MI6 hygrothermal engine: verification against HAMSTAD and EN 15026

AFRC Lab · TIRS MI6 / MI6 Annual 2-D heat-and-moisture solver · 12 November 2026 · Engine MI6A 1.6 (lock bae3ef7d19)

Result: the engine passes the EN 15026 standard test and HAMSTAD benchmarks 1, 2 and 5, all inside the spread of the original European research codes. HAMSTAD 3 (air leakage) is outside what MI6 models, and HAMSTAD 4 cannot be run until its missing input file is found.

1. Summary

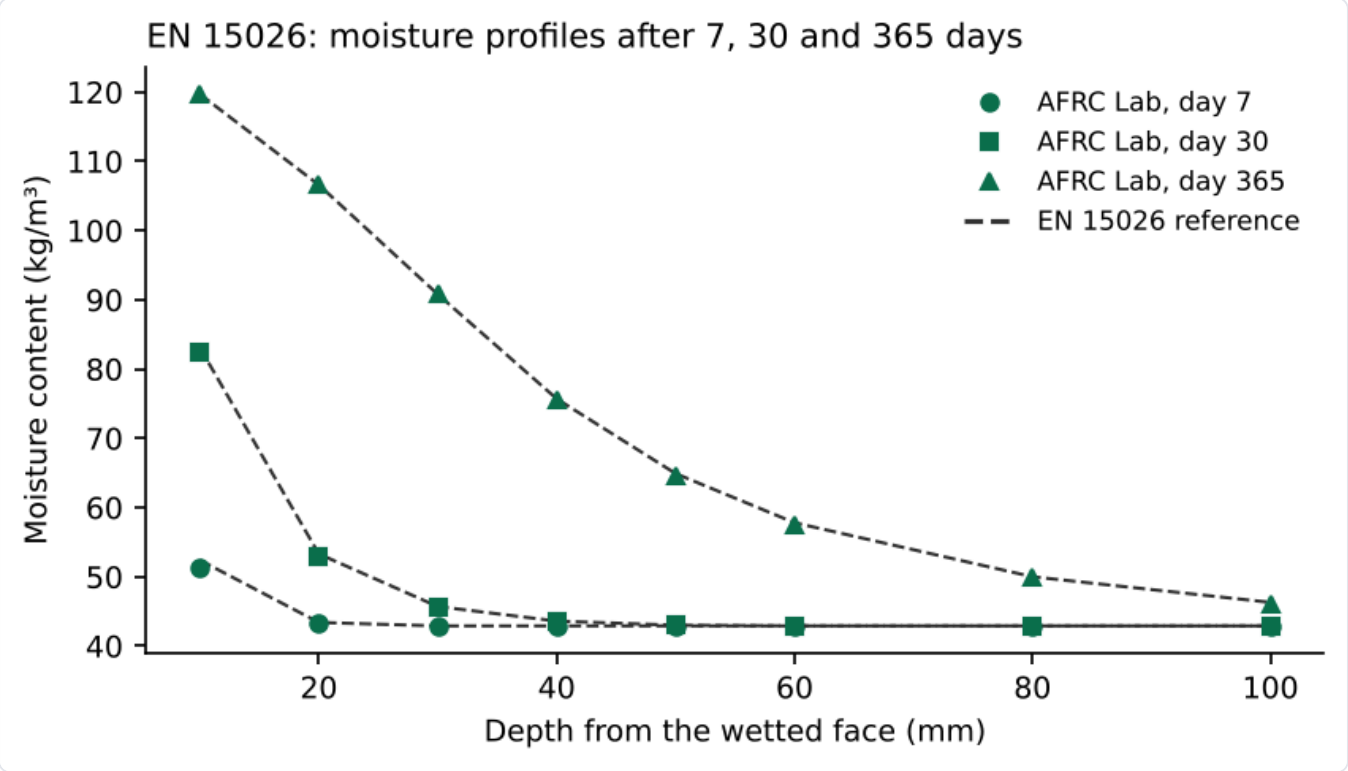
Test	What it checks	Result	Verdict
EN 15026 Annex A	Moisture uptake in a semi-infinite wall (standard pass/fail test)	48 of 48 check values inside the allowed ranges; moisture within 0.3 % of the reference on average (max 1.9 %)	**PASS**
HAMSTAD 1	Insulated roof, 5-year climate: winter condensation and summer drying	Load-bearing layer inside the participant range for 100 % of hours in years 2–5 and within 0.024 kg/m² of it in year 1; insulation layer within 0.021 kg/m² of the range in every year	**PASS**
HAMSTAD 2	Isothermal drying, against the analytical solution	Largest error 0.26 / 0.10 / 0.05 kg/m³ at 100 / 300 / 1000 h; the worst original participant was 2.24 / 1.37 / 0.74	**PASS**
HAMSTAD 3	Air flowing through a wall	Not run. MI6 does not model air leakage through materials (DA07 4.4 lists it as optional). Stated as a limitation in every report.	**NOT APPLICABLE**
HAMSTAD 4	Driving rain and sun on a two-layer wall	Not run yet. The liquid permeability file for the load-bearing layer (perm.txt) is missing from the public HAMSTAD archive.	**DATA MISSING**
HAMSTAD 5	Capillary-active interior insulation (brick, mortar, insulation)	Moisture inside the participant range at 136 of 144 points (worst 0.48 kg/m³ outside); RH at 121 of 144 (worst 0.24 %RH); interface peak 63.8 kg/m³ vs participants 60.3–63.7	**PASS**

