

# ICC-ES Evaluation Report


**ESR-1002**

Reissued August 2024

Subject to renewal August 2025

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2024 ICC Evaluation Service, LLC. All rights reserved.

<p><b>DIVISION: 06 00 00— WOOD, PLASTICS AND COMPOSITES</b></p> <p><b>Section: 06 05 23.10— Adhesives</b></p>	<p><b>REPORT HOLDER:</b></p> <p><b>HENKEL CORPORATION</b></p>	<p><b>EVALUATION SUBJECT:</b></p> <p><b>LOCTITE® UR S110 SERIES (S110, S111, S113-S119) STRUCTURAL URETHANE LAMINATING ADHESIVES</b></p>	
---	---	--	---

## 1.0 EVALUATION SCOPE

**Compliance with the following codes:**

- 2012 and 2009 [International Building Code® \(IBC\)](#)
- 2012 and 2009 [International Residential Code® \(IRC\)](#)
- BOCA® *National Building Code/1999* (BNBC)
- 1999 *Standard Building Code®* (SBC)
- 1997 *Uniform Building Code™* (UBC)

**Property evaluated:**

- Structural

## 2.0 USES

The Henkel Corporation adhesives designated S110, S111, and S113 through S119 are structural urethane laminating adhesives used in the factory fabrication of sandwich panels used to support loads in addition to the panel weight. The S110, S111 and S113 through S119 adhesives are used to bond extruded polystyrene foam plastic (XPS) and expanded polystyrene foam plastic (EPS) sandwich panel core materials to facing components, such as plywood and oriented strand board (OSB). The adhesives are also used to laminate facing materials, such as Douglas fir lumber, plywood, OSB, and coated steel.

## 3.0 DESCRIPTION

The S110, S111 and S113 through S119 adhesives are one-part, moisture-cure, polyurethane adhesives. The S119 adhesive is the fastest reacting adhesive, while S110 adhesive is the slowest. See [Table 2](#) for assembly and cure times. The adhesives are available in 320-gallon (2800 lbs) totes, 275-gallon (2400 lbs) totes, 55-gallon (471 lbs) steel drums and 5-gallon (45 lbs) steel pails [1211 L (1271 kg), 1041 L (1090 kg), 208 L (214) kg and 19 L (20 kg)]. Optimum storage temperatures for an unopened container are 65°F to 95°F (18.3°C to 35°C). Containers must be stored indoors, protected from any water contact and out of direct sunlight. The adhesives, when stored in unopened containers, have a shelf life of 90 days from date of shipment. The adhesives must be used as soon as possible once the containers are opened. Moisture content of wood used in sandwich panel assembly should not be below 8 percent. The difference in wood moisture content of adjoined components should not exceed 4 percent.

S110 Series moisture-curing adhesives require the presence of moisture to activate and accelerate the curing process. Environments lacking humidity will increase the cure time and lengthen the time that adhered components must remain under pressure to achieve suitable bonds for next step processing. Optimum relative humidity is 65 percent.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

The S110, S111, and S113 through S119 adhesives are Type II, Class 2, structural adhesives for use where high resistance to moisture is required in roof, wall and floor sandwich panels subjected to sustained loading. The allowable tensile stress is limited to a maximum 4 psi (27.6 kPa) when extruded polystyrene foam plastic is used, and a maximum 2 psi (13.8 kPa) when expanded polystyrene is used. The allowable shear stress based on creep is limited to a maximum of 80 psi (552 kPa). The allowable shear and tensile stresses for the adhesives between facing material laminations are given in [Table 1](#).

### 4.2 Installation:

**4.2.1 General:** The manufacturer's published installation instructions must be followed, subject to the conditions of this evaluation report. Copies of the instructions and this report must be available at all times during adhesive application.

**4.2.2 Preparation and Application:** Surfaces being bonded must be clean and dry. Dust, oil, grease, water, paint, and other **contaminants** must be removed before adhesive application. The adhesives must be applied at ambient temperatures between 60°F and 95°F (15°C to 35°C).

All S110 Series adhesives must be applied in accordance with the manufacturer's recommended installation instructions, using a bead applicator to apply  $\frac{1}{16}$ -inch-diameter (1.6 mm) beads of adhesive spaced a maximum of  $\frac{5}{8}$  inch (15.9 mm) on center, except for the S110 and S111 adhesives, where application may be by roll coating the surface at a wet-spread rate of 12 grams per square foot (129 g/m<sup>2</sup>). An evenly-distributed, fine-distilled water fog/mist must also be applied at the rate of 1 to 2 grams per square foot (11 to 22 g/m<sup>2</sup>) during adhesive application. Only one coat of adhesive and water must be applied to one of the two contact surfaces, either the core or the facing of the sandwich panel. When the adhesive is applied in beads, the sandwich panel manufacturer must ensure that complete coverage of the contact surfaces of the panel with the adhesive has occurred after the adhesive application and panel pressing are done. Assembly and cure times are found in [Table 2](#). Panels must be pressed at a minimum pressure of 3 psi (21 kPa).

