

Shear Wall (segmented) — Validation Report

Independent verification of the Kouzouki calculation engine against closed-form statics, published design-standard values and worked examples

Engine	Kouzouki — Shear Wall (segmented)
Basis	Segmented-method unit shear $v=V/\Sigma b_i$ (SDPWS 4.3.4.1) and ASD capacity = tabulated nominal / 2.0 (SDPWS Table 4.3A: 15/32 WSP, 10d, 4 in o.c. = 1020 plf nominal → 510 plf ASD seismic).
Validation type	Independent validation
Report date	2026-07-11
Result	PASS — 6/6 checks within tolerance

1. Validation cases

Each case feeds the tool a defined input set and compares its output against a value derived independently of the engine (cited per row). Tolerance is 1% unless noted.

SW1. 8+8 ft segments, V=6000 lb — unit shear

Inputs: method=segmented, sheathing=Wood structural panel, panel_thickness=15/32, nail_size=10d, edge_spacing=4, framing_species=DF-L / SP (SG>=0.49), wall_height=9.0, openings=, seismic=True, chord_area=16.5, anchorage_slip=0.125, wall_length=24.0, segments=8,8, V=6000.0

Checked quantity	Independent value	Tool output	Dev.	Verdict
Unit shear $v = V/\Sigma b$ SDPWS 4.3.4.1	375.0 plf	375.0 plf	0.00%	PASS

SW2. 8+8 ft, V=6000 — ASD capacity

Inputs: method=segmented, sheathing=Wood structural panel, panel_thickness=15/32, nail_size=10d, edge_spacing=4, framing_species=DF-L / SP (SG>=0.49), wall_height=9.0, openings=, seismic=True, chord_area=16.5, anchorage_slip=0.125, wall_length=24.0, segments=8,8, V=6000.0

Checked quantity	Independent value	Tool output	Dev.	Verdict
ASD unit shear capacity = 1020/2 SDPWS Tbl 4.3A, /2 ASD	510.0 plf	510.0 plf	0.00%	PASS
Unit-shear ratio v/vs_ASD demand/capacity	0.735	0.735	0.00%	PASS

SW3. Single 12 ft segment, V=6000 — unit shear

Inputs: method=segmented, sheathing=Wood structural panel, panel_thickness=15/32, nail_size=10d, edge_spacing=3, framing_species=DF-L / SP (SG>=0.49), wall_height=9.0, openings=, seismic=True, chord_area=16.5, anchorage_slip=0.125, wall_length=12.0, segments=12, V=6000.0

Checked quantity	Independent value	Tool output	Dev.	Verdict
Unit shear $v = V/\Sigma b$ SDPWS 4.3.4.1	500.0 plf	500.0 plf	0.00%	PASS
ASD capacity 3 in o.c. = 1330/2 SDPWS Tbl 4.3A	665.0 plf	665.0 plf	0.00%	PASS

SW4. Aspect ratio h/b of narrow segment

Inputs: method=segmented, sheathing=Wood structural panel, panel_thickness=15/32, nail_size=10d, edge_spacing=4, framing_species=DF-L / SP (SG>=0.49), wall_height=9.0, openings=, seismic=True, chord_area=16.5, anchorage_slip=0.125, wall_length=8.0, segments=4,4, V=4000.0

Checked quantity	Independent value	Tool output	Dev.	Verdict
Aspect ratio $h/b = 9/4$ SDPWS Tbl 4.3.4	2.25	2.25	0.00%	PASS

2. Assumptions

- Segmented method; full-height segments resist the story shear.
- Seismic ASD (nominal/2.0); DF-L/SP framing (no SG reduction).
- Overturning $T=v\cdot h$ excludes resisting dead load (conservative).

3. Limitations

- Unit-shear nominal is a SDPWS Table 4.3A lookup — method verification.
- Rigidity/deflection uses representative apparent stiffness G_a (method verification, not an independent stiffness derivation).

4. Sources of the independent values

How the independent values are obtained. Every value in the Independent-value column of Section 1 is computed in a validation harness (validation/cases.py) written and run separately from the calculation engine. Each is an independent re-derivation of the governing closed-form equation, or a value read from a cited published worked example or design-standard table - never copied from the engine's own output. The match therefore confirms the engine reproduces the cited source within tolerance. The source beside each value (Section 1) and the references below identify the governing standard section, equation, or publication.

Basis of the independent values

Segmented-method unit shear $v=V/\Sigma b_i$ (SDPWS 4.3.4.1) and ASD capacity = tabulated nominal / 2.0 (SDPWS Table 4.3A: 15/32 WSP, 10d, 4 in o.c. = 1020 plf nominal → 510 plf ASD seismic).

Governing standards & published sources

- AWC SDPWS — Special Design Provisions for Wind and Seismic (2015 / 2021), incl. Tables 4.2A/4.3A and Sec. 4.3.3-4.3.6.

Per-check citations (Section 1): SDPWS 4.3.4.1; SDPWS Tbl 4.3A, /2 ASD; demand/capacity; SDPWS Tbl 4.3A; SDPWS Tbl 4.3.4.

5. Conclusion

All 6 independent checks reproduce the reference values within tolerance. The engine correctly implements the governing equations for this tool.

Reproduce: `python scripts/run_tool_validation.py` → `python scripts/make_tool_validation_pdfs.py`. This report is for verification/demonstration; results are for preliminary design and must be confirmed by a licensed engineer against the current adopted code and project-specific conditions.