Pass criterion (as used by HAMSTAD and published solver validations): results must lie within the minimum–maximum range of the participating research codes (Chalmers, TU Dresden, KU Leuven, Technion, NRC Canada, Fraunhofer IBP, TU Eindhoven), or within the analytical solution's scatter for HAMSTAD 2. Small excursions well inside the inter-code spread count as a pass. Reference data: HAMSTAD WP2 (Hagentoft 2002, Chalmers R-02:9; Hagentoft et al. 2004), EN 15026 Annex A.

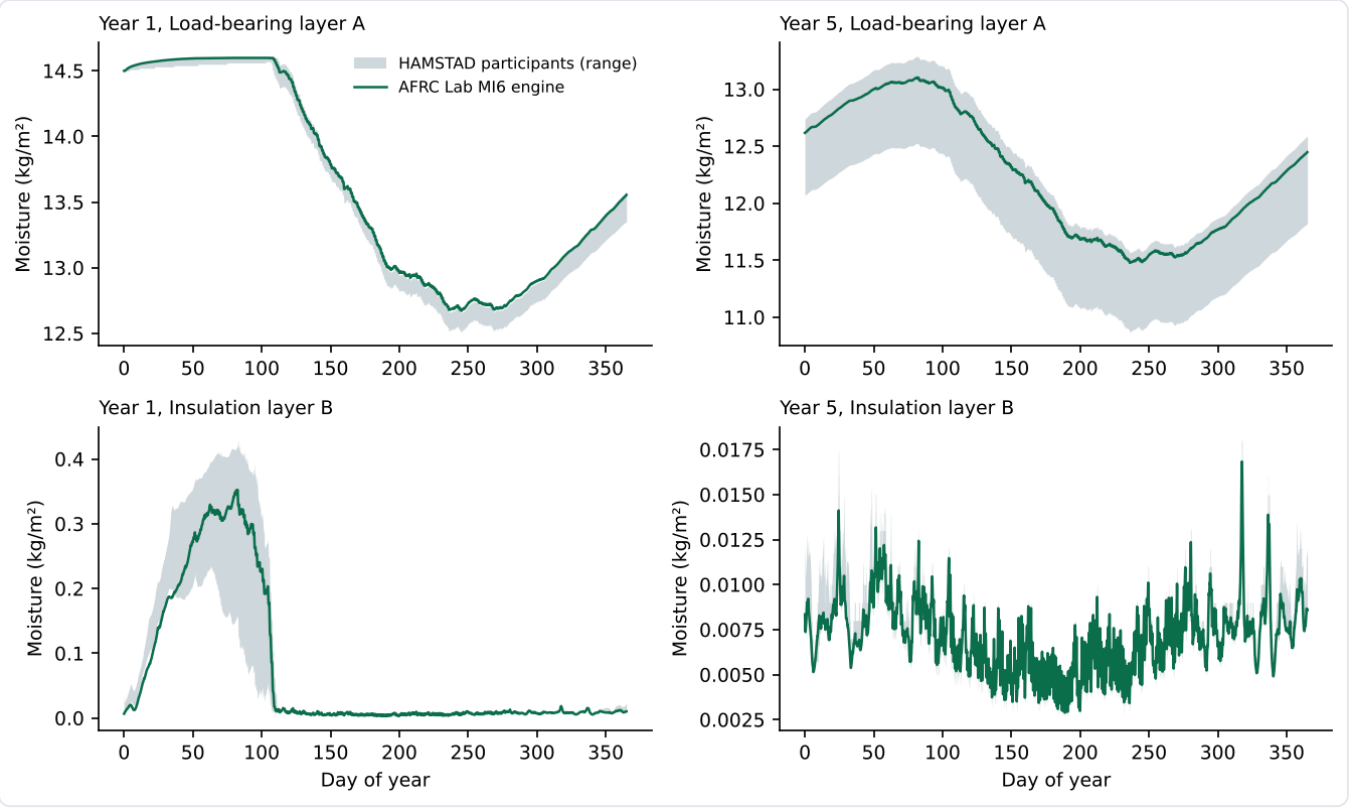
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2. Results by case

