



EVALUATION SUBJECT: GREENFASTEN-1-812 AND COMPSLIDE ROOF MOUNT ASSEMBLIES

REPORT HOLDER:

EcoFasten Solar®
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CSI DIVISION: 06-WOOD AND PLASTICS
CSI Section: 06 25 23-Wood, Plastic, and Composite
Fastenings

1.0 SCOPE OF EVALUATION

1.1 Compliance to the following codes & regulations:

- 2015, 2012, 2009, 2006 International Building Code® (IBC)
- 2015, 2012,2009, 2006 International Residential Code® (IRC)
- 1997 Uniform Building Code (UBC) -- Attached Supplement

1.2 Evaluated in accordance with:

- IAPMO ES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors, (EC002-2016).

1.3 Properties assessed:

- Structural
- Water Penetration

2.0 PRODUCT USE

EcoFasten Solar’s GreenFasten-1-812 and CompSlide Roof Mounts are mounting assemblies used to attach solar panels and other types of equipment to the rafters of roofs with asphalt shingle roof coverings in accordance with 2015 IBC Section 1510 (2012, 2009 and 2006 IBC Section 1509) and 2015 IRC Sections R905, M907, M909 and M2301.2, (2012 IRC Sections R905, M2301.2 and M2302 and 2009 and 2006 IRC Sections R905 and M2301.2).

3.0 PRODUCT DESCRIPTION

3.1 Product information

3.1.1 GreenFasten-1-812: The GreenFasten-1-812 Roof Mount has four basic components: aluminum flashing with pre-installed EPDM grommet (GF-1); one-hole bracket (L-

101-3), slotted bracket (SCL-101-3) or two-hole bracket (L-102-3); an EPDM bonded 18.8 washers; and a 5/16- inch (7.9 mm) diameter lag screw. The published installation instructions provide more detailed dimensional information.

3.1.2 CompSlide Roof Mount: The CompSlide Roof Mount has six basic components: aluminum flashing with pre-installed EPDM grommet (GF-1); a 4-inch (102 mm) long CompSlide unit; an EPDM bonded 18.8 washers; 5/16- inch (7.9 mm) diameter lag screw; one-hole bracket (L-101-3); and a 5/16-inch diameter x 1¼-inch-long (7.9 x 32 mm) Hex Head Cap Bolt with matching serrated flange nut. The published installation instructions provide more detailed dimensional information.

3.1.3 Aluminum Flashing: The aluminum flashings are made from anodized aluminum complying with ASTM B209. Table 2 of this report lists flashings that are used with each mounting assembly.

3.1.4 Acrylume® (Galvalume®) Flashing: The Acrylume® flashings are made from Galvalume® complying with ASTM A792. Table 2 of this report lists flashings that are used with each mounting assembly.

3.2 Materials

The GreenFasten-1-812 and CompSlide Roof Mount components material standards are specified in Table 3 of this report.

Fasteners used to secure the flashing to the roof rafter shall be 5/16-inch-diameter (7.9 mm) lag screws complying with ANSI/ASME B18.2.1-B1. The lag screw shall be long enough to penetrate the rafter a minimum of 2½ inches (64 mm). Lag screws shall be corrosion-resistant. Table 1 of this report includes pull-out capacities for typical roof lumber.

4.0 DESIGN AND INSTALLATION

4.1 Design: Compliance to the following shall be provided by the Designer/Engineer if requested by the jurisdiction having authority: The tabulated allowable loads shown in this report are based on allowable stress design (ASD) and include the load duration factor, C_D, corresponding with the applicable loads in accordance with ANSI/AWC National Design Specification (NDS).

Where the roof mounts are exposed to temperatures exceeding 100°F (37.8°C), uplift allowable loads shall be adjusted by the temperature factor, C_t, in accordance with Section 10.3.4 of the NDS. When products are attached to

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.





wood framing having a moisture content greater than 19 percent (16 percent for engineered wood products), or where wet service is expected, the allowable loads shall be adjusted by the wet service factor, C_M , specified in Section 10.3.3 of the NDS. Connected wood members shall be analyzed for load-carrying capacity at the connection in accordance with the NDS.

