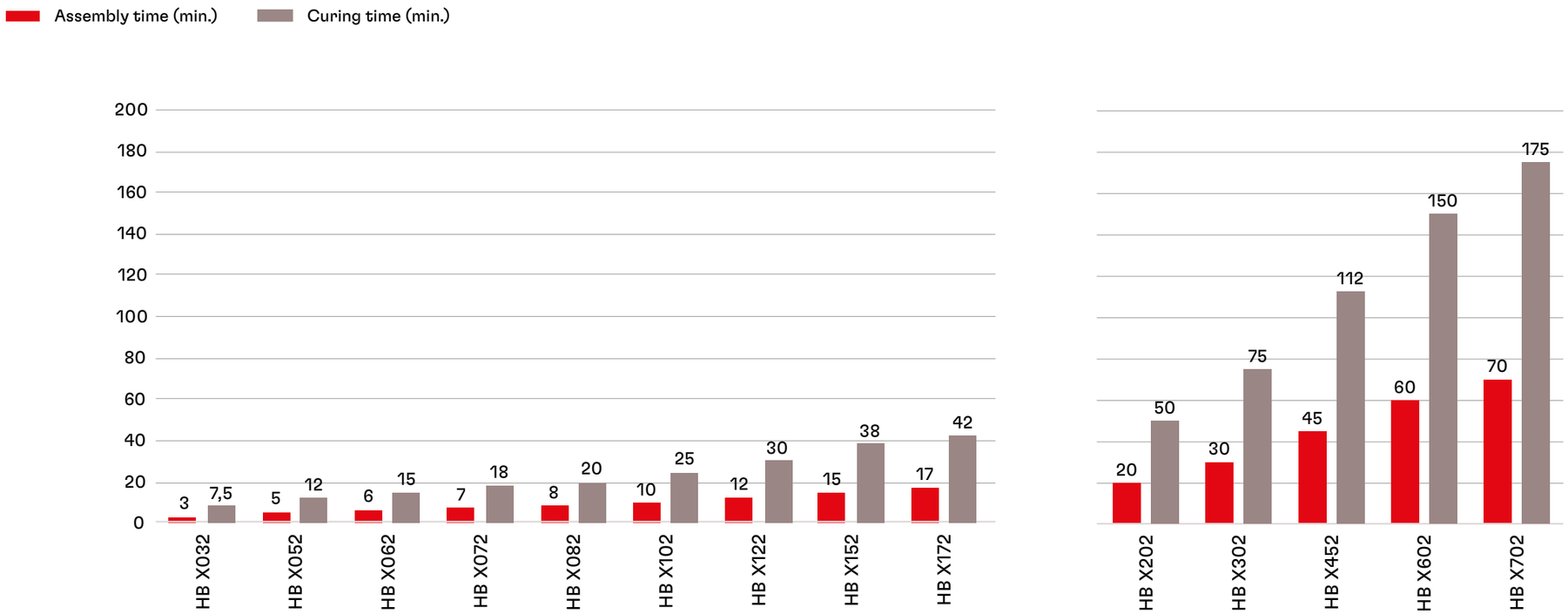
LOCTITE HB S PURBOND LINE



LOCTITE® HB S

- Globally approved and in use since 2010, LOCTITE HB S structural adhesives systems are well-established in mass timber manufacturing.
- LOCTITE HB S systems support the widest range of product grades and are rated to bond the broadest range of engineered wood products.
- LOCTITE HB S is certified for 11 wood species, including deciduous timbers and softwood species, such as larch and Douglas fir. A primer innovation (as adhesion enhancer) makes it possible.
- LOCTITE HB S assembly times can be selected in the range of 2 to 180 minutes.

LOCTITE HB X PURBOND LINE



Product availability differs by region.
Please consult our sales representative.

LOCTITE® HB X

- LOCTITE HB X, the fast-curing, one component, heat & fire-resistant PUR adhesive to meet the latest fire and heat resistance standards on four continents.
- Assembly time range for HB X is 3 to 70 minutes; press time range is 7.5 to 175 minutes.
- LOCTITE HB X is used in the tallest timber buildings in North America, and a growing number of other iconic, award-winning buildings all over the world.

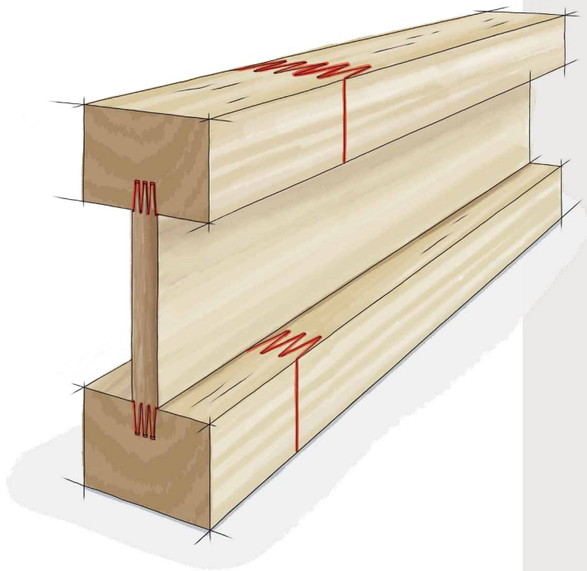
INNOVATION: ADHESIVE SOLUTIONS FOR I-JOISTS

Game-changing I-joist adhesives for North America. Unmatched in simplicity and efficiency, LOCTITE HB I is tailor-made for the North American market. It is the first formaldehyde free, one-component PUR solution for I-joist manufacturing.