EN 15026 Annex A

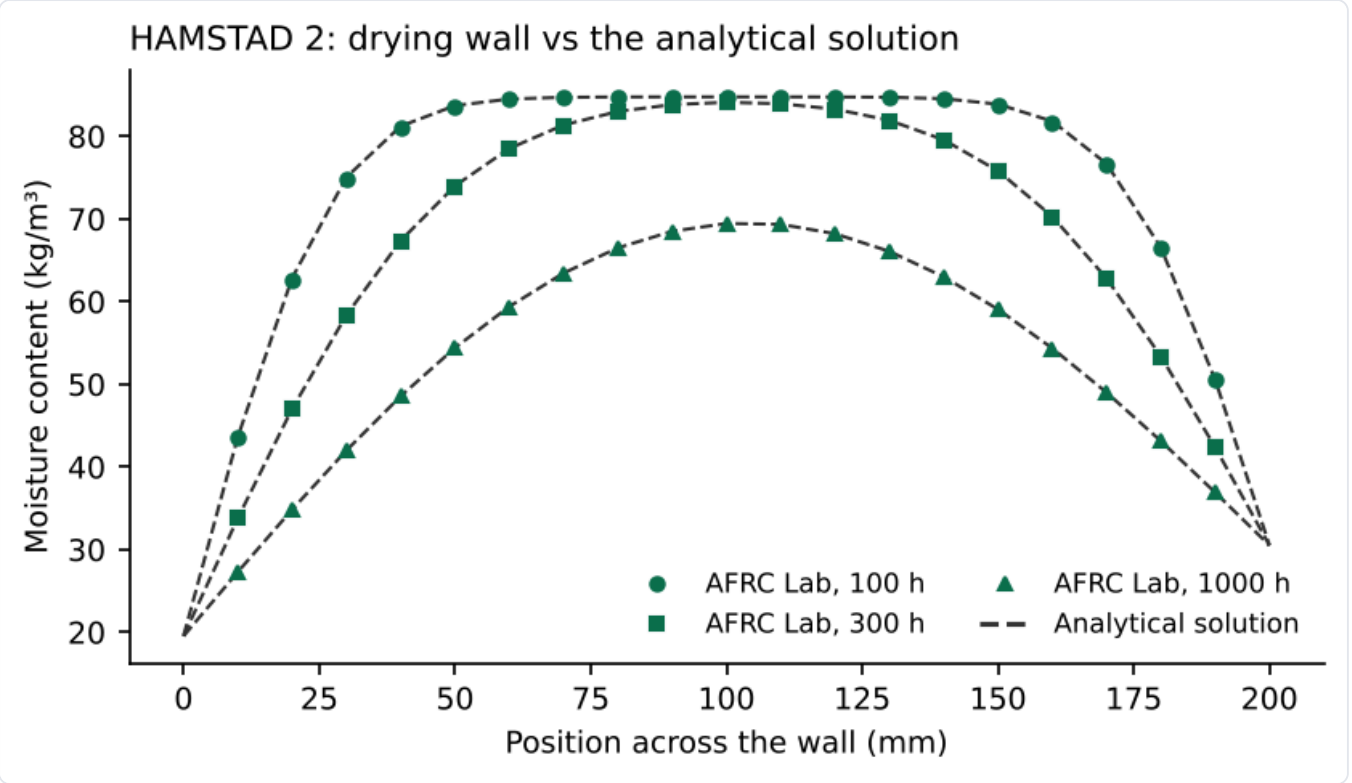


HAMSTAD 1: insulated roof, 5 years

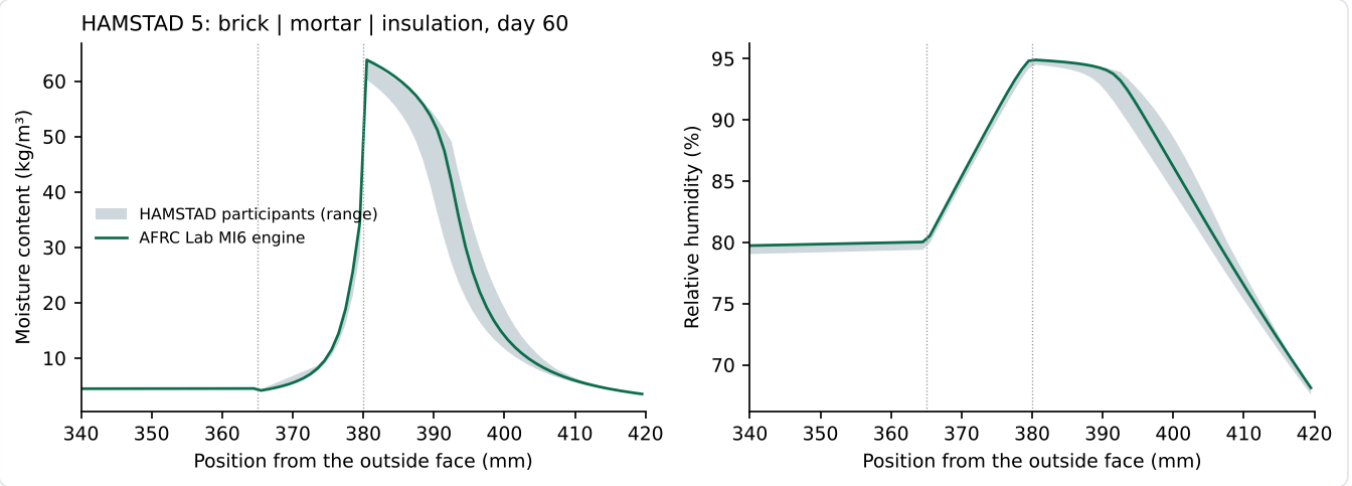


Year	Layer A in range	A worst outside (kg/m²)	Layer B in range	B worst outside (kg/m²)	correlation A / B
1	43.7 %	0.0242	86.8 %	0.0208	0.9998 / 0.9955
2	100.0 %	0.0000	86.3 %	0.0006	0.9998 / 0.8864
3	100.0 %	0.0000	91.6 %	0.0003	0.9999 / 0.9764
4	100.0 %	0.0000	93.4 %	0.0004	0.9999 / 0.9849
5	100.0 %	0.0000	94.1 %	0.0004	0.9999 / 0.9866

HAMSTAD 2: isothermal drying



HAMSTAD 5: capillary-active interior insulation



3. Method notes

- The same solver code that runs every MI6 / MI6 Annual assessment was used: the 2-D finite-volume engine, run on a 1-D strip. Only material data, surface coefficients, initial state and climate were set per case, exactly as the benchmark definitions give them.
- Material functions are entered exactly as the benchmarks define them: van Genuchten / multi-modal retention curves, Schirmer vapour permeability, and exponential or polynomial liquid permeability.
- HAMSTAD 1 runs 5 years on the hourly ClimateBench1 series. HAMSTAD 2 runs 1000 h. HAMSTAD 5 runs 60 days. EN 15026 runs 365 days on a 20 m domain.

- Limitations stated in MI6 reports: no air leakage through materials, no freezing of pore water, and frozen cavity effective conductivity.

AFRC Lab Pty Ltd · Verification record for the TIRS MI6 hygrothermal engine. Benchmark data: HAMSTAD-Project archive (SimQuality), EN 15026 Annex A.