4.2 Installation: The GreenFasten-1-812 and CompSlide Roof Mounts shall be installed to the rafter using one lag screw at each bracket location as described in the published installation instructions. The minimum specific gravity of the wood member shall be as noted in Table 1 of this report. The flashing shall be placed underneath the shingle far enough up slope to prevent water infiltration. Installation of GreenFasten-1-812 and CompSlide Roof Mounts are limited to roofs having minimum and maximum slopes of 3:12 (14 percent) and 12:12 (45 percent), respectively.

CompSlide Roof Mounts shall be installed with a maximum spacing of $1^{15}/_{16}$ inches (49.2 mm) center-to-center between bracket Hex Head Cap Bolts and the lag screw fastener. Hex Head Cap Bolts shall be installed a minimum of $1^{1}/_{16}$ inch (27 mm) on-center from the end of the CompSlide unit.

When the embossed profile on the sheet flashing lifts the shingle on the course above, the installer shall add approved caulking to the underside of the shingles on the course above.

5.0 LIMITATIONS

The GreenFasten-1-812 and CompSlide Roof Mounts described in this report comply with the codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The GreenFasten-1-812 and CompSlide Roof Mounts shall be installed in accordance with this report the manufacturer's published installation instructions, codes listed in Section 1.1 of this report and the supplement.

5.2 Calculations showing compliance with this report shall be submitted to the code official. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 Fasteners used in contact with fire-retardant-treated or preservative-treated lumber shall comply with 2015 IBC Section 2304.10.5 (2012, 2009 and 2006 IBC Section 2304.9.5) or the 2015, 2012 and 2009 IRC Section R317.3 (2006 IRC Section R319.3), as applicable. The report holder or lumber treater shall be contacted for

recommendations on minimum corrosion resistance and connection capacities of fasteners used with the specific proprietary preservative-treated or fire-retardant treated lumber.

5.4 When required by the code official, a licensed design professional shall provide calculations to verify that imposed loads on the assembly do not exceed the allowable loads contained in Table 1 of this report.

5.5 When required by the code official, a licensed design professional shall provide calculations for the assembly support framing.

6.0 SUBSTANTIATING DATA

Testing and analysis data submitted is in conformance with IAPMO ES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors, (EC002-2016). Rain test data is in conformance with the Underwriters Laboratory Standard for Gas Vents, (UL 441-96 Section 25). Test results are from laboratories in compliance with ISO/IEC 17025.

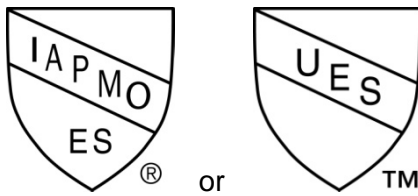
7.0 IDENTIFICATION

EcoFasten Solar's GreenFasten-1-812 and CompSlide Roof Mounts are identified with a label bearing the Manufacturers name and address, product designation, IAPMO Uniform ES Marks of Conformity, this evaluation report number (ER-216), compliance code, and inspection agency.



8.0 STATEMENT OF RECONGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on EcoFasten Solar's GreenFasten-1-812 and CompSlide Roof Mount Assemblies manufactured in Phoenix, Arizona to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification.



IAPMO UES ER #216

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For additional information about this evaluation report please visit
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Table 1: Allowable Load (pounds)			
Load Direction	Bracket ¹	Minimum Specific Gravity of Lumber	Flashing
			GreenFasten-1-812
Based on Tested Ultimate ²			
Uplift	L-101-3	0.52	741
	L-102-3	0.42	653
	SCL-101-3	0.47	604
	CompSlide	0.42	668
Lateral	L-101-3	0.52	298
	L-102-3	0.42	304
	SCL-101-3	0.47	273
	CompSlide	0.42	221
Based on Load at 1/8" Deflection ³			
Uplift	L-101-3	0.52	1293
	L-102-3	0.42	1356
	SCL-101-3	0.47	1926
	CompSlide	0.42	98
Lateral	L-101-3	0.52	320
	L-102-3	0.42	293
	SCL-101-3	0.47	401
	CompSlide	0.42	85

For SI: 1 lb.force = 4.448 N, 1 inch = 25.4 mm.