With an assembly time of 3 to 10 minutes and a press time range of 25 to 75 minutes, LOCTITE HB I is suitable for bonding finger joints, web-to-web, and web-to-flange connections.

The benefits of LOCTITE HB I solutions include no mixing room temperature curing, and a low application weight, all of which contributes to reduced operating costs and improved production processes, enabling a game-changing competitive advantage.

LOCTITE HB I is certified for use in North America according to ASTM E119-20 Standard Test Methods for Fire Tests of Building Construction and Materials, and the I-joist ASTM D5055 Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.



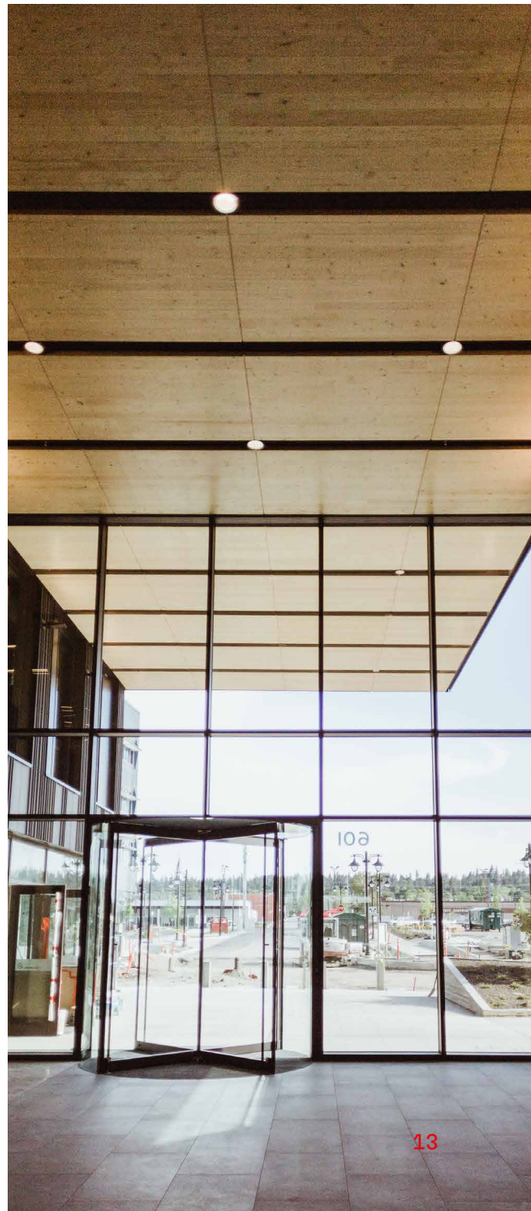
INNOVATION: EDGE BONDING WITH HOT MELT ADHESIVES

Hot melt adhesives based on a range of formulations were originally used in the furniture industry. Now, however, they are increasingly used in mass timber applications, in the production of single-layer wood panels, which are then assembled to produce cross laminated timber (CLT).

In this case, the boards for one layer are joined to form a single panel with hot melt bonding adhesives applied on the edge. These adhesive bonds allow better calibration of CLT layers and help to avoid gaps between the boards, which is increasingly important for better fire resistance and visual properties of the board.

Because of their rapidly formed initial strength characteristics, hot melt adhesives enable short throughput times in a continuous jointing process. This in turn allows the use of shorter press beds and more cost-effective machines. It also enables the feed rates for continuous presses to be increased, boosting throughput quantities.

With its expertise in hot melt adhesives and its comprehensive product portfolio, Henkel Engineered Wood is able to offer solutions for specific customer requirements.



INNOVATION: ADVANCES IN THE USE OF PRIMER SYSTEMS

Henkel Engineered Wood continues to give high priority to the adhesive bonding of hardwood timbers and other species notoriously difficult to bond, such as the Douglas fir and larch.

After obtaining approvals for these primer systems for the bonding of beech and larch timbers from building regulatory authorities, the primer dwell time was eliminated, subject to certain prerequisites. This allows the “inline” application of the primer, in the same operation as the downstream step of applying the adhesive.

A leading position in the fastest growing market segments, comprehensive services, and proven expertise in end-to-end timber bonding processes makes Henkel Engineered Wood a valued partner.

Henkel Engineered Wood helps manufacturers to **pursue the opportunities and to sustain solid business results** in at least three ways.

- Professional and **proven end-to-end bonding solutions** to transform wood into high performance construction material are offered, along with the **expertise to support development** of new applications.
- LOCTITE HB bonding solutions offer a competitive edge. They are developed and tailored for **optimized manufacturing productivity, maximum quality, safety, and lower total costs**.
- By using LOCTITE HB formaldehyde free adhesives exclusively, manufacturers signal their **commitment to sustainability and healthy indoor air**, which is underscored by Henkel Engineered Wood’s **sustainability initiatives and active advocacy**.

IMPRINT

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