## 5.0 CONDITIONS OF USE:

The S110, S111 and S113 through S119 Structural Urethane Laminating Adhesives described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The adhesives must be used, applied, and cured in accordance with this report and the manufacturer's instructions.
- 5.2 The adhesive application must be limited to sandwich panels specifically recognized in an ICC-ES evaluation report. The allowable structural shear and tensile stresses of the adhesive are given in Section 4.1 of this report.
- 5.3 The adhesives must be used only with the sandwich panel facings and cores described in Section 2.0 of this report.
- 5.4 Henkel Structural Urethane Laminating Adhesives are manufactured in Elgin, Illinois, under a quality-control program with inspections by ICC-ES.

## 6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Sandwich Panel Adhesives \(AC05\)](#), dated June 2009 (editorially revised May 2014).

## 7.0 IDENTIFICATION

- 7.1 Each container of adhesive must bear markings and inscriptions showing the product name, the Henkel Corporation name, the batch code, the manufacturing date, storage requirements, and the evaluation report number (ESR-1002).

7.2 The report holder's contact information is the following:

**HENKEL CORPORATION**  
**10 FINDERNE AVENUE**  
**BRIDGEWATER, NEW JERSEY 08807**  
**(908) 685-5484**  
[www.henkelna.com](http://www.henkelna.com)  
[tim.brown@us.henkel.com](mailto:tim.brown@us.henkel.com)

TABLE 1—ALLOWABLE SHEAR AND TENSILE STRESSES

FACING MATERIAL LAMINATIONS <sup>1</sup>	S110, S111 AND S113 THROUGH S119	
	Shear Stress (psi)	Tensile Stress (psi)
Douglas fir/Douglas fir	80	40
Plywood/plywood	50	10
OSB/OSB	28	4
Steel/steel <sup>2</sup>	44	17

For SI: 1 psi = 6895 Pa.

<sup>1</sup>The laminations describe two plies adhered to each other (e.g., OSB/OSB is OSB adhered to OSB).

<sup>2</sup>Steel shall be coated with an epoxy coated primer consisting of:

INGREDIENT	CAS#	APPROX. %
Xylene	1330-20-7	>23
Propylene glycol MEE	108-65-6	11
Isophorone	78-59-1	9
Strontium chromate	7789-06-02	5
Ethyl benzene	100-41-4	5
Methyl isobutyl keytone	108-65-6	3
Formaldehyde	50-00-0	0.5

TABLE 2—MAXIMUM ASSEMBLY TIME AND MINIMUM CURE TIME FOR S110 SERIES STRUCTURAL ADHESIVES (minutes, unless noted otherwise)

TEMPERATURE <sup>1,2</sup> (F)	S110	S111	S113	S114	S115	S116	S117	S118	S119
	Assembly (Cure)	Assembly (Cure)	Assembly (Cure)	Assembly (Cure)	Assembly (Cure)	Assembly (Cure)	Assembly (Cure)	Assembly (Cure)	Assembly (Cure) (minutes-seconds)
60	150 (180)	62 (104)	32 (63)	23 (48)	17 (26)	10 (22)	7 (8)	6 (7)	3-20 (7-0)
65	135 (170)	52 (95)	28 (56)	19 (40)	16 (25)	9 (19)	7 (8)	6 (7)	3-10 (6-40)
70	125 (150)	45 (88)	24 (51)	16 (33)	14 (25)	8 (16)	7 (8)	5 (7)	2-50 (5-50)
75	110 (140)	38 (82)	22 (46)	13 (27)	12 (24)	7 (14)	7 (8)	5 (7)	2-50 (5-0)
80	90 (130)	33 (76)	19 (42)	12 (25)	11 (23)	7 (12)	6 (7)	4 (6)	2-40 (4-10)
85	80 (120)	29 (71)	17 (39)	10 (23)	9 (22)	6 (10)	6 (7)	4 (6)	2-40 (3-40)
90	75 (105)	26 (67)	16 (36)	9 (23)	8 (22)	6 (9)	6 (7)	4 (5)	2-30 (3-10)
95	60 (90)	23 (63)	14 (33)	8 (23)	6 (22)	5 (9)	5 (6)	4 (5)	2-30 (2-30)

For SI: °C = (°F - 32) <sup>5</sup>/<sub>9</sub>.

<sup>1</sup>Glue line temperature.

<sup>2</sup>Water mist of 1 to 2 grams/square foot on the adhesive surface is required to ensure uniform cure rate.