1. Brackets are shown in Figures 2, 5 and 6 of this report
2. Lowest value of tested samples divided by factor-of-safety.
3. Average load of tested samples at 1/8-inch deflection.



Table 2: Assembly Models and Installation			
Model/assembly	Flashing(s) ¹	Bracket(s)/mounting hardware	Fastener
GreenFasten-812	Flat 8" x 12" (GF1-XXX-812; GF1M-XXX-812); GF1-XXX-812-U; GF1-XXX-812-Peak; GF1-XXX-812-ARCs; GF1-XXX-812-Ridges; or GF1-XXX-812-Lines-6.0 Flat 8" x 10" (GF1M-XXX-810); GF2VM-XXX-810	One-hole bracket (L-101-3); or Slotted bracket (SCL-101-3); or Two-hole bracket (L-102-3)	5/16" diameter lag screw
CompSlide Roof Mount ²	Flat 8" x 12"; GF1-XXX-812-U; GF1-XXX-812-Peak; GF1-XXX-812-ARCs; GF1-XXX-812-Ridges; or GF1-XXX-812-Lines-6.0	4" long CompSlide mounting unit and: One-hole bracket (L-101-3); or Slotted bracket (SCL-101-3); or Two-hole bracket (L-102-3)	5/16" diameter lag screw; and 5/16" diameter x 1-1/4" long hex-head cap bolt with matching serrated flange nut

¹ All flashing systems come with an EPDM bonded 18.8 grommet mounted in the center

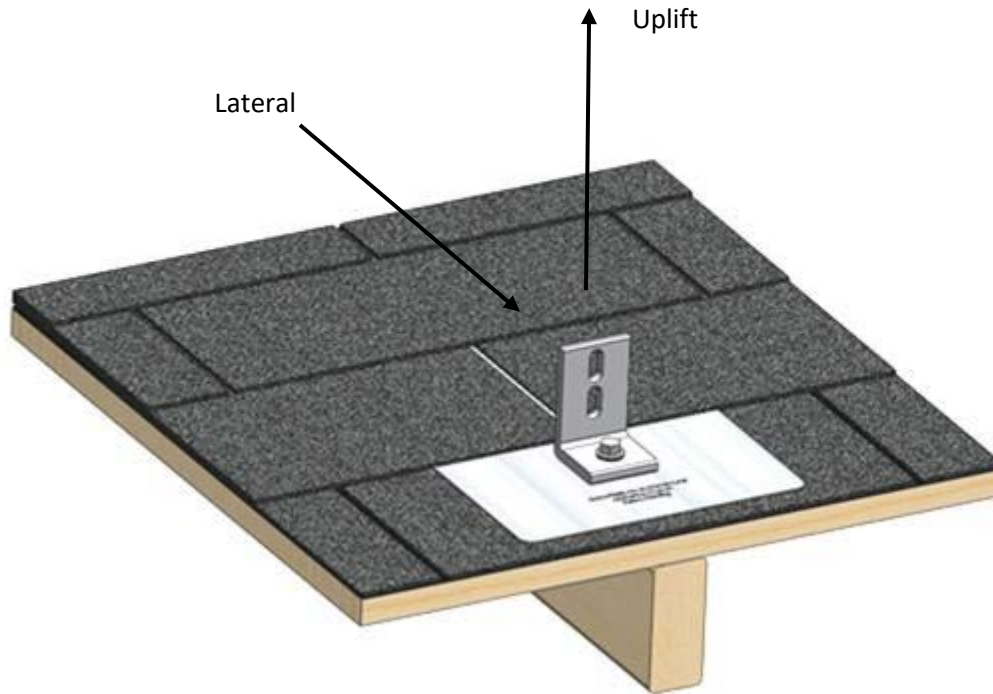
² Includes an EPDM bonded 18.8 washer

³ Install with approved sealant under the exposed tab of asphalt shingles.

Table 3: Material Properties		
Hex Lag screw	ANSI/ASME B18.2.1-B1 see table 12 QSM for pull out capacities for typical roof lumber (ADS)	Figure 1
Aluminum Bracket	AAS-6061	Figure 2, 5 & 6
EPDM Metal roof bushing (washer)	Type 304 stainless steel complying with ASTM A 240	Figure 3
EPDM Grommet	ASTM D412, D297, D2240, and ASTM D624, with a durometer rating of 60	Figure 4
Flashing	ASTM B209; ASTM A792	Figure 4
Aluminum Support Plate		Figure 7
CompSlide	AAS 6061	Figure 8



Load Orientation/Direction Detail



Building Green with EcoFasten Solar®



EcoFasten Solar Components



Figure 1:
Lag Screw

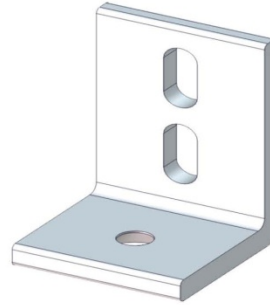


Figure 2: L-102-3

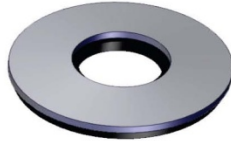


Figure 3:
EPDM
Metal
roof
bushing



Figure 4:
GreenFast
en-1-812
Flashing
with
EPDM

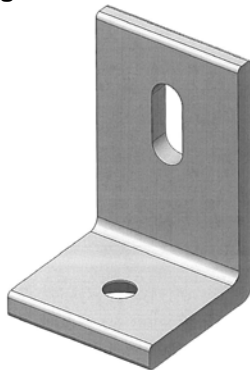


Figure 5: L-101-3

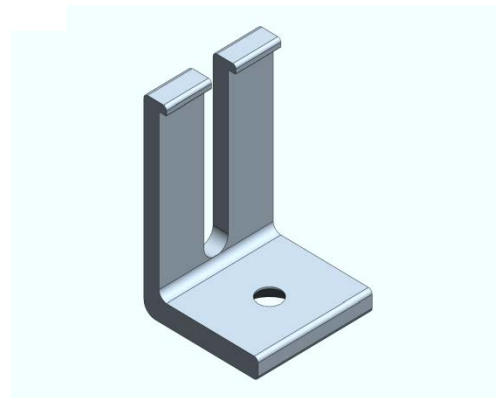


Figure 6: SCL-101-3



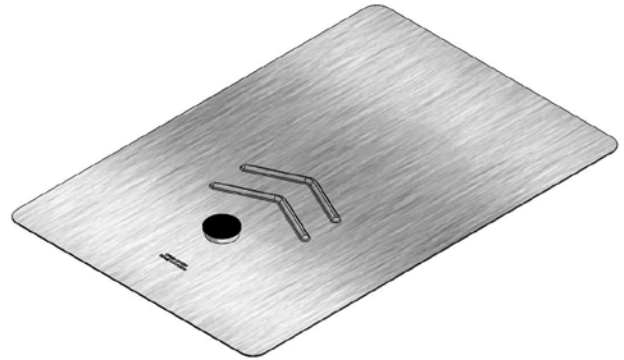
Figure 7: CompSlide Roof Mount Assembly



Figure 8: Flashings



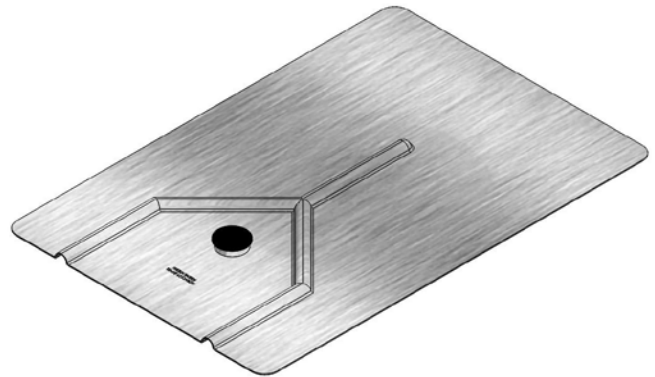
GF1-XXX-812-LINES



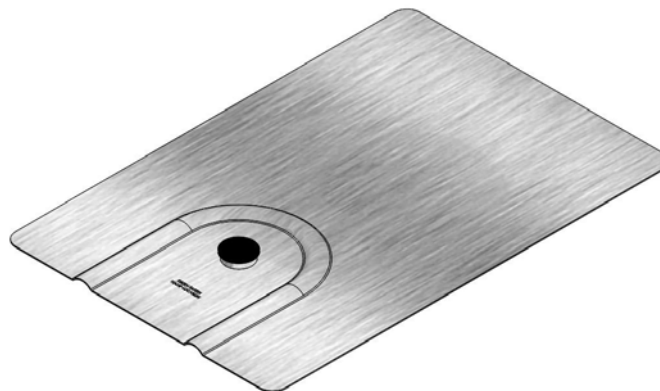
GF1-XXX-812-RIDGES



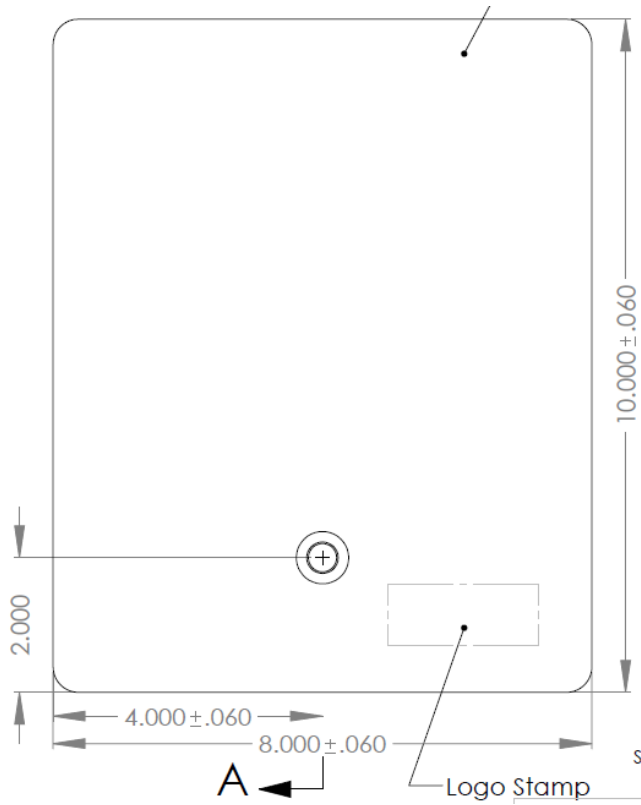
GF1-XXX-812-ARCS



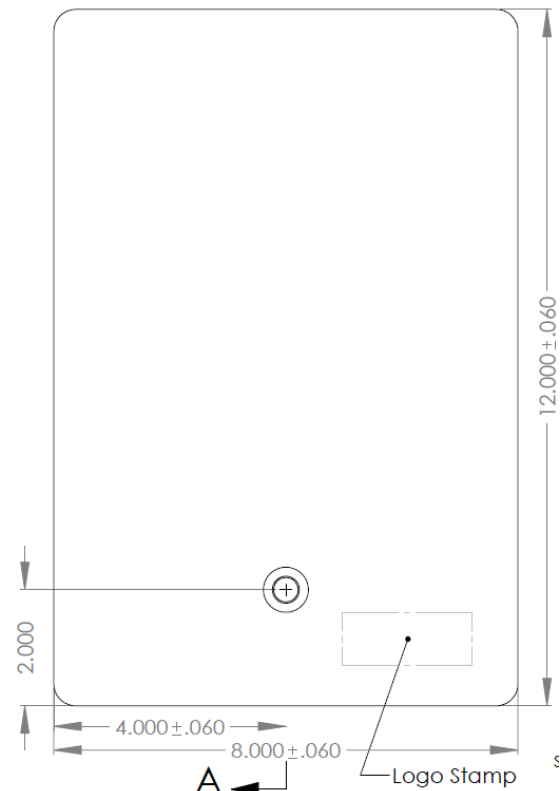
GF1-XXX-812-PEAK



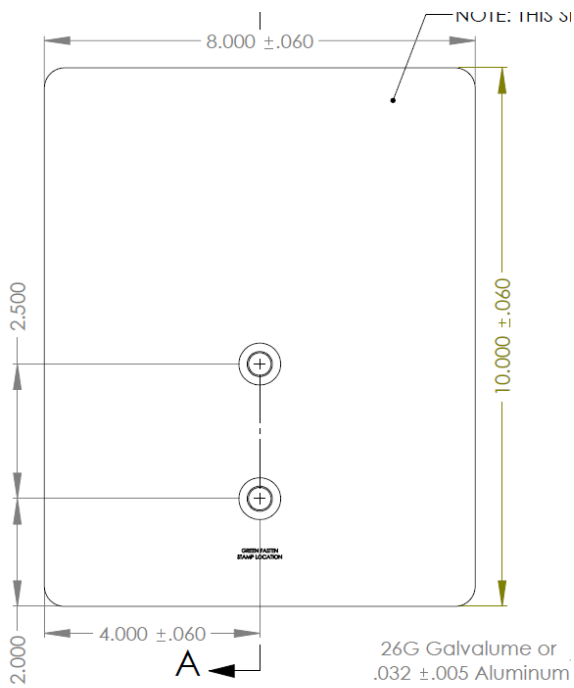
GG1-XXX-812-U



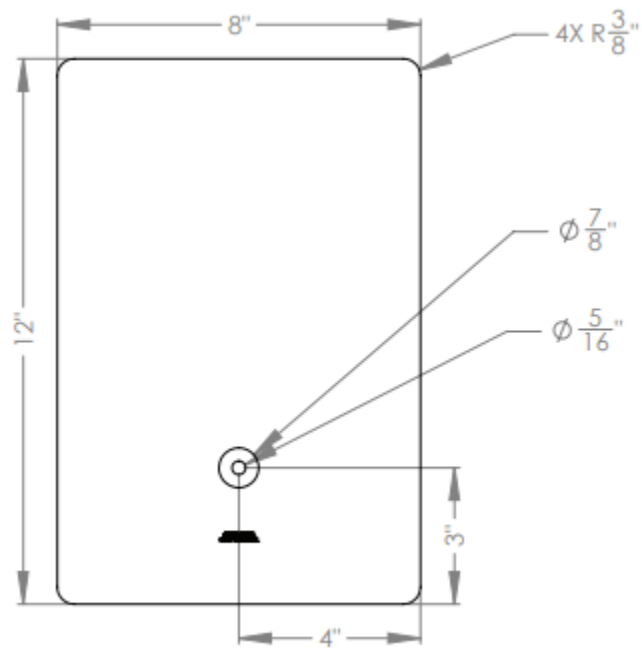
GF1M-XXX-810



GF1M-XXX-812



GF2V-XXX-810



GF1-XXX-812

26G Galvalume or .032 ±.005 Aluminum



UBC SUPPLEMENT

EVALUATION SUBJECT:
**GREENFASTEN-1-812 AND COMPSLIDE ROOF
MOUNT ASSEMBLIES**

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CSI DIVISION: 06—WOOD AND PLASTICS
**CSI Section: 06 25 23—Wood, Plastic, and
Composite Fastenings**

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes

- 1997 Uniform Building Code (UBC)

2.0 FINDINGS

The Greenfasten-1-812 and Compslide Roof Mount Assemblies described in IAPMO UES Evaluation Report ER-216 comply with the codes listed in Section 1.1 of this supplement. Use, design, and installation shall be in accordance with ER-216.

3.0 SUBSTANTIATING DATA

Testing and analysis data submitted is in conformance with IAPMO ES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors, (EC002-2011). Rain test data is in conformance with the Underwriters Laboratory Standard for Gas Vents, (UL 441-96 Section 15). Test results are from laboratories in compliance with ISO/IEC 17025.

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